SERVICE MANUAL

AIR-CONDITIONER
SPLIT WALL TYPE

42NQV025M2 / 38NYV025M2

March, 2010
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1. SAFETY PRECAUTIONS

For general public use
Power supply cord of outdoor unit shall be more than 1.5 mm² (H07RN-F or 60245IEC66) polychloroprene sheathed flexible cord.

• Read this “SAFETY PRECAUTIONS” carefully before servicing.
• The precautions described below include the important items regarding safety. Observe them without fail.
• After the servicing work, perform a trial operation to check for any problem.
• Turn off the main power supply switch (or breaker) before the unit maintenance.

CAUTION
New Refrigerant Air Conditioner Installation
• THIS AIR CONDITIONER ADOPTS THE NEW HFC REFRIGERANT (R410A) WHICH DOES NOT DESTROY OZONE LAYER.
R410A refrigerant is apt to be affected by impurities such as water, oxidizing membrane, and oils because the working pressure of R410A refrigerant is approx. 1.6 times of refrigerant R22. Accompanied with the adoption of the new refrigerant, the refrigeration machine oil has also been changed. Therefore, during installation work, be sure that water, dust, former refrigerant, or refrigeration machine oil does not enter into the new type refrigerant R410A air conditioner circuit.
To prevent mixing of refrigerant or refrigerating machine oil, the sizes of connecting sections of charging port on main unit and installation tools are different from those used for the conventional refrigerant units. Accordingly, special tools are required for the new refrigerant (R410A) units. For connecting pipes, use new and clean piping materials with high pressure fittings made for R410A only, so that water and/or dust does not enter. Moreover, do not use the existing piping because there are some problems with pressure fittings and possible impurities in existing piping.

CAUTION
TO DISCONNECT THE APPLIANCE FROM THE MAIN POWER SUPPLY
This appliance must be connected to the main power supply by a circuit breaker or a switch with a contact separation of at least 3 mm.

DANGER
• ASK AN AUTHORIZED DEALER OR QUALIFIED INSTALLATION PROFESSIONAL TO INSTALL/MAINTAIN THE AIR CONDITIONER.
INAPPROPRIATE SERVICING MAY RESULT IN WATER LEAKAGE, ELECTRIC SHOCK OR FIRE.
• TURN OFF MAIN POWER SUPPLY BEFORE ATTEMPTING ANY ELECTRICAL WORK. MAKE SURE ALL POWER SWITCHES ARE OFF. FAILURE TO DO SO MAY CAUSE ELECTRIC SHOCK.

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

• CORRECTLY CONNECT THE CONNECTING CABLE. IF THE CONNECTING CABLE IS INCORRECTLY CONNECTED, ELECTRIC PARTS MAY BE DAMAGED.
• CHECK THAT THE EARTH WIRE IS NOT BROKEN OR DISCONNECTED BEFORE SERVICE AND INSTALLATION. FAILURE TO DO SO MAY CAUSE ELECTRIC SHOCK.
• DO NOT INSTALL NEAR CONCENTRATIONS OF COMBUSTIBLE GAS OR GAS VAPORS. FAILURE TO FOLLOW THIS INSTRUCTION CAN RESULT IN FIRE OR EXPLOSION.

• TO PREVENT THE INDOOR UNIT FROM OVERHEATING AND CAUSING A FIRE HAZARD, PLACE THE UNIT WELL AWAY (MORE THAN 2 M) FROM HEAT SOURCES SUCH AS RADIATORS, HEAT REGISTORS, FURNACE, STOVES, ETC.

• WHEN MOVING THE AIR-CONDITIONER FOR INSTALLATION IN ANOTHER PLACE, BE VERY CAREFUL NOT TO ALLOW THE SPECIFIED REFRIGERANT (R410A) TO BECOME MIXED WITH ANY OTHER GASEOUS BODY INTO THE REFRIGERATION CIRCUIT. IF AIR OR ANY OTHER GAS IS MIXED IN THE REFRIGERANT, THE GAS PRESSURE IN THE REFRIGERATION CIRCUIT WILL BECOME ABNORMALLY HIGH AND IT MAY RESULT IN THE PIPE BURSTING AND POSSIBLE PERSONNEL INJURIES.

• IN THE EVENT THAT THE REFRIGERANT GAS LEAKS OUT OF THE PIPE DURING THE SERVICE WORK AND THE INSTALLATION WORK, IMMEDIATELY LET FRESH AIR INTO THE ROOM. IF THE REFRIGERANT GAS IS HEATED, SUCH AS BY FIRE, GENERATION OF POISONOUS GAS MAY RESULT.

WARNING

• Never modify this unit by removing any of the safety guards or bypass any of the safety interlock switches.

• Do not install in a place which cannot bear the weight of the unit. Personal injury and property damage can result if the unit falls.

• 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 generate.

• The electrical work must be performed by a qualified electrician in accordance with the Installation Manual. Make sure the air conditioner uses an exclusive circuit.
An insufficient circuit capacity or inappropriate installation may cause fire.

• When wiring, use the specified cables and connect the terminals securely to prevent external forces applied to the cable from affecting the terminals.

• Be sure to provide grounding.
Do not connect ground wires to gas pipes, water pipes, lightning rods or ground wires for telephone cables.

• Conform to the regulations of the local electric company when wiring the power supply.
Inappropriate grounding may cause electric shock.

CAUTION

• Exposure of unit to water or other moisture before installation may result in an electrical short.
Do not store in a wet basement or expose to rain or water.

• Do not install in a place that can increase the vibration of the unit. Do not install in a place that can amplify the noise level of the unit or where noise or discharged air might disturb neighbors.

• To avoid personal injury, be careful when handling parts with sharp edges.

• Perform the specified installation work to guard against an earthquake.
If the air conditioner is not installed appropriately, accidents may occur due to the falling unit.

For Reference:
If a heating operation would be continuously performed for a long time under the condition that the outdoor temperature is 0°C or lower, drainage of defrosted water may be difficult due to freezing of the bottom plate, resulting in a trouble of the cabinet or fan.
It is recommended to procure an antifreeze heater locally for a safe installation of the air conditioner.
For details, contact the dealer.
# 2. SPECIFICATIONS

## 2-1. Specifications

<table>
<thead>
<tr>
<th>Unit model</th>
<th>Indoor</th>
<th>42NQV025M2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor</td>
<td>38NYV025M2</td>
<td></td>
</tr>
</tbody>
</table>

### Cooling capacity
- Indoor: 2.5 (kW)
- Outdoor: 38NYV025M2
- Heating capacity:
  - Indoor: 3.2 (kW)
  - Outdoor: 4.0 (kW)

### Cooling capacity range
- Indoor: 1.1 - 2.9 (kW)
- Outdoor: 0.9 - 4.0 (kW)

### Power supply
1Ph/50Hz/220-240V, 1Ph/60Hz/220-230V

### Electric characteristic

<table>
<thead>
<tr>
<th>Indoor</th>
<th>Operation mode</th>
<th>Cooling</th>
<th>Heating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Running current</td>
<td>0.16 - 0.14</td>
<td>0.16 - 0.14</td>
</tr>
<tr>
<td></td>
<td>Power consumption (W)</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Power factor (%)</td>
<td>87</td>
<td>87</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outdoor</th>
<th>Operation mode</th>
<th>Cooling</th>
<th>Heating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Running current</td>
<td>3.54 - 3.76</td>
<td>4.09 - 3.76</td>
</tr>
<tr>
<td></td>
<td>Power consumption (W)</td>
<td>740</td>
<td>855</td>
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<tr>
<td></td>
<td>Power factor (%)</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>Starting current (A)</td>
<td>4.25</td>
<td></td>
</tr>
</tbody>
</table>

### COP (Cooling / Heating)
3.25/3.62

### Operating noise

<table>
<thead>
<tr>
<th>Indoor</th>
<th>(Cooling / Heating) (dB-A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Low</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outdoor</th>
<th>(Cooling / Heating) (dB-A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Low</td>
</tr>
</tbody>
</table>

### Indoor unit

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Height (mm)</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Width (mm)</td>
<td>740</td>
</tr>
<tr>
<td></td>
<td>Depth (mm)</td>
<td>195</td>
</tr>
<tr>
<td>Net weigh (kg)</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Fan motor output (W)</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Air flow rate (Cooling / Heating) (m³ / min)</td>
<td>8.7/9.6</td>
<td></td>
</tr>
</tbody>
</table>

### Outdoor unit

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Height (mm)</th>
<th>530</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Width (mm)</td>
<td>660</td>
</tr>
<tr>
<td></td>
<td>Depth (mm)</td>
<td>240</td>
</tr>
<tr>
<td>Net weigh (kg)</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Compressor Motor output (W)</td>
<td>750</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Single rotary type with DC-inverter variable speed control</td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>DA89X1C-23EZ</td>
<td></td>
</tr>
<tr>
<td>Fan motor output (W)</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Air flow rate (Cooling / Heating) (m³ / min)</td>
<td>27/27</td>
<td></td>
</tr>
</tbody>
</table>

### Piping connection

<table>
<thead>
<tr>
<th>Indoor unit</th>
<th>Liquid side (mm)</th>
<th>∅6.35</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gas side (mm)</td>
<td>∅9.52</td>
</tr>
<tr>
<td>Outdoor unit</td>
<td>Liquid side (mm)</td>
<td>∅6.35</td>
</tr>
<tr>
<td></td>
<td>Gas side (mm)</td>
<td>∅9.52</td>
</tr>
<tr>
<td>Maximum length (m)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Maximum charge-less length (m)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Maximum height difference (m)</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

### Refrigerant
- Name of refrigerant: R410A
- Weight (kg): 0.63

### Wiring connection

- Power supply: 3 Wires: Includes earth (Outdoor)
- Interconnection: 4 Wires: Includes earth

### Usable temperature range

<table>
<thead>
<tr>
<th>Indoor</th>
<th>(Cooling / Heating) (°C)</th>
<th>21 - 32/Up to 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor</td>
<td>(Cooling / Heating) (°C)</td>
<td>15 - 43/10 - 24</td>
</tr>
</tbody>
</table>

* The specification may be subject to change without notice for purpose of improvement.
2-2. Operation Characteristic Curve

*Cooling*

![Cooling Current vs. Compressor Speed]

Conditions:
- Indoor: DB 27°C/WB 19°C
- Outdoor: DB 35°C
- Air Flow: High
- Pipe Length: 5m
- Voltage: 230V

*Heating*

![Heating Current vs. Compressor Speed]

Conditions:
- Indoor: DB 20°C
- Outdoor: DB 7°C/WB 6°C
- Air Flow: High
- Pipe Length: 5m
- Voltage: 230V

2-3. Capacity Variation Ratio According to Temperature

*Cooling*

![Cooling Capacity Ratio vs. Outside Temperature]

Capacity ratio 100% is 2.5kw

Conditions:
- Indoor: DB 27°C/WB 19°C
- Indoor Air Flow: High
- Pipe Length: 5m
- Voltage: 230V

*Heating*

![Heating Capacity Ratio vs. Outside Temperature]

Capacity ratio 100% is 3.2kw

Conditions:
- Indoor: DB 20°C
- Indoor Air Flow: High
- Pipe Length: 5m
- Voltage: 230V
This air conditioner adopts the new refrigerant HFC (R410A) which does not damage the ozone layer.

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

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

3-1. Safety During Installation/Servicing

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

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

   If other refrigerant than R410A is mixed, pressure in the refrigeration cycle becomes abnormally high, and it may cause personal injury, etc. by a rupture.

2. Confirm the used refrigerant name, and use tools and materials exclusive for the refrigerant R410A. The refrigerant name R410A is indicated on the visible place of the outdoor unit of the air conditioner using R410A as refrigerant. To prevent mischarging, the diameter of the service port differs from that of R22.

3. If a refrigeration gas leakage occurs during installation/servicing, be sure to ventilate fully.

   If the refrigerant gas comes into contact with fire, a poisonous gas may occur.

4. When installing or removing an air conditioner, do not allow air or moisture to remain in the refrigeration cycle. Otherwise, pressure in the refrigeration cycle may become abnormally high so that a rupture or personal injury may be caused.

5. After completion of installation work, check to make sure that there is no refrigeration gas leakage.

   If the refrigerant gas leaks into the room, coming into contact with fire in the fan-driven heater, space heater, etc., a poisonous gas may occur.

6. When an air conditioning system charged with a large volume of refrigerant is installed in a small room, it is necessary to exercise care so that, even when refrigerant leaks, its concentration does not exceed the marginal level.

   If the refrigerant gas leakage occurs and its concentration exceeds the marginal level, an oxygen starvation accident may result.

7. Be sure to carry out installation or removal according to the installation manual.

   Improper installation may cause refrigeration trouble, water leakage, electric shock, fire, etc.

8. Unauthorized modifications to the air conditioner may be dangerous. If a breakdown occurs please call a qualified air conditioner technician or electrician.

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

3-2. Refrigerant Piping Installation

3-2-1. Piping Materials and Joints Used

For the refrigerant piping installation, copper pipes and joints are mainly used. Copper pipes and joints suitable for the refrigerant must be chosen and installed. Furthermore, it is necessary to use clean copper pipes and joints whose interior surfaces are less affected by contaminants.

1. Copper Pipes

   It is necessary to use seamless copper pipes which are made of either copper or copper alloy and it is desirable that the amount of residual oil is less than 40 mg/10 m. Do not use copper pipes having a collapsed, deformed or discolored portion (especially on the interior surface).

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

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

   Thicknesses of copper pipes used with R410A are as shown in Table 3-2-1. Never use copper pipes thinner than 0.8 mm even when it is available on the market.
### 2. Joints

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

- **a) Flare Joints**
  
  Flare joints used to connect the copper pipes cannot be used for pipings whose outer diameter exceeds 20 mm. In such a case, socket joints can be used.
  
  Sizes of flare pipe ends, flare joint ends and flare nuts are as shown in Tables 3-2-3 to 3-2-6 below.

- **b) Socket Joints**
  
  Socket joints are such that they are brazed for connections, and used mainly for thick pipings whose diameter is larger than 20 mm.
  
  Thicknesses of socket joints are as shown in Table 3-2-2.

#### Table 3-2-1 Thicknesses of annealed copper pipes

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Outer diameter (mm)</th>
<th>Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>R410A</td>
</tr>
<tr>
<td>1/4</td>
<td>6.35</td>
<td>0.80</td>
</tr>
<tr>
<td>3/8</td>
<td>9.52</td>
<td>0.80</td>
</tr>
<tr>
<td>1/2</td>
<td>12.70</td>
<td>0.80</td>
</tr>
<tr>
<td>5/8</td>
<td>15.88</td>
<td>1.00</td>
</tr>
</tbody>
</table>

#### Table 3-2-2 Minimum thicknesses of socket joints

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Reference outer diameter of copper pipe jointed (mm)</th>
<th>Minimum joint thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4</td>
<td>6.35</td>
<td>0.50</td>
</tr>
<tr>
<td>3/8</td>
<td>9.52</td>
<td>0.60</td>
</tr>
<tr>
<td>1/2</td>
<td>12.70</td>
<td>0.70</td>
</tr>
<tr>
<td>5/8</td>
<td>15.88</td>
<td>0.80</td>
</tr>
</tbody>
</table>

---

### 3-2-2. Processing of Piping Materials

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

#### 1. Flare processing procedures and precautions

- **a) Cutting the Pipe**
  
  By means of a pipe cutter, slowly cut the pipe so that it is not deformed.

