

TOSHIBA

SERVICE MANUAL

AIR-CONDITIONER (SPLIT TYPE)

**OUTDOOR UNIT
DIGITAL INVERTER**

RAV-SM1104AT8P-E (TR)

RAV-SM1404AT8P-E (TR)

RAV-SM1104AT8JP-E

RAV-SM1404AT8JP-E



Original instruction

Adoption of Refrigerant

To prevent the ozone layer destruction, this air conditioner adopted refrigerant HFC (R410A) instead the conventional refrigerant R22.

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SAFETY CAUTION

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.

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) | <ul style="list-style-type: none">• 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) | <ul style="list-style-type: none">• 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 | WARNING ELECTRICAL SHOCK HAZARD Disconnect all remote electric power supplies before servicing. |
| | ELECTRICAL SHOCK HAZARD Disconnect all remote electric power supplies before servicing. | |
|  | WARNING | WARNING Moving parts. Do not operate unit with grille removed. Stop the unit before the servicing. |
| | Moving parts. Do not operate unit with grille removed. Stop the unit before the servicing. | |
|  | CAUTION | CAUTION High temperature parts. You might get burned when removing this panel. |
| | High temperature parts. You might get burned when removing this panel. | |
|  | CAUTION | CAUTION Do not touch the aluminum fins of the unit. Doing so may result in injury. |
| | Do not touch the aluminum fins of the unit. Doing so may result in injury. | |
|  | CAUTION | CAUTION BURST HAZARD Open the service valves before the operation, otherwise there might be the burst. |
| | BURST HAZARD Open the service valves before the operation, otherwise there might be the burst. | |


Precaution for Safety

The manufacturer shall not assume any liability for the damage caused by not observing the description of this manual.








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 or valve cover 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 before proceeding with the work. |
| | 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. |
|  Electric shock hazard | When you access inside of the service panel 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. |
| | Before operating the air conditioner after having completed the work, check that the electrical parts box cover of the indoor unit and service panel or valve cover of the outdoor unit are closed, and set the circuit breaker to the ON position. You may receive an electric shock etc. if the power is turned on without first conducting these checks. |
|  Execute discharge between terminals. | Even if the circuit breaker has been set to the OFF position before the service panel is removed and the electrical parts are repaired, you will still risk receiving an electric shock. For this reason, short-circuit the high-voltage capacitor terminals to discharge the voltage before proceeding with the repair work. For details on the short-circuiting procedure, refer to the Service Manual. You may receive an electric shock if the voltage stored in the capacitors has not been sufficiently discharged. |
|  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. |
|  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

| | |
|--|--|
|  General | 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. |

WARNING

| | |
|---|---|
|  General | <p>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.</p> |
| | <p>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.</p> |
| | <p>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.</p> |
| | <p>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.</p> |
| | <p>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.</p> |
| | <p>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.</p> |
| | <p>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.</p> |
| | <p>When transporting the air conditioner, wear shoes with additional protective toe caps.</p> |
| | <p>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.</p> |
| | <p>When transporting the air conditioner, use a forklift and when moving the air conditioner by hand, move the unit with 2 people. or move the unit with 4 people.</p> |
| | <p>Do not customize the product. Doing so may result in electric shock or other failure.</p> |
| | <p>This air conditioner has passed the pressure test as specified in IEC 60335-2-40 Annex EE.</p> |
| | <p>Do not add any other devices without factory advice.</p> |
|  Check earth wires. | <p>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.</p> |
| | <p>After completing the repair or relocation work, check that the ground wires are connected properly.</p> |
| | <p>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.</p> |
|  Prohibition of modification. | <p>Do not modify the products. Do not also disassemble or modify the parts. It may cause a fire, electric shock or injury.</p> |
|  Use specified parts. | <p>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.</p> |
|  Do not bring a child close to the equipment. | <p>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.</p> |
|  Insulating measures | <p>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.</p> |
|  No fire | <p>When performing repairs using a gas burner, replace the refrigerant with nitrogen gas because the oil that coats the pipes may otherwise burn.</p> |
| | <p>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.</p> |

| | |
|---|---|
|  Refrigerant | <p>The refrigerant used by this air conditioner is the R410A.</p> |
| | <p>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.</p> |
| | <p>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.</p> |
| | <p>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.</p> |
| | <p>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.</p> |
| | <p>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.</p> |
| | <p>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.</p> |
|  Assembly/ Cabling | <p>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.</p> |
| | <p>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.</p> |
|  Insulator check | <p>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.</p> |
|  Ventilation | <p>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.</p> |
| | <p>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 be generated.</p> |
|  Compulsion | <p>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.</p> |
| | <p>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 cooking 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.</p> |
| | <p>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.</p> |
| | <p>Nitrogen gas must be used for the airtight test.</p> |
| | <p>The charge hose must be connected in such a way that it is not slack.</p> |
| | <p>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.</p> |

| | |
|---|---|
|  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. <ul style="list-style-type: none"> • 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. <ol style="list-style-type: none"> 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 heat-resistant gloves. |
| | 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 heat-resistant gloves. |
|  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. |
| | 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 (THAILAND) CO., LTD.**
144 / 9 Moo 5, Bangkadi Industrial Park, Tivanon Road, Tambol Bangkadi,
Amphur Muang, Pathumthani 12000, Thailand

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-SM1104AT8P-E, RAV-SM1404AT8P-E
RAV-SM1104AT8JP-E, RAV-SM1404AT8JP-E
RAV-SM1104AT8P-TR, RAV-SM1404AT8P-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.

Complies with the provisions of the following harmonized standard:

EN 378-2: 2008 + A2:2012

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

Disposal

How to dispose of air conditioners with a rating of 12 kW and below in accordance with the 2002/96/EC Directive WEEE (Waste Electrical and Electronic Equipment) is provided in the Installation Manual supplied with your product. For disposal of the product above 12 kW in rating you should use a registered company in accordance with any national or EU legislation.

<Model names with a rating of 12 kW and below (outdoor units)>

DI series

RAV-SM1104AT8P-E,
RAV-SM1104AT8JP-E,
RAV-SM1104AT8P-TR

Specifications

| Model | Sound power level (dBA) | | Weight (kg) |
|-------------------|-------------------------|---------|-------------|
| | Cooling | Heating | |
| RAV-SM1104AT8P-E | * | 71 | 69 |
| RAV-SM1104AT8JP-E | * | 71 | 69 |
| RAV-SM1404AT8P-E | * | 71 | 69 |
| RAV-SM1404AT8JP-E | * | 71 | 69 |
| RAV-SM1104AT8P-TR | * | 71 | 69 |
| RAV-SM1404AT8P-TR | * | 71 | 69 |

*: Under 70 dBA

• Refrigerant (R410A)

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

1. Safety Caution Concerned to Refrigerant

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 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 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 | 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. | 7) Screwdriver (+, -) |
| 2) Torque wrench | 8) Spanner or Monkey wrench |
| 3) Pipe cutter | 9) Hole core drill |
| 4) Reamer | 10) Hexagon wrench (Opposite side 4mm) |
| 5) Pipe bender | 11) Tape measure |
| 6) Level vial | 12) Metal saw |

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

- | | |
|----------------|--|
| 1) Clamp meter | 3) Insulation resistance tester (Megger) |
| 2) Thermometer | 4) Electroscop |

1. SPECIFICATIONS

1-1. Outdoor Unit

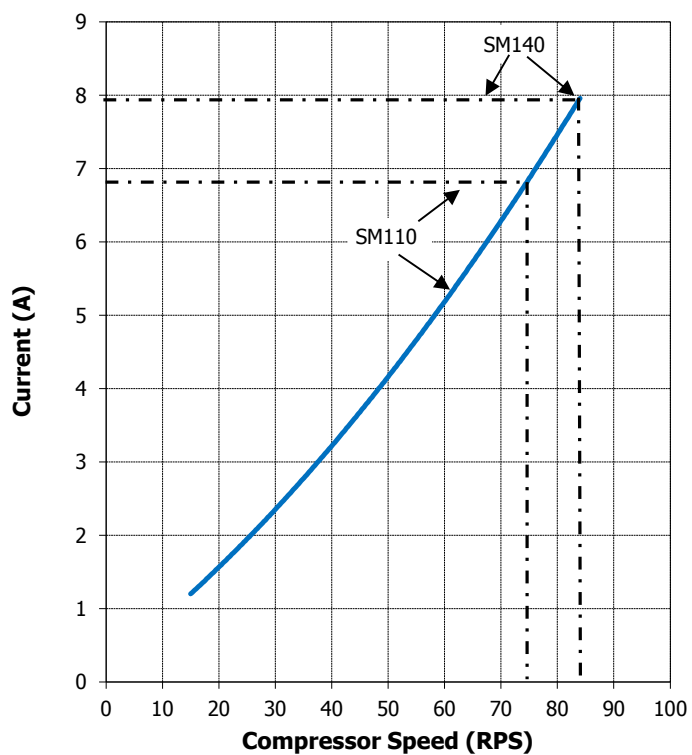
<Digital Inverter>

| Model name | Outdoor unit | | RAV-SM | 1104AT8*P* | 1404AT8*P* |
|----------------------------------|---|----------------|------------------------|---|-----------------------|
| Power supply | | | | 3 phase 380-415V, 50Hz 3 phase 380V, 60Hz (Power exclusive to outdoor is required.) | |
| Compressor | Type | | | Hermetic compressor | |
| | Motor | | (kW) | 2.5 | 3.0 |
| | Pole | | | 4 | 4 |
| Refrigerant charged | | | (kg) | 2.8 | 2.8 |
| Refrigerant control | | | | Pulse motor valve | |
| Inter connecting pipe | Standard length | | (m) | 7.5 | 7.5 |
| | Min. length | | (m) | 5 | 5 |
| | Max. total length | | (m) | 50 | 50 |
| | Additional refrigerant charge under long piping connector | | | 40g/m (31m to 50m) | 40g/m (31m to 50m) |
| | Height difference | Outdoor lower | (m) | 30 | 30 |
| | | Outdoor higher | (m) | 30 | 30 |
| Outer dimension | Height | | (mm) | 890 | 890 |
| | Width | | (mm) | 900 | 900 |
| | Depth | | (mm) | 320 | 320 |
| Appearance | | | | Silky shade (Muncel 1Y8.5/0.5) | |
| Total weight | | | (kg) | 69 | 69 |
| Heat exchanger | | | | Finned tube | |
| Fan unit | Fan | | | Propeller fan | |
| | Standard air flow high | | (m3/min.) | 68 | 70 |
| | Motor | | (W) | 100 | 100 |
| Connecting pipe | Gas side | | (mm) | 15.9 | 15.9 |
| | Liquid side | | (mm) | 9.5 | 9.5 |
| Sound pressure level | | | Cooling/Heating (dB-A) | 53/54 | 54/55 |
| Sound power level | | | Cooling/Heating (dB-A) | 70/71 | 70/71 |
| Outside air temperature, Cooling | | | °C (Dry bulb temp.) | 46 to -15 | |
| Outside air temperature, Heating | | | °C (Wet bulb temp.) | 15 to -15 | |

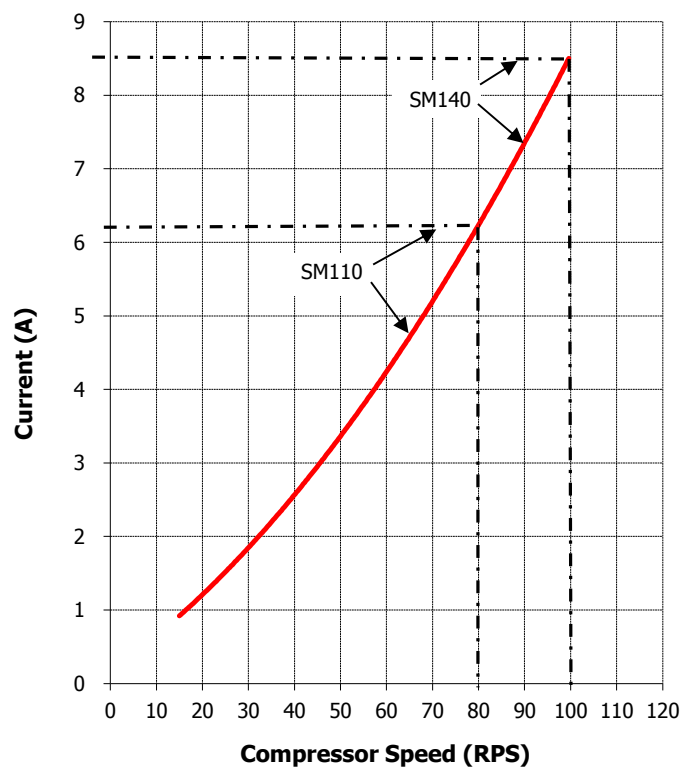
1-2. Operation Characteristic Curve

RAV-SM1104AT*P*, SM1404AT*P*

<Cooling>

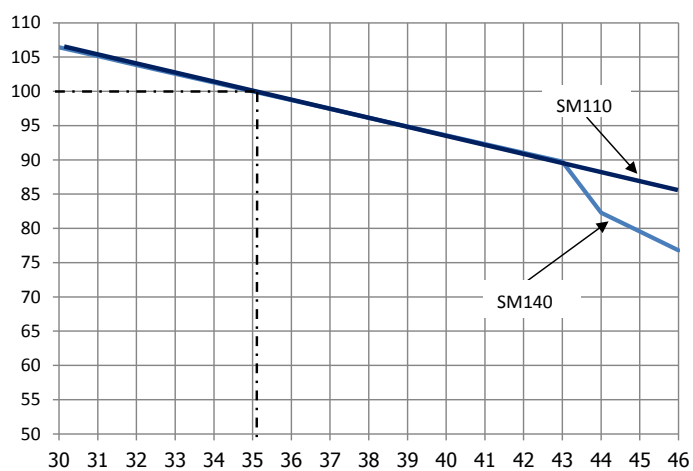


<Heating>

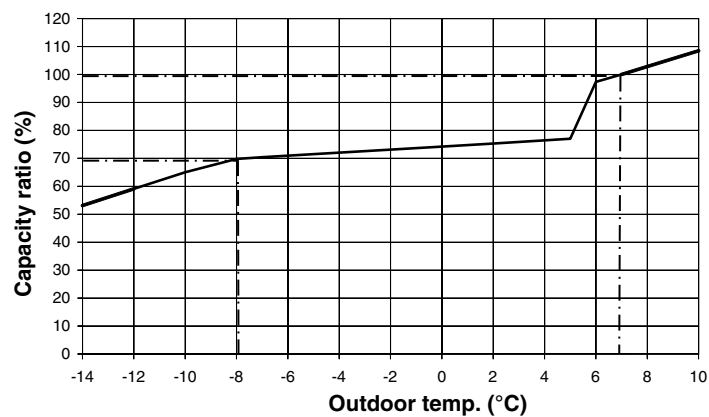


• Capacity variation ratio according to temperature

<Cooling>

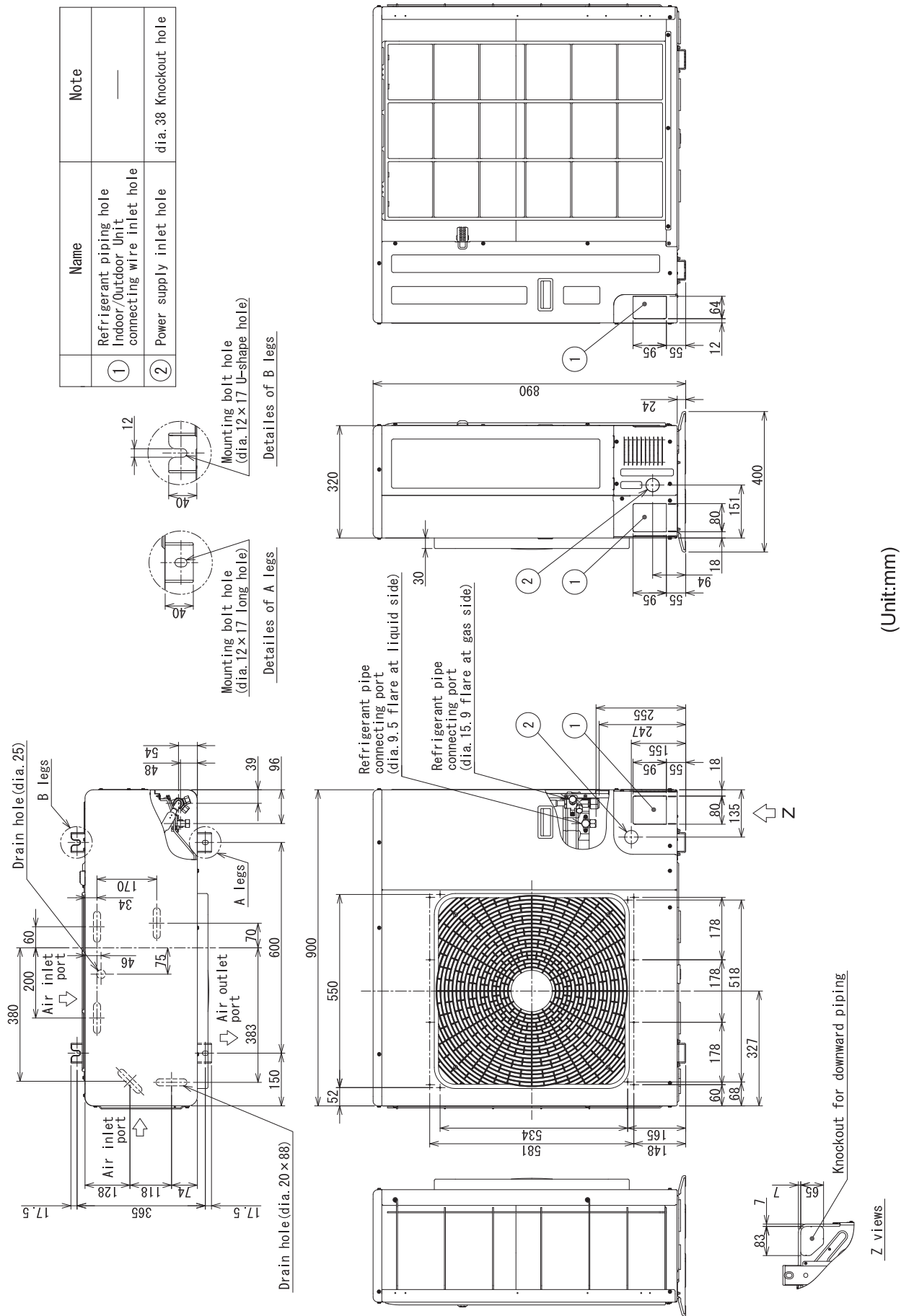


<Heating>

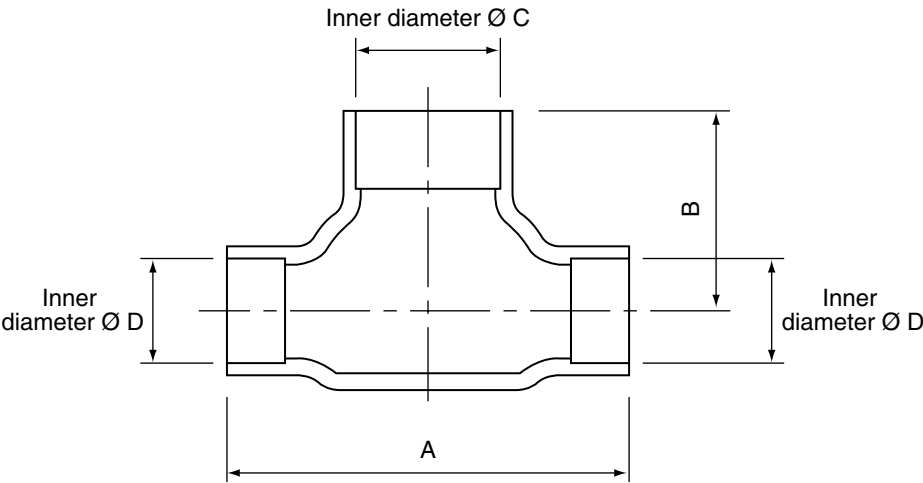


2. CONSTRUCTION VIEWS (EXTERNAL VIEWS)

2-1. RAV-SM1104AT8*P*, SM1404AT8*P*



RAV-TWP30E2, RAV-TWP50E2 (Simultaneous Twin)

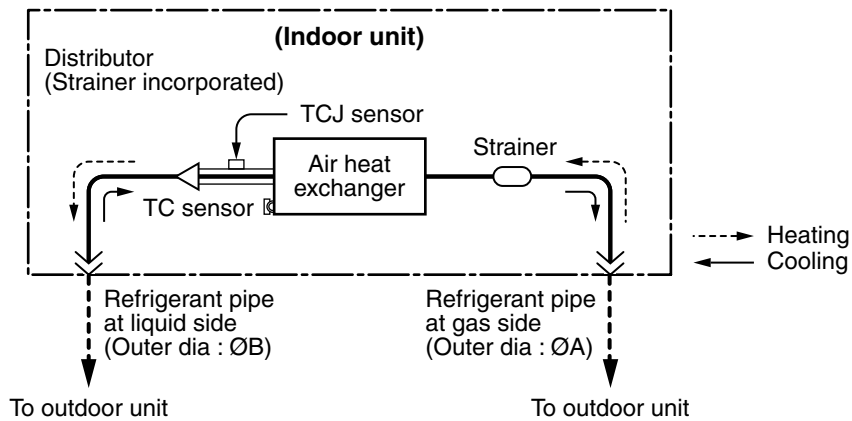


| Model (RBC-) | | A | B | C | D |
|--------------|-------------|----|----|-------|-------|
| TWP30E2 | Liquid side | 36 | 14 | Ø9.5 | Ø6.4 |
| | Gas side | 43 | 23 | Ø15.9 | Ø12.7 |
| TWP50E2 | Liquid side | 34 | 14 | Ø9.5 | Ø9.5 |
| | Gas side | 44 | 21 | Ø15.9 | Ø15.9 |

3. SYSTEMATIC REFRIGERATING CYCLE DIAGRAM

3-1. Indoor Unit

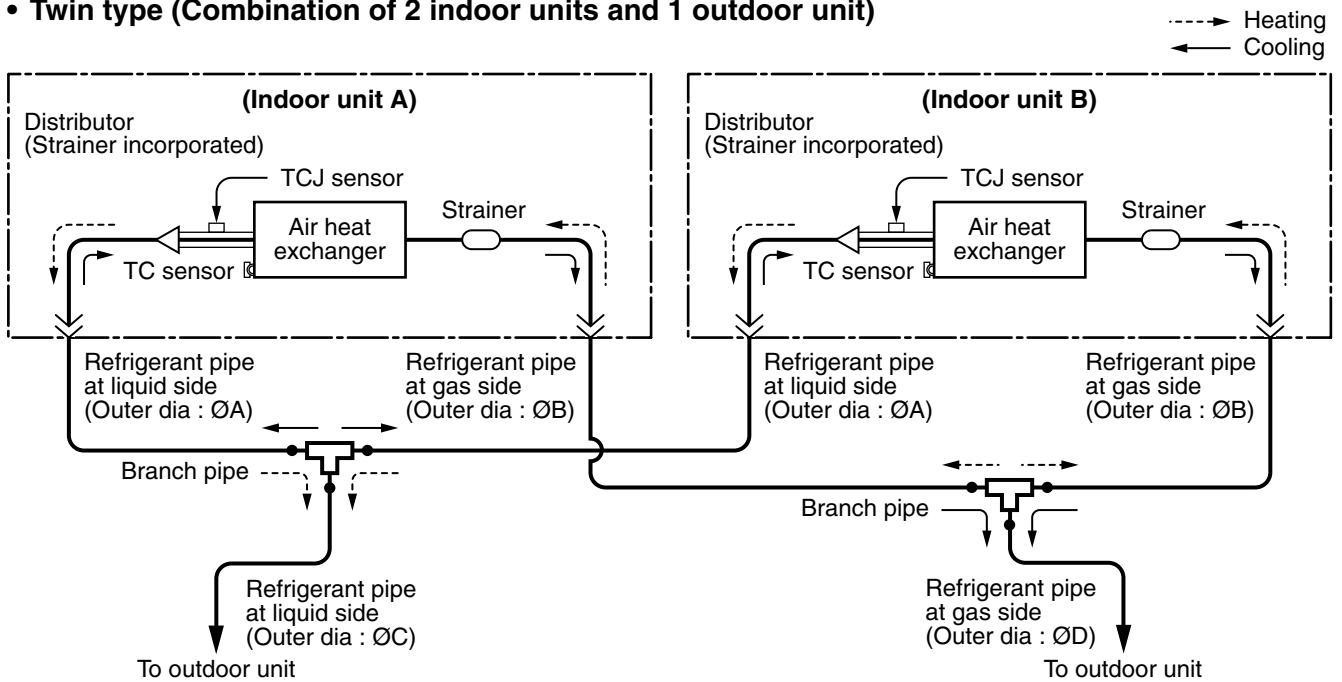
- Single type (Combination of 1 indoor unit and 1 outdoor unit)



Dimension table

| Indoor unit | Outer diameter of refrigerant pipe | |
|-------------|------------------------------------|----------------|
| | Gas side ØA | Liquid side ØB |
| SM1404 type | 15.9 | 9.5 |

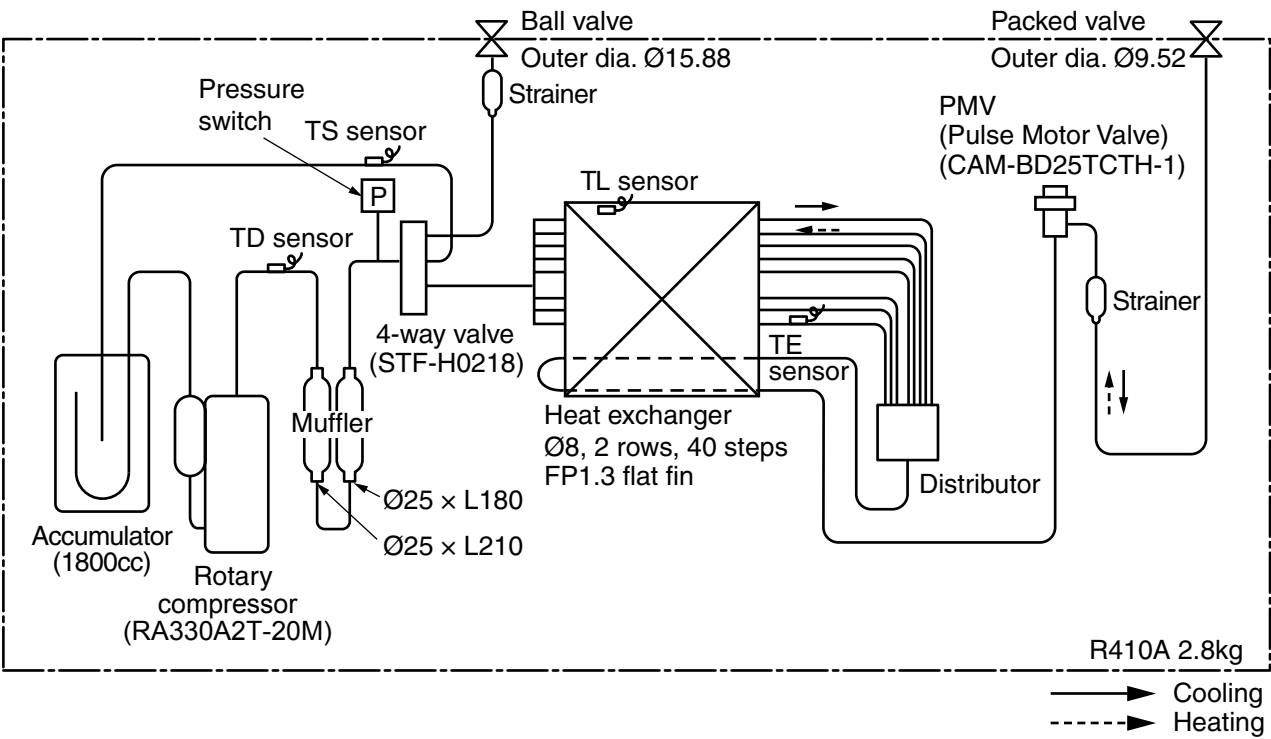
- Twin type (Combination of 2 indoor units and 1 outdoor unit)



| Indoor unit | Branch pipe RBC- | A | B | C | D |
|-------------|------------------|-----|------|-----|------|
| SM56 × 2 | TWP30E2 | 6.4 | 12.7 | 9.5 | 15.9 |
| SM80 × 2 | TWP50E2 | 9.5 | 15.9 | 9.5 | 15.9 |

3-2. Outdoor Unit

RAV-SM1104AT8*P*, SM1404AT8*P*



RAV-SM1104AT8*P*

| | | Pressure | | | | Pipe surface temperature (°C) | | | | * Comp. Hz | Fan | Temp | |
|---------|----------|----------|------|-----------|------|-------------------------------|------|------|------|------------------|------|---------|-------|
| | | (MPa) | | (kg/cm²G) | | | | | | | | In | Out |
| | | Pd | Ps | Pd | Ps | (TD) | (TS) | (TC) | (TE) | | | | |
| Cooling | Standard | 3.01 | 0.85 | 31.6 | 9.6 | 80 | 12 | 10 | 40 | 59 | HIGH | 27/19 | 35/- |
| | Overload | 3.72 | 1.10 | 36.7 | 11.5 | 86 | 16 | 18 | 54 | 53 | HIGH | 32/24 | 46/- |
| | Low load | 2.03 | 0.82 | 20.7 | 8.4 | 40 | 11 | 8 | 4 | 20 | LOW | 18/15.5 | -15/- |
| Heating | Standard | 2.51 | 0.63 | 26.2 | 6.6 | 72 | 3 | 39 | 1 | 63 | HIGH | 20/- | 7/6 |
| | Overload | 3.37 | 1.01 | 31.9 | 11.4 | 82 | 17 | 55 | 14 | 40 | LOW | 30/- | 24/18 |
| | Low load | 2.15 | 0.24 | 21.9 | 2.4 | 77 | -19 | 55 | -17 | 80 | HIGH | 15/- | -15/- |

RAV-SM1404AT8*P*

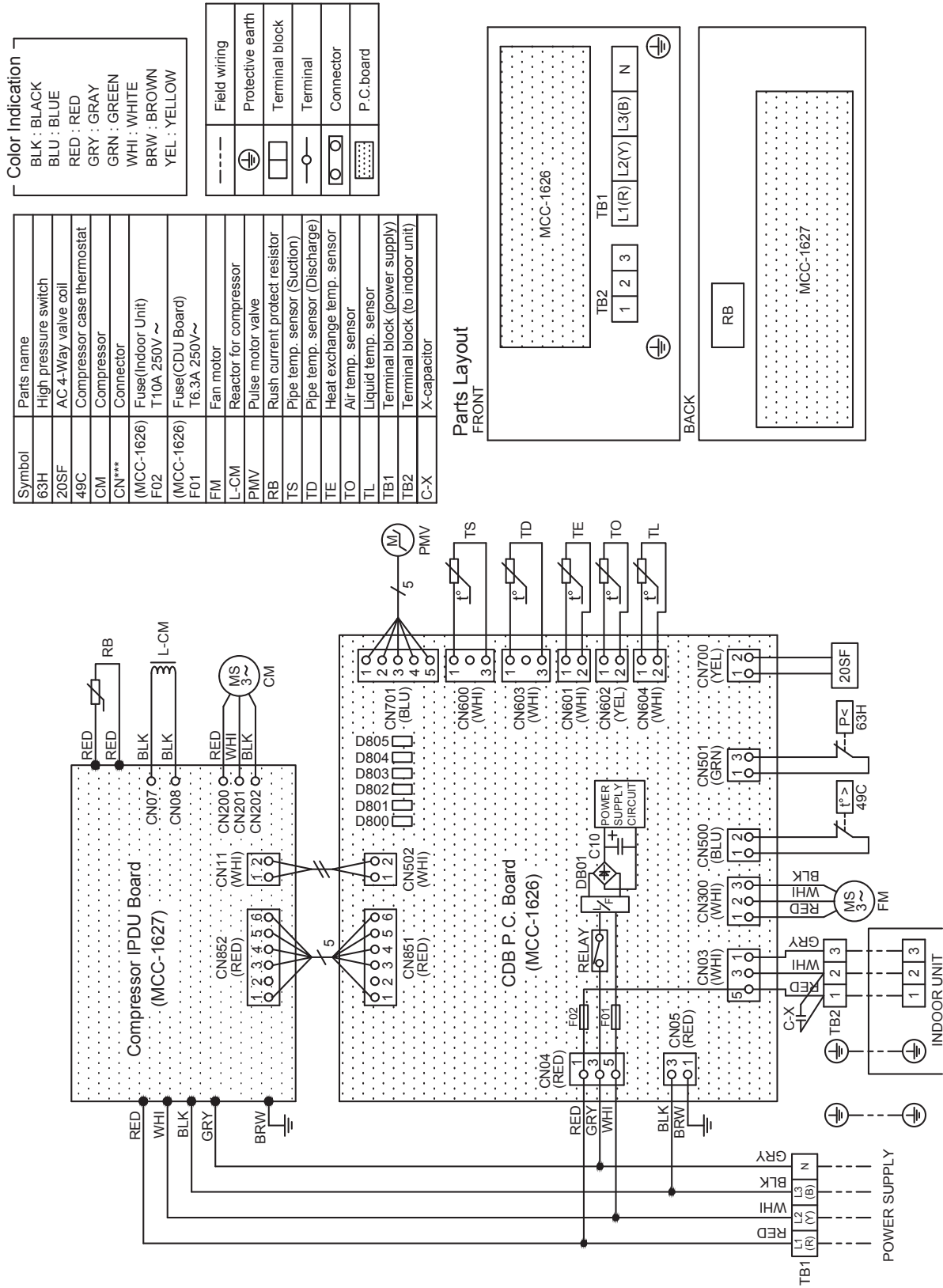
| | | Pressure | | | | Pipe surface temperature (°C) | | | | * Comp. Hz | Fan | Temp | |
|---------|----------|----------|------|-----------|------|-------------------------------|------|------|------|------------------|------|---------|-------|
| | | (MPa) | | (kg/cm²G) | | | | | | | | In | Out |
| | | Pd | Ps | Pd | Ps | (TD) | (TS) | (TC) | (TE) | | | | |
| Cooling | Standard | 3.24 | 0.73 | 34.4 | 8.7 | 90 | 10 | 8 | 40 | 77 | HIGH | 27/19 | 35/- |
| | Overload | 3.72 | 1.10 | 37.2 | 10.9 | 86 | 16 | 18 | 54 | 53 | HIGH | 32/24 | 46/- |
| | Low load | 2.05 | 0.83 | 20.9 | 8.5 | 41 | 10 | 8 | 4 | 20 | LOW | 18/15.5 | -15/- |
| Heating | Standard | 2.57 | 0.60 | 28.4 | 6.4 | 69 | 1 | 40 | 1 | 72 | HIGH | 20/- | 7/6 |
| | Overload | 3.38 | 0.99 | 30.6 | 11.4 | 83 | 17 | 54 | 13 | 40 | LOW | 30/- | 24/18 |
| | Low load | 2.30 | 0.23 | 23.5 | 2.3 | 78 | -17 | 38 | -17 | 92 | HIGH | 15/- | -15/- |

* 4 poles are provided to this compressor.

The compressor frequency (Hz) measured with a clamp meter is 2 times of revolutions (rps) of the compressor.

4. WIRING DIAGRAM

4-2. RAV-SM1104AT8*P*, SM1404AT8*P*



5. SPECIFICATIONS OF ELECTRICAL PARTS

Outdoor Unit

| No. | Parts name | Type | Specifications |
|-----|---|----------------------|----------------------------|
| 1 | Compressor | RA330A2T-20M | Output 3000W |
| 2 | Outdoor fan motor | WDF-340-A100-1 | Output 100W |
| 3 | High pressure switch | ACB-4UB83W | ON : 3.2MPa, OFF : 4.15MPa |
| 4 | PMV-Coil | CAM-MD12TCTH-7 | DC12V |
| 5 | Coil-value-4way | STF-H01AJ1872A1 | AC220V ~ 240V |
| 6 | Reactor | CH-55-2Z-T | 5.8mH, 14A |
| 7 | P.C.board for control and fan motor drive | MCC-1626 | — |
| 8 | P.C.board for compressor drive | MCC-1627 | — |
| 9 | Outdoor temp. sensor (TO sensor) | — | 10 kΩ at 25°C |
| 10 | Discharge temp. sensor (TD sensor) | — | 50 kΩ at 25°C |
| 11 | Suction temp. sensor (TS sensor) | — | 10 kΩ at 25°C |
| 12 | Heat exchanger sensor (TE sensor) | — | 10 kΩ at 25°C |
| 13 | Heat exchanger sensor (TL sensor) | — | 50 kΩ at 25°C |
| 14 | Fuse (Mounted on P.C.board, MCC-1626) | 50T 100H | T10A, 250V |
| 15 | Fuse (Mounted on P.C.board, MCC-1626) | 50(P) 063HF GF001 C4 | T6.3A, 250V |
| 16 | Fuse (Mounted on P.C.board, MCC-1626) | SCT 3.15A | 3.15A, 250V |
| 17 | Fuse (Mounted on P.C.board, MCC-1627) | 50(P) 063HF GF001 C4 | T6.3A, 250V |
| 18 | Fuse (Mounted on P.C.board, MCC-1627) | GAC1 31.5A | 31.5A, 500V |
| 19 | PTC Thermistor | MZ32-101RMARD01E | 100Ω, 500V |

6. REFRIGERANT R410A

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

The working pressure of the 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 refrigerant during installation work or servicing time.

The next section describes the precautions for air conditioner using the 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.

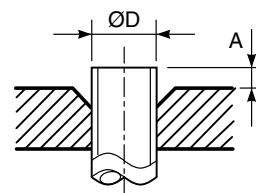


Fig. 6-2-1 Flare processing dimensions

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 |

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 |

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 | 19.0 | 1.0 | 23.3 | 24.0 | 19.2 | 34 | 36 |

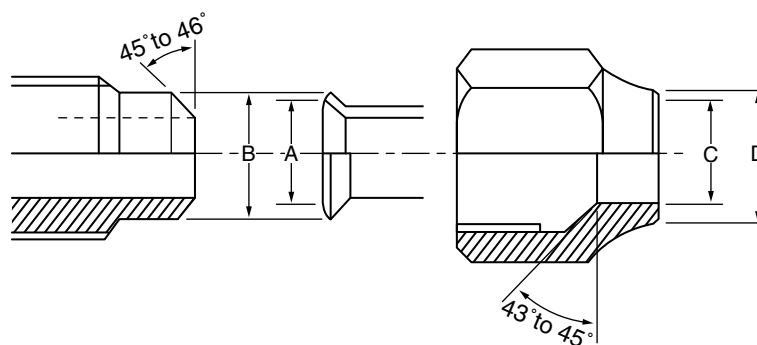


Fig. 6-2-2 Relations between flare nut and flare seal surface

2. Flare Connecting Procedures and Precautions

- Make sure that the flare and union portions do not have any scar or dust, etc.
- Correctly align the processed flare surface with the union axis.
- 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) |

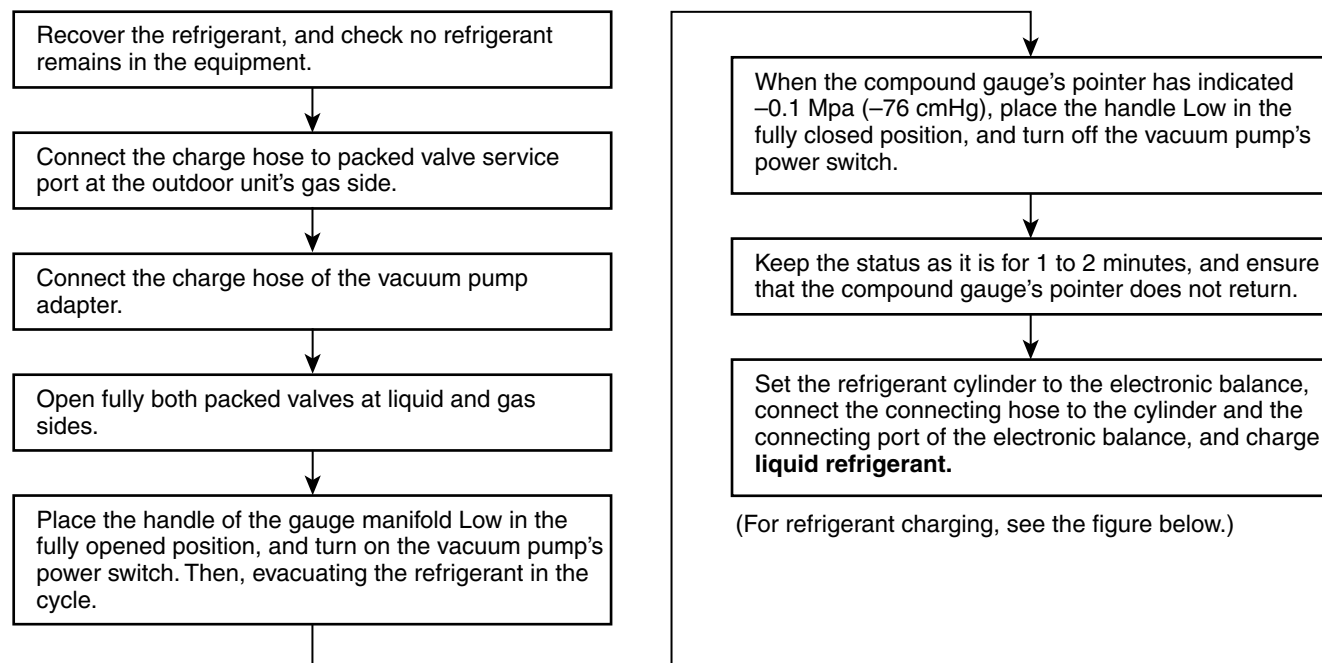
6-3. Tools

6-3-1.Required Tools

Refer to the “4. Tools” (Page 13)

6-4. Recharging of Refrigerant

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



- 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.