- **b) Removing Burrs and Chips**
  
  If the flared section has chips or burrs, refrigerant leakage may occur.
  
  Carefully remove all burrs and clean the cut surface before installation.

- **c) Insertion of Flare Nut**
d) Flare Processing
Make certain that a clamp bar and copper pipe have been cleaned.
By means of the clamp bar, perform the flare processing correctly.
Use either a flare tool for R410A or conventional flare tool.
Flare processing dimensions differ according to the type of flare tool. When using a conventional flare tool, be sure to secure "dimension A" by using a gauge for size adjustment.

Fig. 3-2-1 Flare processing dimensions

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Outer diameter (mm)</th>
<th>Thickness (mm)</th>
<th>A (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flare tool for R410A clutch type</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clutch type</td>
</tr>
<tr>
<td>1/4</td>
<td>6.35</td>
<td>0.8</td>
<td>0 to 0.5</td>
</tr>
<tr>
<td>3/8</td>
<td>9.52</td>
<td>0.8</td>
<td>0 to 0.5</td>
</tr>
<tr>
<td>1/2</td>
<td>12.70</td>
<td>0.8</td>
<td>0 to 0.5</td>
</tr>
<tr>
<td>5/8</td>
<td>15.88</td>
<td>1.0</td>
<td>0 to 0.5</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Outer diameter (mm)</th>
<th>Thickness (mm)</th>
<th>A (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flare tool for R22 clutch type</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clutch type</td>
</tr>
<tr>
<td>1/4</td>
<td>6.35</td>
<td>0.8</td>
<td>0 to 0.5</td>
</tr>
<tr>
<td>3/8</td>
<td>9.52</td>
<td>0.8</td>
<td>0 to 0.5</td>
</tr>
<tr>
<td>1/2</td>
<td>12.70</td>
<td>0.8</td>
<td>0 to 0.5</td>
</tr>
<tr>
<td>5/8</td>
<td>15.88</td>
<td>1.0</td>
<td>0 to 0.5</td>
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</table>

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

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Outer diameter (mm)</th>
<th>Thickness (mm)</th>
<th>Dimension (mm)</th>
<th>Flare nut width (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>A  B  C  D</td>
<td></td>
</tr>
<tr>
<td>1/4</td>
<td>6.35</td>
<td>0.8</td>
<td>9.1 9.2 6.5 13</td>
<td>17</td>
</tr>
<tr>
<td>3/8</td>
<td>9.52</td>
<td>0.8</td>
<td>13.2 13.5 9.7 20</td>
<td>22</td>
</tr>
<tr>
<td>1/2</td>
<td>12.70</td>
<td>0.8</td>
<td>16.6 16.0 12.9 23</td>
<td>26</td>
</tr>
<tr>
<td>5/8</td>
<td>15.88</td>
<td>1.0</td>
<td>19.7 19.0 16.0 25</td>
<td>29</td>
</tr>
</tbody>
</table>
### Table 3-2-6 Flare and flare nut dimensions for R22

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Outer diameter (mm)</th>
<th>Thickness (mm)</th>
<th>Dimension (mm)</th>
<th>Flare nut width (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>1/4</td>
<td>6.35</td>
<td>0.8</td>
<td>9.0</td>
<td>9.2</td>
</tr>
<tr>
<td>3/8</td>
<td>9.52</td>
<td>0.8</td>
<td>13.0</td>
<td>13.5</td>
</tr>
<tr>
<td>1/2</td>
<td>12.70</td>
<td>0.8</td>
<td>16.2</td>
<td>16.0</td>
</tr>
<tr>
<td>5/8</td>
<td>15.88</td>
<td>1.0</td>
<td>19.7</td>
<td>19.0</td>
</tr>
<tr>
<td>3/4</td>
<td>19.05</td>
<td>1.0</td>
<td>23.3</td>
<td>24.0</td>
</tr>
</tbody>
</table>

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

2. **Flare Connecting Procedures and Precautions**
   
a) Make sure that the flare and union portions do not have any scar or dust, etc.
   
b) Correctly align the processed flare surface with the union axis.
   
c) Tighten the flare with designated torque by means of a torque wrench. The tightening torque for R410A is the same as that for conventional R22. Incidentally, when the torque is weak, the gas leakage may occur. When it is strong, the flare nut may crack and may be made non-removable. When choosing the tightening torque, comply with values designated by manufacturers. Table 3-2-7 shows reference values.

**NOTE:**

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

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

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

3-3-1. Required Tools

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

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

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

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

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

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

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

General tools (Conventional tools can be used.)

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

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

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

1. Clamp meter
2. Thermometer
3. Insulation resistance tester
4. Electroscope
3-4. Recharging of Refrigerant

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

---

1. Recover the refrigerant, and check no refrigerant remains in the equipment.
2. Connect the charge hose to packed valve service port at the outdoor unit’s gas side.
3. Connect the charge hose to the vacuum pump adapter.
4. Open fully both packed valves at liquid and gas sides.
5. Place the handle of the gauge manifold Low in the fully opened position, and turn on the vacuum pump’s power switch.
6. When the compound gauge’s pointer has indicated –0.1 Mpa (–76 cmHg), place the handle Low in the fully closed position, and turn off the vacuum pump’s power switch.
7. Keep the status as it is for 1 to 2 minutes, and ensure that the compound gauge’s pointer does not return.
8. Set the refrigerant cylinder to the electronic balance, connect the connecting hose to the cylinder and the connecting port of the electronic balance, and charge liquid refrigerant.

(For refrigerant charging, see the figure below.)

---

1. Never charge refrigerant exceeding the specified amount.
2. If the specified amount of refrigerant cannot be charged, charge refrigerant bit by bit in COOL mode.
3. Do not carry out additional charging.

When additional charging is carried out if refrigerant leaks, the refrigerant composition changes in the refrigeration cycle, that is characteristics of the air conditioner changes, refrigerant exceeding the specified amount is charged, and working pressure in the refrigeration cycle becomes abnormally high pressure, and may cause a rupture or personal injury.

---

Fig. 3-4-1 Configuration of refrigerant charging
1. Be sure to make setting so that **liquid** can be charged.
2. When using a cylinder equipped with a siphon, liquid can be charged without turning it upside down.

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

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

**3-5. Brazing of Pipes**

**3-5-1. Materials for Brazing**

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

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

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

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

2. When performing brazing again at time of servicing, use the same type of brazing filler.

**3-5-2. Flux**

1. **Reason why flux is necessary**
   - By removing the oxide film and any foreign matter on the metal surface, it assists the flow of brazing filler.
   - In the brazing process, it prevents the metal surface from being oxidized.
   - By reducing the brazing filler’s surface tension, the brazing filler adheres better to the treated metal.
2. Characteristics required for flux
   - Activated temperature of flux coincides with the brazing temperature.
   - Due to a wide effective temperature range, flux is hard to carbonize.
   - It is easy to remove slag after brazing.
   - The corrosive action to the treated metal and brazing filler is minimum.
   - It excels in coating performance and is harmless to the human body.

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

3. Types of flux
   - Noncorrosive flux
     Generally, it is a compound of borax and boric acid.
     It is effective in case where the brazing temperature is higher than 800°C.
   - Activated flux
     Most of fluxes generally used for silver brazing are this type.
     It features an increased oxide film removing capability due to the addition of compounds such as potassium fluoride, potassium chloride and sodium fluoride to the borax-boric acid compound.

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

<table>
<thead>
<tr>
<th>Piping material</th>
<th>Used brazing filler</th>
<th>Used flux</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper - Copper</td>
<td>Phosphor copper</td>
<td>Do not use</td>
</tr>
<tr>
<td>Copper - Iron</td>
<td>Silver</td>
<td>Paste flux</td>
</tr>
<tr>
<td>Iron - Iron</td>
<td>Silver</td>
<td>Vapor flux</td>
</tr>
</tbody>
</table>

5-3-3. Brazing

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

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

Never use gas other than Nitrogen gas.

1. Brazing method to prevent oxidation
   1) Attach a reducing valve and a flow-meter to the Nitrogen gas cylinder.
   2) Use a copper pipe to direct the piping material, and attach a flow-meter to the cylinder.
   3) Apply a seal onto the clearance between the piping material and inserted copper pipe for Nitrogen in order to prevent backflow of the Nitrogen gas.
   4) When the Nitrogen gas is flowing, be sure to keep the piping end open.
   5) Adjust the flow rate of Nitrogen gas so that it is lower than 0.05 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. 3-5-1 Prevention of oxidation during brazing
4. CONSTRUCTION VIEWS

4-1. Indoor Unit

- Front panel
- Knock out system
- Air inlet
- Air filter
- Heat exchanger
- Air outlet
- Wireless remote controller
- Remote controller holder
- Hanger
- Drain hose (0.5m)
- Connecting pipe (0.37m) (Flare φ6.35)
- Connecting pipe (0.32m) (Flare φ9.52)
- Center line
- Installation plate outline
- For stud bold (φ8 - φ10)
- For stud bold (φ6)
4-2. Outdoor Unit

A. Detail Drawing (Back Leg)

B. Detail Drawing (Front Leg)

Fan Guard

COVER - PV

Liquid Side (Flare Ø 6.35)

Gas Side (Flare Ø 9.52)

Service Port

Installation Dimension

Air inlet

Air Outlet

500

280

100 or More

400 or More

45 or More
5. WIRING DIAGRAM

5-1. Indoor Unit

Quick check for diagnosing faults

<table>
<thead>
<tr>
<th>Check Items</th>
<th>Diagnosis result</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;1*&quot; OPERATION indicator</td>
<td>Check to see if the OPERATION indicator goes on &amp; off when the main switch or circuit breakers turned on, or power cord is plugged in the wall outlet.</td>
</tr>
<tr>
<td>&quot;2*&quot; Terminal block</td>
<td>Check for the voltage between ① and ② is 220 to 240VAC. Check for the voltage between ② and ③ is 15 to 60VDC.</td>
</tr>
<tr>
<td>&quot;3*&quot; Fuse 3.15A</td>
<td>Check Varistor if the fuse is open.</td>
</tr>
<tr>
<td>&quot;4*&quot; DC5V</td>
<td>Check for the voltage between ② and ③ terminal of CN20.</td>
</tr>
</tbody>
</table>
## 6. SPECIFICATION OF ELECTRICAL PARTS

### 6-1. Indoor Unit

<table>
<thead>
<tr>
<th>No.</th>
<th>Parts name</th>
<th>Type</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fan motor (for indoor)</td>
<td>AFN-220-20-4D</td>
<td>AC Motor with 145°C thermo fuse</td>
</tr>
<tr>
<td>2</td>
<td>Thermo. sensor (TA-sensor)</td>
<td></td>
<td>10 kΩ at 25°C</td>
</tr>
<tr>
<td>3</td>
<td>Switching transformer (T01)</td>
<td>ST-02</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Microcontroller unit (IC81)</td>
<td>µPD780076GK-703-9ET-A</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Heat exchanger sensor (TC-sensor)</td>
<td></td>
<td>10 kΩ at 25°C</td>
</tr>
<tr>
<td>6</td>
<td>Line filter (L01)</td>
<td>SS11V-R06270</td>
<td>27 mH, AC 0.6A</td>
</tr>
<tr>
<td>7</td>
<td>Bridge diode (DB01)</td>
<td>DB105G</td>
<td>1A, 600V</td>
</tr>
<tr>
<td>8</td>
<td>Capacitor (C27)</td>
<td>EKMH401VSN470MP20S</td>
<td>47μF, 400V</td>
</tr>
<tr>
<td>9</td>
<td>Fuse (F01)</td>
<td>FJL250V3.15A</td>
<td>3.15A, 250 V</td>
</tr>
<tr>
<td>10</td>
<td>Regulator IC (IC02)</td>
<td>S7805PIC</td>
<td>5VDC, 0.5A</td>
</tr>
<tr>
<td>11</td>
<td>Varistor (R01)</td>
<td>SR561K14DO</td>
<td>560V</td>
</tr>
<tr>
<td>12</td>
<td>Louver motor</td>
<td>24BYJ48</td>
<td>DC 12V</td>
</tr>
</tbody>
</table>

### 6-2. Outdoor Unit

<table>
<thead>
<tr>
<th>No.</th>
<th>Parts name</th>
<th>Model name</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SC coil (Noise filter)</td>
<td>L01 GET-04051, L03 GET-04052</td>
<td>0.6mH, 15A, 2.0mH, 10A</td>
</tr>
<tr>
<td>2</td>
<td>DC-DC transformer</td>
<td>SWT-72</td>
<td>Primary side DC280V, Secondary side 7.0 V x 1, 12 V x 1, 17V x 2</td>
</tr>
<tr>
<td>3</td>
<td>Reactor</td>
<td>CH-69-Z-T</td>
<td>L=19mH, 10A</td>
</tr>
<tr>
<td>4</td>
<td>Outside fan motor</td>
<td>WLF-240-20A-1</td>
<td>20W</td>
</tr>
<tr>
<td>5</td>
<td>Fan control relay</td>
<td>G5NB-1A</td>
<td>Coil DC12V Contact AC250V-1.5A</td>
</tr>
<tr>
<td>6</td>
<td>Outside air temp. sensor (TO sensor)</td>
<td>(Inverter attached)</td>
<td>10kΩ (25°C)</td>
</tr>
<tr>
<td>7</td>
<td>Heat exchanger temp. sensor (TE sensor)</td>
<td>(Inverter attached)</td>
<td>10kΩ (25°C)</td>
</tr>
<tr>
<td>8</td>
<td>Discharge temp. sensor (TD sensor)</td>
<td>(Inverter attached)</td>
<td>62kΩ (20°C)</td>
</tr>
<tr>
<td>9</td>
<td>Terminal block (6P)</td>
<td>JX0-6B</td>
<td>20A, AC250V</td>
</tr>
<tr>
<td>10</td>
<td>Fuse</td>
<td>For protection of switching power source</td>
<td>3.15A, AC250V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For protection of inverter input overcurrent</td>
<td>25A, AC250V</td>
</tr>
<tr>
<td>11</td>
<td>Electrolytic capacitor</td>
<td>LLQ2G501KHUBTF</td>
<td>500μF, DC 400 V x 3 pieces</td>
</tr>
<tr>
<td>12</td>
<td>IGBT</td>
<td>GT15J321</td>
<td>15A, 600</td>
</tr>
<tr>
<td>13</td>
<td>Compressor</td>
<td>DA89X1C-23EZ</td>
<td>3-phases 4-poles 750W</td>
</tr>
<tr>
<td>14</td>
<td>Rectifier</td>
<td>D15XB60-4001</td>
<td>15A, 600V</td>
</tr>
<tr>
<td>15</td>
<td>4-way valve coil</td>
<td></td>
<td>AC220-240V</td>
</tr>
<tr>
<td>16</td>
<td>Running capacitor (for fan motor)</td>
<td>DS451155NPQB</td>
<td>AC450V, 1.5μF</td>
</tr>
</tbody>
</table>
7. REFRIGERANT CYCLE DIAGRAM

7-1. Refrigerant Cycle Diagram

NOTE:
- The maximum pipe length of this air conditioner is 10 m. The addition charging of refrigerant is unnecessary because this air conditioner is designed with charge-less specification.
7-2. Operation Data

<Cooling>

<table>
<thead>
<tr>
<th>Temperature condition(°C)</th>
<th>Standard pressure P (MPa)</th>
<th>Heat exchanger pipe temp.</th>
<th>Indoor fan mode</th>
<th>Outdoor fan mode</th>
<th>Compressor revolution (rps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor</td>
<td>Outdoor</td>
<td>Indoor</td>
<td>Outdoor</td>
<td>Indoor</td>
<td>Outdoor</td>
</tr>
<tr>
<td>27/19</td>
<td>35/-</td>
<td>0.9 to 1.1</td>
<td>9 to 11</td>
<td>47 to 49</td>
<td>High</td>
</tr>
</tbody>
</table>

<Heating>

<table>
<thead>
<tr>
<th>Temperature condition(°C)</th>
<th>Standard pressure P (MPa)</th>
<th>Heat exchanger pipe temp.</th>
<th>Indoor fan mode</th>
<th>Outdoor fan mode</th>
<th>Compressor revolution (rps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor</td>
<td>Outdoor</td>
<td>Indoor</td>
<td>Outdoor</td>
<td>Indoor</td>
<td>Outdoor</td>
</tr>
<tr>
<td>20/-</td>
<td>7/6</td>
<td>2.4 to 2.6</td>
<td>43 to 45</td>
<td>0 to 3</td>
<td>High</td>
</tr>
</tbody>
</table>

NOTES:

1. Measure surface temperature of heat exchanger pipe around center of heat exchanger path U bent.
   (Thermistor thermometer)
2. Connecting piping condition 5 m
8. CONTROL BLOCK DIAGRAM

8-1. Indoor Unit

- Heat Exchanger Sensor
- Temperature Sensor
- Infrared Rays Signal Receiver
- Infrared Rays
  - 36.7kHz
- Initializing Circuit
- Clock Frequency Oscillator Circuit
- Power Supply Circuit
- Noise Filter
- Operation Display
- Timer Display
- Indoor Fan Motor
- Louver ON/OFF Signal
- Louver Driver
- Louver Motor
- Serial Signal Transmitter/Receiver
- Serial Signal Communication
- M.C.U

REMOTE CONTROL

- Remote Control
- Infrared Rays
- Operation (▲)
- Operation Mode Selection
  - AUTO, COOL, DRY, HEAT
- Temperature Setting
- Fan Speed Selection
- ON TIMER Setting
- OFF TIMER Setting
- Louver Auto Swing
- Louver Direction Setting
- ECO
8-2. Outdoor Unit

- Outdoor Unit
- Indoor Unit
- 230V 50Hz signal
- Noise filter
- Input current sensor
- Converter (AC→DC)
- Inverter (DC→AC)
- Gate drive circuit
- Rotor position detect circuit
- Over current sensor
- High power factor correction circuit
- Relay
- Fan motor
- 4-way Valve
- Over voltage sensor
- Gate driver circuit
- Rotor position detect circuit
- Outdoor fan motor
- High power factor correction control
- Outdoor fan control
- Indoor fan control
- High power factor correction control
- Signal communication to indoor unit M.C.U
- 1. PWM synthesis function
- 2. Input current release control
- 3. IGBT over-current detect control
- 4. Outdoor fan control
- 5. High power factor correction control
- 6. Signal communication to indoor unit M.C.U
- P.C.B (MCC 5009)
- Discharge temp. sensor
- Outdoor air temp. sensor
- Heat Exchanger temp. sensor
9. OPERATION DESCRIPTION

9-1. Outline of Air Conditioner Control
This air conditioner is a capacity-variable type air conditioner, which uses AC motor both the indoor fan motor and the outdoor fan motor. And the capacity-proportional control compressor which can change the motor speed in the range from 22 to 83 rps is mounted. The AC motor drive circuit is mounted to the indoor unit. The compressor and the inverter is mounted to the outdoor unit.

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

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

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

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

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

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

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

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

- Compressor operation control
- 4-way valve control

Operations followed to judgment of serial signal from indoor side

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

3. Contents of operation command signal (Serial signal) from indoor unit controller to outdoor unit controller
The following three types of signals are sent from the indoor unit controller.

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

4. Contents of operation command signal (Serial signal) from outdoor unit controller to indoor unit controller
The following signals are sent from the outdoor unit controller.

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

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

Contents of judgment are described below.

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

When no signal is received from the outdoor unit controller, it is assumed as a trouble.
9-2. Operation Description

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<table>
<thead>
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<th>Item</th>
<th>Operation flow and applicable data, etc.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Basic operation</td>
<td>1. Operation control</td>
<td>Receiving the user’s operation condition setup, the operation statuses of indoor/outdoor units are controlled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1) The operation conditions are selected by the remote controller as shown in the below.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) A signal is sent by ON button of the remote controller.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) The signal is received by a sensor of the indoor unit and processed by the indoor controllers as shown in the below.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) The indoor controller controls the indoor fan motor and louver motor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5) The indoor controller sends the operation command to the outdoor controller, and sends/receives the control status with a serial signal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6) The outdoor controller controls the operation as shown in the left, and also controls the compressor, outdoor fan motor and 4-way valve.</td>
</tr>
</tbody>
</table>

**Remote controller**

- Selection of operation conditions
- Control contents of remote controller
  - ON/OFF (Air conditioner)
  - Operation select (COOL/HEAT/AUTO/DRY)
  - Temperature setup
  - Air direction
  - Swing
  - Air volume select (AUTO/LOW/LOW+/MED/MED+/HIGH)
  - ECO
  - ON timer setup
  - OFF timer setup
  - Hi-POWER

**Indoor unit**

- Signal receiving
- Indoor unit control
  - Command signal generating function of indoor unit operation
  - Calculation function (temperature calculation)
  - Activation compensation function of indoor fan
  - Cold draft preventive function
  - Timer function
  - Indoor heat exchanger release control

**Outdoor unit**

- Serial signal send/receive
- Outdoor unit control
  - Frequency control of inverter output
  - Waveform composite function
  - Calculation function (Temperature calculation)
  - AD conversion function
  - Quick heating function
  - Delay function of compressor reactivation
  - Current release function
  - GTr over-current preventive function
  - Defrost operation function

**Files**

- FILE NO. SVM-10042
1. Basic operation

2. Cooling/Heating operation

The operations are performed in the following parts by controls according to cooling/heating conditions.

1) Receiving the operation ON signal of the remote controller, the cooling or heating operation signal starts being transferred from the indoor controller to the outdoor unit.

2) At the indoor unit side, the indoor fan is operated according to the contents of “2. Indoor fan motor control” and the louver according to the contents of “9. Louver control”, respectively.

3) The outdoor unit controls the outdoor fan motor, compressor and 4-way valve according to the operation signal sent from the indoor unit.

---

3. AUTO operation

Selection of operation mode

As shown in the following figure, the operation starts by selecting automatically the status of room temperature (Ta) when starting AUTO operation.

*1. When reselecting the operation mode, the fan speed is controlled by the previous operation mode.

4. DRY operation

DRY operation is performed according to the difference between room temperature and the setup temperature as shown below.

In DRY operation, fan speed is controlled in order to prevent lowering of the room temperature and to avoid air flow from blowing directly to persons.

---

FILE NO. SVM-10042
2. Indoor fan motor control

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

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

* The fan speed broadly varies due to position of the louver, etc. The described value indicates one under condition of inclining downward blowing.

1) When setting the fan speed to L, L+, M, M+ or H on the remote controller, the operation is performed with the constant speed shown in Fig. 1.

2) When setting the fan speed to AUTO on the remote controller, revolution of the fan motor is controlled to the fan speed level shown in Fig. 2 and Table 1 according to the setup temperature, room temperature, and heat exchanger temperature.

(Table 1) Indoor fan and air flow rate

<table>
<thead>
<tr>
<th>Fan speed level</th>
<th>COOL</th>
<th>HEAT</th>
<th>DRY</th>
<th>Fan speed (rpm)</th>
<th>Air flow rate (m³/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WF</td>
<td>UH</td>
<td></td>
<td></td>
<td>1350</td>
<td>607</td>
</tr>
<tr>
<td>WE</td>
<td>H</td>
<td></td>
<td></td>
<td>1300</td>
<td>576</td>
</tr>
<tr>
<td>WD</td>
<td>UH</td>
<td>M+</td>
<td>UH</td>
<td>1250</td>
<td>554</td>
</tr>
<tr>
<td>WC</td>
<td>H</td>
<td></td>
<td></td>
<td>1200</td>
<td>522</td>
</tr>
<tr>
<td>WB</td>
<td>M+</td>
<td>M</td>
<td>M+</td>
<td>1120</td>
<td>486</td>
</tr>
<tr>
<td>WA</td>
<td>M</td>
<td></td>
<td></td>
<td>1100</td>
<td>468</td>
</tr>
<tr>
<td>W9</td>
<td>M</td>
<td>L+</td>
<td>L+</td>
<td>1040</td>
<td>444</td>
</tr>
<tr>
<td>W8</td>
<td>L</td>
<td></td>
<td></td>
<td>960</td>
<td>402</td>
</tr>
<tr>
<td>W7</td>
<td>L+</td>
<td>L-</td>
<td>L+</td>
<td>910</td>
<td>376</td>
</tr>
<tr>
<td>W6</td>
<td>L</td>
<td></td>
<td></td>
<td>880</td>
<td>360</td>
</tr>
<tr>
<td>W5</td>
<td>L-</td>
<td>UL</td>
<td>L-</td>
<td>830</td>
<td>334</td>
</tr>
<tr>
<td>W4</td>
<td>UL</td>
<td></td>
<td></td>
<td>800</td>
<td>318</td>
</tr>
<tr>
<td>W3</td>
<td>SUL</td>
<td></td>
<td>SUL</td>
<td>700</td>
<td>266</td>
</tr>
<tr>
<td>W2</td>
<td>SUL</td>
<td></td>
<td></td>
<td>650</td>
<td>239</td>
</tr>
<tr>
<td>W1</td>
<td>SUL</td>
<td></td>
<td></td>
<td>600</td>
<td>213</td>
</tr>
</tbody>
</table>
### Item 2. Indoor fan motor control

#### Description

1. **In heating operation**

   - **Operation flow and applicable data, etc.**

   ![HEAT ON](image)

   ![Manual](image)

   **Indication**

   **Fan speed**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Fan speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>W8</td>
</tr>
<tr>
<td>L+</td>
<td>(L + M) / 2</td>
</tr>
<tr>
<td>M</td>
<td>WA</td>
</tr>
<tr>
<td>M+</td>
<td>(M + H) / 2</td>
</tr>
<tr>
<td>H</td>
<td>WE</td>
</tr>
</tbody>
</table>

   ![TC ≥ 42 C](image)

   **YES**

   **Min air flow rate control**

   ![Limited to Min WD tap](image)

   \[* \text{Fan speed} = \frac{(TC - (42 + a))}{10} \times (WD - W8) + W8\]

   \[a: \text{In up operation 1, in down operation 0}\]

   \[\text{Limited to Min WD tap}\]

   ![Cold draft preventive control](image)

   **In starting and in stability**

   ![In starting](image)

   ![In stability](image)

<table>
<thead>
<tr>
<th><strong>In starting</strong></th>
<th><strong>In stability</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FAN AUTO</strong></td>
<td></td>
</tr>
<tr>
<td>• Until 12 minutes passed after operation start</td>
<td>• When 12 to 25 minutes passed after operation start and room temp. is higher than (set temp. –3°C)</td>
</tr>
<tr>
<td>• When 12 to 25 minutes passed after operation start and room temp. is 3°C or lower than set temp.</td>
<td>• When 25 minutes or more passed after operation start</td>
</tr>
<tr>
<td><strong>FAN Manual</strong></td>
<td></td>
</tr>
<tr>
<td>• Room temp. &lt; Set temp. –4°C</td>
<td>• Room temp. ≥ Set temp. –3.5°C</td>
</tr>
</tbody>
</table>

2. **In starting and in stability**

   - **Until 12 minutes passed after operation start**
   - **When 12 to 25 minutes passed after operation start**
   - **Room temp. < Set temp. –4°C**
   - **When 12 to 25 minutes passed after operation start**
   - **Room temp. > Set temp. –3.5°C**

3. **In stability**

   - **When 12 to 25 minutes passed after operation start**
   - **Room temp. > Set temp. –3.5°C**
### 3. Capacity control

The cooling or heating capacity depending on the load is adjusted. According to the difference between the setup value of temperature and the room temperature, the capacity is adjusted by the compressor revolution.

#### Remote controller
- **Set temp.** (Ts)
- **Room temp.** (Ta)
- **Ts – Ta**
- **Correction of Hz signal**
- **Detection of electromotive force of compressor motor winding**
- **Detection of motor speed and rotor position**
- **Correction value of Hz signal ≤ Operating Hz**
- **Inverter output change**
- **Commutation timing change**
- **Change of compressor speed**

#### Indoor unit

1. The difference between set temperature on remote controller (Ts) and room temperature (Ta) is calculated.
2. According to the temperature difference, the correction value of Hz signal which determines the compressor speed is set up.
3. The rotating position and speed of the motor are detected by the electromotive force occurred on the motor winding with operation of the compressor.
4. According to the difference resulted from comparison of the correction value of Hz signal with the present operation Hz, the inverter output and the commutation timing are varied.
5. Change the compressor motor speed by outputting power to the compressor.

* The contents of control operation are same in cooling operation and heating operation.

### 4. Current release control

This function prevents troubles on the electronic parts of the compressor driving inverter. This function also controls drive circuit of the compressor speed so that electric power of the compressor drive circuit does not exceed the specified value.

#### Outdoor unit inverter main circuit control current
- **Outdoor temp. To**
- **Setup of current release point**
- **Operating current ≤ Setup value**
  - **High**
    - **Reduce compressor speed**
  - **Low**
    - **Current decrease**

Capacity control continues.