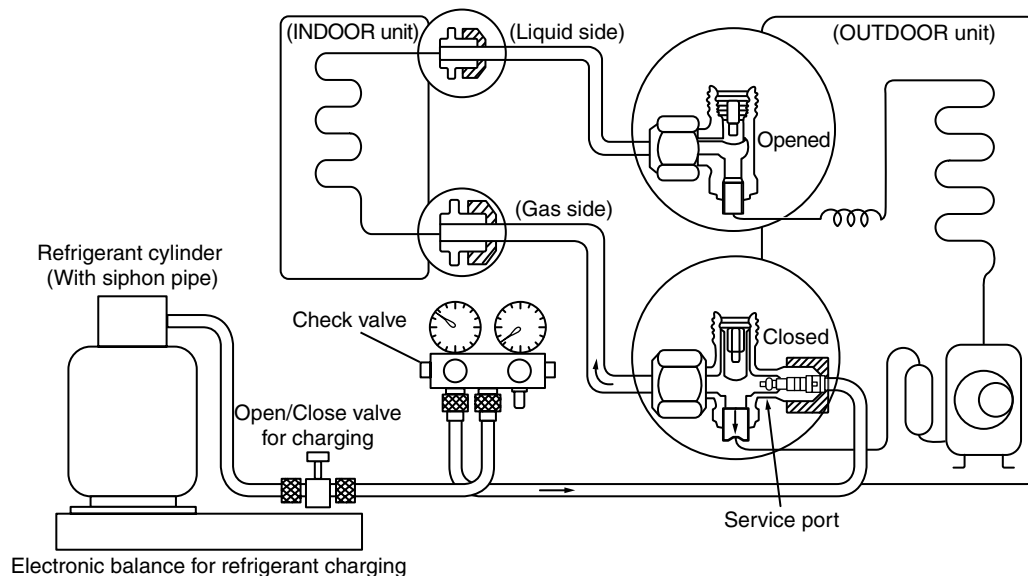
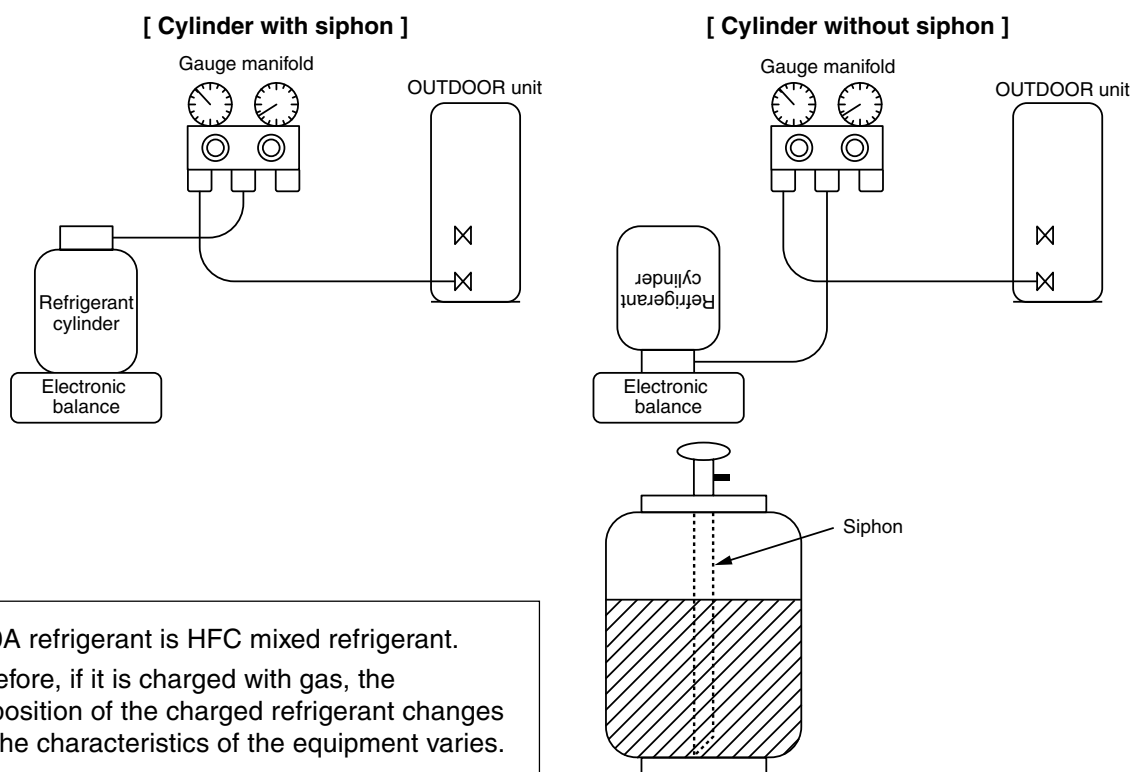


Fig. 6-4-1 Configuration of refrigerant charging

- 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.

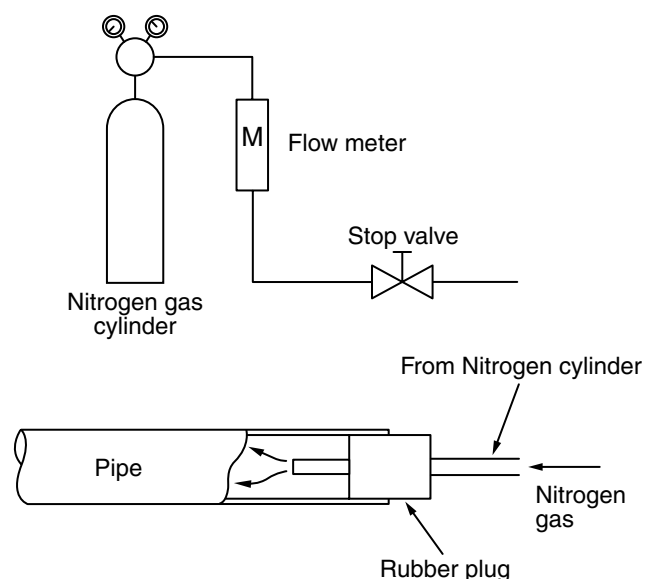


Fig. 6-5-1 Prevention of oxidation during brazing

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.

NOTE)

Confirmation of existence of scratch or dent of the former pipes to be applied and also confirmation of 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)

| Pipe outer diameter | | Ø6.4 | Ø9.5 | Ø12.7 | Ø15.9 | Ø19.0 |
|---------------------|-------------|------|------|-------|-------|-------|
| Thickness | R410A | 0.8 | 0.8 | 0.8 | 1.0 | 1.0 |
| | R22 (R407C) | | | | | |

- 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-TWP30E2, RBC-TWP50E2. 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.

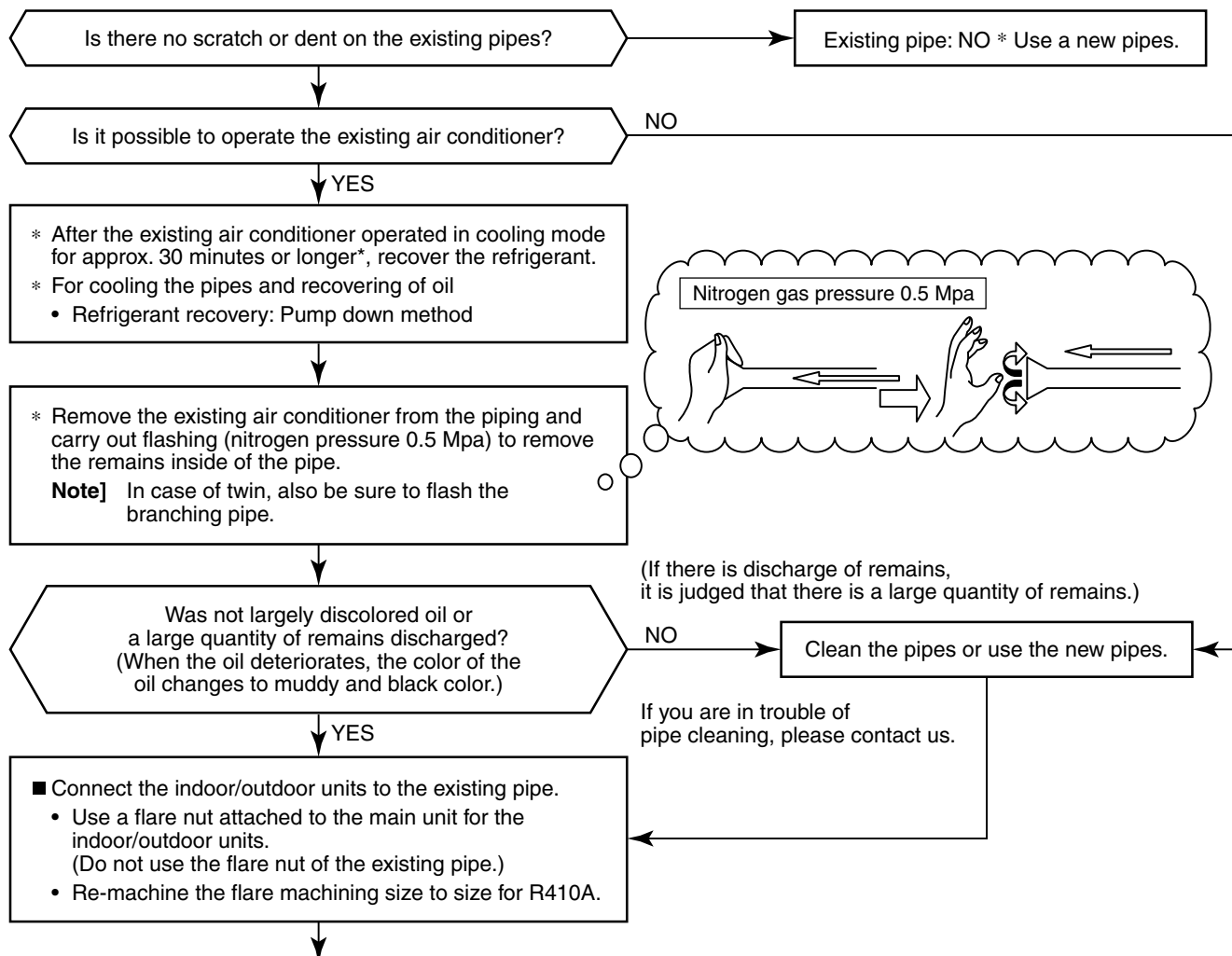
6-6-4. Curing of Pipes

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

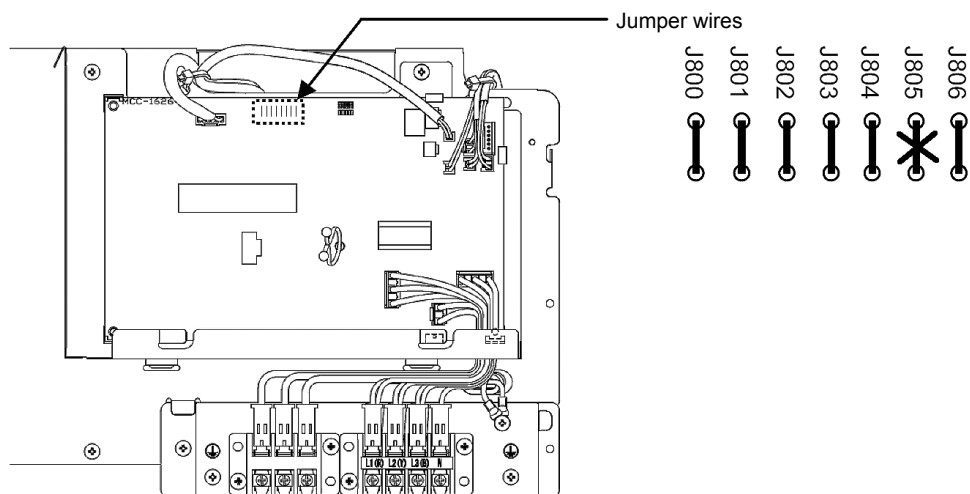


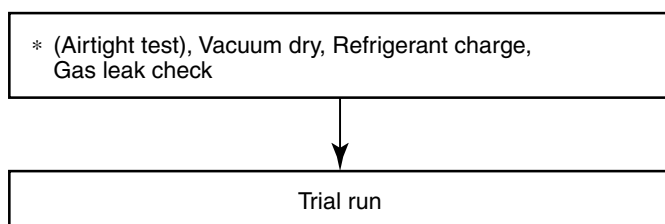
■ Existing piping

The following settings are required when using a pipe Ø19.1 mm as the existing piping at the gas pipe side.

Steps taken to support existing piping

1. Cut J805 (Jumper).
2. Set the circuit breaker to the ON position to turn on the power.






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 | Ø19.0 |
|---------------------------|---------------|------|-------|-------|------------------|
| For R410A | 17 | 22 | 26 | 29 | 36 |
| For R22 | Same as above | | 24 | 27 | Same as above |

2) Flare machining size: A

(mm)



| Copper pipe outer dia. | Ø6.4 | Ø9.5 | Ø12.7 | Ø15.9 | Ø19.0 |
|---------------------------|------|------|-------|-------|-------|
| For R410A | 9.1 | 13.2 | 16.6 | 19.7 | 24.0 |
| For R22 | 9.0 | 13.0 | 16.2 | 19.4 | 23.3 |

Becomes 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

Cautions for using existing pipe

- Do not reuse the flare to prevent gas leak.
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 leak.
When the pipe corresponds to any of the following, do not use it. Install a new pipe instead.
- The pipe has been open (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 thickness.

| Reference outside diameter (mm) | Wall thickness (mm) |
|------------------------------------|------------------------|
| Ø9.5 | 0.8 |
| Ø15.9 | 1.0 |
| Ø19.1 | 1.0 |

- Never use any pipe with a wall thickness less than these thicknesses due to insufficient pressure capacity.

6-7. Replenishing refrigerant

In order to assure the reliability of the appliance, the amount of refrigerant to be replenished shall be subject to the following restrictions. Follow the margin of excess replenished refrigerant, which is equivalent to the current R22. Otherwise, abnormally high pressure may be generated in the refrigeration cycle, which may result in failure, explosion of the product, or personal injury.

[Possible gas leakage]

Recharging refrigerant is allowed only if it is confirmed that the amount of leakage (e.g. slow leakage upon installation) is within the additional margin specified below.

The amount of leakage is not certain if the product does not function properly (e.g. insufficient cooling / heating performance). In such case, recover the refrigerant and replenish the refrigerant.

[Restrictions for the amount of additional charging]

- a. The amount of refrigerant additionally charged shall not exceed 10% of that specified. If the situation is not solved with such amount, recover the refrigerant completely and charge the specified amount.
- b. In case of slow leakage upon installation and the pipe connection length of not over 15m, further tighten the flare nut or take other effective measures. Do not recharge the refrigerant.

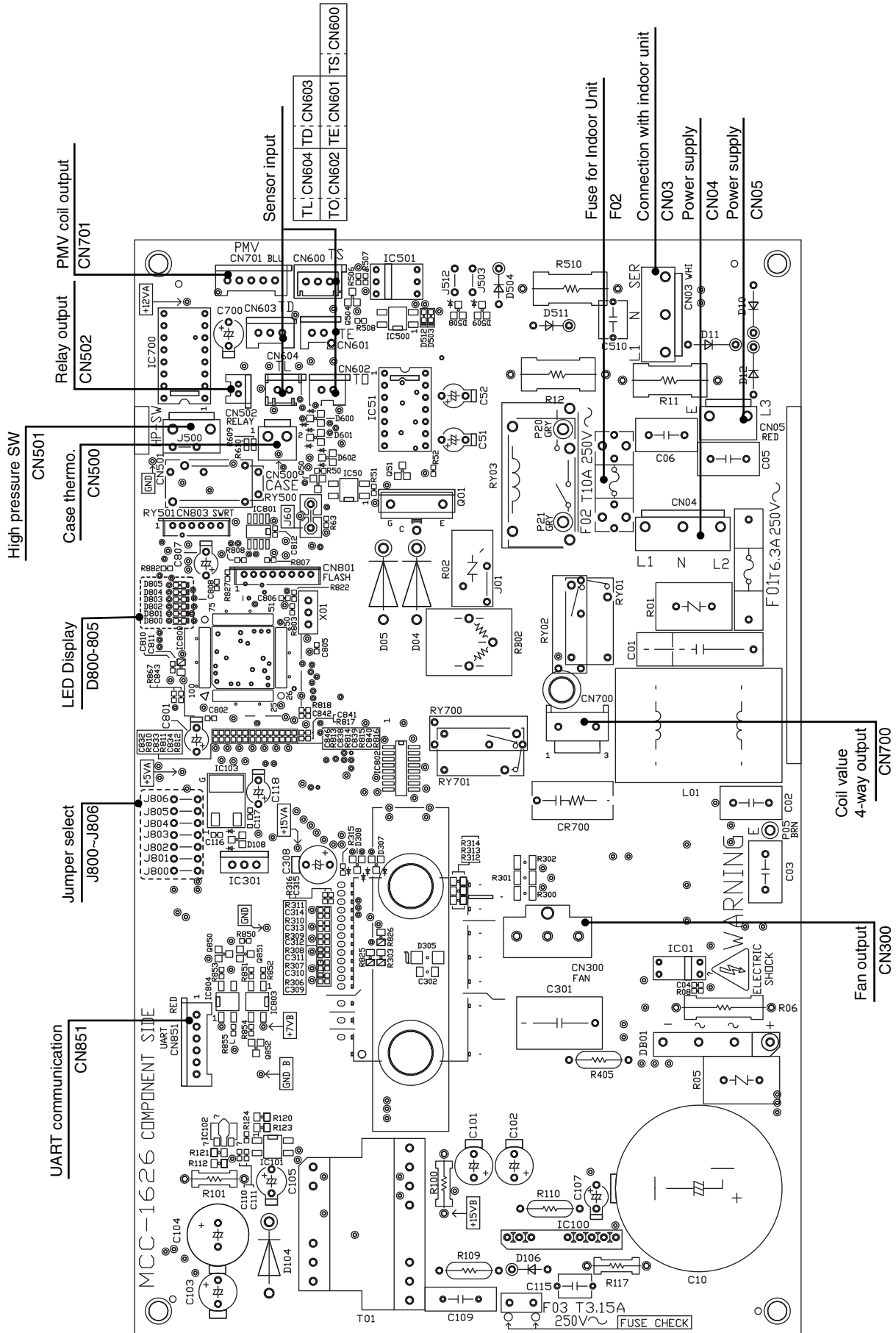
[Cautions for recharging with refrigerant]

- a. Use a scale with an accuracy of at least 10g to recharge the refrigerant. Do not use a bathroom scale.
- b. If the refrigerant leaks, identify the source and make sure to repair it. The refrigerant gas is not hazardous, but if it touches a heat source (e.g. fan heater, stove), a poisonous gas may be generated.
- c. Use liquid refrigerant for replenishment. Replenish the refrigerant carefully and slowly.

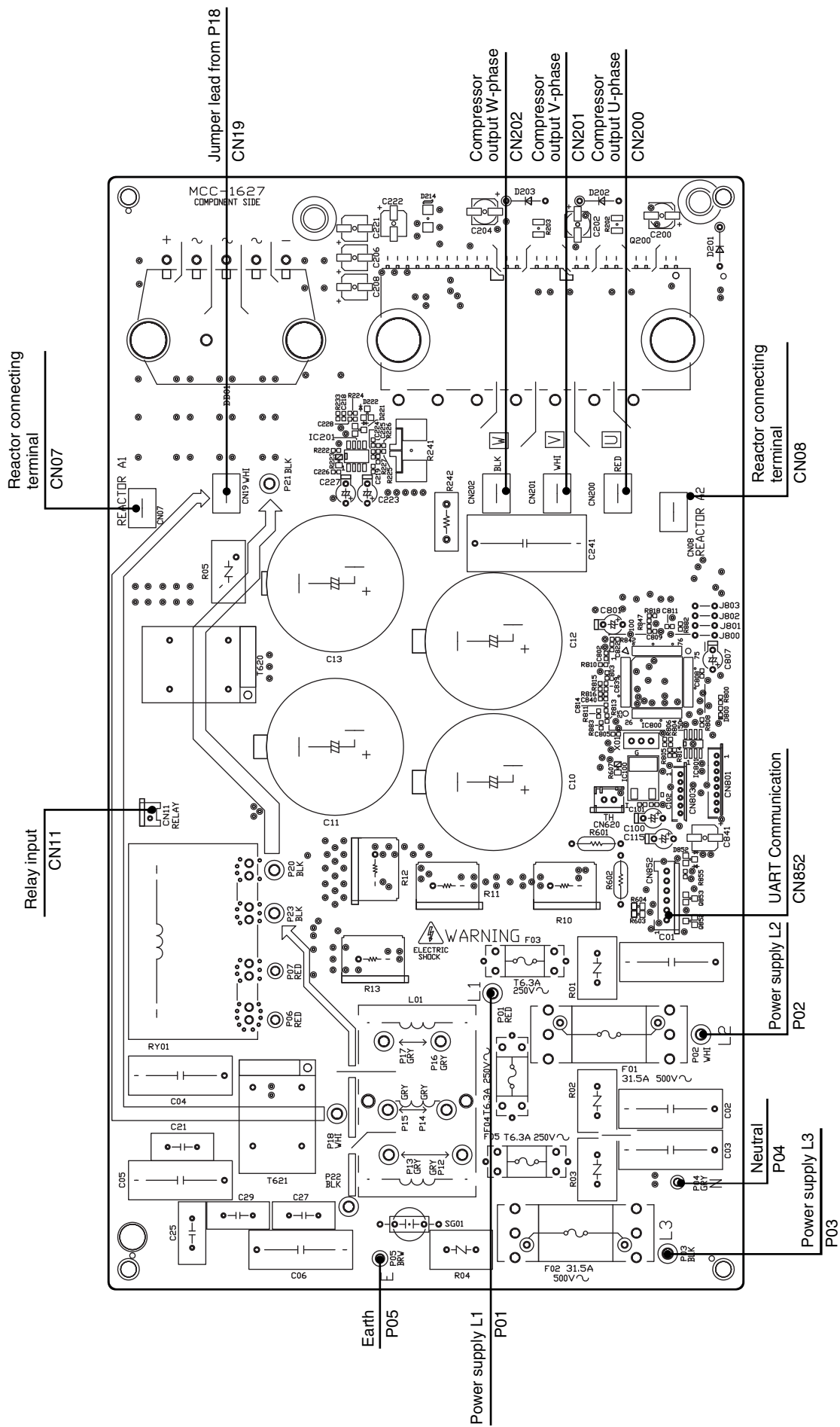
7. OUTDOOR CONTROL CIRCUIT

7-1. Outdoor unit control

7-1-1. P.C.board for Control and fan drive (MCC-1626)



7-1-2. P.C. board for compressor drive (MCC-1627)



7-2. Outline of Main Controls

1. Pulse Modulating Valve (PMV) control

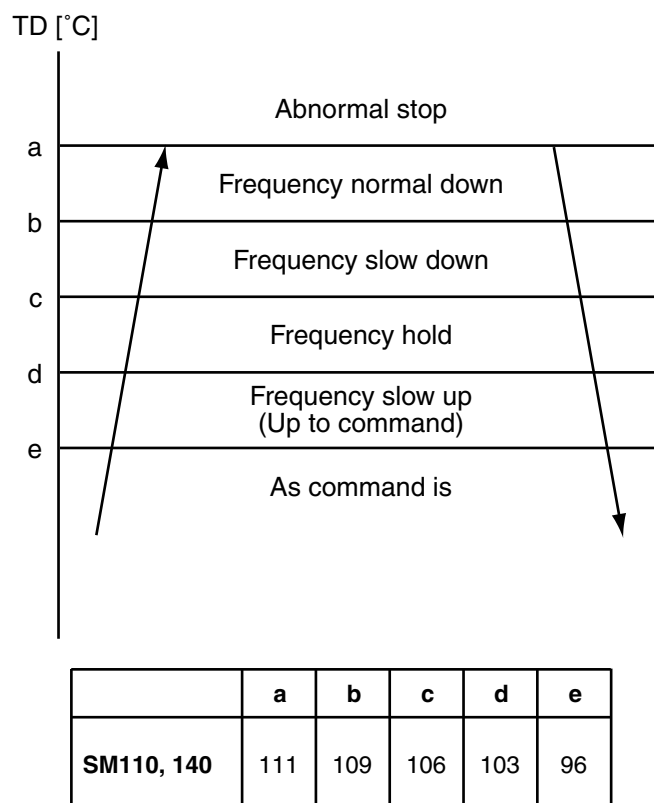
- 1) For PMV with SM110, 140 : 30 to 500 pulses during operation, respectively.
- 2) In cooling operation, PMV is controlled with the temperature difference between TS sensor and TC sensor.
- 3) In heating operation, PMV is controlled with the temperature difference between TS sensor and TE sensor.
- 4) For the temperature difference in items 2) and 3), -1 to 5K is aimed as the target in both cooling and heating operations.
- 5) When the cycle excessively rose in both cooling and heating operations, PMV is controlled by TD sensor.
The aimed value is usually SM110, 140 : 91°C in both cooling and heating operations.