#### Table: Current release values

<table>
<thead>
<tr>
<th>Outdoor temp.</th>
<th>Cooling current release value</th>
<th>Heating current release value</th>
</tr>
</thead>
<tbody>
<tr>
<td>45°C</td>
<td>3.60A</td>
<td>7.72A</td>
</tr>
<tr>
<td>40°C</td>
<td>44°C 5.17A</td>
<td></td>
</tr>
<tr>
<td>39°C</td>
<td>16°C 5.17A</td>
<td></td>
</tr>
<tr>
<td>15.5°C</td>
<td>10.5°C 9.26A</td>
<td></td>
</tr>
<tr>
<td>11°C</td>
<td></td>
<td>10.80A</td>
</tr>
<tr>
<td>Item</td>
<td>Operation flow and applicable data, etc.</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 5. Release protective control by temperature of indoor heat exchanger | <In cooling/dry operation> (Prevent-freezing control for indoor heat exchanger) In cooling/dry operation, the sensor of indoor heat exchanger detects evaporation temperature and controls the compressor speed so that temperature of the heat exchanger does not exceed the specified value.                   | 1) When temperature of the indoor heat exchanger drops below 5°C, the compressor speed is reduced. (P zone)  
2) When temperature of the indoor heat exchanger rises in the range from 6°C to under 7°C, the compressor speed is kept. (Q zone)  
3) When temperature of the indoor heat exchanger rises to 7°C or higher, the capacity control operation returns to the usual control in cooling operation. (R zone) |

![Diagram](chart1.png)

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

![Diagram](chart2.png)
6. Defrost control  
(Only in heating operation)

(This function removes frost adhered to the outdoor heat exchanger.)

The temperature sensor of the outdoor heat exchanger (Te sensor) judges the frosting status of the outdoor heat exchanger and the defrost operation is performed with 4-way valve reverse defrost system.

The necessity of defrost operation is detected by the outdoor heat exchanger temperature. The conditions to detect the necessity of defrost operation differ in A, B, or C zone each. (Table 1)

**<Defrost operation>**
- Defrost operation in A to C zones
  1) Stop operation of the compressor for 20 seconds.
  2) Invert (OFF) 4-way valve 10 seconds after stop of the compressor.
  3) The outdoor fan stops at the same time when the compressor stops.
  4) When temperature of the indoor heat exchanger becomes 38°C or lower, stop the indoor fan.

**<Finish of defrost operation>**
- Returning conditions from defrost operation to heating operation
  1) Temperature of outdoor heat exchanger rises to +8°C or higher.
  2) Temperature of outdoor heat exchanger is kept at +5°C or higher for 80 seconds.
  3) Defrost operation continues for 15 minutes.

**<Returning from defrost operation>**
1) Stop operation of the compressor for approx. 50 seconds.
2) Invert (ON) 4-way valve approx. 40 seconds after stop of the compressor.
3) The outdoor fan starts rotating at the same time when the compressor starts.

---

**Table 1**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A zone</td>
<td>When Te0 - TE ≥ 2.5 continued for 2 minutes in A zone, defrost operation starts.</td>
</tr>
<tr>
<td>B zone</td>
<td>When the operation continued for 2 minutes in B zone, defrost operation starts.</td>
</tr>
<tr>
<td>C zone</td>
<td>When Te0 - TE ≥ 3 continued for 2 minutes in C zone, defrost operation starts.</td>
</tr>
</tbody>
</table>

* The minimum value of Te sensor 10 to 15 minutes after start of operation is stored in memory as Te0.
<table>
<thead>
<tr>
<th>Item</th>
<th>Operation flow and applicable data, etc.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Louver control</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1) Louver position | This function controls the air direction of the indoor unit.  
- The position is automatically controlled according to the operation mode (COOL/HEAT).  
- The set louver position is stored in memory by the microcomputer, and the louver returns to the stored position when the next operation is performed. (Cooling/Heating memory position)  
The angle of the louver is indicated as the louver closes fully is 0°. | |
| | 1) Louver position in cooling operation | |
| | ![Diagram of Louver position in cooling operation](image) | |
| | ![Initial setting of "Cooling storage position"](image)  
Louver : Directs downward (48°) | |
| | 2) Louver position in heating operation | |
| | ![Diagram of Louver position in heating operation](image) | |
| | ![Initial setting of "Heating storage position"](image)  
Louver : Directs downward (115.7°) | |
| 2) Air direction adjustment | | |
| | ![Diagram of Air direction](image) | |
| | Horizontal blowing  
Inclined blowing  
Blowing downward  
Inclined blowing  
Horizontal blowing | |
| | 3) Swing | |
| | - Swing operation is performed in width 35° with the stop position as the center.  
- If the stop position exceeds either upper or lower limit position, swing operation is performed in width 35° from the limit which the stop position exceeded. | |
| | ![Diagram of Swing operation](image) | |
| | • The louver position can be arbitrarily set up by pressing [FIX] button. | |
| | • Swing  
When pressing [SWING] button during operation, the louver starts swinging. | |
8. ECO operation

When pressing [ECO] button on the remote controller, a Economic operation is performed.

**Cooling operation**

This function operates the air conditioner with the difference between the set and the room temperature as shown in the following figure.

\[
\begin{align*}
\text{Room temp.} - \text{Set temp.} & \quad \text{Cool min} \\
\text{Frequency} & \quad \text{DRY max}
\end{align*}
\]

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

**Heating operation**

1) Setting the compressor speed to Max. aHz, the temperature zone in which the operation can be performed with Max. cHz is gradually widened after 30 minutes passed when starting ECO operation.

2) The indoor fan speed is depend on presetting and can change every speed after setting ECO operation.
9. Temporary operation

Pressing [RESET] button starts the temporary operation of [AUTO] operation. When keeping [RESET] button pressed for 10 seconds or more, the temporary [COOL] operation is performed.

- Filter lamp ON
  - NO: Temporary [AUTO] operation
- Did you press [RESET] button for 3 seconds or more?
  - YES: Temporary [AUTO] operation
  - NO: Temporary [COOL] Operation
- Did you press [RESET] button for 10 seconds or more?
  - YES: Switch to [AUTO RESTART] control.
  - NO: Temporary [COOL] Operation

Description

1) When pressing [RESET] button, the temporary [AUTO] operation starts.
2) When keeping [RESET] button pressed for 3 seconds or more, Pi, Pi, Pi sound is heard and [AUTO RESTART] control is changed.
3) When keeping [RESET] button pressed for 10 seconds or more, “Pi” sound is heard and the temporary [COOL] operation starts.
4) If the filter lamp goes on, press [RESET] button to go off the filter lamp, and then press [RESET] button again.
5) To stop the temporary operation, press the button again.

10. Discharge temperature control

<table>
<thead>
<tr>
<th>Td value</th>
<th>Control operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>117°C</td>
<td>Judges as an error and stops the compressor.</td>
</tr>
<tr>
<td>112°C</td>
<td>Reduce the compressor speed.</td>
</tr>
<tr>
<td>108°C</td>
<td>Reduce slowly compressor speed.</td>
</tr>
<tr>
<td>105°C</td>
<td>Keeps the compressor speed.</td>
</tr>
<tr>
<td>98°C</td>
<td>If the operation is performed with lower speed than one commanded by the serial signal, speed is slowly raised up to the commanded speed.</td>
</tr>
<tr>
<td></td>
<td>Operates with speed commanded by the serial signal.</td>
</tr>
</tbody>
</table>

1. Purpose
This function detects error on the refrigerating cycle or error on the compressor, and performs protective control.

2. Operation
- Control of the compressor speed
  The speed control is performed as described in the left table based upon the discharge temperature.
### 11. Remote-A or B selection

<table>
<thead>
<tr>
<th>Item</th>
<th>Operation flow and applicable data, etc.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting the remote controller</td>
<td>To separate using of remote control for each indoor unit in case of 2 air conditioner are installed nearly.</td>
<td>1. <strong>Purpose</strong> This operation is to operate only one indoor unit using one remote controller.</td>
</tr>
<tr>
<td></td>
<td><strong>Remote Control B Setup.</strong></td>
<td>2. <strong>Description</strong> When operating one indoor unit in a situation where two indoor units have been installed in the same room or nearby rooms, this operation prevents the remote controller signal from being received simultaneously by both units, thus preventing both units from operating.</td>
</tr>
<tr>
<td></td>
<td>1) Press RESET button on the indoor unit to turn the air conditioner ON.</td>
<td>3. <strong>Operation</strong> The indoor unit on which the remote controller selection has been set to B receives the signal of the remote controller also set to B. (At the factory the remote controller selection is set to A on all the indoor units. There is no A setting display.)</td>
</tr>
<tr>
<td></td>
<td>2) Point the remote control at the indoor unit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3) Push and hold CHK • button on the Remote Control by the tip of the pencil. *&quot;00&quot; will be shown shown on the display.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4) Press MODE • during pushing CHK •. &quot;B&quot; will show on the display and &quot;00&quot; will disappear and the air conditioner will turn OFF. The Remote Control B is memorized.</td>
<td></td>
</tr>
<tr>
<td>Note:</td>
<td>1. Repeat above step to reset Remote Control to be A.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Remote Control A has mot &quot;A&quot; display.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Default setting of Remote Control from factory is A.</td>
<td></td>
</tr>
</tbody>
</table>

![Remote Control Display](image)
<table>
<thead>
<tr>
<th>Item</th>
<th>Operation flow and applicable data, etc.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Hi-POWER Mode</td>
<td>([Hi-POWER] button on the remote controller is pressed) When [Hi-POWER] button is pressed while the indoor unit is in Auto, Cooling or Heating operation, Hi-POWER mark is indicated on the display of the remote controller and the unit operates as follows.</td>
<td></td>
</tr>
</tbody>
</table>
|              | **1. Automatic operation**  
- The indoor unit operates in according to the current operation. |             |
|              | **2. Cooling operation**  
- The preset temperature drops 1°C  
  (The value of the preset temperature on the remote controller does not change.)  
  The indoor unit's fan speed level increase 1 tap |             |
|              | **3. Heating operation**  
- The preset temperature increases 2°C  
  (The value of the preset temperature on the remote controller does not change.)  
  The indoor unit's fan speed level increase 1 tap |             |
|              | **4. The Hi-POWER mode can not be set in Dry operation** |             |
9-3. **Auto Restart Function**

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

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

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

To set the auto restart function, proceed as follows:

The power supply to the unit must be on; the function will not set if the power is off.

Press the [RESET] button located in the center of the front panel continuously for three seconds.

The unit receives the signal and beeps three times.

The unit then restarts operating automatically in the event of power supply being accidentally shut down.

**• When the unit is standby (Not operating)**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Motions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press [RESET] button for more than three seconds. (Less than 10 seconds)</td>
<td>The unit is on standby. ↓ The unit starts to operate. The green indicator is on. ↓ After approx. three seconds, The unit beeps three times and continues to operate.</td>
</tr>
</tbody>
</table>

If the unit is not required to operate at this time, press [RESET] button once more or use the remote controller to turn it off.

**• When the unit is in operation**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Motions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press [RESET] button for more than three seconds. (Less than 10 seconds)</td>
<td>The unit is in operation. The green indicator is on. ↓ The unit stops operating. The green indicator is turned off. ↓ After approx. three seconds, The unit beeps three times.</td>
</tr>
</tbody>
</table>

If the unit is required to operate at this time, press [RESET] button once more or use the remote controller to turn it on.

**• While the filter check indicator is on, the RESET button has the function of filter reset button.**
9-3-2. How to Cancel the Auto Restart Function

To cancel auto restart function, proceed as follows:

Repeat the setting procedure: the unit receives the signal and beeps three times.
The unit will be required to be turned on with the remote controller after the main power supply is turned off.

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

<table>
<thead>
<tr>
<th>Operation</th>
<th>Motions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press [RESET] button for more than three seconds. (Less than 10 seconds)</td>
<td>The unit is on stand-by. ↓ The unit starts to operate. The green indicator is on. ↓ After approx. three seconds, The unit beeps three times and continues to operate. If the unit is not required to operate at this time, press [RESET] button once more or use the remote controller to turn it off.</td>
</tr>
</tbody>
</table>

- When the system is operating

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

9-3-3. Power Failure During Timer Operation

When the unit is turned off because of power failure during timer operation, the timer operation is cancelled. In that case, set the timer operation again.

**NOTE:**
The Everyday Timer is reset while a command signal can be received from the remote controller even if it stopped due to a power failure.
9-4. Remote control
9-4-1. Remote control and its functions

1. Infrared signal emitter
2. Start/Stop button (O)
3. Mode select button (M)
4. Temperature button (C)
5. Fan speed button (G)
6. Swing louver button (S)
7. Set louver button (D)
8. On timer button (O)
9. Off timer button (F)
10. Sleep timer button (Q)
11. Setup button (O)
12. Clear button (S)
13. Memory and Preset button (P)
14. High power button (W)
15. Economy button (E)
16. Filter reset button (H)
17. Clock reset button (C)
18. Check button (R)

Note: Some models, remote will have text above the buttons.

9-4-2. Operation of remote control

1. AUTOMATIC OPERATION
   To automatically select cooling, heating, or fan only operation.
   1. Press M MODE : Select A.
   2. Press U MODE : Set the desired temperature.

2. COOLING / HEATING / FAN ONLY OPERATION
   1. Press M MODE : Select Cool ☑️, Heat ☑️, or Fan only ☑️.
   2. Press U MODE : Set the desired temperature.
      Cooling: Min. 17°C, Heating: Max. 30°C, Fan Only: No temperature indication
   3. Press O : Select AUTO, LOW ☑️, LOW+ ☑️, MED ☑️, MED+ ☑️, or HIGH ☑️.

3. DRY OPERATION (COOLING ONLY)
   For dehumidification, a moderate cooling performance is controlled automatically.
   1. Press M MODE : Select Dry ☑️.
   2. Press U MODE : Set the desired temperature.

4. HI-POWER OPERATION
   To automatically control room temperature and airflow for faster cooling or heating operation (except in DRY and FAN ONLY mode)
   Press HI-POWER : Start and stop the operation.
5. ECO OPERATION
To automatically control room to save energy (except in DRY and FAN ONLY mode)

Press : Start and stop the operation.

Note: Cooling operation; the set temperature will increase automatically 1 degree/hour for 2 hours (maximum 2 degrees increase). For heating operation the set temperature will decrease.

6. TEMPORARY OPERATION
In case of the misplaced or discharged remote control

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

7. TIMER OPERATION

<table>
<thead>
<tr>
<th>Setting the ON Timer</th>
<th>Setting the OFF Timer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Press : Set the desired ON timer.</td>
<td>Press : Set the desired OFF timer.</td>
</tr>
<tr>
<td>2 Press : Set the timer</td>
<td>Press : Set the timer.</td>
</tr>
<tr>
<td>3 Press : Cancel the timer</td>
<td>Press : Cancel the timer</td>
</tr>
</tbody>
</table>

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

**Setting Everyday Timer**

| 1 Press : Set the ON timer. | 3 Press . |
| 2 Press : Set the OFF timer. | 4 Press button during the ( or ) mark flashing. |

- During the every day timer is activation, both arrows ( or ) are indicated.

Note:
- Keep the remote control in accessible transmission to the indoor unit; otherwise, the time lag of up to 15 minutes will occur.
- The setting will be saved for the next same operation.

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

1. Select your preferred operation.
2. Press and hold P for 3 seconds to memorize the setting. The mark displays.
3. Press P: Operate the preset operation.
9. AUTO RESTART OPERATION
To automatically restart the conditioner after the power failure (Power of the unit must be on.)

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

10. SLEEP TIMER OPERATION
To start the sleep timer (OFF timer) operation

   Press ☼ : Select 1, 3, 5 or 9 hrs for OFF timer operation.
9-4-3. Name and Functions of Indications on Remote Controller

[Display]

All indications, except for the clock time indicator, are displayed by pressing the ◇ button.

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

2 **Mode indicator**
   Indicates the current operation mode.
   (AUTO : Automatic control, A : Auto changeover control, ◆ : Cool, ◆ : Dry, ☀ : Heat, ☼ : Fan only)

3 **Temperature indicator**
   Indicates the temperature setting.
   (17°C to 30°C)

4 **FAN speed indicator**
   Indicates the selected fan speed.
   AUTO or five fan speed levels
   (LOW ▼, LOW+ ▼, MED ▼, MED+ ▼, HIGH ▼) can be shown.
   Indicates AUTO when the operating mode is either AUTO or ◆ : Dry.

5 **TIMER and clock time indicator**
   The time setting for timer operation or the clock time is indicated.
   The current time is always indicated except during TIMER operation.

6 **Hi-POWER indicator**
   Indicates when the Hi-POWER operation starts.
   Press the Hi-POWER button to start and press it again to stop the operation.

7 **P (PRESET) indicator**
   Flashes for 3 seconds when the PRESET button is pressed during operation.
   The P mark is shown when holding down the button for more than 3 seconds while the mark is flashing.
   Press another button to turn off the mark.

8 **ECO indicator**
   Indicates when the ECO is in activated.
   Press the ECO button to start and press it again to stop operation.

9 **A, B change indicator remote controller**
   When the remote controller switching function is set, "B" appears in the remote controller display.
   (When the remote controller setting is "A", there is no indication at this position.)

10 **Swing**
   Indicates when louver is swing.
   Press swing button to start the swing operation and press it again to stop the swing operation.
Before installing the wireless remote controller

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

---

**Diagram Elements:**

- **Wireless remote controller**
- **Batteries**
- **Pan head wood screw**
- **Remote control holder**
- **Installation plate**
- **Wall**
- **Shield pipe**
- **Air filter**
- **Nano Silver Ginseng filter**
- **Nano-Photo Copper Zinc filter**
- **Extension drain hose**
- **Saddle**
- **Vinyl tape**
- **6 mm thick heat resisting polyethylene foam**

---

**Installation Notes:**

- For the rear left and left piping:
  - Insert the cushion between the indoor unit and wall, and tilt the indoor unit for better operation.

- Do not allow the drain hose to get slack.
  - Cut the piping hole sloped slightly.
  - Make sure to run the drain hose sloped downward.

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

- Insulate the refrigerant pipes separately with insulation, not together.
  - 6 mm thick heat resisting polyethylene foam

---

**Diagram Details:**

- **47 mm or more**
- **120 mm or more**
- **180 mm or more**
- **45 mm or more**
- **100 mm or more**
- **400 mm or more**
- **500 mm or more**
- **Saddle**
- **Extension drain hose** (Not available, provided by installer)
10-1-2. Optional installation parts

<table>
<thead>
<tr>
<th>Part Code</th>
<th>Parts name</th>
<th>Q'ty</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Refrigerant piping</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Liquid side : Ø6.35 mm</td>
<td>One each</td>
</tr>
<tr>
<td></td>
<td>Gas side : Ø9.52 mm</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Pipe insulating material</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(polyethylene foam, 6 mm thick)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Putty, PVC tapes</td>
<td>One each</td>
</tr>
</tbody>
</table>

<Fixing bolt arrangement of outdoor unit>

![Diagram](attachment:image)

Fig. 10-1-2

- Secure the outdoor unit with the fixing bolts and nuts if the unit is likely to be exposed to a strong wind.
- Use Ø8 mm or Ø10 mm anchor bolts and nuts.
- If it is necessary to drain the defrost water, attach drain nipple ⑨ to the bottom plate of the outdoor unit before installing it.
## 10-1-3. Accessory and installation parts

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part name (Q'ty)</th>
<th>Part No.</th>
<th>Part name (Q'ty)</th>
<th>Part No.</th>
<th>Part name (Q'ty)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><img src="image1.png" alt="Image" /></td>
<td>Installation plate x 1</td>
<td>4</td>
<td><img src="image2.png" alt="Image" /></td>
<td>Remote control holder x 1</td>
</tr>
<tr>
<td>2</td>
<td><img src="image4.png" alt="Image" /></td>
<td>Wireless remote control x 1</td>
<td>5</td>
<td><img src="image5.png" alt="Image" /></td>
<td>Nano-Silver Ginseng filter x 1 (42HQV9002)</td>
</tr>
<tr>
<td>3</td>
<td><img src="image7.png" alt="Image" /></td>
<td>Battery x 2</td>
<td>6</td>
<td><img src="image8.png" alt="Image" /></td>
<td>Nano-Photo Copper Zinc filter x 1 (42HQV9003)</td>
</tr>
</tbody>
</table>

### Others

<table>
<thead>
<tr>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner’s manual</td>
</tr>
<tr>
<td>Installation manual</td>
</tr>
</tbody>
</table>

The part marked with an asterisk (*) is packaged with the outdoor unit.
10-1-4. Installation/Servicing Tools

<Changes in the product and components>

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

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

New tools for R410A

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

- Incidentally, the “refrigerant cylinder” comes with the refrigerant designation (R410A) and protector coating in the U. S’s ARI specified rose color (ARI color code: PMS 507).
- Also, the “charge port and packing for refrigerant cylinder” require 1/2 UNF 20 threads per inch corresponding to the charge hose’s port size.
10-2. Indoor Unit

10-2-1. Installation place

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

**CAUTION**

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

<Remote controller>

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

10-2-2. Cutting a hole and mounting installation plate

**<Cutting a hole>**

When installing the refrigerant pipes from the rear.

![Diagram of cutting a hole](image)

**Fig. 10-2-2**

1. After determining the pipe hole position on the mounting plate (.), drill the pipe hole (∅65 mm) at a slight downward slant to the outdoor side.

**NOTE:**

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

<Mounting the installation plate>

![Diagram of mounting the installation plate](image)

**Fig. 10-2-3**

- Anchor bolt holes
- Hook
- Weight
- 1 Mounting screw
- Pipe hole
- Indoor unit
- Thread
- Installation plate

* : Axial distance

**Fig. 10-2-1**
<When the installation plate is directly mounted on the wall>

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

**CAUTION**

When installing the installation plate with a mounting screw, do not use the anchor bolt hole. Otherwise the unit may fall down and result in personal injury and property damage.

![Installation plate](image)

**Fig. 10-2-4**

- 5 mm dia. hole
- Clip anchor (local parts)

**Fig. 10-2-5**

**CAUTION**

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

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

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

9-2-3. Electrical work

1. The supply voltage must be the same as the rated voltage of the air conditioner.
2. Prepare the power source for exclusive use with the air conditioner.

**NOTE:**
- Wire type : More than H07RN-F or 245 IEC66 (1.0 mm² or more)

**CAUTION**

This appliance can be connected to the mains in either of the following two ways.

1. **Connection to fixed wiring:**
   - A switch or circuit breaker which disconnects all poles and has a contact separation of at least 3 mm must be incorporate in the fixed wiring. An approved circuit breaker or switches must used.
2. **Connection with power supply plug:**
   - Attach power supply plug with power cord and plug it into wall outlet. An approved power supply cord and plug must be used.

**NOTE:**
- Perform wiring works so as to allow a generous wiring capacity.
10-2.4. Wiring connection

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

1. Remove the air inlet grille.
   Open the air inlet grille upward and pull it toward you.
2. Remove the terminal cover and cord clamp.
3. Insert the connecting cable (according to the local cords) into the pipe hole on the wall.
4. Take out the connecting cable through the cable slot on the rear panel so that it protrudes about 15 cm from the front.
5. Insert the connecting cable fully into the terminal block and secure it tightly with screws.
6. Tightening torque: 1.2 N·m (0.12 kgf·m)
7. Secure the connecting cable with the cord clamp.
8. Fix the terminal cover, rear plate bushing and air inlet grille on the indoor unit.

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

**Fig. 10-2-5**

**10-2.5. Piping and drain hose installation**

**<Piping and Drain Hose Forming>**

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

1. **Die-cutting Front panel slit**
   Cut out the slit on the leftward or right side of the front panel for the left or right connection and the slit on the bottom left or right side of the front panel for the bottom left or right connection with a pair of nippers.

2. **Changing drain hose**
   For leftward connection, bottom leftward connection and rear leftward connection’s piping, it is necessary to change the drain hose and drain cap.

**How to remove the drains cap**
Clip drain cap by needle-nose plier, and pull out.

**Fig. 10-2-6**

**How to install the drain hose**
- The drain hose can be removed by take off screw, after that twisting and pulling.
- When removing the drain hose, be careful of any sharp edges of steel plate. The edges can cause injuries.

**Fig. 10-2-7**

**NOTE:**
- Use stranded wire only.
- Wire type: H07RN-F or more
<How to fix the Drains Cap>
1) Insert hexagonal wrench (⌀4 mm) in a center head.

![Fig. 10-2-8](image)

2) Firmly insert drains cap.

![Fig. 10-2-9](image)

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

**<In case of right or left piping>**
- After scribing slits of the front panel with a knife or a making-off pin, cut them with a pair of nippers or an equivalent tool.

![Fig. 10-2-10](image)

**<In case of bottom right or bottom left piping>**
- After scribing slits of the front panel with a knife or a making-off pin, cut them with a pair of nippers or an equivalent tool.

![Fig. 10-2-11](image)

<Left-hand connection with piping>
Bend the connecting pipe so that it is laid within 43 mm above the wall surface. If the connecting pipe is laid exceeding 43 mm above the wall surface, the indoor unit may unstably be set on the wall. When bending the connecting pipe, make sure to use a spring bender so as not to crush the pipe.

**Bend the connection pipe within a radius of 30 mm (⌀6.35) 40 mm (⌀9.52).**

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

![Fig. 10-2-12](image)

**NOTE:**
If the pipe is bent incorrectly, the indoor unit may unstably be set on the wall.
After passing the connecting pipe through the pipe hole, connect the connecting pipe to the auxiliary pipes and wrap the facing tape around them.

**CAUTION**
- Bind the auxiliary pipes (two) and connecting cable with facing tape tightly. In case of leftward piping and rear-leftward piping, bind the auxiliary pipes (two) only with facing tape.

![Fig. 10-2-16](image)

- Carefully arrange pipes so that any pipe does not stick out of the rear plate of the indoor unit.
- Carefully connect the auxiliary pipes and connecting pipes to each other and cut off the insulating tape wound on the connecting pipe to avoid double-taping at the joint, moreover, seal the joint with the vinyl tape, etc.
- Since dewing results in a machine trouble, make sure to insulate both the connecting pipes. (Use polyethylene foam as insulating material.)
- When bending a pipe, carefully do it not to crush it.
10-2-6. Indoor unit fixing

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

![Fig. 10-2-14](image)

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

![Fig. 10-2-15](image)

9-2-7. Drainage

1. Run the drain hose sloped downwards.

NOTE:

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

![Fig. 10-2-16](image)

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

![Fig. 10-2-17](image)

CAUTION

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

This air conditioner has the structure designed to drain water collected from dew, which forms on the back of the indoor unit, to the drain pan. Therefore, do not store the power cord and other parts at a height above the drain guide.

![Fig. 10-2-18](image)
10-3. Outdoor Unit
10-3-1. Installation place
- A place which provides the spaces around the outdoor unit as shown in the left diagram.
- A place which can bear the weight of the outdoor unit and does not allow an increase in noise level and vibration.
- A place where the operation noise and discharged air do not disturb users neighbors.
- A place which is not exposed to a strong wind.
- A place free of a leakage of combustible gases.
- A place which does not block a passage.
- When the outdoor unit is to be installed in an elevated position, be sure to secure its feet.
- An allowable length of the connecting pipe is up 10 m.
- An allowable height level is up to 8 m.
- A place where the drain water does not raise any problem.

**CAUTION**
1. Install the outdoor unit without anything blocking the air discharging.
2. When the outdoor unit is installed in a place exposed always exposed to strong wind like a coast or on a high storey of a building, secure the normal fan operation using a duct or a wind shield.
3. In particularly windy areas, install the unit such as to avoid admission of wind.
4. Installation in the following places may result in trouble.
   Do not install the unit in such places.
   - A place full of machine oil.
   - A saline-place such as the coast.
   - A place full of sulfide gas.
   - A place where high-frequency waves are likely to be generated as from audio equipment, welders, and medical equipment.

Fig. 10-3-1

10-3-2. Refrigerant piping connection

**<Flaring>**
1. Cut the pipe with a pipe cutter.

![Image](image1.png)

**Fig. 10-3-2**
2. Insert a flare nut into the pipe, and flare the pipe.
   **Projection margin in flaring : A (Unit : mm)**

![Image](image2.png)

**Fig. 10-3-3**

<table>
<thead>
<tr>
<th>Rigid (Clutch type)</th>
<th>Outer dia. of copper pipe</th>
<th>R410A tool used</th>
<th>Conventional tool used</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.35</td>
<td>0 to 0.5</td>
<td>1.0 to 1.5</td>
<td></td>
</tr>
<tr>
<td>9.52</td>
<td>0 to 0.5</td>
<td>1.0 to 1.5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Imperial (wing nut type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer dia. of copper pipe</td>
</tr>
<tr>
<td>6.35</td>
</tr>
<tr>
<td>9.52</td>
</tr>
</tbody>
</table>

**<Tightening connection>**
Align the centers of the connecting pipes and tighten the flare nut as far as possible with your fingers. Then tighten the nut with a spanner and torque wrench as shown in the figure.

![Image](image3.png)

**Fig. 10-3-4**

**CAUTION**
- Do not apply excess torque.
- Otherwise, the nut may crack depending on the conditions.
After the piping has been connected to the indoor unit, you can perform the air purge together at once.

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

---

**Tightening torque of flare pipe connections**
The operating pressure of R410A is higher than that of R22. (Approx. 1.6 times).
It is therefore necessary to firmly tighten the flare pipe connecting sections (which connect the indoor and outdoor units) up to the specified tightening torque.
Incorrect connections may cause not only a gas leakage, but also damage to the refrigerant cycle.

![Flare at indoor unit side](image1)
![Flare at outdoor unit side](image2)

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

1. Connect the charge hose from the manifold valve to the service port of the gas side packed valve.
2. Connect the charge hose to the port of the vacuum pump.
3. Operate the vacuum pump to start evacuating.
4. Operate the vacuum pump to start evacuating.
5. Close the low pressure side valve handle of gauge manifold.
6. Open fully the low pressure side handle of the vacuum pump.
7. Remove the charging hose from the service port.
8. Securely tighten the caps on the packed valves.