REQUIREMENT

A sensor trouble may cause a liquid back-flow or abnormal overheat resulting in excessive shortening of the compressor life. In a case of trouble on the compressor, be sure to check there is no error in the resistance value an the refrigerating cycle of each sensor after repair and then start the operation.

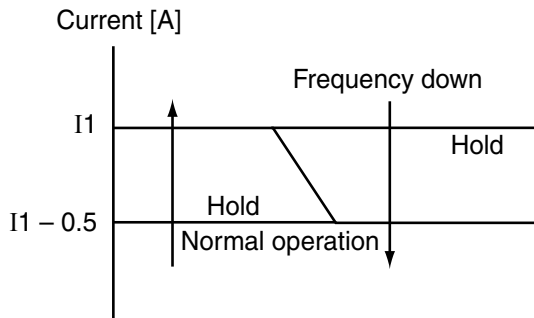
2. Discharge temperature release control

- 1) When the discharge temperature did not fall or the discharge temperature rapidly went up by PMV control, this control lowers the compressor frequency. It subdivides the frequency control up to 0.6Hz to stabilize the cycle.
- 2) When the discharge temperature detected an abnormal stop zone, the compressor stops and then restarts after 2 minutes 30 seconds.
The error counting is cleared when the operation continued for 10 minutes. If the error is detected by 4 times without clearing, the error is determined and restarting is not performed.
* The cause is considered as excessively little amount of refrigerant, PMV error or clogging of the cycle.
- 3) For displayed contents of error, confirm on the check code list.



3. Current release control

The output frequency and the output voltage are controlled by AC current value detected by current transformer on the outdoor P.C. board so that input current of the inverter does not exceed the specified value.



| Model | SM110 | | SM140 | |
|--------------|-------|------|-------|------|
| | COOL | HEAT | COOL | HEAT |
| I1 value [A] | 12.5 | 12.5 | 12.5 | 12.5 |

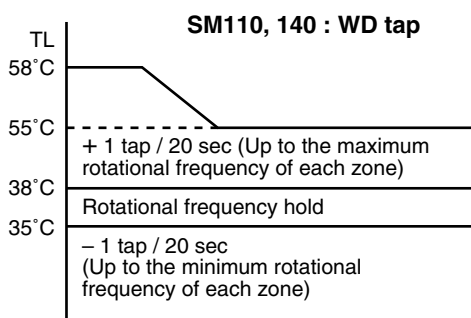
4. Outdoor fan control

Allocations of fan tap revolutions [rpm]

| Model | W1 | W2 | W3 | W4 | W5 | W6 | W7 | W8 | W9 | WA | WB | WC | WD | WE | WF |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| SM110 | 280 | 280 | 330 | 360 | 410 | 460 | 540 | 580 | 640 | 700 | 840 | 860 | 900 | 940 | 940 |
| SM140 | 280 | 280 | 330 | 360 | 410 | 460 | 540 | 580 | 640 | 700 | 840 | 860 | 900 | 940 | 940 |

4-1. Cooling fan control

- 1) An outdoor fan is controlled by TL sensor, TO sensor and compressor frequency. An outdoor fan is controlled at 1-tap interval of DC fan control.
- 2) At the start time, the fan is fixed for 60 seconds only with the maximum fan tap corresponded to the zone in the following table but it is controlled with TL sensor temperature after then.



| Temp. range | SM110 SM140 | 34.2 Hz or lower | | 34.2Hz to 52.2Hz | | 52.2Hz or higher | |
|------------------|----------------|------------------|------|------------------|------|------------------|------|
| | | Min. | Max. | Min. | Max. | Min. | Max. |
| 38°C ≤ TO | | W6 | WD | W8 | WD | WA | WD |
| 29°C ≤ TO < 38°C | | W5 | WC | W7 | WC | 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 |
| -4°C ≤ TO < 0°C | | W1 | W2 | W2 | W4 | W3 | W5 |
| TO < -4°C | | OFF | W2 | OFF | W4 | OFF | W4 |
| TO error | | OFF | WD | OFF | WD | OFF | WD |

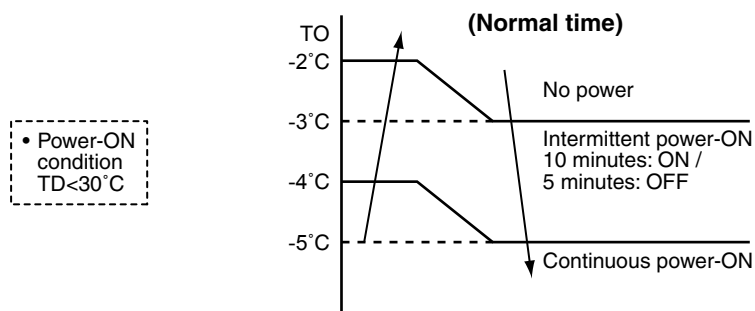
4-2. Heating fan control

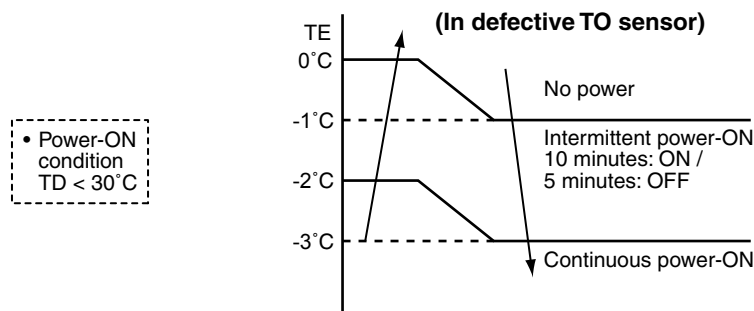
- 1) An outdoor fan is controlled by TE sensor, TO sensor and compressor frequency. (It is controlled with W1 for minimum and the maximum is controlled according to the following table.)
- 2) At the start time, the fan is fixed for 3 minutes only with the maximum fan tap corresponded to the zone in the following table but it is controlled with TE sensor temperature after then.
- 3) When a status $TE \geq 24^{\circ}\text{C}$ continues for 5 minutes, the operation stops. In this case, no error display appears and the status is same as the normal thermo-OFF. The can restarts after approx. 2 minutes 30 seconds and this continuous operation is not an error.
- 4) When the above status as 3) occurs frequently, it is considered that filter of the suction part of the indoor unit is dirty. Clean the filter and restart the operation.

| | | | | | | |
|------|---|-------------------|----------------|------------------|------------------|------------------|
| TE | – 2 tap / 20 seconds (up to W1) Stop timer count | Temp. range | SM110 SM140 | 20.4 Hz or lower | 20.4Hz to 45.0Hz | 45.0Hz or higher |
| 24°C | – 2 tap / 20 seconds (up to W1) | | | Max. | Max. | Max. |
| 21°C | – 1 tap / 20 seconds (up to W1) | 10°C ≤ TO | | W7 | W8 | W9 |
| 18°C | | 5°C ≤ TO < 10°C | | W9 | WB | WE |
| 15°C | Rotational frequency hold | -3°C ≤ TO < 5°C | | WE | WE | WE |
| | | -10°C ≤ TO < -3°C | | WE | WE | WE |
| | + 1 tap / 20 seconds (up to Max. tap of each zone) | TO < –10°C | | WE | WE | WE |
| | | TO error | | WE | WE | WE |

5. Coil heating control

- 1) This control function heats the compressor by turning on the stopped compressor instead of a case heater. It purposes to prevent stagnation of the refrigerant inside of the compressor.
- 2) As usual, turn on power of the compressor for the specified time before a test run after installation; otherwise a trouble of the compressor may be caused.
As same as a test run, it is recommended to turn on power of the compressor beforehand when starting operation after power of the compressor has been interrupted and left as it is for a long time.
- 3) A judgment for electricity is performed by TD and TO sensors.
If TO sensor is defective, a backup control is automatically performed by TE sensor.
For a case of defective TO sensor, judge it with outdoor LED display.
- 4) For every model, the power is turned off when TD is 30°C or more.





| | |
|--------------|-------------------|
| | SM110, 140 |
| Output power | 50W |

REQUIREMENT

While heating the coil, the power sound may be heard. However it is not a trouble.

6. Short intermittent operation preventive control

- For 3 to 10 minutes after operation start, in some cases, the compressor does not stop to protect the compressor even if receiving the thermostat-OFF signal from indoor.
However it is not abnormal status. (The operation continuance differs according to the operation status.)
- When the operation stops by the remote controller, the operation does not continue.

7. Current release value shift control

- This control purposes to prevent troubles of the electronic parts such as the compressor driving elements and the compressor during cooling operation.
- The current release control value (I1) is selected from the following table according to TO sensor value.

Current release control value (I1) [A]

| Temperature range | SM110 | SM140 |
|--|-------|-------|
| $47^{\circ}\text{C} \leq \text{TO}$ | 4.8 | 4.8 |
| $44^{\circ}\text{C} \leq \text{TO} < 47^{\circ}\text{C}$ | 7.7 | 7.7 |
| $39^{\circ}\text{C} \leq \text{TO} < 44^{\circ}\text{C}$ | 8.7 | 8.7 |
| TO error | 4.8 | 4.8 |

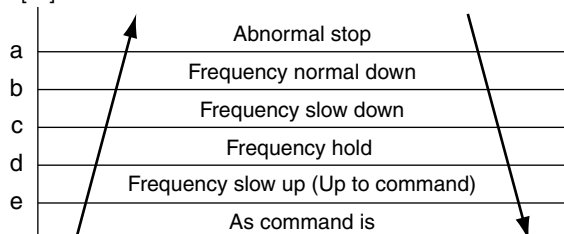
8. Over-current protective control

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

9. High-pressure release control

- The operation frequency is controlled to restrain abnormal rising of high pressure by TL sensor in cooling operation and TC sensor in heating operation.
- When TL sensor in cooling operation or TC sensor in heating operation detects abnormal temperature of the stop zone, stop the compressor and the error count becomes +1.
- 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.
- The error count when the compressor stopped with 2) is cleared after the operation continued for 10 minutes.
If the error count becomes [10] without clearing, the error is determined and reactivation is not performed.
- For the error display contents, confirm on the check code list.

HEAT TC / COOL TL
[°C]



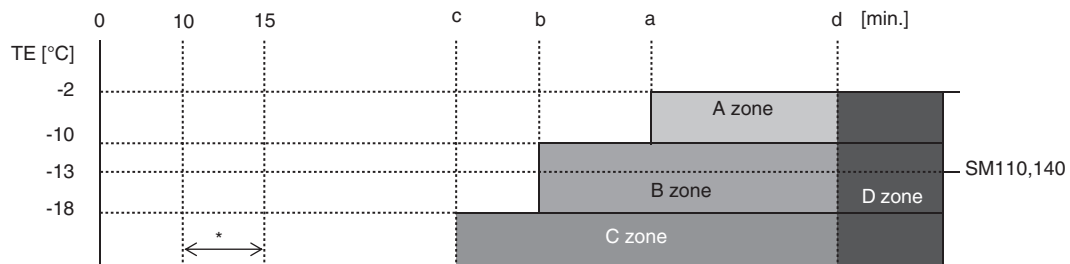
[°C]

| | SM110, 140 | |
|---|-------------------|----------------|
| | HEAT TC | COOL 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 |

10. Defrost control

- ① In heating operation, defrost operation is performed when TE sensor temperature satisfies any condition in A zone to D zone.
- ② The defrost operation is immediately finished if TE sensor temperature has become 12°C continuing for 3 seconds or more, or it also is finished when condition of 7°C < TE < 12°C has continued for 1 minute. The defrost operation is also finished when defrost operation has continued for 10 minutes even if TE sensor temperature has become 7°C or lower.
- ③ After defrost operation has finished, the compressor and the outdoor fan start heating operation after stopped for approx. 40 seconds.

Start of heating operation



* From 10 minutes to 15 minutes after a heating operation started, the minimum value of TE is stored in memory as TEO and the minimum temperature of TO as ToO.

| | At normal TO | At error TO |
|---------------|--|---|
| A zone | When status of $[(TEO - TE) - (ToO - TO) \geq 3^{\circ}\text{C}]$ continued for 20 seconds | When status of $[(TEO - TE) \geq 3^{\circ}\text{C}]$ continued for 20 seconds |
| B zone | When status of $[(TEO - TE) - (ToO - TO) \geq 2^{\circ}\text{C}]$ continued for 20 seconds | When status of $[(TEO - TE) \geq 2^{\circ}\text{C}]$ continued for 20 seconds |
| C zone | When status of $[SM110,140 : TE \leq -18^{\circ}\text{C}]$ continued for 20 seconds | |
| D zone | When compressor operation status with SM110,140 : $TE < -2^{\circ}\text{C}$ are added by d times | |

| | SM110, 140 |
|---|------------|
| a | 55 |
| b | 45 |
| c | 39 |
| d | 150 |

11. High-pressure switch

- 1) When the high-pressure switch operates, the operation of the compressor is terminated.
- 2) The compressor restarts after 5 minutes using [1] as an error count.
After restart, the error count is cleared when operation continues for 10 minutes or more.
- 3) An error is confirmed with the error count [10].
- 4) For the indicated contents of error, confirm using the check code table.

12. Control of compressor case thermo

- 1) The compressor stops when the case thermo of the compressor operated.
- 2) When the case thermo operated for approx. 80 seconds, H04 error code is displayed on the wired remote controller. → Refer to the Check Code.
- 3) When the case thermo is reset, the operation restarts.

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 error detected on the indoor unit?
 2. Outdoor fan does not rotate or air volume changes.
 - Does not outside low-temperature operation control work in cooling operation?
 3. 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 indoor controller?
 - b) Did you return the cabling to the initial positions?
 - c) Are connecting cables of indoor unit and remote controller correct?

2. Troubleshooting procedure

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



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 cables of the remote controller to shield cables.

<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 error detected on the indoor unit?
 2. Outdoor fan does not rotate or air volume changes.
 - Does not outside low-temperature operation control work in cooling operation?
 3. 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 indoor controller?
 - b) Did you return the cabling to the initial positions?
 - c) Are connecting cables 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

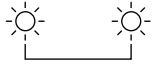
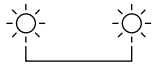
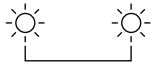
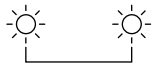

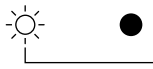

The primary judgment to check whether a trouble occurred in the indoor unit or outdoor unit is carried out with the following method.

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

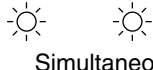
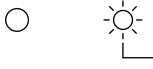
The indoor unit monitors the operating status of the air conditioner, and the blocked contents of self-diagnosis are displayed restricted to the following cases if a protective circuit works.

● : 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, miswiring between receiving unit and indoor unit, miswiring of power supply of outdoor unit, or power supply error. | |
| Operation Timer Ready Flash ● ● | E01 | Receiving error | Receiving unit } Miswiring or wire connection error between receiving unit and indoor unit |
| | E02 | Sending error | |
| | E03 | Communication stop | |
| | E08 | Duplicated indoor unit No. | Setup error |
| | E09 | Duplicated header units of remote controller | |
| | E10 | Communication error between CPUs on indoor unit P.C. board | |
| | E18 | Wire connection error between indoor units, Indoor power OFF (Communication stop between indoor master and follower or between main and sub indoor twin) | |
| Operation Timer Ready ● ● Flash | E04 | Miswiring between indoor unit and outdoor unit or connection error (Communication stop between indoor and outdoor units) | |
| Operation Timer Ready ● Flash Flash Alternate flash | P01 | Overflow was detected. } Protective device of indoor unit worked. Indoor DC fan error | |
| | P10 | | |
| | P12 | | |
| Operation Timer Ready Flash ● Flash Alternate flash | P03 | Outdoor unit discharge temp. error | Protective device of outdoor unit worked. |
| | P04 | High pressure SW system error | |
| | P05 | Open phase detection error, Power supply voltage error | Outdoor unit error |
| | P07 | Heat sink overheat error | |
| | P15 | Gas leak detection error | |
| | P20 | Outdoor unit high pressure protection | |
| | P22 | Outdoor unit : Outdoor unit fan error | Protective device of outdoor unit worked. |
| | P26 | Outdoor unit : Inverter Idc operation | |
| | P29 | Outdoor unit : Position detection error | |
| | | P31 | Stopped because of error of other indoor unit in a group (Check codes of E03/L03/L07/L08) |

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

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. 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

| Central Control indication | Remote Controller indication | Sensor lamp part | | Representative defective position | Detection | Explanation of error contents | Automatic Reset | Operation continuation |
|----------------------------|------------------------------|------------------|-------|--|-----------|---|-----------------|------------------------|
| | | Block Indication | Flash | | | | | |
| 19 | F04 | ◎ ◎ ○ | ALT | Outdoor unit Discharge temp. sensor (TD) error | Outdoor | Disconnection, short of discharge temp. sensor (TD) was detected | × | × |
| 18 | F06 | ◎ ◎ ○ | ALT | Outdoor unit Heat exchanger temp. sensor (TE) error | Outdoor | Disconnection, short of heat exchanger temp. sensor (TE) was detected. | × | × |
| 18 | F07 | ◎ ◎ ○ | ALT | Outdoor unit Heat exchanger temp. sensor (TL) error | Outdoor | Disconnection, short of outside heat exchanger temp. sensor (TL) was detected. | × | × |
| 1b | F08 | ◎ ◎ ○ | ALT | Outdoor unit Outside air temp. sensor (TO) error | Outdoor | Disconnection, short of outside air temp. sensor (TO) was detected. | ○ | ○ |
| A2 | F12 | ◎ ◎ ○ | ALT | Outdoor unit Suction temp. sensor (TS) error | Outdoor | Disconnection, short of suction temp. sensor (TS) was detected. | × | × |
| 43 | F13 | ◎ ◎ ○ | ALT | Outdoor unit Heat sink temp. sensor (TH) error | Outdoor | Disconnection, short of heat sink temp. sensor (TH) (P.C.board installed) was detected. | × | × |
| 18 | F15 | ◎ ◎ ○ | ALT | Outdoor unit Miss-mounting of temp. sensor (TE, TS) | Outdoor | Miss-mounting of outdoor heat exchanger temp. sensor (TE) and suction temp. sensor (TS) was detected. | × | × |
| 1C | F31 | ◎ ◎ ○ | SIM | Outdoor unit EEPROM error | Outdoor | Outdoor P.C.board part (EEPROM) error was detected. | × | × |
| 1F | H01 | ● ◎ ● | | Outdoor unit Compressor break down | Outdoor | Reached release point at min-Hz during compressor operating. | × | × |
| 1d | H02 | ● ◎ ● | | Outdoor unit Compressor lock | Outdoor | Compressor lock was detected. | × | × |
| 17 | H03 | ● ◎ ● | | Outdoor unit Current detection circuit error | Outdoor | Current detection circuit error. | × | × |
| 44 | H04 | ● ◎ ● | | Outdoor unit case thermostat worked | Outdoor | Case thermostat worked. | × | × |
| 88 | L10 | ◎ ○ ◎ | SIM | Outdoor unit Unset model type of service P.C.board | Outdoor | When outdoor service P.C.board was used, model type select jumper setting was inappropriate. | × | × |
| 1C | L29 | ◎ ○ ◎ | SIM | Outdoor unit Communication error between MCUs | Outdoor | Communication error between MCUs | × | × |
| 1E | P03 | ◎ ● ◎ | ALT | Outdoor unit Discharge temp. error | Outdoor | Error was detected by discharge temp. release control. | × | × |
| 21 | P04 | ◎ ● ◎ | ALT | Outdoor unit High pressure SW system error | Outdoor | High pressure protection switch worked. | × | × |
| AF | P05 | ◎ ● ◎ | ALT | Power supply voltage error | Outdoor | Power supply voltage error. Open phase detection error. | × | × |
| 1C | P07 | ◎ ● ◎ | ALT | Outdoor unit Heat sink overheat error | Outdoor | Abnormal overheat was detected by outdoor heat sink temp. sensor. | × | × |
| AE | P15 | ◎ ● ◎ | ALT | Gas leak detection | Outdoor | Abnormal overheat of discharge temp. or suction temp. was detected. | × | × |
| 22 | P20 | ◎ ● ◎ | ALT | Outdoor High pressure protective operation | Outdoor | Error was detected by high release control from indoor / outdoor heat exchanger temp. sensor. | × | × |
| 1A | P22 | ◎ ● ◎ | ALT | Outdoor unit Outdoor fan system error | Outdoor | Error (Over-current, lock, overheat, etc.) was detected on outdoor fan drive circuit. | × | × |
| 14 | P26 | ◎ ● ◎ | ALT | Outdoor unit Short-circuit of compressor drive element | Outdoor | Short-circuited protective operation of compressor drive circuit element (G-Tr / IGBT) worked. | × | × |
| 16 | P29 | ◎ ● ◎ | ALT | Outdoor unit Position detection circuit error | Outdoor | Position detection error of compressor motor was detected. | × | × |