---

**<Shaping pipes>**
1. How to shape the pipes
   Shape the pipes along the incused line on the outdoor unit.
2. How to fit position of the pipes
   Put the edges of the pipes to the place with a distance of 85 mm from the incused line.

![Incused line](image3)

---

**10-3-3. Evacuating**
After the piping has been connected to the indoor unit, you can perform the air purge together at once.

---

**CAUTION**

- **KEEP IMPORTANT 5 POINTS FOR PIPING WORK**
  1. Take away dust and moisture (Inside of the connecting pipes.)
  2. Tight connection (between pipes and unit)
  3. Evacuate the air in the connecting pipes using VACUUM PUMP.
  4. Check gas leak (connected points)
  5. Be save to fully open the packed valves before operation.
<Packed valve handling precautions>

Open the valve stem all the way out; but do not try to open it beyond the stopper. Securely tighten the valve stem cap with torque in the following table:

<table>
<thead>
<tr>
<th>Side</th>
<th>Torque (N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas side</td>
<td>30 to 42 (3.0 to 4.2 kgf-m)</td>
</tr>
<tr>
<td>Liquid side</td>
<td>16 to 18 (1.6 to 1.8 kgf-m)</td>
</tr>
<tr>
<td>Service port</td>
<td>9 to 10 (0.9 to 1.0 kgf-m)</td>
</tr>
</tbody>
</table>

Hexagonal wrench is required.

Fig. 10-3-8

10-3-4. Wiring connection

1. Remove the valve cover from the outdoor unit.
2. Connect the connecting cable to the terminal as identified with their respective matched numbers on the terminal block of indoor and outdoor unit.
3. When connecting the connecting cable to the outdoor unit terminal, make a loop as shown in the installation diagram of indoor and outdoor unit, to prevent water coming in the outdoor unit.
4. Insulate the unused cords (conductors) from any water coming in the outdoor unit. Proceed them so that they do not touch any electrical or metal parts.

<Stripping length of connection cable>

<table>
<thead>
<tr>
<th>Power source</th>
<th>50 Hz, 220 - 240 V~ Single phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60 Hz, 220 - 230 V~ Single phase</td>
</tr>
<tr>
<td>Maximum running current</td>
<td>8A</td>
</tr>
<tr>
<td>Installation fuse rating</td>
<td>16A</td>
</tr>
<tr>
<td>Power cord</td>
<td>H07RN-F or 245 IEC66 (1.5 mm² or more)</td>
</tr>
</tbody>
</table>

**CAUTION**

- Wrong wiring connection may cause some electrical parts burn out.
- Be sure to comply with local codes on running the wire from indoor unit to outdoor unit (size of wire and wiring method etc).
- Every wire must be connected firmly.
- This installation fuse (20A) must be used for the power supply line of this air conditioner. If incorrect or incomplete wiring is carried out, it will cause an ignition or smoke. Prepare the power supply for exclusive use with the air conditioner.
- This product can be connected to the mains. Connection to fixed wiring: A switch which disconnects all poles and has a contact separation of at least 3 mm must be incorporated in the fixed wiring.

**NOTE: Connecting cable**

- Wire type: More than H07RN-F or 245 IEC66 (1.0 mm² or more)
10-3.5. Gas leak test

Check the flare nut connections for the gas leak with a gas leak detector or soap water.

10-3-6. Test operation
To switch the TEST RUN (COOL) mode, push the RESET button for 10 sec.
(The beeper will make a short beep.)

10-3-7. Auto restart setting
This product is designed so that, after a power failure, it can restart automatically in the same operating mode as before the power failure.

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

<How to set the auto restart>
- Press and hold down the RESET button for about 3 seconds. After 3 seconds, the electronic beeper makes three short beeps to tell you the Auto Restart has been selected.
- To cancel the Auto Restart, follow the steps described in the section Auto Restart Function of the Owner’s Manual.

10-3-8. Remote Controller Selector Switch Setting
When two indoor units are installed in the separated rooms, it is not necessary to change the selector switches.

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

Remote Control A-B Selection
To separate using of remote control for each indoor unit in case of 2 air conditioners are installed nearly.

Remote Control B Setup.
1. Press RESET button on the indoor unit to turn the air conditioner ON.
2. Point the remote control at the indoor unit.
3. Push and hold button on the Remote Control by the tip of the pencil. “00” will be shown on the display.
4. Press during pushing , “B” will show on the display and “00” will disappear and the air conditioner will turn OFF. The Remote Control B is memorized.

Note:
1. Repeat above step to reset Remote Control to be A.
2. Remote Control A have not “A” display.
3. Default setting of Remote Control from factory is A.
11. HOW TO DIAGNOSE THE TROUBLE

The pulse modulating circuits are mounted to both indoor and outdoor units. Therefore, diagnose troubles according to the diagnosis procedure as described below. (Refer to the check points in servicing written on the wiring diagrams attached to the indoor/outdoor units.)

### Table 11-1

<table>
<thead>
<tr>
<th>No.</th>
<th>Troubleshooting Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First Confirmation</td>
</tr>
<tr>
<td>2</td>
<td>Primary Judgement</td>
</tr>
<tr>
<td>3</td>
<td>Judgement by Flashing LED of Indoor Unit</td>
</tr>
<tr>
<td>4</td>
<td>Self-Diagnosis by Remote Controller</td>
</tr>
<tr>
<td>5</td>
<td>Judgement of Trouble by Every Symptom</td>
</tr>
<tr>
<td>6</td>
<td>How to Check Simply the Main Parts</td>
</tr>
</tbody>
</table>

**NOTE:**

A large-capacity electrolytic capacitor is used in the outdoor unit controller (inverter). Therefore, if the power supply is turned off, charge (charging voltage DC280V) remains and discharging takes a lot of time. After turning off the power source, if touching the charging section before discharging, an electrical shock may be caused. Discharge the electrolytic capacitor completely by using soldering iron, etc.

**<Discharging method>**

1. Remove the inverter cover (plating) by opening four mounting claws.
2. As shown below, connect the discharge resistance (approx. 100Ω40W) or plug of the soldering iron to voltage between + – terminals of the C12 (“CAUTION HIGH VOLTAGE” is indicated.) electrolytic capacitor (500µF/400V) on P.C. board, and then perform discharging.

11-1. First Confirmation

11-1-1. Confirmation of power supply

Confirm that the power breaker operates (ON) normally.

11-1-2. Confirmation of power voltage

Confirm that power voltage is AC 220-240 V ± 10%. If power voltage is not in this range, the unit may not operate normally.
11-1-3. Operation which is not a trouble (Program operation)

For controlling the air conditioner, the program operations are built in the microcomputer as described in the following table. If a claim is made for running operation, check whether or not it meets to the contents in the following table. When it does, we inform you that it is not trouble of equipment, but it is indispensable for controlling and maintaining of air conditioner.

Table 11-1-1

<table>
<thead>
<tr>
<th>No.</th>
<th>Operation of air conditioner</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>When power breaker is turned “ON”, the operation lamp (Green) of the indoor unit flashes.</td>
<td>The OPERATION lamp of the indoor unit flashes when power source is turned on. If [①] button is operated once, flashing stops. (Flashes also in power failure)</td>
</tr>
<tr>
<td>2</td>
<td>Compressor may not operate even if the room temperature is within range of compressor-ON.</td>
<td>The compressor does not operate while compressor restart delay timer (3-minutes timer) operates. The same phenomenon is found after power source has been turned on because 3-minutes timer operates.</td>
</tr>
<tr>
<td>3</td>
<td>In Dry and ECONO. Mode, FAN (air flow) display does not change even though FAN (air flow select) button is operated.</td>
<td>The air flow indication is fixed to [AUTO].</td>
</tr>
<tr>
<td>4</td>
<td>Increasing of compressor motor speed stops approx. 30 seconds after operation started, and then compressor motor speed increases again approx. 30 seconds after.</td>
<td>For smooth operation of the compressor, the compressor motor speed is restricted to Max. 41 rps for 2 minutes, and Max.91 rps for 2 minutes to 3 minutes, respectively after the operation has started.</td>
</tr>
<tr>
<td>5</td>
<td>The set value of the remote controller should be below the room temperature.</td>
<td>If the set value is above the room temperature, Cooling operation is not performed. And check whether battery of the remote controller is consumed or not.</td>
</tr>
<tr>
<td>6</td>
<td>In AUTO mode, the operation mode is changed.</td>
<td>After selecting Cool or Heat mode, select an operation mode again if the compressor keeps stop status for 15 minutes.</td>
</tr>
<tr>
<td>7</td>
<td>In HEAT mode, the compressor motor speed does not increase up to the maximum speed or decreases before the temperature arrives at the set temperature.</td>
<td>The compressor motor speed may decrease by high-temp. release control (Release protective operation by temp.-up of the indoor heat exchanger) or current release control.</td>
</tr>
</tbody>
</table>

11-2. Primary Judgement

To diagnose the troubles, use the following methods.
(1) Judgement by flashing LED of indoor unit
(2) Self-diagnosis by service check remote controller
(3) Judgement of trouble by every symptom

Firstly, use the method (1) for diagnosis. Then, use the method (2) and (3) to diagnose the details of troubles.
11-3. Judgment by Flashing LED of Indoor Unit

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

Table 11-3-1

<table>
<thead>
<tr>
<th>Item</th>
<th>Check code</th>
<th>Block display</th>
<th>Description for self-diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td>OPERATION (Green)</td>
<td>Power failure (when power is ON)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flashing display (1 Hz)</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>00</td>
<td>OPERATION (Green)</td>
<td>Protective circuit operation for indoor P.C. board</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flashing display (5 Hz)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>01</td>
<td>OPERATION (Green)</td>
<td>Protective circuit operation for connecting cable and serial signal system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TIMER (Yellow)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flashing display (5 Hz)</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>02</td>
<td>OPERATION (Green)</td>
<td>Protective circuit operation for outdoor P.C. board</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flashing display (5 Hz)</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>03</td>
<td>OPERATION (Green)</td>
<td>Protective circuit operation for others (including compressor)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TIMER (Yellow)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flashing display (5 Hz)</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:
1. The contents of items B and C and a part of item E are displayed when air conditioner operates.
2. When item B and C, and item B and a part of item E occur concurrently, priority is given to the block of item B.
3. The check codes can be confirmed on the remote controller for servicing.
11-4. Self-Diagnosis by Remote Controller (Check Code)

1. If the lamps are indicated as shown B to E in Table 11-3-1, execute the self-diagnosis by the remote controller.

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

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

1. Press [ON] button with a tip of pencil to set the remote controller to the service mode.
   • “OK” is indicated on the display of the remote controller.

2. Press [ON] or [OFF] button
   If there is no fault with a code, the indoor unit will beep once (Beep) and the display of the remote controller will change as follows:

   ![Remote Controller Display]

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

   If there is a fault, the indoor unit will beep for 10 seconds (Beep, Beep, Beep...).
   Note the check code on the display of the remote controller.
   • 2-digits alphanumeric will be indicated on the display.
   • All indicators on the indoor unit will flash. (5 times per 1 sec.)

   • “7F” is indicated on the display of the remote controller.

4. Press [E] button to release the service mode.
   • The display of the remote controller returns to as it was before service mode was engaged.

Fig. 11-4-1
11-4-2. Caution at servicing

(1) After servicing, push the [ ] button to return to the normal mode.
(2) After servicing by the check code, turn off breaker of the power supply, and turn on breaker of the power supply again so that memory in the microcomputer returns the initial status. However, the check codes are not deleted even if the power supply is turned off because they are stored in the fixed memory.

<table>
<thead>
<tr>
<th>Check code</th>
<th>Block distinction</th>
<th>Operation of diagnosis function</th>
<th>judgement and action</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Indoor P.C. board</td>
<td>Short-circuit or disconnection of the room temperature sensor (TA sensor).</td>
<td>Operation continues. Displayed when error is detected.</td>
</tr>
<tr>
<td>01</td>
<td>Connect-</td>
<td>Return serial signal is not sent to indoor side from operation started.</td>
<td>1. When the outdoor unit never operate: (1) Check connecting cable, and correct if defective wiring. (2) Check 25A fuse of inverter P.C. board. (3) Check 3.15A of inverter P.C. board. 2. To display [Other] block during operation, check compressor thermo. operation and supply gas (check gas leak also). 3. Unit operates normally during check. If Return serial signal does not stop between ② and ③ of the indoor terminal block, replace inverter P.C. board. If signal stops between ② and ③ of the indoor terminal block, replace indoor P.C. board.</td>
</tr>
<tr>
<td>02</td>
<td>Indoor P.C. board</td>
<td>Operation continues.</td>
<td>Displayed when error is detected.</td>
</tr>
<tr>
<td>03</td>
<td>Indoor P.C. board</td>
<td>Operation continues.</td>
<td>Displayed when error is detected.</td>
</tr>
<tr>
<td>04</td>
<td>Trouble on other indoor P.C. boards</td>
<td>Operation continues.</td>
<td>Flashes when trouble is detected on Operation command signal, and normal status when signal is reset.</td>
</tr>
<tr>
<td>05</td>
<td>Operation command signal is not sent to outdoor side.</td>
<td>Operation continues.</td>
<td>Flashes when trouble is detected on Operation command signal, and normal status when signal is reset.</td>
</tr>
</tbody>
</table>

Table 11-4-1

<table>
<thead>
<tr>
<th>Check code</th>
<th>Block distinction</th>
<th>Operation of diagnosis function</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Indoor P.C. board</td>
<td>Short-circuit or disconnection of the room temperature sensor (TA sensor).</td>
<td>Operation continues. Displayed when error is detected.</td>
</tr>
<tr>
<td>01</td>
<td>Connect-</td>
<td>Return serial signal is not sent to indoor side from operation started.</td>
<td>1. When the outdoor unit never operate: (1) Check connecting cable, and correct if defective wiring. (2) Check 25A fuse of inverter P.C. board. (3) Check 3.15A of inverter P.C. board. 2. To display [Other] block during operation, check compressor thermo. operation and supply gas (check gas leak also). 3. Unit operates normally during check. If Return serial signal does not stop between ② and ③ of the indoor terminal block, replace inverter P.C. board. If signal stops between ② and ③ of the indoor terminal block, replace indoor P.C. board.</td>
</tr>
<tr>
<td>02</td>
<td>Indoor P.C. board</td>
<td>Operation continues.</td>
<td>Displayed when error is detected.</td>
</tr>
<tr>
<td>03</td>
<td>Indoor P.C. board</td>
<td>Operation continues.</td>
<td>Displayed when error is detected.</td>
</tr>
<tr>
<td>04</td>
<td>Trouble on other indoor P.C. boards</td>
<td>Operation continues.</td>
<td>Displayed when error is detected.</td>
</tr>
<tr>
<td>05</td>
<td>Operation command signal is not sent to outdoor side.</td>
<td>Operation continues.</td>
<td>Displayed when error is detected.</td>
</tr>
<tr>
<td>Block distinction</td>
<td>Operation of diagnosis function</td>
<td>Cause of operation</td>
<td>Air conditioner status</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------</td>
<td>--------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Outdoor P.C. board</td>
<td>Check code 14</td>
<td>Inverter over-current protective circuit operates. (Short time)</td>
<td>All off</td>
</tr>
<tr>
<td></td>
<td>Check code 16</td>
<td>Position-detect circuit error or short-circuit between windings of compressor</td>
<td>All off</td>
</tr>
<tr>
<td></td>
<td>Check code 17</td>
<td>Current-detect circuit error</td>
<td>All off</td>
</tr>
<tr>
<td></td>
<td>Check code 18</td>
<td>Being out of place, disconnection or short-circuit of outdoor temp. sensor</td>
<td>All off</td>
</tr>
<tr>
<td></td>
<td>Check code 19</td>
<td>Disconnection or short-circuit of discharge temp. sensor</td>
<td>All off</td>
</tr>
<tr>
<td></td>
<td>Check code 1A</td>
<td>Outdoor fan drive system error</td>
<td>All off</td>
</tr>
<tr>
<td></td>
<td>Check code 1C</td>
<td>Compressor drive output error, Compressor error (lock, missing, etc.), Break down</td>
<td>All off</td>
</tr>
<tr>
<td>Others (including compressor)</td>
<td>Check code 07</td>
<td>Return serial signal has been sent when operation started, but it is not sent from halfway. (1) Compressor thermo, operation Gas shortage Gas leak (2) Instantaneous power failure</td>
<td>Operation continues</td>
</tr>
<tr>
<td></td>
<td>Check code 1D</td>
<td>Compressor does not rotate. (Current protective circuit does not operate when a specified time passed after compressor had been activated.)</td>
<td>All off</td>
</tr>
<tr>
<td></td>
<td>Check code 1E</td>
<td>Discharge temp. exceeded 117°C</td>
<td>All off</td>
</tr>
<tr>
<td></td>
<td>Check code 1F</td>
<td>Break down of compressor</td>
<td>All off</td>
</tr>
<tr>
<td></td>
<td>Check code 08</td>
<td>Four-way valve inverse error (TC sensor value lowered during heating operation.)</td>
<td>Operation continues</td>
</tr>
</tbody>
</table>
11-5. Judgement of Trouble by Every Symptom

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

- Be sure to disconnect the motor connector CN31 after shut off the power supply, or it will be a cause of damage of the motor.
(2) Power is not turned on though Indoor P.C. board is replaced
<Confirmation procedure>

Turn on power supply.

Does operation lamp flash? NO

Is wired correctly to white and black lead wires of terminal board? NO

Correct wiring.

YES

YES

To item of "Power is not turned on".
(3) Only the indoor fan does not operate.

**<Check procedure>**

- Shut off the power supply once.
- Turn the power supply.
- Does the fan stop in no operating status?
  - NO: Control P.C. board is defective. Replace the P.C. board.
  - YES: Control P.C. board is defective. Replace the P.C. board.
- Start the operation with low fan setting in cool operation.
- Does the fan rotate?
  - NO: Does AC 120 V or higher voltage apply to between red and black lead of fan motor?
    - NO: Does connecting terminal, connecting cable or power supply cord completely? Does not found the short wire about connecting cable and power cord?
      - NO: Repair the bearing of the fan.
      - YES: Motor control circuit failure (IC31, D301) or 12 V switching transformer failure (T01).
    - YES: Repair the bearing of the fan.
  - YES: Change the setting of cooling to high fan.
- Does the fan rotate normally?
  - NO: Does the fan rotate?
    - NO: Operation stops
    - YES: Operation stops
  - YES: Turn on the power supply.
- Does the fan speed become higher?
  - NO: Replace connecting the cable (or power cord), and terminal block.
  - YES: Replace the control P.C. board.
- Is the rotation signal (DC+5 V–0 V) output between ② (gray lead wire) and ③ (brown lead wire) of the motor connector (CN11) when rotating the cross flow fan by hand in no operating status? (1 pulse/one turn)
  - NO: Replace the fan motor.
  - YES: Replace the control P.C. board.

Normal
(4) Troubleshooting for remote control

Press [ $ ] button.

Is transmission mark indicated?

NO

Is receiver on indoor unit exposed to direct sunlight?

YES

NO

Does indoor unit operate when moving remote control near receiver or indoor unit?

YES

NO

Batteries are exhausted.

Press [ $ ] button.

Is transmission mark indicated?

NO

YES

Does indoor unit start to operate by automatic restart function?

YES

NO

Does radio sound is affected by remote control when a signal is transmitted at distance of 5 cm from radio?

YES

NO

P.C. board is defective.

Remote control is defective.

Avoid direct sunlight.

Keep indoor unit away from thyristor fluorescent light.

Replace P.C. board.

Replace batteries.

Normal operation

Replace remote control.

Note: After batteries replacement, short circuit the metal terminal at the side of the battery compartment.
11-5-2. Wiring Failure (Interconnected and serial signal wire)

(1) Outdoor unit does not operate.

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

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

   ![Diagram of terminal block on indoor side]

   S5277G or equivalent (G or J type)
   (Diode with rated voltage of 400V or more is acceptable.)

   Normal time : Voltage swings between DC15V and 60V.
   Abnormal time : Voltage does not vary.

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

   **<Check procedure>** Select phenomena described below.

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

   - Gas circulation amount is down.
   - Measure gas pressure.
   - Thermo operation of compressor
   - Gas shortage
   - Gas leak
   - Pipe clogging

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

   - To item of compressor does not operate.

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

   - Gas leak
   - Miswiring of connecting wires of indoor/outdoor units
   - Clogging of pipe and coming-off TC sensor

   Refer to the chart in 10-6
11-6. How to Check Simply the Main Parts

11-6-1. How to check the P.C. board (Indoor unit)

(1) Operating precautions

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

(2) Inspection procedures

1) When a P.C. board is judged to be defective, check for disconnection, burning, or discoloration of the copper foil pattern or this P.C. board.
2) The P.C. board consists of the following 2 parts

a. Main P.C. board part:
   DC power supply circuit (5 V, 12 V, 15 V), Indoor fan motor control circuit, CPU and peripheral circuits, buzzer, and Driving circuit of louver.

b. Indication unit of infrared ray receiving
   Infrared ray receiving circuit, LED:
   To check defect of the P.C. board, follow the procedure described below.

(3) Checking procedure.

<table>
<thead>
<tr>
<th>No.</th>
<th>Procedure</th>
<th>Check points</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turn off the power supply breaker and remove the P.C. board assembly from electronic parts base. Remove the connecting cables from the terminal block.</td>
<td>Check whether or not the fuse (F01) is blown.</td>
<td>Impulse voltage was applied or the indoor fan motor short-circuited.</td>
</tr>
<tr>
<td>2</td>
<td>Remove the connector of the motor and turn on the power supply breaker. If OPERATION indicator flashes (once per second), it is not necessary to check steps (1 to 3) in the right next column.</td>
<td>Check power supply voltage: 1. Between No. 1 and No. 3 of CN01 (AC 220–240V) 2. Between (+) and (−) of C27 (DC 310–340V) 3. Between 12V and GND 4. Between 5V and GND</td>
<td>1. The terminal block or the crossover cable is connected wrongly. 2. The capacitor (C01, C02 or C27), line filter (L01), resistor (R64), or the diode (DB01) is defective. 3. T01 and IC01 are defective. 4. T01 and IC02 are defective.</td>
</tr>
<tr>
<td>3</td>
<td>Push [✓] button once to start the unit. (Do not set the mode to On-Timer operation.)</td>
<td>Check power supply voltage: 1. Between CN51 and No. 1 of CN01 (DC 15–60V)</td>
<td>IC51 and IC52 are defective.</td>
</tr>
<tr>
<td>4</td>
<td>Shorten the restart delay timer and start unit.</td>
<td>Check whether or not all indicators (OPERATION and TIMER) are lit for 3 seconds and they return to normal 3 seconds later.</td>
<td>The indicators are defective or the housing assembly (CN20) is defective.</td>
</tr>
</tbody>
</table>
| 5   | Push [✓] button once to start the unit,  
   • Shorten the restart delay timer.  
   • Set the operation mode to COOL.  
   • Set the fan speed level to AUTO.  
   • Set the preset temperature much lower than the room temperature. (The unit (compressor) operates continuously in the above condition.) | 1. Check whether or not the compressor operates.  2. Check whether or not the OPERATION indicator flashes. | 1. The temperature of the indoor heat exchanger is extremely low.  2. The connection of the heat exchanger sensor is loose. (The connector is disconnected.) (CN62) 3. The heat exchanger sensor and the P.C. board are defective. (Refer to Table 11-4-1.) 4. The main P.C. board is defective. |
### Procedure
If the above condition (No. 5) still continues, start the unit in the following condition.
- Set the operation mode to HEAT.
- Set the preset temperature much higher than room temperature.

### Check points
1. Check whether or not the compressor operates.
2. Check whether or not the OPERATION indicator flashes.

### Causes
1. The temperature of the indoor heat exchanger is extremely high.
2. The connection of the heat exchanger sensor short-circuited.
   (CN62)
3. The heat exchanger sensor and the P.C. board are defective.
   (Refer to Table 11-4-1.)
4. The main P.C. board is defective

---

### Procedure
Connect the motor connector to the motor and turn on the power supply. Start the unit the following condition.
- Set the fan speed level to HIGH.
  (The unit (compressor) operates continuously in the above condition in No. 5.)

### Check points
1. Check it is impossible to detect the voltage (DC 15V) between 3 and 4 of the motor terminals.
2. The motor does not operate or the fan motor does not rotate with high speed.
   (But it is possible to receive the signal from the remote controller.)
3. The motor rotates but vibrates strongly.

### Causes
1. The indoor fan motor is defective.
   (Protected operation of P.C. board.)
2. The P.C. board is defective.
3. The connection of the motor connector is loose.

---

### Sensor characteristic table

![Sensor characteristic table diagram]

<table>
<thead>
<tr>
<th>Resistance value (kΩ)</th>
<th>Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD</td>
<td></td>
</tr>
<tr>
<td>TA, TC, TO, TE</td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**
- TD: Discharge temp. sensor
- TA: Room temp. sensor
- TC: Heat exchanger temp. sensor
- TO: Outdoor temp. sensor
- TE: Outdoor heat exchanger temp. sensor
## 11-7. How to Diagnose Trouble in Outdoor Unit

### 11-7-1. Summarized inner diagnosis of inverter assembly

<table>
<thead>
<tr>
<th>Diagnosis/Process flowchart</th>
<th>Item</th>
<th>Contents</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Diagram of the flowchart]</td>
<td>Preparation</td>
<td>Turn &quot;OFF&quot; the power breaker, and remove 3P connector which connects inverter and compressor.</td>
<td>If fuse was blown, be sure to check the electrolytic capacitor and diode block. (DB01)</td>
</tr>
<tr>
<td>Check 25A fuse (Part No.F01).</td>
<td>Check</td>
<td>- Check whether 25A fuse on the control board assembly is blown or not. (F01)</td>
<td>- Connect discharge resistance (approx. 100Ω40W) or soldering iron (plug) between +, – terminals of the electrolytic capacitor (500µF) of C12 (with printed CAUTION HIGH VOLTAGE) on P.C. board.</td>
</tr>
<tr>
<td>Check terminal voltage of electrolytic capacitor.</td>
<td>Operation</td>
<td>Turn on power breaker, and operate the air conditioner in COOL mode by short-circuit of the timer. Measure terminal voltage of the electrolytic capacity.</td>
<td>If 15A fuse is blown, discharge both edges of the electrolytic capacitor with soldering iron.</td>
</tr>
<tr>
<td>Does outdoor fan rotate?</td>
<td>Measurement</td>
<td></td>
<td>OK if 500µF → DC280 to 320V</td>
</tr>
<tr>
<td>Does LED on control board flash or go on?</td>
<td>Check</td>
<td>After operation, turn off the power breaker after 2 minutes 20 seconds passed, and discharge the electrolytic capacity by soldering iron. Check voltage between motor phases.</td>
<td>Remove CN300 by pushing the part (an arrow indication) because CN300 is a connector with lock.</td>
</tr>
<tr>
<td>Replace outdoor fan motor.</td>
<td>Stop</td>
<td>- Is not winding between 1-2, 2-3, or 1-3 opened or short-circuited?</td>
<td>→ Resistance between phases should be approx. 55 to 77Ω</td>
</tr>
<tr>
<td>[A]</td>
<td>Check Measurement</td>
<td>- Is not frame grounded with 1, 2 or 3?</td>
<td>→ Should be 10MΩ or more</td>
</tr>
<tr>
<td>[B]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[C]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11-8. How to Check Simply the Main Parts

11-8-1. How to check the P.C. board (Indoor unit)

(1) Operating precautions

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

(2) Inspection procedures

1) When a P.C. board is judged to be defective, check for disconnection, burning, or discoloration of the copper foil pattern or this P.C. board.
2) The P.C. board consists of the following 2 parts
   a. Main P.C. board part:
      DC power supply circuit (5V, 12V), Indoor fan motor control circuit, CPU and peripheral circuits, buzzer, and Driving circuit of top/bottom louvers.
   b. Indication unit of infrared ray receiving
      Infrared ray receiving circuit, LED:
      To check defect of the P.C. board, follow the procedure described below.
## 11-8-2. Indoor unit (Other parts)

<table>
<thead>
<tr>
<th>No.</th>
<th>Part name</th>
<th>Checking procedure</th>
</tr>
</thead>
</table>
| 1   | Room temp. (TA) sensor<br>Heat exchanger (TC) sensor | Disconnect the connector and measure the resistance value with tester. (Normal temp.)<br>
|     | [Image: Temperature Sensor Table](#) | ![Temperature Sensor Table](#) |
| 2   | Remote controller                | To item of How to judge whether remote controller is good or bad of the Judgement of trouble by symptom. |
| 3   | Louver motor<br>24BYJ48          | Measure the resistance value of each winding coil by using the tester. (Under normal temp. 25°C)<br>
|     | ![Position and Resistance](#)    | ![Position and Resistance](#) |
| 4   | Indoor fan motor                 | Since judgement of AC motor is difficult on the single motor, refer to 10-5-1. (3). |

### Temperature Sensor Table

<table>
<thead>
<tr>
<th>Sensor</th>
<th>10°C</th>
<th>20°C</th>
<th>25°C</th>
<th>30°C</th>
<th>40°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA, TC (kΩ)</td>
<td>20.7</td>
<td>12.6</td>
<td>10.0</td>
<td>7.9</td>
<td>4.5</td>
</tr>
</tbody>
</table>

## 11-8-3. Outdoor unit

<table>
<thead>
<tr>
<th>No.</th>
<th>Part name</th>
<th>Checking procedure</th>
</tr>
</thead>
</table>
| 1   | Compressor<br>(Model : DA89X1C-23EZ) | Measure the resistance value of each winding by using the tester. <br>
|     | ![Position and Resistance](#)    | ![Position and Resistance](#) |
| 2   | Outdoor fan motor<br>(Model : WLF-240-20A-1) | Measure the resistance value of winding by using the tester. <br>
|     | ![Position and Resistance](#)    | ![Position and Resistance](#) |
| 3   | Outdoor temperature sensor (TO), outdoor heat exchanger temperature sensor (TE) | Disconnect the connector, and measure resistance value with the tester. (Normal temperature)<br>
|     | ![Position and Resistance](#)    | ![Position and Resistance](#) |

### Position and Resistance

<table>
<thead>
<tr>
<th>Position</th>
<th>Resistance value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red - White</td>
<td>1.1Ω</td>
</tr>
<tr>
<td>White - Black</td>
<td>1.1Ω</td>
</tr>
<tr>
<td>Black - Red</td>
<td>1.1Ω</td>
</tr>
</tbody>
</table>

For details, refer to Section 10-9.
### 11-6-4. Checking Method for Each Part

<table>
<thead>
<tr>
<th>No.</th>
<th>Part name</th>
<th>Checking procedure</th>
</tr>
</thead>
</table>
| 1   | Electrolytic capacitor (For raising pressure, smoothing) | 1. Turn OFF the power supply breaker.  
2. Discharge all three capacitors completely.  
3. Check that safety valve at the bottom of capacitor is not broken.  
4. Check that vessel is not swollen or exploded.  
5. Check that electrolytic liquid does not blow off.  
6. Check that the normal charging characteristics are show in continuity test by the tester.  