Error mode detected by outdoor unit

| Operation of diagnostic function | | | | Judgment and measures |
|----------------------------------|---|---------------------------|----------------------------------|---|
| Check code | Cause of operation | Status of air conditioner | Condition | |
| F04 | Disconnection, short of discharge temp. sensor (TD) | Stop | Displayed when error is detected | 1. Check discharge temp. sensor (TD). 2. Check outdoor P.C.board. |
| F06 | Disconnection, short of heat exchanger temp. sensor (TE) | Stop | Displayed when error is detected | 1. Check temp. sensor (TE). 2. Check outdoor P.C.board. |
| F07 | Disconnection, short of heat exchanger temp. sensor (TL) | Stop | Displayed when error is detected | 1. Check temp. sensor (TL). 2. Check outdoor P.C.board. |
| F08 | Disconnection, short of outside air temp. sensor (TO) | Stop | Displayed when error is detected | 1. Check outside air temp. sensor (TO). 2. Check outdoor P.C.board. |
| F12 | Disconnection, short of suction temp. sensor (TS) | Stop | Displayed when error is detected | 1. Check suction temp. sensor (TS). 2. Check outdoor P.C.board. |
| F13 | Disconnection, short of heat sink temp. sensor (TH) | Stop | Displayed when error is detected | 1. Check outdoor P.C.board. (MCC-1627 (Q200) is incorporated in TH sensor) |
| F15 | Miss-mounting of outdoor temp. sensor (TE, TS) | Stop | Displayed when error is detected | 1. Check temp. sensor (TE, TS). 2. Check outdoor P.C.board. |
| F31 | Outdoor P.C. EEPROM error | Stop | Displayed when error is detected | 1. Check outdoor P.C.board. |
| L10 | Unset jumper of service P.C.board | Stop | Displayed when error is detected | 1. Outdoor service P.C.board. Check model type setting jumper wire. |
| L29 | Communication error between MCUs of outdoor unit, | Stop | Displayed when error is detected | 1. Check outdoor P.C.board. 2. Check connection between outdoor P.C.boards. |
| H01 | Compressor break down * Although operation has started, operation frequency decreases and operation stops. | Stop | Displayed when error 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 error is detected | 1. Trouble of compressor (Lock, etc.) : Replace compressor. 2. Wiring error of compressor (Open phase). |
| H03 | Current detection circuit error | Stop | Displayed when error is detected | 1. Check outdoor P.C.board. (AC current detection circuit) |
| H04 | Case thermostat operation * Abnormal overheat of compressor | Stop | Displayed when error 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. |

| Operation of diagnostic function | | | | Judgment and measures |
|----------------------------------|---|---------------------------|----------------------------------|---|
| Check code | Cause of operation | Status of air conditioner | Condition | |
| P03 | Discharge temp. error * Discharge temp. (TD) over specified value was detected. | Stop | Displayed when error is detected | 1. Check refrigerating cycle (Gas leak). 2. Trouble of PMV (Pulse Motor Valve). 3. Check discharge temp. sensor (TD). |
| P04 | High pressure SW system error | Stop | Displayed when error is detected | 1. Check service valves are fully opened. (Gas side, Liquid side) 2. Check of outdoor fan operation. 3. Check clogging of outdoor PMV (Pulse Motor Valve). 4. Check clogging of heat exchanger in indoor/outdoor units. 5. Short-circuit status of suction/discharge air in outdoor unit. 6. Check outdoor P.C.board error. 7. Check fan system error (Cause of air volume drop) at Indoor side. 8. Check PMV (Pulse Motor Valve) opening status in indoor unit. |
| P05 | Power supply error * Power supply voltage error * Open phase of 3-phase 4-wire power supply | Stop | Displayed when error is detected | 1. Check power supply voltage. (AC342 to 457V) 2. Check open phase of 3-phase 4-wire power supply. |
| P07 | Heat sink overheat error * Heat sink temp. sensor detected over specified temperature. | Stop | Displayed when error is detected | 1. Check screw tightening between P.C.board and heat sink and check radiator grease. 2. Check heat sink blast path. |
| P15 | Gas leak detection * Discharge temp. sensor (TD), Suction temp. sensor (TS) detected temperature over specified temp. | Stop | Displayed when error 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). |
| P20 | High pressure protective operation * During cooling operation, outdoor temp. sensor (TE) detected temperature over specified temp. | Stop | Displayed when error is detected | 1. Check outdoor heat exchanger sensor (TE). 2. Check full open of service valve. 3. Check indoor / outdoor fan. 4. Check PMV (Pulse Motor Valve). 5. Check clogging and short circuit of indoor / outdoor heat exchanger. 6. Overcharge of refrigerant. Recharge. |
| P22 | Outdoor fan system error | Stop | Displayed when error is detected | 1. Check lock of fan motor. 2. Check power supply voltage. (AC342 to 457V) 3. Check screw tightening between P.C.board and heat sink and check radiator grease. 4. Check heat sink blast path. 5. Check outdoor P.C.board. |
| P26 | Short-circuit of compressor drive element | Stop | Displayed when error is detected | 1. When performing operation while taking-off compressor wire, P26 error occurs. Check control P.C.board. 2. When performing operation while taking-off compressor wire, an error does not occur. Compressor rare short. |
| P29 | Position detection circuit error | Stop | Displayed when error is detected | 1. Check outdoor P.C.board. |

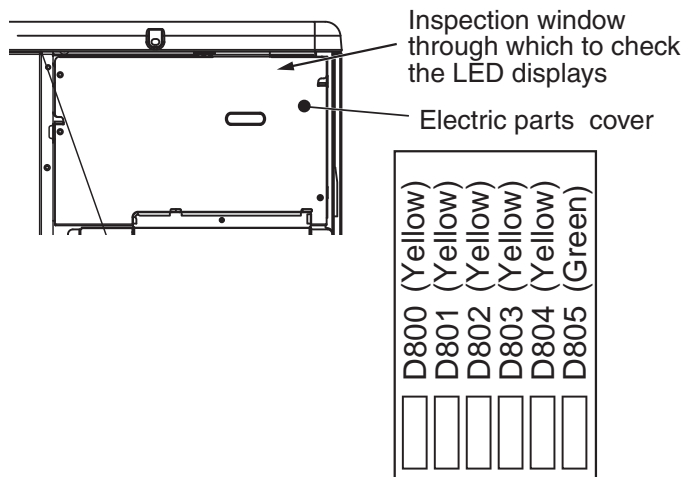
Contents Error Display

* When fixations of the errors were overlapped, the latest error is displayed.

| NO | Item | Check code [Wired remote controller] | LED display | | | | | |
|----|---|---|------------------|------------------|------------------|------------------|------------------|-----------------|
| | | | D800 (Yellow) | D801 (Yellow) | D802 (Yellow) | D803 (Yellow) | D804 (Yellow) | D805 (Green) |
| 1 | Discharge temp. sensor (TD) error | F04 | ⊙ | ● | ● | ● | ● | ○ |
| 2 | Heat exchanger temp. sensor (TE) error | F06 | ● | ⊙ | ● | ● | ● | ○ |
| 3 | Heat exchanger temp. sensor (TL) error | F07 | ⊙ | ⊙ | ● | ● | ● | ○ |
| 4 | Outside air temp. sensor (TO) error | F08 | ● | ● | ⊙ | ● | ● | ○ |
| 5 | Suction temp. sensor (TS) error | F12 | ⊙ | ● | ⊙ | ● | ● | ○ |
| 6 | Heat sink temp. sensor (TH) error | F13 | ● | ⊙ | ⊙ | ● | ● | ○ |
| 7 | Miss-mounting of outdoor temp. sensor (TE, TS) | F15 | ⊙ | ⊙ | ⊙ | ● | ● | ○ |
| 8 | EEPROM error | F31 | ● | ⊙ | ● | ⊙ | ● | ○ |
| 9 | Compressor break down | H01 | ⊙ | ⊙ | ● | ⊙ | ● | ○ |
| 10 | Compressor lock | H02 | ● | ● | ⊙ | ⊙ | ● | ○ |
| 11 | Current detection circuit error | H03 | ⊙ | ● | ⊙ | ⊙ | ● | ○ |
| 12 | Case thermostat operation | H04 | ● | ⊙ | ⊙ | ⊙ | ● | ○ |
| 13 | Unset model type of P.C.board | L10 | ● | ● | ● | ● | ⊙ | ○ |
| 14 | Communication error between MCUs | L29 | ⊙ | ● | ● | ● | ⊙ | ○ |
| 15 | Discharge temp. error | P03 | ● | ⊙ | ● | ● | ⊙ | ○ |
| 16 | High pressure SW system error | P04 | ⊙ | ⊙ | ● | ● | ⊙ | ○ |
| 17 | Power supply voltage error | P05 | ● | ● | ⊙ | ● | ⊙ | ○ |
| 18 | Heat sink overheat error | P07 | ● | ⊙ | ⊙ | ● | ⊙ | ○ |
| 19 | Gas leak detection | P15 | ⊙ | ⊙ | ⊙ | ● | ⊙ | ○ |
| 20 | High pressure protective operation | P20 | ⊙ | ● | ● | ⊙ | ⊙ | ○ |
| 21 | Fan system error | P22 | ● | ⊙ | ● | ⊙ | ⊙ | ○ |
| 22 | Short-circuit of compressor drive element | P26 | ⊙ | ⊙ | ● | ⊙ | ⊙ | ○ |
| 23 | Position detection circuit error | P29 | ● | ● | ⊙ | ⊙ | ⊙ | ○ |
| 24 | Compressor IPDU or other (not specially identified) | — | ⊙ | ● | ⊙ | ⊙ | ⊙ | ○ |
| 25 | Power supply error | — | ● | ● | ● | ● | ● | ● |

○ : ON ● : OFF ⊙: Rapid flash (5 times /sec.)

* The LEDs are located at the top right of the P.C. board of the outdoor unit as shown in the figure on the right.



8-2-4. 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 wired remote controller is displayed only when the same error occurred continuously by multiple times while LED of the outdoor P.C. board displays even an error which occurred once.
Therefore the display on the wired remote controller may differ from that of LED.

LED display on outdoor P.C. board


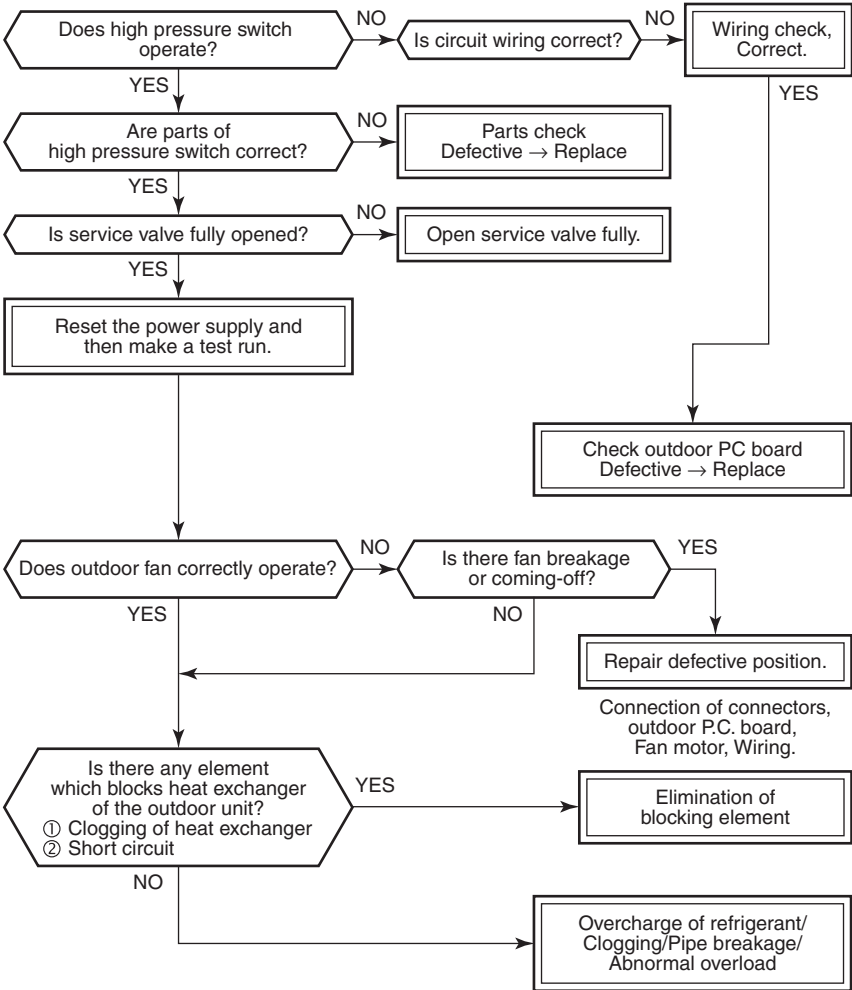
| | | | | | | | |
|--|---|---------------|---------------|---------------|---------------|---------------|--------------|
| | | D800 (Yellow) | D801 (Yellow) | D802 (Yellow) | D803 (Yellow) | D804 (Yellow) | D805 (Green) |
| [Display of error which is generating] | | | | | | | |
| • When even one of D800 to D804 rapid flashing, it indicates that an error occurred. | | | | | | | |
| (No error) | | ● | ● | ● | ● | ● | ○ |
| (Error occurred) | ◎ | ● | ● | ● | ● | ● | ○ |
| (Example of discharge temp. sensor error) | | | | | | | |
| ○ : ON, : ● OFF, ◎ : Rapid flashing (5 times / second) | | | | | | | |

| Check code | Outdoor LED display | Check and troubleshooting (Item without special mention Indicates part of outdoor unit.) |
|------------|---------------------|---|
| [E04] | — | <p>[Indoor/Outdoor communication error]</p> <pre> graph TD Q1{{Is setting of group address of remote controller correct?}} -- NO --> A1[Check CODE No. [14].] Q1 -- YES --> Q2{{Are inner wiring and indoor/outdoor control wires (1, 2, 3) correct?}} Q2 -- NO --> A2[Correct wiring indoor/outdoor control wires] Q2 -- YES --> Q3{{Are wiring of terminal blocks (1, 2, 3) correct?}} Q3 -- NO --> A3[Correct wiring of connectors and terminal blocks.] Q3 -- YES --> A4[Check outdoor P.C. board . Defect → Replace] </pre> |
| [F04] | ◎ ● ● ● ● ○ | <p>[Discharge temp. sensor (TD) error]</p> <pre> graph TD Q1{{Is connection of CN603 correct? Is resistance value of TD sensor correct?}} -- NO --> A1[Correct connector. Sensor error → Replace] Q1 -- YES --> A2[Check outdoor P.C. board. Defect → Replace] </pre> |
| [F06] | ● ◎ ● ● ● ○ | <p>[Heat exchanger temp. sensor (TE) error]</p> <pre> graph TD Q1{{Is connection of CN601 correct? Is resistance value of TE sensor correct?}} -- NO --> A1[Correct connector. Sensor error → Replace] Q1 -- YES --> A2[Check outdoor P.C. board. Defect → Replace] </pre> |
| [F07] | ◎ ◎ ● ● ● ○ | <p>[Heat exchanger temp. sensor (TL) error]</p> <pre> graph TD Q1{{Is connection of CN604 correct? Is resistance value of TL sensor correct?}} -- NO --> A1[Correct connector. Sensor error → Replace] Q1 -- YES --> A2[Check outdoor P.C. board. Defect → Replace] </pre> |


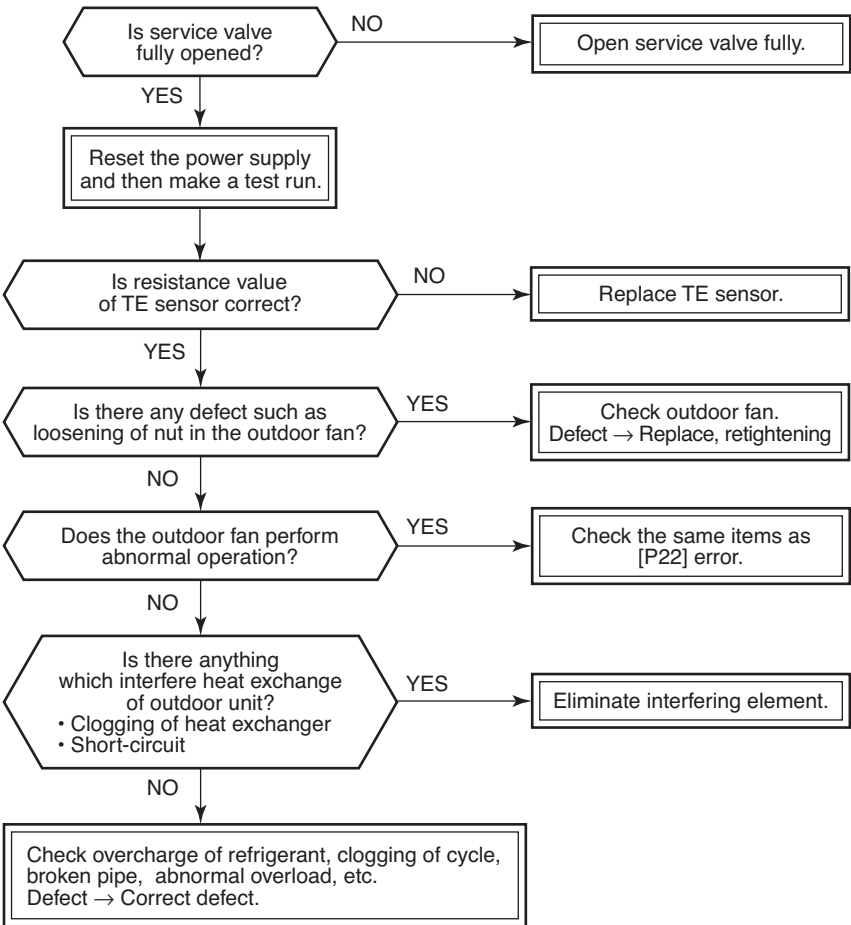
| Check code | Outdoor LED display | Check and troubleshooting (Item without special mention Indicates part of outdoor unit.) |
|------------|---------------------|---|
| [F08] | ● ● ◎ ● ● ○ | <p>[Outside air temp. sensor (TO) error]</p> <pre> graph TD Q1{{Is connection of CN602 correct? Is resistance value of TO sensor correct?}} Q1 -- NO --> A1[Correct connector. Sensor error → Replace] Q1 -- YES --> A2[Check outdoor P.C. board. Defect → Replace] </pre> |
| [F12] | ◎ ● ◎ ● ● ○ | <p>[Suction temp. sensor (TS) error]</p> <pre> graph TD Q1{{Is connection of CN600 correct? Is resistance value of TS sensor correct?}} Q1 -- NO --> A1[Correct connector. Sensor error → Replace] Q1 -- YES --> A2[Check outdoor P.C. board. Defect → Replace] </pre> |
| [F13] | ● ◎ ◎ ● ● ○ | <p>[Heat sink temp. sensor (TH) error]</p> <pre> graph TD A1[Check outdoor P.C. board. (MCC-1627) Defect → Replace] </pre> |
| [F15] | ◎ ◎ ◎ ● ● ○ | <p>[Miss-mounting of heat exchanger sensor (TE, TS)]</p> <pre> graph TD Q1{{Is mounting status of TE and TS sensors correct?}} Q1 -- NO --> A1[Correct sensor mounting.] Q1 -- YES --> Q2{{Is CN600 connection correct? Is resistance value of TS sensor correct?}} Q2 -- NO --> A2[Correct connector. Sensor error → Replace] Q2 -- YES --> Q3{{Is CN601 connection correct? Is resistance value of TE sensor correct?}} Q3 -- NO --> A3[Correct connector. Sensor error → Replace] Q3 -- YES --> A4[Check outdoor P.C. board. Defect → Replace] </pre> |

| Check code | Outdoor LED display | Check and troubleshooting (Item without special mention Indicates part of outdoor unit.) |
|------------|---------------------|---|
| [F31] | ● ◎ ● ◎ ● ○ | <p>[EEPROM error]</p> <div>Check outdoor P.C. board. Defect → Replace</div> |
| [H01] | ◎ ◎ ● ◎ ● ○ | <p>[Compressor break down]</p> <pre> graph TD Q1{{Is power supply voltage correct? AC342 to 457V}} -- NO --> A1[Correct power supply line.] Q1 -- YES --> Q2{{Is wire connection correct? Compressor lead (P.C. board side, Compressor side), Reactor lead, Power supply lead}} Q2 -- NO --> A2[Check wire connection and correct it.] Q2 -- YES --> Q3{{Does an abnormal overload happen?}} Q3 -- YES --> A3[Remove and improve the cause of overload.] Q3 -- NO --> A4[Check outdoor P.C. board. Defect → Replace] </pre> |
| [H02] | ● ● ◎ ◎ ● ○ | <p>[Compressor lock]</p> <pre> graph TD Q1{{Is power supply voltage correct? AC342 to 457V}} -- NO --> A1[Correct power supply line.] Q1 -- YES --> Q2{{Is wire connection correct? Compressor lead (P.C. board side, Compressor side), Reactor lead, Power supply lead}} Q2 -- NO --> A2[Check wire connection and correct it.] Q2 -- YES --> Q3{{Is compressor under correct conditions?}} Q3 -- YES --> A3[Check outdoor P.C. board. Defect → Replace] Q3 -- NO --> Q4{{Is there refrigerant stagnation?}} Q4 -- NO --> A4[Compressor lock → Replace] Q4 -- YES --> Q5{{Does PMV correctly operate?}} Q5 -- NO --> A5[Check TE, TS sensors and PMV. Defect → Replace] Q5 -- YES --> A6[Check outdoor P.C. board. Defect → Replace] </pre> |




| Check code | Outdoor LED display | Check and troubleshooting (Item without special mention Indicates part of outdoor unit.) |
|------------|---------------------|--|
| [H03] | ●●●●●○ | [Current detection circuit error] <div>Check outdoor P.C. board. Defect → Replace</div> |
| [H04] | ●●●●●○ | [Case thermostat operation] <pre> graph TD Q1{Are CN500 connection and case thermostat correct?} -- NO --> A1[Correct connector. Case thermostat error → Replace] Q1 -- YES --> Q2{Short each pins of CN500. Can compressor operate?} Q2 -- NO --> A2[Check outdoor P.C. board. Defect → Replace] Q2 -- YES --> Q3{Is there gas leak? Is there refrigerant shortage?} Q3 -- YES --> A3[Repair defectives position. Recharge refrigerant.] Q3 -- NO --> Q4{Is service valve fully opened?} Q4 -- NO --> A4[Open service valve fully.] Q4 -- YES --> Q5{Is PMV under correct conditions?} Q5 -- NO --> A5[Correct defective position. Replace defective part.] Q5 -- YES --> A6[Check crushed or broken pipe. Defect → Correct and Replace] </pre> |
| [L10] | ●●●●●○ | [Unset model type] : Only when service P.C. board is used <div>Cut jumper line according to the explanation sheet packaged with the service P.C. board.</div> |
| [L29] | ●●●●●○ | [Communication error between MCUs] <div>Check outdoor P.C. board. Defect → Replace</div> |
| [P03] | ●●●●●○ | [Discharge temp. error] <pre> graph TD Q1{Is there gas leak? Is there refrigerant shortage?} -- YES --> A1[Repair defective position. Recharge refrigerant.] Q1 -- NO --> Q2{Is PMV under correct conditions?} Q2 -- NO --> A2[Repair defective position. Replace defective part.] Q2 -- YES --> Q3{Does an abnormal overload happen?} Q3 -- YES --> A3[Remove and improve the cause of overload.] Q3 -- NO --> Q4{Is connection of CN603 correct? Is resistance value of TD sensor correct?} Q4 -- NO --> A4[Correct connector. Sensor error → Replace] Q4 -- YES --> A5[Check outdoor P.C. board. Defect → Replace] </pre> |

| Check code | Outdoor LED display | Check and troubleshooting (Item without special mention Indicates part of outdoor unit.) |
|------------|---|--|
| [P04] |  | <p>[High pressure SW system error]</p>  <pre> graph TD Q1{{Does high pressure switch operate?}} -- NO --> Q2{{Is circuit wiring correct?}} Q1 -- YES --> Q3{{Are parts of high pressure switch correct?}} Q2 -- NO --> A1[Wiring check, Correct.] Q2 -- YES --> Q3 Q3 -- NO --> A2[Parts check Defective → Replace] Q3 -- YES --> Q4{{Is service valve fully opened?}} Q4 -- NO --> A3[Open service valve fully.] Q4 -- YES --> A4[Reset the power supply and then make a test run.] A1 --> A5[Check outdoor PC board Defective → Replace] A3 --> A5 A4 --> Q5{{Does outdoor fan correctly operate?}} Q5 -- NO --> Q6{{Is there fan breakage or coming-off?}} Q5 -- YES --> Q7{{Is there any element which blocks heat exchanger of the outdoor unit? ① Clogging of heat exchanger ② Short circuit}} Q6 -- YES --> A6[Repair defective position. Connection of connectors, outdoor P.C. board, Fan motor, Wiring.] Q6 -- NO --> Q7 Q7 -- YES --> A7[Elimination of blocking element] Q7 -- NO --> A8[Overcharge of refrigerant/ Clogging/Pipe breakage/ Abnormal overload] </pre> |

| Check code | Outdoor LED display | Check and troubleshooting (Item without special mention Indicates part of outdoor unit.) |
|------------|---------------------|--|
| [P05] | ● ● ◎ ● ◎ ○ | <p>[Power supply error]</p> <pre> graph TD Q1{{Is there no open phase of the power supply?}} -- YES --> A1[Correct wiring] Q1 -- NO --> Q2{{Is there no down or up of power supply voltage? (AC342 to 457V)}} Q2 -- YES --> A2[Confirm electric construction, etc.] Q2 -- NO --> A3[Check outdoor P.C. board. Defect → Replace] </pre> |
| [P07] | ● ◎ ◎ ● ◎ ○ | <p>[Heat sink overheat error]</p> <pre> graph TD Q1{{Is the power device on P.C. board screwed without looseness? (Q200 of MCC-1627) Are radiation grease properly applied? (Q200 of MCC-1627)}} -- YES --> Q2{{Does something block the ventilation around the heat sink? Does something block air flow from the fan?}} Q1 -- NO --> A1[Apply radiation grease to objective parts. Retightening of screws.] Q2 -- YES --> A2[Remove blocking matter. Correct short-circuit.] Q2 -- NO --> A3[Check outdoor P.C. board. Defect → Replace] </pre> |
| [P15] | ◎ ◎ ◎ ● ◎ ○ | <p>[Gas leak detection]</p> <pre> graph TD Q1{{Is there gas leak? Is there refrigerant shortage?}} -- YES --> A1[Repair defective position. Recharge refrigerant.] Q1 -- NO --> Q2{{Is PMV under correct conditions?}} Q2 -- NO --> A2[Repair defective position. Replace defective part.] Q2 -- YES --> Q3{{Is service valve fully opened?}} Q3 -- NO --> A3[Open service valve fully.] Q3 -- YES --> Q4{{Is there crushed pipe?}} Q4 -- YES --> A4[Correct and replace piping.] Q4 -- NO --> Q5{{Check temp. sensor. TD sensor CN603 TS sensor CN600}} Q5 -- Error --> A5[Correct connector. Sensor error → Replace] Q5 -- OK --> A6[Check outdoor P.C. board. Defect → Replace] </pre> |

| Check code | Outdoor LED display | Check and troubleshooting (Item without special mention Indicates part of outdoor unit.) |
|------------|---|---|
| [P20] |  | <p>[High pressure protective operation]</p>  <pre> graph TD Q1{{Is service valve fully opened?}} -- NO --> A1[Open service valve fully.] Q1 -- YES --> A2[Reset the power supply and then make a test run.] A2 --> Q2{{Is resistance value of TE sensor correct?}} Q2 -- NO --> A3[Replace TE sensor.] Q2 -- YES --> Q3{{Is there any defect such as loosening of nut in the outdoor fan?}} Q3 -- YES --> A4[Check outdoor fan. Defect → Replace, retightening] Q3 -- NO --> Q4{{Does the outdoor fan perform abnormal operation?}} Q4 -- YES --> A5[Check the same items as [P22] error.] Q4 -- NO --> Q5{{Is there anything which interfere heat exchange of outdoor unit? • Clogging of heat exchanger • Short-circuit}} Q5 -- YES --> A6[Eliminate interfering element.] Q5 -- NO --> A7[Check overcharge of refrigerant, clogging of cycle, broken pipe, abnormal overload, etc. Defect → Correct defect.] </pre> |

| Check code | Outdoor LED display | Check and troubleshooting (Item without special mention Indicates part of outdoor unit.) |
|------------|---------------------|---|
| [P22] | ● ◎ ● ◎ ◎ ○ | <p>[Fan system error]</p> <pre> graph TD Q1{{Is AC mains voltage correct? (AC342 to 457V)}} Q2{{Rotate shaft of the fan motor by hands during power-OFF. Can it rotate smoothly? Is coil resistance of fan motor correct? Between red and white lead wire : 12 to 20Ω Between white and black lead wire : 12 to 20Ω Between black and red lead wire : 12 to 20Ω}} Q3{{Is the power device on P.C.board screwed without looseness? (IC300 of MCC-1626) Are radiation grease properly applied? (IC300 of MCC-1626)}} Q4{{Does something block the ventilation around the heat sink? Does something block air flow from the fan ?}} A1[Check wiring construction. Ask repair of power supply.] A2[Replace fan motor] A3[Apply radiation grease to objective parts. Retightening of screws.] A4[Remove blocking matter. Correct short-circuit.] A5[Check outdoor P.C.Board. Defect → Replace] Q1 -- NO --> A1 Q1 -- YES --> Q2 Q2 -- NO --> A2 Q2 -- YES --> Q3 Q3 -- NO --> A3 Q3 -- YES --> Q4 Q4 -- YES --> A4 Q4 -- YES --> A5 </pre> |

| Check code | Outdoor LED display | Check and troubleshooting (Item without special mention Indicates part of outdoor unit.) |
|--------------|---|--|
| [P26] |  | <p>[Short-circuit of compressor drive element]</p> <pre> graph TD Q1{{Are connections of compressor lead and reactor correct? (Check referring to the Wiring diagram.)}} Q1 -- NO --> A1[Correct wiring.] Q1 -- YES --> Q2{{Does the same error occur in operation without compressor lead?}} Q2 -- YES --> A2[Replace outdoor P.C. board.] Q2 -- NO --> A3[Check compressor. (Rear short, etc.) Defect → Replace] </pre> |
| [P29] |  | <p>[Position detection circuit error]</p> <pre> graph TD A1[Check outdoor P.C. board. Defect → Replace] </pre> |
| — No code |  | <p>[Other error] Compressor disorder due to sudden change of load, etc.</p> <ul style="list-style-type: none"> * Although the display of outdoor LED outputs, the unit automatically restarts and error is not determined. * LED display also may output due to wire coming-off of compressor. |

Temperature sensor

Temperature – Resistance value characteristic table

TE, TS, TO sensors

Representative value

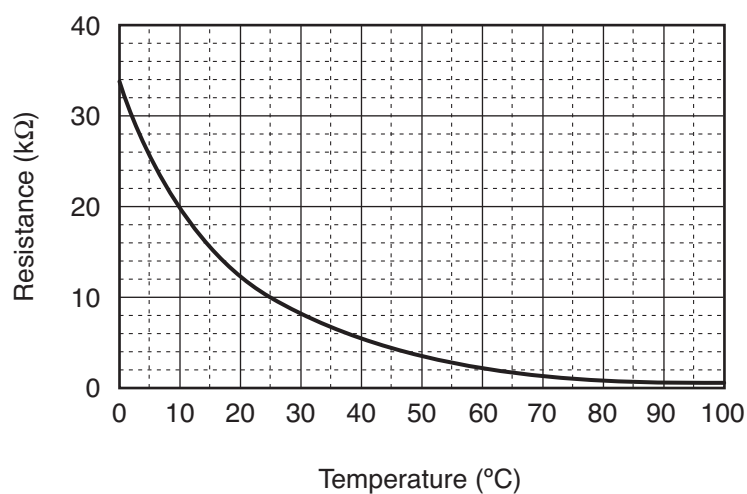
| Temperature (°C) | Resistance value (kΩ) | | |
|---------------------|-----------------------|------------------|-----------------|
| | (Minimum value) | (Standard value) | (Maximum value) |
| 0 | 32.33 | 33.80 | 35.30 |
| 10 | 19.63 | 20.35 | 21.09 |
| 20 | 12.23 | 12.59 | 12.95 |
| 25 | 9.75 | 10.00 | 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

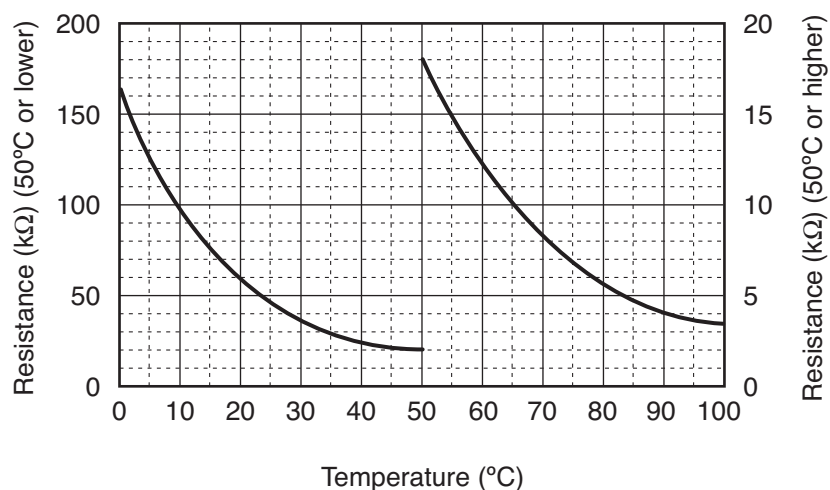
Representative value

| 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 |

TE, TS, TO sensors

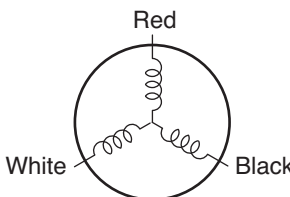
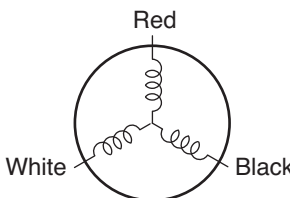
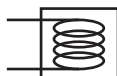


TD, TL sensors



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

8-3. Table Inspection of outdoor unit main parts

| No. | Parts name | Checking procedure | | | | | | |
|------------------|--|--|------------------|------------------|-------------|------------|---------------|-------------|
| 1 | Compressor (Model : RA330A2T-20M) | <div>Measure the resistance value of each winding by using the tester.</div> <div></div> <table><tr><th>Position</th><th>Resistance value</th></tr><tr><td>Red – White</td><td rowspan="3">1.20 Ω</td></tr><tr><td>White – Black</td></tr><tr><td>Black – Red</td></tr></table> <div>Under 20°C</div> | Position | Resistance value | Red – White | 1.20 Ω | White – Black | Black – Red |
| Position | Resistance value | | | | | | | |
| Red – White | 1.20 Ω | | | | | | | |
| White – Black | | | | | | | | |
| Black – Red | | | | | | | | |
| 2 | Outdoor fan motor (Model : WDF-340-A100-1) | <div>Measure the resistance value of each winding by using the tester.</div> <div></div> <table><tr><th>Position</th><th>Resistance value</th></tr><tr><td>Red – White</td><td rowspan="3">17.3±1.7 Ω</td></tr><tr><td>White – Black</td></tr><tr><td>Black – Red</td></tr></table> <div>Under 20°C</div> | Position | Resistance value | Red – White | 17.3±1.7 Ω | White – Black | Black – Red |
| Position | Resistance value | | | | | | | |
| Red – White | 17.3±1.7 Ω | | | | | | | |
| White – Black | | | | | | | | |
| Black – Red | | | | | | | | |
| 3 | 4-way valve coil (Cooling/heating switching) (Model : STF-H) | <div>Measure the resistance value of each winding by using the tester.</div> <div></div> <div>Connector : White</div> <table><tr><th>Resistance value</th></tr><tr><td>7.1±0.36 Ω</td></tr></table> <div>Under 20°C</div> | Resistance value | 7.1±0.36 Ω | | | | |
| Resistance value | | | | | | | | |
| 7.1±0.36 Ω | | | | | | | | |

9. SETUP AT LOCAL SITE AND OTHERS

9-1. Calling of error history

<Contents>

The error 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.

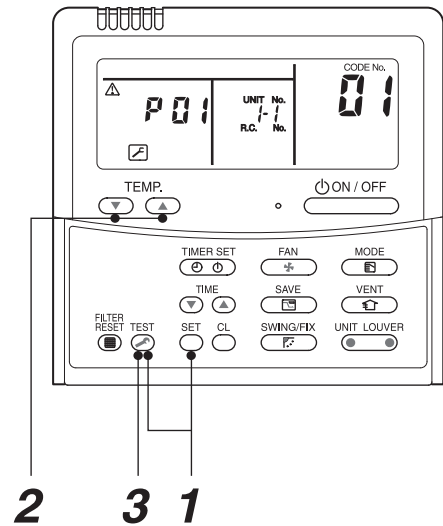
Service Check goes on, the **item code 01** is displayed, and then the content of the latest alarm is displayed. The number and error contents of the indoor unit in which an error occurred are displayed.

- 2 In order to monitor another error history, push the set temperature **▼** / **▲** buttons to change the error history No. (Item code).

Item code **01** (Latest) → Item code **04** (Old)

NOTE : 4 error 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

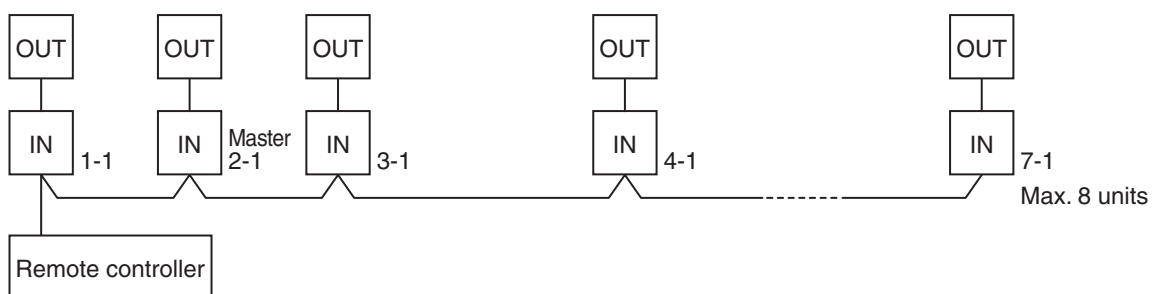
Do not push **CL** button, otherwise all the error histories of the indoor unit are deleted.

(Group control operation)

In a group control, operation of maximum 8 indoor units can be controlled by a remote controller.

The indoor unit connected with outdoor unit (Individual/Master of twin) controls room temperature according to setting on the remote controller.

<System example>



1. Display range on remote controller

The setup range (Operation mode/Air volume select/Setup temp) of the indoor unit which was set to the master unit is reflected on the remote controller.

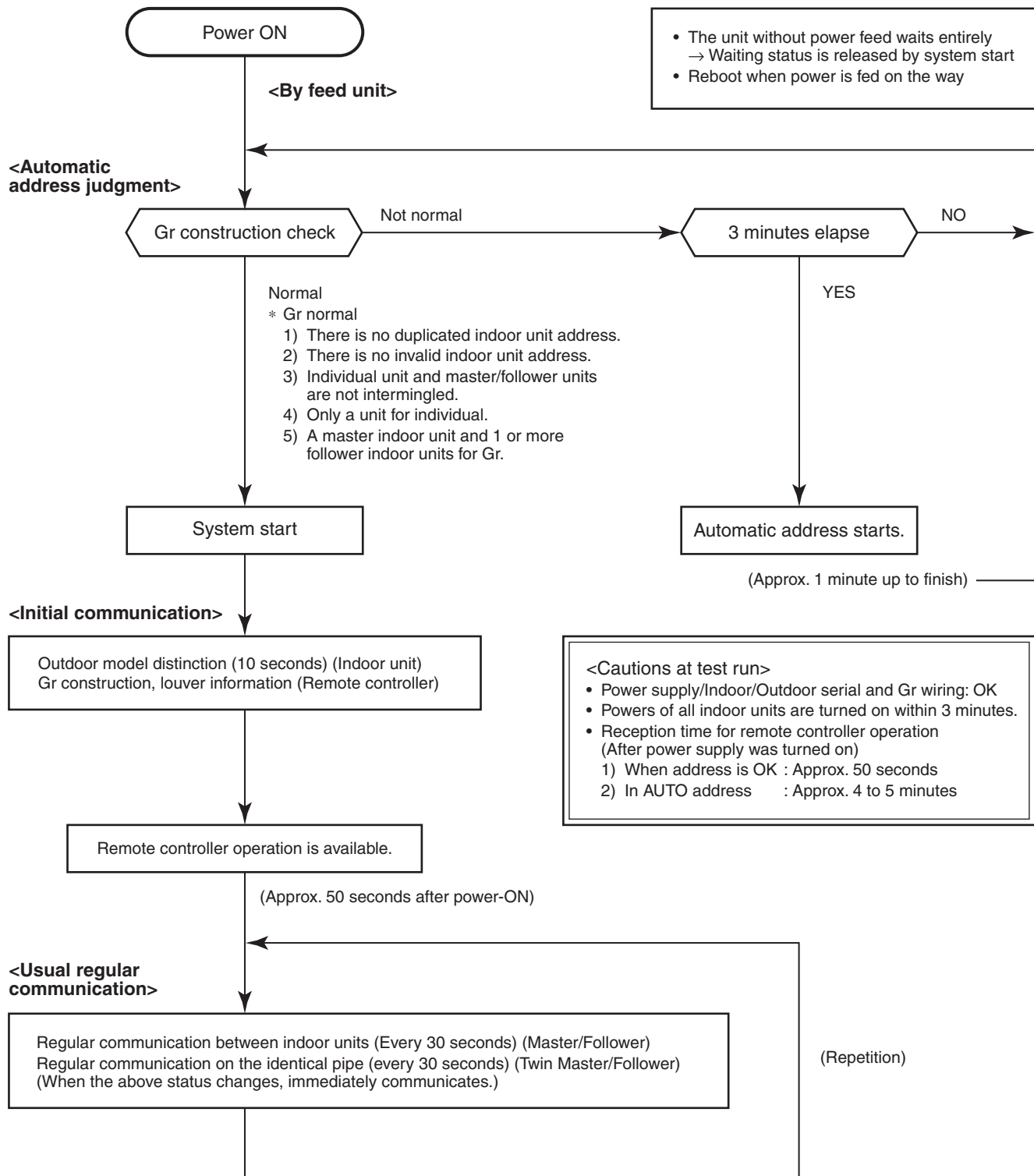
2. Address setup

Turn on power of the indoor unit to be controlled in a group within 3 minutes after setting of automatic address.

If power of the indoor unit is not turned on within 3 minutes (completion of automatic address setting), the system is rebooted and the automatic address setting will be judged again.

- 1) Connect 3 In/Out cables surely.
- 2) Check line address/indoor address/group address of the unit one by one.
- 3) The unit No. (line/indoor gout address) which have been set once keep the present status as a rule if the unit No. is not duplicated with one of another unit.

■ 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. Others

Recovering the refrigerant

WARNING

Don't admit air into refrigerant during recovery.
Otherwise, the pressure in the freezing cycle might increase abnormally. Serious injury could occur if it bursts.

[Recovering the refrigerant]




- You need to recover the refrigerant when moving or repairing the indoor and/or outdoor units. You cannot do this while the air conditioner is running in cooling mode because a protective device will be tripped. Be sure to recover the refrigerant in test run mode.
- Use a refrigerant recovery device when the amount of refrigerant to be recovered exceeds the initial amount of 1.3kg.



■ Instructions (Recovery to the Air Conditioner)

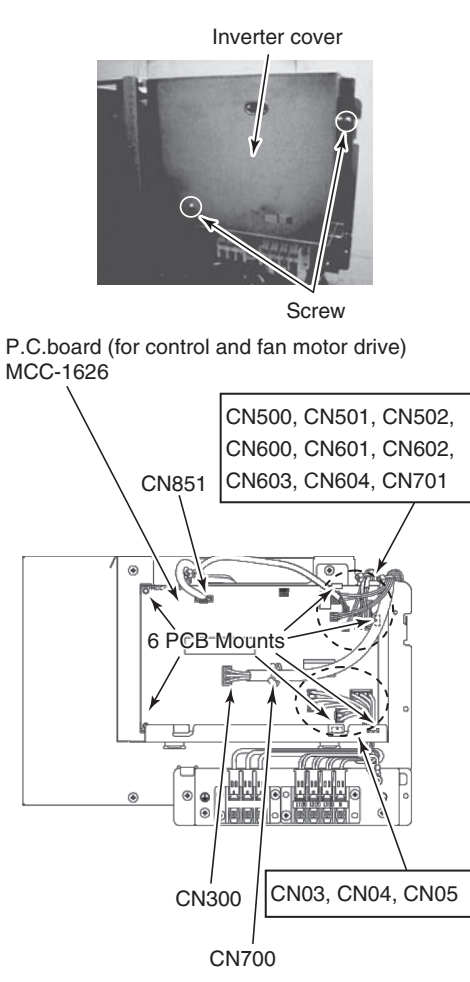
1. Power on the air conditioner.
2. To set the air conditioner to test run mode, hold down the Temporary button for more than 10 seconds. Then, you will hear a "Pi" sound, and the light (green), light (green) and light (orange) lamps will blink quickly to indicate that the air conditioner has gone into a test run mode.
3. Wait for one minute to elapse, and then close the valve of liquid side.
4. It is recommended to attach a pressure gauge at the service port so that you can determine when refrigerant recovery has been completed.
5. Upon completion, close the valve of gas side.
6. Stop the air conditioner.
7. Power off the air conditioner.
 - Complete Steps 2 to 6 within five minutes. Otherwise, the protective device might trip, causing the outdoor unit to stop.
 - If the recovery operation has been interrupted by the protective device, turn off the air conditioner. In this case, use a refrigerant recovery device.

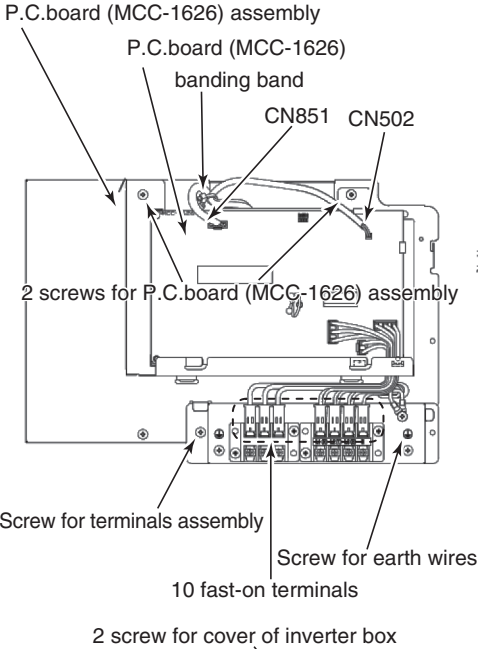
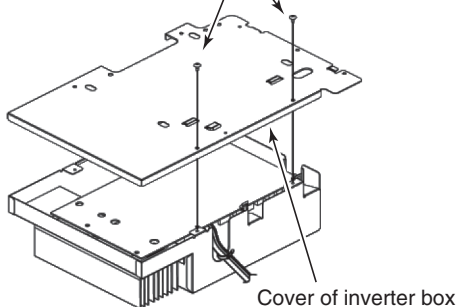
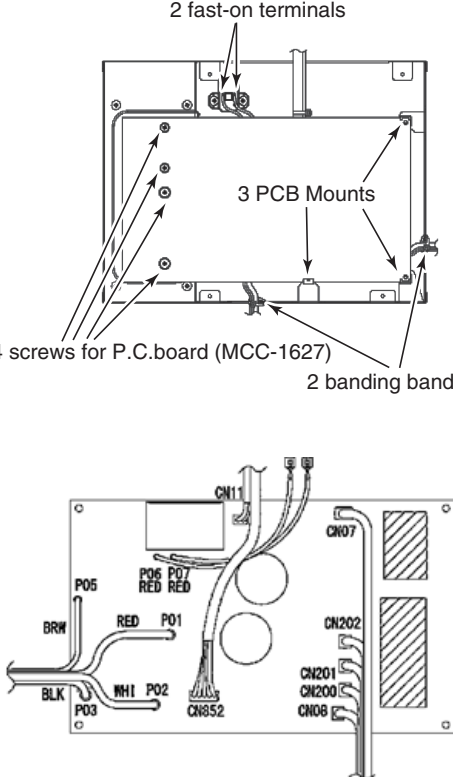
10. DETACHMENTS

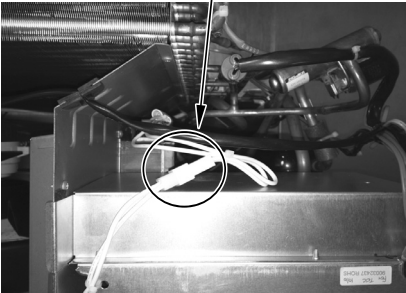

10-1. RAV-SM1104AT8*P*, SM1404AT8*P*

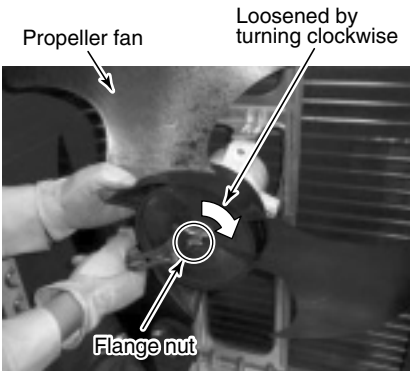
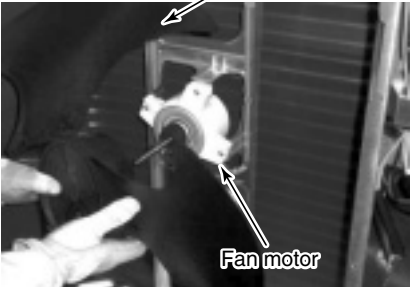

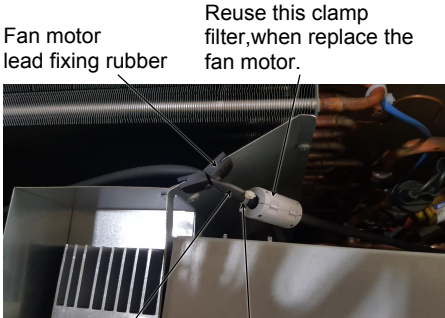
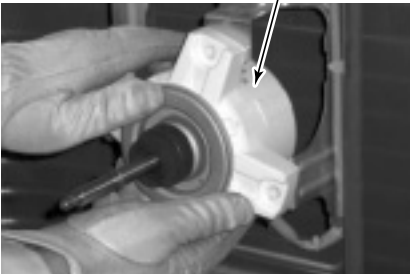
| No. | Part name | Procedure | Remarks |
|-----|------------------|---|--|
| ① | Common procedure | <div style="text-align: center;">CAUTION</div> <p>Be sure to put on the gloves at working time; otherwise an injury may be caused by a part, etc.</p> <hr/> <p>1. Detachment</p> <ol style="list-style-type: none"> 1) Stop operation of the air conditioner and then turn off switch of the breaker. 2) Remove the front panel. (Hexagonal screw $\varnothing 4 \times 10$, 2 pcs.) * After removing screws, remove the front panel while pulling it downward. 3) Remove the power wire and indoor/outdoor connecting wire from the cord clamp and the terminals. 4) Remove the top plate. (Hexagonal screw $\varnothing 4 \times 10$, 5 pcs.) <p>2. Attachment</p> <ol style="list-style-type: none"> 1) Attach the top plate. (Hexagonal screw $\varnothing 4 \times 10$, 5 pcs.) In this time, insert the fin guard of rear side between the top plate and the heat exchanger (Rear side). 2) Connect the power supply wire and the indoor/outdoor connecting wire to the terminal and fix it with cord clamp. <hr/> <div style="text-align: center;">CAUTION</div> <p>Using bundling band on the market, be sure to fix the power wire and indoor/outdoor connecting wire along the crossover pipe so that they do not come to contact with the compressor, valve at gas side, pipe at gas side and discharge pipe.</p> <hr/> <ol style="list-style-type: none"> 3) Attach the front panel. (Hexagonal screw $\varnothing 4 \times 10$, 2 pcs.) |  <p>Front panel</p>  <p>Top plate</p> <p>Insert the fin guard of rear side between the top plate and the heat exchanger (at rear side).</p>  |


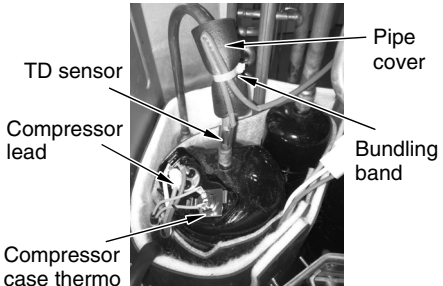


| No. | Part name | Procedure | Remarks |
|-----|------------------------|--|---|
| ② | Discharge port cabinet | 1. Detachment <ol style="list-style-type: none"> 1) Carry out work of 1 of ①. 2) Remove screws for the discharge port cabinet and the partition plate. (ST1T Ø4 × 8, 3 pcs.) 3) Remove screws for the discharge port cabinet and the bottom plate. (Hexagonal screw Ø4 × 10, 2 pcs.) 4) Remove screws of the discharge port cabinet and the motor base. (ST1T Ø4 × 8, 2 pcs.) 5) Remove screws of the discharge port cabinet and the heat exchanger. (ST1T Ø4 × 8, 1 pc.) 6) Remove screws of the discharge port cabinet and the fin guard. (Hexagonal screw Ø4 × 10, 2 pcs.) |  |
| ③ | Side cabinet | 1. Detachment <ol style="list-style-type: none"> 1) Carry out work of 1 of ①. 2) Remove screws which fix the inverter assembly and the side cabinet. (ST1T Ø4 × 8, 2 pcs.) 3) Remove screws of the side cabinet and the valve fixing plate. (ST1T Ø4 × 8, 2 pcs.) 4) Remove screws of the side cabinet and the pipe panel (Rear). (Hexagonal screw Ø4 × 10, 2 pcs.) 5) Remove screws of the side cabinet and the bottom plate. (Hexagonal screw Ø4 × 10, 1 pc.) 6) Remove screws of the side cabinet and the heat exchanger. (Hexagonal screw Ø4 × 10, 3 pcs.) 7) Slide the side cabinet upward and then remove it. (Hook of inverter) |  |


| No. | Part name | Procedure | Remarks |
|-----|--|---|--|
| ④ | P.C.board (for control and fan motor drive) MCC-1626 | <p>1. Detachment</p> <p>1) Carry out work of 1 of ①.</p> <hr/> <p style="text-align: center;">⚠ WARNING</p> <p>Never disassemble the inverter for 3 minutes after power has been turned off because an electric shock may be caused.</p> <hr/> <p>2) Remove the inverter-cover. Remove screw of the inverter-cover and inverter-box. (ST1T Ø4 × 10, 1 pc.)</p> <p>3) Remove all the connectors connected to the P.C.board.</p> <ul style="list-style-type: none"> * Remove the connectors by pulling the connector body. Do not pull the wire. * Connectors should be removed after unlocking the housing section. <p>CN03 : Connection with indoor unit (3P: White) CN04 : Power supply (3P: Red) CN05 : Power supply (2P: Red) CN300 : Outdoor fan motor (3P: White) (Remove the fan motor wire from the cord clamp) CN500 : Case thermo. (2P: Blue) CN501 : High pressure switch (2P: Green) CN502 : Relay output (2P: White) CN600 : TS sensor (3P: White, tube:) CN601 : TE sensor (2P: White, tube:) CN602 : TO sensor (2P: Yellow, tube:) CN603 : TD sensor (3P: White, tube:) CN604 : TL sensor (2P: White, tube:) CN700 : 4-way coil (2P: Yellow) CN701 : PMV coil (5P: Blue) CN851 : UART Communication (6P: Red)</p> <p>4) Remove the P.C.board from the 6 PCB Mounts.</p> <p>2. Attachment</p> <p>1) Mount the P.C.board to inverter box.</p> <p>2) Mount the individual components in the opposite procedure to that during detachment.</p> <hr/> <p style="text-align: center;">⚠ CAUTION</p> <p>Be sure that all the connectors are connected correctly and securely inserted. If the components on the P.C.board were bent during this procedure, straighten them so they do not touch other parts.</p> <hr/> |  <p>Inverter cover</p> <p>Screw</p> <p>P.C.board (for control and fan motor drive) MCC-1626</p> <p>CN500, CN501, CN502, CN600, CN601, CN602, CN603, CN604, CN701</p> <p>CN851</p> <p>6 PCB Mounts</p> <p>CN300</p> <p>CN03, CN04, CN05</p> <p>CN700</p> |

| No. | Part name | Procedure | Remarks |
|-----|---|--|---|
| ④ | P.C.board (for compressor drive) MCC-1627 | <p>1. Detachment</p> <p>1) Carry out work of ④.</p> <hr/> <p style="text-align: center;">⚠ WARNING</p> <p>Never disassemble the inverter for 3 minutes after power has been turned off because an electric shock may be caused.</p> <hr/> <p>2) Remove the connectors and fast-on terminals</p> <ul style="list-style-type: none"> * Remove the connectors by pulling the connector body. Do not pull the wire. * Connectors should be removed after unlocking the housing section. <p>Remove 10 fast-on terminals from 2 terminals and screw for fixing earth wires. Cut the banding band and remove connector.</p> <p style="margin-left: 40px;">CN502 : Relay input (2P: White) CN851 : UART Communication (6P: Red)</p> <p>3) Remove 1 screw for fixing the terminals assembly and take off the terminals assembly from inverter assembly with getting off the hook of inverter assembly from slit of the terminals assembly.</p> <p>4) Remove 2 screws for fixing P.C.board (MCC-1626) assembly and take off P.C.board (MCC-1626) assembly.</p> <p>5) Remove 2 screws and take off the cover of inverter box.</p> <p>6) Remove all the 4 screws which secures the P.C.board (MCC1627) to the heat sink.</p> <p>7) Cut 2 banding bands and remove 2 fast-on terminals from PTC thermistor.</p> <ul style="list-style-type: none"> * Remove the connectors by pulling the connector body. Do not pull the wire. <p>8) Remove the P.C.board from the 3 PCB Mounts.</p> <p>9) Remove all the connectors and fast-on terminals connected to the P.C.board.</p> <ul style="list-style-type: none"> * Remove the connectors and fast-on terminals by pulling the connector body. Do not pull the wire. * Connectors should be removed after unlocking the housing section. <p style="margin-left: 40px;">CN11 : Relay input (2P: White) CN852 : UART Communication (6P: Red) CN07,08 : Reactor (1P: fast-on terminal) CN200,201,202: Compressor (1P: fast-on terminal)</p> <p>2. Attachment</p> <p>1) Mount the individual components in the opposite procedure to that during detachment.</p> <hr/> <p style="text-align: center;">⚠ CAUTION</p> <p>Be sure that all the connectors are connected correctly and securely inserted. If the components on the P.C.board were bent during this procedure, straighten them so they do not touch other parts.</p> <hr/> |    |

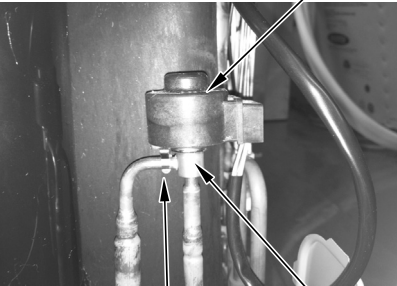
| No. | Part name | Procedure | Remarks |
|-----|---|--|---|
| ⑤ | Exchange of electric parts (Continued) | 2. Reactor 1) Carry out works of 1 of ① and ③. 2) Remove the relay connector connected to the control P.C. board. 3) Remove each reactor. (Truss B tight screw Ø4 × 6, 2 pcs. each) 4) Attach a new reactor. | <p data-bbox="1154 254 1414 330">Reactor relay connector (Connected to lead wire (White) at P.C. board side)</p>  <p data-bbox="1187 723 1252 746">Screws</p>  |

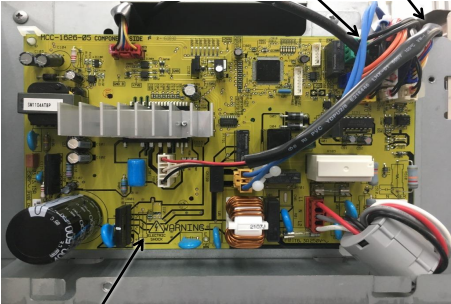

| No. | Part name | Procedure | Remarks |
|-----|-----------|--|--|
| ⑥ | Fan motor | <p>1) Carry out works of 1 of ① and ②.</p> <p>2) Remove the flange nut fixing the fan motor and the propeller fan. * The flange nut is loosened by turning clockwise. (To tighten it, turn it counterclockwise.)</p> <p>3) Remove the propeller fan.</p> <p>4) Remove the connector for fan motor from the inverter.</p> <p>5) Remove the fan motor lead from the fan motor lead fixing rubber of the penetrated part of the partition plate.</p> <p>6) Remove the fixing screws (4 pcs. each) while supporting the fan motor so that it does not fall.</p> <p>* Cautions when assembling the fan motor</p> <ul style="list-style-type: none"> * Tighten the flange nut with 4.95N•m (50kgf.cm). * Adjust length on the fan motor lead fixing rubber so that the fan motor lead does not slacken in order not to put the fan motor lead into contact with the propeller fan. <p>Attach the fan motor lead fixing rubber to the partition plate so that projection directs to the refrigerating cycle side.</p> <ul style="list-style-type: none"> * Be sure that the rector body does not come to contact with the fan motor lead. * Be sure to bind the removed bundling band with the bundling band on the market. <hr/> <p style="text-align: center;">⚠ CAUTION</p> <p>Use the metal band of the motor base to fix the fan motor lead on the motor base so that the fan motor lead does not come to contact with the propeller fan.</p> <hr/> <p>NOTE:</p> <p>Please reuse the clamp filter when replace the fun motor.</p> |  <p>Propeller fan</p> <p>Loosened by turning clockwise</p> <p>Flange nut</p>  <p>Propeller fan</p> <p>Fan motor</p>  <p>Fan motor connector</p> <p>Inverter</p>  <p>Fan motor lead fixing rubber</p> <p>Reuse this clamp filter, when replace the fan motor.</p> <p>Projection / Refrigerating cycle side</p> <p>Bundling band</p>  <p>Fan motor</p> |

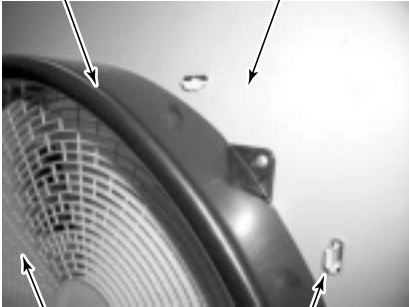
| No. | Part name | Procedure | Remarks |
|-----|-------------------------------|--|---|
| ⑦ | Compressor Compressor lead | 1. Removal of broken compressor <ol style="list-style-type: none"> 1) Recover the refrigerant gas. 2) Carry out works of 1 of ① and ②, ③. 3) Remove the piping panel (Front). Remove screws of the piping panel (Front) and the bottom plate. (Hexagonal screw Ø4 × 10, 2 pcs.) Remove screws of the piping panel (Front) and the piping panel (Rear). (Hexagonal screw Ø4 × 10, 1 pc.) 4) Remove the piping panel (Rear). Remove screws of the piping panel (Rear) and the bottom plate. (Hexagonal screw Ø4 × 10, 2 pcs.) 5) Remove the valve fixing plate. Remove bolts of the valve. (Hexagonal screw Ø6 × 16, 4 pcs.) Remove screws of the valve fixing plate and the partition plate. (ST1T Ø4 × 10, 1 pc.) Remove screws of the valve fixing plate and the accumulator. (Hexagonal screw Ø4 × 10, 1 pc.) Cut off the bundling band for the discharge pipe and the suction pipe and then remove each sensor and coil lead of PMV. 6) Remove the soundproof plate. (Upper side, outer winding, inner winding) 7) Remove terminal cover from the compressor and then remove the compressor lead and also the compressor case thermo. 8) Remove TD sensor fixed to the discharge pipe. 9) Remove the compressor lead. (Leave the ferrite core attached to the electric parts box as it is.) |  <p>Piping panel (Front) Piping panel (Rear)</p>  <p>TD sensor Compressor lead Compressor case thermo Pipe cover Bundling band</p>  <p>Accumulator Pipe cover, bundling band, each sensor (TL, TO, TE, TD, TS sensors) PMV coil lead. Bundling band, each sensor (TL, TO, TE, TD, TS sensors) Pipe cover, bundling band, each sensor (TL, TO, TE, TD, TS sensors) Suction pipe</p>  <p>TS sensor</p> |

| No. | Part name | Procedure | Remarks |
|-----|--|--|---|
| ⑦ | Compressor Compressor lead (Continued) | <p>10) Using a burner, remove the discharge pipe and the suction pipe connected to the compressor.</p> <hr/> <p>⚠ WARNING</p> <p>In case of removing the piping by broiling the welded part with a burner, if the piping includes oil, it may burst into flames at the moment when wax melted, so take sufficient care.</p> <hr/> <p>⚠ CAUTION</p> <p>Note so that the flame does not catch the 4-way valve and PMV. (An operation may become an error.)</p> <hr/> <p>11) Pull off the discharge pipe and the suction pipe of the refrigerating cycle upward.</p> <p>12) Remove the compressor bolts which fix the compressor to the bottom plate. (3 pcs.)</p> <p>13) Pull out the compressor toward you.</p> <hr/> <p>⚠ CAUTION</p> <p>The weight of the compressor is 15kg or more, so handle it by 2 workers.</p> <hr/> | <p>Remove (Discharge pipe) Remove (Suction pipe)</p>  <p>Compressor bolt (3 pcs.)</p> |

| No. | Part name | Procedure | Remarks |
|-----|--|---|---|
| ⑦ | Compressor Compressor lead (Continued) | <p>2. Mounting of compressor</p> <p>1) Mount the compressor in the reverse procedure of removal.</p> <p>NOTES:</p> <ul style="list-style-type: none"> * After exchange of the compressor, be sure to exchange the compressor lead. (Repair part code of compressor lead: 43T60443) * Fix the removed each sensor and PMV coil lead wire to the discharge pipe and the suction pipe with the bundling band via the pipe cover. <p>In this time, take note that each sensor and PMV coil lead wire do not come to contact with the discharge pipe and the reactor. (For fixing to the discharge pipe, use the black heat-proof pipe cover and the bundling band for heat-proof which is sold on the market.)</p> <ul style="list-style-type: none"> * As shown in the right figure, mount the soundproof plate (inner winding, outer winding) by inserting between the compressor and the piping, and between piping and the partition plate. * Put the compressor lead wire and the compressor case thermo between inner winding and outer winding of the soundproof as if dropping them in. | <div data-bbox="1019 254 1458 707"> <p>Header pipe Suction pipe Accumulator Discharge pipe</p> </div> <div data-bbox="1019 707 1458 913"> <p>Pass the soundproof plate (inner winding) through between compressor and discharge pipe, suction pipe and then put it on the other side at this position.</p> <p>Pass the soundproof plate (outer winding) through between the suction pipe and accumulator and then put it on the other side at this position.</p> </div> <div data-bbox="1019 948 1458 1395"> <p>Soundproof plate (upper)</p> <p>Do not make clearance between the soundproof plate (upper) and the soundproof plate (outer winding).</p> <p>Soundproof plate (outer winding)</p> </div> <div data-bbox="467 1430 1206 1969"> <p>Pipe cover, bundling band, each sensor (TL, TO, TE, TD, TS sensors) PMV coil lead</p> <p>Pipe cover, bundling band, each sensor (TL, TO, TE, TD, TS sensors) PMV coil lead.</p> <p>Bundling band, each sensor (TL, TO, TE sensors)</p> <p>Pipe cover, bundling band, each sensor (TL, TO, TE, TD, TS sensors)</p> <p>Suction pipe</p> <p>PMV coil lead</p> </div> |

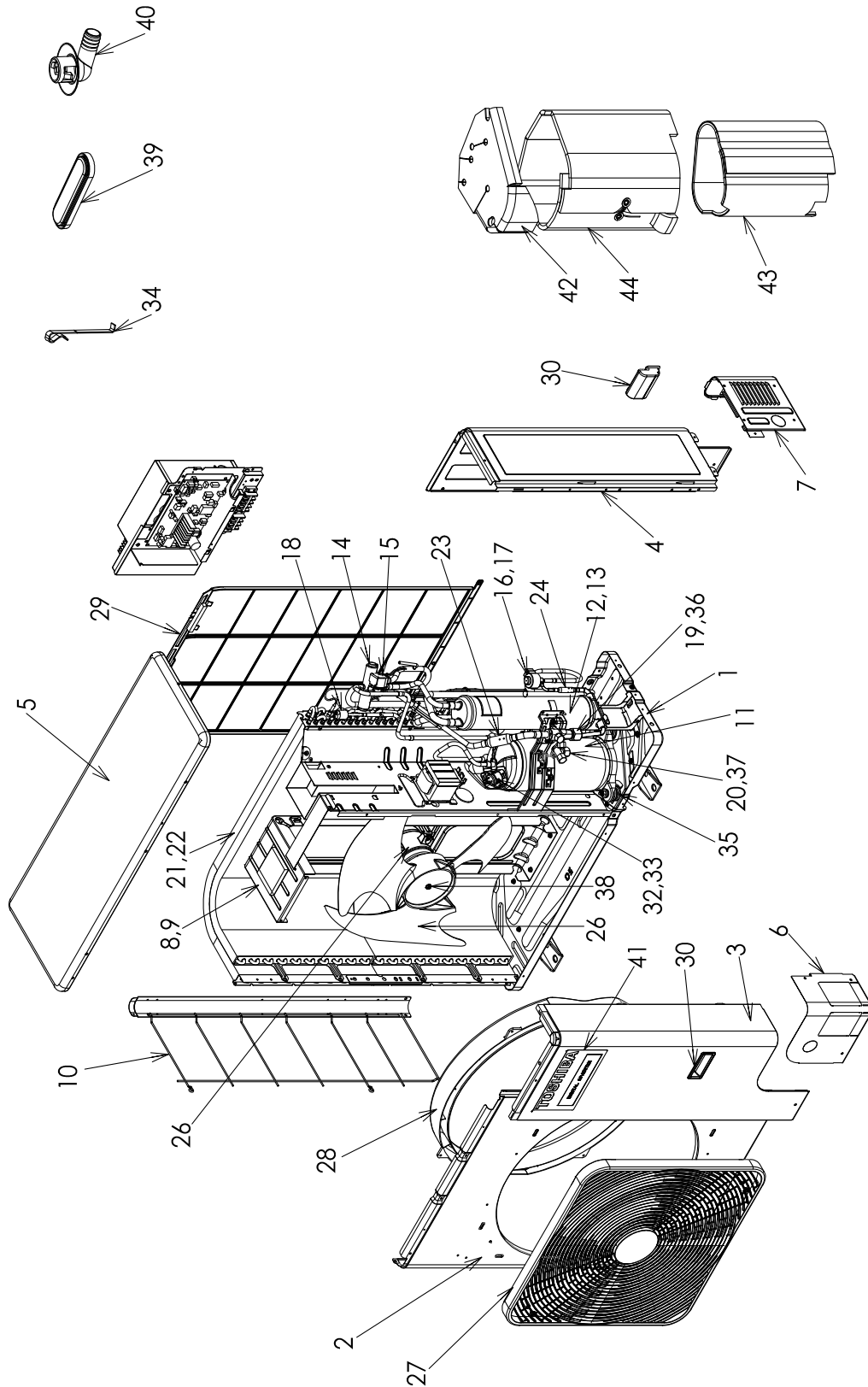
| No. | Part name | Procedure | Remarks |
|-----|--|--|---|
| ⑦ | Compressor Compressor lead (Continued) | <p>3. Vacuuming</p> <ol style="list-style-type: none"> 1) Connect the vacuum pump to the charge port of the gas pipe valve and then drive the vacuum pump. 2) Carry out vacuuming until the vacuum low pressure gauge indicates 1 (mmHg). <p>NOTE: Before vacuuming, open PMV fully. If PMV is closed, vacuuming may be impossible between the liquid pipe valve and PMV of the outdoor unit.</p> <p>Forced full-opening method of PMV Please refer to “9. SETUP AT LOCAL SITE AND OTHERS” (9-3-3.2)</p> <p>4. Refrigerant charging</p> <ol style="list-style-type: none"> 1) Add the quantity of refrigerant specified by the pipe length into the charge port of the valve. | |
| ⑧ | PMV coil | <p>1. Detachment</p> <ol style="list-style-type: none"> 1) Carry out works of 1 of ① and ③. 2) While pulling the coil upward and removing the spring which pinches the copper pipe, remove the coil from PMV main body. <p>2. Attachment</p> <ol style="list-style-type: none"> 1) Match the spring to the copper pipe and fix it. |  |

| No. | Part name | Procedure | Remarks |
|-----|----------------------|---|--|
| ⑨ | High pressure switch | <p>1. Detachment</p> <ol style="list-style-type: none"> 1) Recover the refrigerant gas. 2) Carry out works of 1 of ①. 3) Remove the inverter cover. Remove screws between the inverter cover and the inverter box. (ST1T Ø4 × 10, 2 pcs) 4) Cut the bundling bands that fixate high pressure switch lead line. 5) Remove the connector for high pressure switch from the inverter. 6) Remove the High pressure switch. <p>* Cautions when assembling the high pressure switch</p> <ul style="list-style-type: none"> * Tighten the high pressure switch with $11 \pm 1 \text{ N}\cdot\text{m}$. * Tightening work must use two spanners. | <p>High pressure switch connector</p> <p>Cut the bundling band</p>  <p>Inverter</p> <p>High pressure switch</p> <p>Cut the bundling band</p>  |

| No. | Part name | Procedure | Remarks |
|-----|-----------|--|---|
| ⑩ | Fan guard | <p>3. Detachment</p> <p>1) Carry out works of 1 of ① and ②.</p> <hr/> <p style="text-align: center;">CAUTION</p> <hr/> <p>To prevent scratching on the product, handle the product on a cardboard or cloth.</p> <hr/> <p>2) Remove the discharge port cabinet and then put on it so that the fan guard side directs downward.</p> <p>3) Remove the hooking claws (8 positions) of the fan guard.</p> <p>2. Attachment</p> <p>1) Push the hooking claws (8 positions) with hands from the front side to fix the claws.</p> <hr/> <p style="text-align: center;">CAUTION</p> <hr/> <p>Check that all the hooking claws are fixed at the specified positions.</p> <hr/> | <div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> Bell mouth Discharge port cabinet </div>  <div style="display: flex; justify-content: space-around; margin-top: 10px;"> Fan guard Hooking claw </div> |

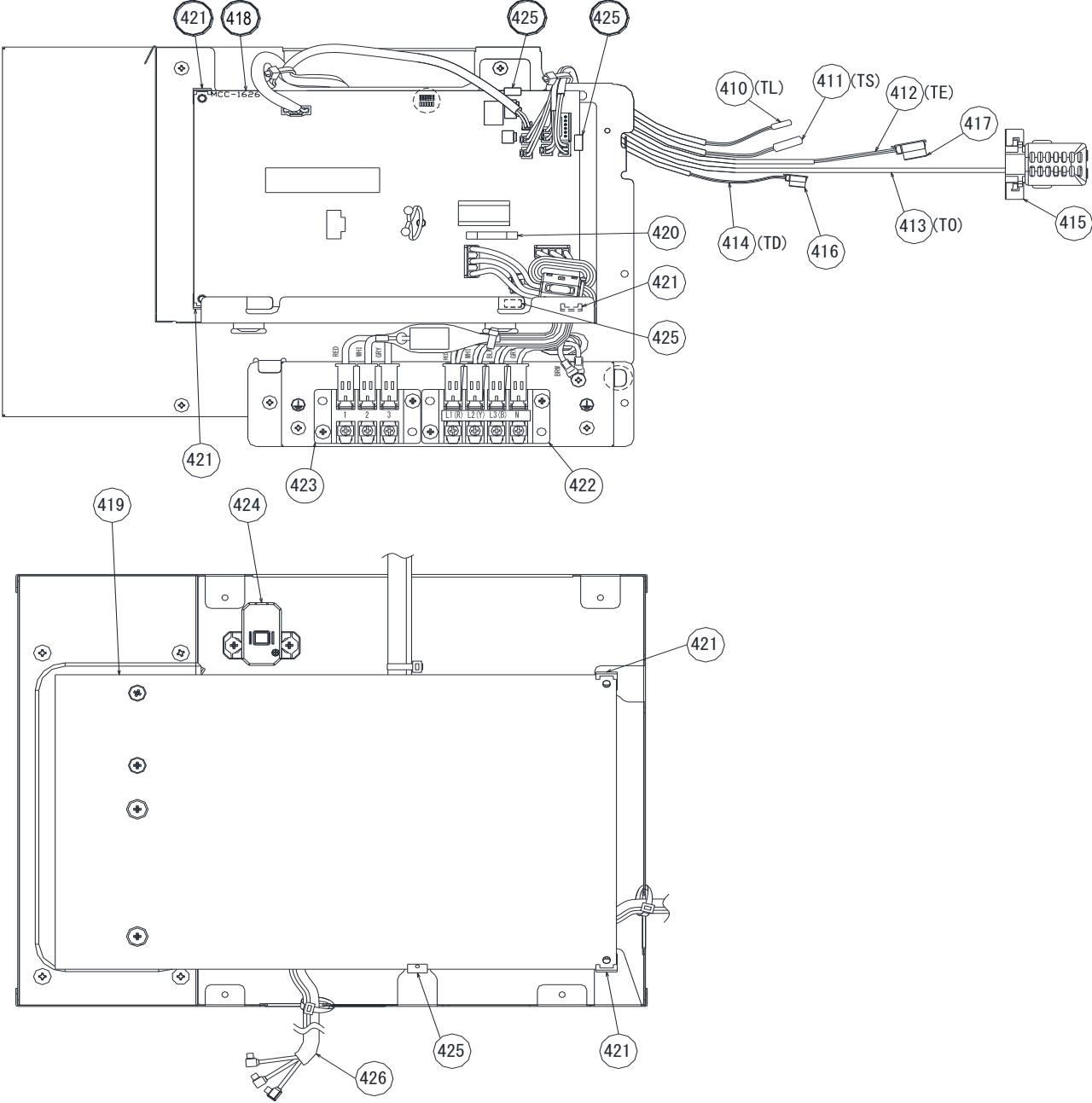
11. EXPLODED VIEWS AND PARTS LIST

**11-1. RAV-SM1104AT8P-E, SM1104AT8JP-E, SM1104AT8P-TR
RAV-SM1404AT8P-E, SM1404AT8JP-E, SM1404AT8P-TR**



| Location No. | Parts No. | Description | RAV-SM | | | | | |
|--------------|-----------|---------------------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|
| | | | 1104 AT8P-E | 1404 AT8P-E | 1104 AT8P-TR | 1404 AT8P-TR | 1104 AT8JP-E | 1404 AT8JP-E |
| 1 | 43T42351 | ASM-BASE | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 43T00606 | ASM-COAT-C-A-T | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 | 43T00601 | ASM-PANEL-FRONT | 1 | 1 | 1 | 1 | 1 | 1 |
| 4 | 43T00607 | ASM-COAT-P-S-R | 1 | 1 | 1 | 1 | 1 | 1 |
| 5 | 43T00600 | ASM-CABI-UP | 1 | 1 | 1 | 1 | 1 | 1 |
| 6 | 43T00608 | ASM-COAT-P-P-FR | 1 | 1 | 1 | 1 | 1 | 1 |
| 7 | 43T00609 | ASM-COAT-P-P-BK | 1 | 1 | 1 | 1 | 1 | 1 |
| 8 | 43T39342 | MOTOR BASE | 1 | 1 | 1 | 1 | - | - |
| 9 | 43T39349 | ASM-COAT-BASE-M | - | - | - | - | 1 | 1 |
| 10 | 43T19346 | FIN GUARD ASSEMBLY | 1 | 1 | 1 | 1 | 1 | 1 |
| 11 | 43T41515 | COMPRESSOR | 1 | 1 | 1 | 1 | 1 | 1 |
| 12 | 43T48301 | ACCUMLATOR ASSEMBLY | 1 | 1 | 1 | 1 | - | - |
| 13 | 43T48304 | ASM-ACCUM | - | - | - | - | 1 | 1 |
| 14 | 43T46383 | VALVE-4WAY | 1 | 1 | 1 | 1 | 1 | 1 |
| 15 | 43T63337 | 4 WAY VALVE COIL ASSEMBLY | 1 | 1 | 1 | 1 | 1 | 1 |
| 16 | 43T46387 | VALVE,PULSE,MODULATING | 1 | 1 | 1 | 1 | 1 | 1 |
| 17 | 43T63342 | COIL,PMV | 1 | 1 | 1 | 1 | 1 | 1 |
| 18 | 43T63353 | SW-PRESS | 1 | 1 | 1 | 1 | 1 | 1 |
| 19 | 43T46381 | VALVE;BALL 15.88 DIA | 1 | 1 | 1 | 1 | 1 | 1 |
| 20 | 43T46380 | VALVE;PACKED 9.52 DIA | 1 | 1 | 1 | 1 | 1 | 1 |
| 21 | 43T43492 | ASM-COND | 1 | 1 | 1 | 1 | - | - |
| 22 | 43T43493 | WORK-COND | - | - | - | - | 1 | 1 |
| 23 | 43T47372 | STRAINER | 1 | 1 | - | 1 | 1 | 1 |
| 23 | 43T60331 | TERMINAL, 3P | - | - | 1 | - | - | - |
| 24 | 43T47396 | STRAINER | 1 | 1 | 1 | 1 | 1 | 1 |
| 25 | 43T60478 | ASM-SERV-MOT | - | 1 | 1 | 1 | 1 | 1 |
| 25 | 43T60636 | ASM-SERV-MOT | 1 | - | - | - | - | - |
| 26 | 43T20352 | FAN-PR(PB522) | 1 | 1 | 1 | 1 | 1 | 1 |
| 27 | 43T19372 | FAN GUARD(TOSHIBA) | 1 | 1 | 1 | 1 | 1 | 1 |
| 28 | 43T22313 | BELLMOUTH | 1 | 1 | 1 | 1 | 1 | 1 |
| 29 | 43T19345 | FIN GUARD | 1 | 1 | 1 | 1 | 1 | 1 |
| 30 | 43T71302 | HANDLE | 2 | 2 | 2 | 2 | 2 | 2 |
| 32 | 43T54319 | BIMETAL-THERMO | 1 | 1 | 1 | 1 | 1 | 1 |
| 33 | 43T50307 | HOLDER-THERMO | 1 | 1 | 1 | 1 | 1 | 1 |
| 34 | 43T19333 | HOLDER, SENSOR | 1 | 1 | 1 | 1 | 1 | 1 |
| 35 | 43T49346 | RUBBER CUSHION | 3 | 3 | 3 | 3 | 3 | 3 |
| 36 | 43T47334 | BONNET; 15.88 DIA. | 1 | 1 | 1 | 1 | 1 | 1 |
| 37 | 43T47332 | BONNET, 9.52 DIA | 1 | 1 | 1 | 1 | 1 | 1 |
| 38 | 43047669 | NUT, FLANGE | 1 | 1 | 1 | 1 | 1 | 1 |
| 39 | 43089160 | CAP, WATERPROOF | 5 | 5 | 5 | 5 | 5 | 5 |
| 40 | 43T79305 | DRAIN NIPPLE | 1 | 1 | 1 | 1 | 1 | 1 |
| 41 | 43T85553 | MARK-T | 1 | 1 | 1 | 1 | 1 | 1 |
| 42 | 43T04314 | SOUND-INSU(UP) | 1 | 1 | 1 | 1 | 1 | 1 |
| 43 | 43T04312 | SOUND-INSU(IS) | 1 | 1 | 1 | 1 | 1 | 1 |
| 44 | 43T04313 | SOUND-INSU(OS) | 1 | 1 | 1 | 1 | 1 | 1 |

Inverter assembly



| Location No. | Part No. | Description | RAV- | |
|--------------|----------|-------------------------------|---|---|
| | | | SM1104AT8P-E SM1104AT8JP-E SM1104AT8JP-TR | SM1404AT8P-E SM1404AT8JP-E SM1404AT8JP-TR |
| 410 | 43T50335 | TEMPERATURE SENSOR | 1 | 1 |
| 411 | 43T50336 | TEMPERATURE SENSOR | 1 | 1 |
| 412 | 43T50338 | TEMPERATURE SENSOR | 1 | 1 |
| 413 | 43T50337 | TEMPERATURE SENSOR | 1 | 1 |
| 414 | 43T50346 | TEMPERATURE SENSOR | 1 | 1 |
| 415 | 43T63335 | SENSOR HOLDER | 1 | 1 |
| 416 | 43T63317 | HOLDER,SENSOR | 1 | 1 |
| 417 | 43T63316 | HOLDER,SENSOR | 1 | 1 |
| 418 | 43TNV340 | PC BOARD ASSY CDB | 1 | - |
| 418 | 43TNV341 | PC BOARD ASSY CDB | - | 1 |
| 419 | 43T6W385 | PC BOARD ASSY IPDU (MCC-1627) | 1 | 1 |
| 420 | 43T60413 | FUSE | 1 | 1 |
| 421 | 43T95301 | SUPPORT, SPACER | 5 | 5 |
| 422 | 43T60419 | TERMINAL;4P | 1 | 1 |
| 423 | 43T60331 | TERMINAL; 3P | 1 | 1 |
| 424 | 43T50345 | THERMISTOR,PTC | 1 | 1 |
| 425 | 43T95302 | SPACER(EDGE) | 4 | 4 |
| 426 | 43T60479 | WIRE ASSY(COMP LEAD) | 1 | 1 |
| 427 | 43T63323 | HOLDER, SENSOR | 1 | 1 |

WARNINGS ON REFRIGERANT LEAKAGE

Check of Concentration Limit

The room in which the air conditioner is to be installed requires a design that in the event of refrigerant gas leaking out, its concentration will not exceed a set limit.

The refrigerant R410A which is used in the air conditioner is safe, without the toxicity or combustibility of ammonia, and is not restricted by laws to be imposed which protect the ozone layer. However, since it contains more than air, it poses the risk of suffocation if its concentration should rise excessively. Suffocation from leakage of R410A is almost non-existent.

If a conditioner system is to be installed in a small room, select a suitable model and installation procedure so that if the refrigerant accidentally leaks out, its concentration does not reach the limit (and in the event of an emergency, measures can be made before injury can occur).

In a room where the concentration may exceed the limit, create an opening with adjacent rooms, or install mechanical ventilation combined with a gas leak detection device.

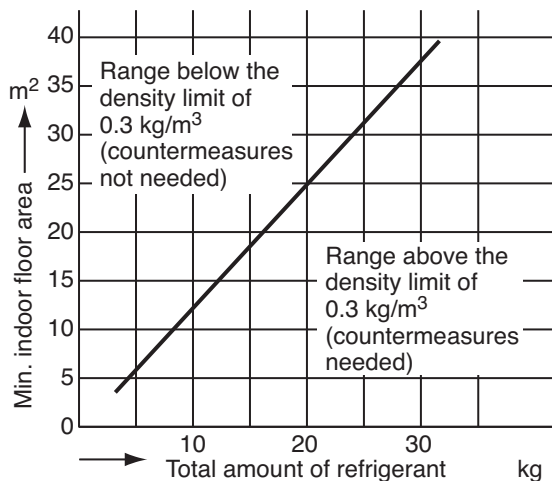
The concentration is as given below.

$$\frac{\text{Total amount of refrigerant (kg)}}{\text{Min. volume of the indoor unit installed room (m}^3\text{)}} \leq \text{Concentration limit (kg/m}^3\text{)}$$

The concentration limit of R410A which is used in air conditioners is 0.3kg/m³.

NOTE

The minimum indoor floor area compared with the amount of refrigerant is roughly as follows:
(When the ceiling is 2.7m high)



Toshiba Carrier (Thailand) Co., Ltd.

**144/9 MOO 5, BANGKADI INDUSTRIAL PARK, TIVANON ROAD, TAMBOL BANGKADI,
AMPHUR MUANG, PATHUMTHANI 12000, THAILAND.**