   **Case that product is good**  
   Pointer swings once, and returns slowly. When performing test once again under another polarity, the pointer should return.  

C12, C13, C14 $\rightarrow$ 500µF/400V |

<table>
<thead>
<tr>
<th>No.</th>
<th>Part name</th>
<th>Checking procedure</th>
</tr>
</thead>
</table>
| 2   | Converter module | 1. Turn OFF the power supply breaker.  
2. Discharge all three capacitors completely.  
3. Check that the normal rectification characteristics are shown in continuity test by the tester. |

**Diode check**  
<table>
<thead>
<tr>
<th>Tester rod</th>
<th>Resistance value in good product</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Theta$</td>
<td>$\Theta$</td>
</tr>
<tr>
<td>$\Theta_1$</td>
<td>$\Theta$</td>
</tr>
<tr>
<td>$\Theta_2$</td>
<td>$\Theta_1$</td>
</tr>
</tbody>
</table>

**Resistance value**  
50kΩ or more  
(0Ω in trouble)
11-9. How to Simply Judge Whether Outdoor Fan Motor is Good or Bad

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

2. Cause
   The following causes are considered when the outdoor fan motor does not normally rotate.
   1) Mechanical lock of the outdoor fan motor
   2) Winding error of the outdoor fan motor
   3) Motor drive circuit error of the outdoor P.C. board

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

   Turn OFF the breaker.

   Disconnect two connectors (CN300) of the outdoor fan motor from the inverter.

   Does the fan rotate without trouble when rotating it with hands?

   YES
   If the resistance value between the connector (CN300 : Motor winding) is 70 to 150Ω, it is normal.

   NO
   NO

   Fan motor is normal.
   Fan motor error

   (Outdoor P.C. board error)

NOTE :
However, GND circuit error inside of the motor may be accepted in some cases when the above check is performed.
When the fan motor does not become normal even if P.C. board is replaced the outdoor fan motor.
### 12. PART REPLACEMENT

#### 12-1. Indoor Unit

<table>
<thead>
<tr>
<th>No.</th>
<th>Part name</th>
<th>Procedures</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| ①  | Front panel      | How to remove the front panel  
1) Stop the operation of the air conditioner and turn off its main power supply.  
2) Pull the air inlet grille toward you to open it and remove the air inlet grille. Then remove the 2 screws fixing the front panel.  
3) First open the horizontal louver, and then remove the front panel from the back body by pulling it toward you.  
How to mount the front panel  
Push the front panel back in and make sure all hooks are locked. |         |
| ②  | Electrical part  | How to remove the electrical part.  
1) Remove the front panel with procedure ①.  
2) Remove the screw holding the electrical part cover.  
3) Disconnect the 3 connectors 2-(3P) for the fan motor and the connector (5P) for the louver motor from the P.C. board assembly.  
4) Pull out the TC sensor from the sensor holder.  
5) Remove the screw for the ground connection, remove the screw for the electrical part box. Then remove the LED and the electrical part box from the main unit.  
How to mount the electrical part.  
1) To put back the electrical part box, lock it to the upper hook of the back body.  
2) Tighten the screws on the electrical part box.  
3) Connect the 3 connectors and arrange the wiring same as original condition and then tighten the screw from the LED unit to the back body.  
4) Attach the TC sensor to the holder.  
5) Tighten the screw for the ground connection.  
6) Tighten the screw on the electrical part cover. |         |
| ③  | Horizontal louver| 1) Remove the front panel and the electrical part following procedure ②.  
2) Remove the center shaft of the horizontal louver from the back body.  
3) Remove the left shaft from the back body.  
4) Remove the horizontal louver from the back body. |         |
<table>
<thead>
<tr>
<th>No.</th>
<th>Part name</th>
<th>Procedures</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Heat exchanger</td>
<td>1) Remove the front panel, electrical part and the horizontal louver following procedure 3.   &lt;br&gt;2) Remove the pipe holder at the rear side of main unit.  &lt;br&gt;3) Remove the 2 screws on the heat exchanger at the base bearing.  &lt;br&gt;4) Remove the screw on the heat exchanger at the fixed plate from the back body and then pull out the right hand side until the socket of heat exchanger released from the hook of the band motor (L), and then pull out the upper side of heat exchanger slowly.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Cross flow fan</td>
<td>1) Remove the front panel, electrical part, horizontal louver and the heat exchanger following procedure 4.   &lt;br&gt;2) Remove the 2 screws on the band motor (L) and remove the 2 screws on the band motor (R) and then remove the cross flow fan.  &lt;br&gt;3) Loosen the set screw of the cross flow fan then separate the fan and the fan motor.  &lt;br&gt;Notice&lt;br&gt;To assemble cross flow fan and fan motor to the unit, please turn the fan motor unit the center of its terminal meets the top position of band motor (R). Fix the cross flow fan with the set screw at the position where the gap between the back body and the right surface of the cross flow fan is 4.7 mm.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Base bearing</td>
<td>1) Remove the front panel, electrical part, horizontal louver, heat exchanger and the cross flow fan following procedure 5.   &lt;br&gt;2) Remove the 2 screws fixing the base bearing.  &lt;br&gt;3) Remove the bearing from the base bearing. If the housing protrudes from the base bearing, put the housing in position and attach the bearing to the base bearing.</td>
<td></td>
</tr>
</tbody>
</table>
### 12-3-1. Outdoor Unit

<table>
<thead>
<tr>
<th>No.</th>
<th>Part name</th>
<th>Procedures</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Common procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Detachment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1) Stop operation of the air conditioner, and turn off the main switch and breaker of the air conditioner.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) Remove the valve cover. (ST1TØ4 x 10ℓ 1 pc)</td>
<td>• After removing screw, remove the valve cover pulling it downward.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3) Remove the wiring cover (ST1TØ4 x 10ℓ 2 pcs.), and then remove the power cord, connecting cable, and cord clamp (ST2TØ4 x 16ℓ 3 pcs.).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4) Remove the upper cabinet. (ST1TØ4 x 10ℓ 5 pcs.)</td>
<td>• After removing screws, remove the upper cabinet pulling it upward.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Attachment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1) Attach the upper cabinet. (ST1TØ4 x 10ℓ 5 pcs.)</td>
<td>• Hook the rear side of the upper cabinet to the claw of the rear cabinet, and then place it on the front cabinet.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) After connecting the power cord and connecting cable, attach the cord clamp and wiring cover.</td>
<td>• Insert the upper part into the upper cabinet, and insert the claw which has been hooked to the lower part into the square hole, and then fix it with screw. (ST1TØ4 x 10ℓ 1 pc.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3) Attach the valve cover. (ST1TØ4 x 10ℓ 1 pc.)</td>
<td>• Insert the upper part to the upper cabinet, set the hook claw of the valve cover to square holes (at three positions) of the main unit, and attach it pushing upward.</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>Front cabinet</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Detachment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1) Perform work of item 1 of ①.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) Remove upper screw (ST1TØ4 x 10ℓ 4 pcs.) of the front cabinet, and lower screws (ST1TØ4 x 10ℓ 8 pcs.) of the front cabinet.</td>
<td>• Both side of front cabinet envelop the unit, so remove it by pulling sideward.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Attachment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1) Assemble front cabinet to the unit.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) Attach the removed screws to the original positions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Part name</td>
<td>Procedures</td>
<td>Remarks</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| ③  | Inverter assembly | 1) Perform work of item 1 of ①.  
2) Remove screw (ST1T∅4 x 10℠ 1 pc.) of the upper part of the front cabinet.  
   • If removing the inverter cover in this condition, the P.C. board can be checked.  
   • If there is no space in the upper part of the upper cabinet, perform work of ②.  
   
   Be careful when checking the inverter because high-voltage circuit is incorporated in it.  
3) Perform discharging by connecting the ⊕,⊖ polarities by discharging resistance (approx. 100Ὠ40W) or plug of soldering iron to ⊕,⊖ terminals of the C13 (printed “CAUTION HIGH VOLTAGE” is attached.) electrolytic capacitor (500 µF/400 WV) on the P.C. board.  
   
   Be careful to discharge the capacitor because the electrolytic capacitor cannot naturally discharge and voltage remains depending on the malfunction state in some cases.  
4) Perform the work of ②.  
5) Remove the screw (ST1T∅4 x 10℠ 1 pc.) fixing the main body and the inverter box.  
6) Remove the lead wire from the holder on the terminal block.  
7) Disconnect the connectors of various lead wires.  

   Requirement :  
   As each connector has a lock mechanism, avoid removing the connector by holding the lead wire, but by holding the connector. |
<table>
<thead>
<tr>
<th>No.</th>
<th>Part name</th>
<th>Procedures</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| 4   | Control board assembly | 1) Disconnect lead wires and connectors connected from the control board assembly to other parts.  
   1. Lead wires  
       • Connection with terminal block: 3 wires (Black, White, Orange)  
       • Connection with compressor: remove the connector (3P)  
       • Connection with reactor: remove the connector (2P)  
   2. Connectors (6 positions)  
      CN703 : Outdoor fan (3P: white)*  
      CN701 : 4 way valve (3P: Yellow)*  
      CN601 : TD sensor (2P: White)  
      CN602 : TO sensor (2P: White)  
   * Note 1) As the connector has a stopper, release the housing lock when removing.  
   ** Note 2) Hold the housing (resin part) with stopper and pull out to remove.  
 2) Remove the control board assembly from the inverter box.  
  Note 2) Remove the claw of the board support fixed to the inverter board, and remove upwards holding the heat sink.  
 3) Remove the three screws fixing the heat sink and control board assemble.  
 4) Attach the new control board assembly.  
  Note 4) When attaching the new control board assembly, insert the P.C. board into the guide rail groove correctly. |
<table>
<thead>
<tr>
<th>No.</th>
<th>Part name</th>
<th>Procedures</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| ③   | Fan motor | 1) Perform work of item 1 of ① and 1 of ②.  
2) Remove the flange nut fixing the fan motor and the propeller fan.  
   - Flange nut is loosened by turning clockwise.  
      (To tighten the flange nut, turn counterclockwise.)  
3) Remove the propeller fan.  
4) Disconnect the connector for the fan motor from the inverter.  
5) Remove the fixing screws (4 pcs.) holding the fan motor by hand so that it does not fall.  
6) Cut the motor lead at the point which is 100 mm apart from the connector toward the fan.  
7) Use the connector used for the inverter, and pinch the lead wires using the closed end splice. |         |
| ④   | Compressor| 1) Perform work of item 1 of ①, 1 of ②, and ③.  
2) Extract refrigerant gas.  
3) Remove the partition board.  
   (ST1T∅4 x 10 3 pcs.)  
4) Remove the sound-insulation material.  
5) Remove the terminal cover of the compressor, and disconnect the lead wire of the compressor thermo and the compressor from the terminal.  
6) Remove the pipe connected to the compressor with a burner.  
   - Make sure the flame does not touch the 4 way valve.  
7) Remove the fixing screw of the base plate and heat exchanger.  
   (ST1T∅4 x 10 2 pcs.)  
8) Pull upward the refrigeration cycle.  
9) Remove the nut fixing the compressor to the base plate. |         |
| ⑤   | Reactor   | 1) Perform work of item 1 of ①, 1 of ②, and ③.  
2) Remove the screw fixing the reactor.  
   (ST1T∅ 4 x 10 2 PCS.) |         |
<table>
<thead>
<tr>
<th>No.</th>
<th>Part name</th>
<th>Procedures</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| 6   | Fan guard | 1. **Detachment**  
   1) Perform work of item 1 of ① and 1 of ②.  
   **Requirement:**  
   Perform the work on a corrugated cardboard, cloth, etc. to prevent scratches to the product.  
   2) Remove the front cabinet, and place it down so that the fan guard side faces downwards.  
   3) Remove the hooking claws by pushing a minus screwdriver according to the arrow mark in the right figure, and remove the fan guard.  
2. **Attachment**  
1) Insert the claws of the fan guard in the hole of the front cabinet. Push the hooking claws (8 positions) by your hand and fix the claws.  
   **Requirement:**  
   This completes all the attaching work. Check that all the hooking claws are fixed to the specified positions. | |
Replacement of temperature sensor for servicing only

<table>
<thead>
<tr>
<th>No.</th>
<th>Part name</th>
<th>Procedures</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>1) Cut the sensor 100 mm longer than old one.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) Cut the protective tube after pulling out it (200 mm).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) Move the protective tube toward the thermal sensor side and tear the tip of lead wire in two, then strip the covering part.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) Pass the stripped part through the thermal constringent tube.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5) Cut the old sensor 100 mm length on the connector side, and recycle that connector.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6) Tear the lead wire in two on the connector side and strip and covering part.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7) Twist the leads on the connector and sensor sides, and solder them.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8) Move the thermal constringent tubes toward the soldered parts and heat them with the dryer and constring them.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9) Wind the attached color tape round the both terminals of the protective tube when colored protective tube is used.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10) Fix the sensor again.</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:

1) Store the joint part of the sensor and the connector in the electric parts box.
2) Never joint them near the thermal sensor part. Otherwise, it would cause insulation inferiority because of dew drops.
3) When replacing the sensor using the colored protective tube, wind the color tape matching the color of that tube.

<table>
<thead>
<tr>
<th>Part name</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor</td>
<td>1</td>
<td>Length: 3 m</td>
</tr>
<tr>
<td>Sensor Spring (A)</td>
<td>1</td>
<td>For spare</td>
</tr>
<tr>
<td>Sensor Spring (B)</td>
<td>1</td>
<td>For spare</td>
</tr>
<tr>
<td>Thermal constringent tube</td>
<td>3</td>
<td>Including one spare</td>
</tr>
<tr>
<td>Color tape</td>
<td>1</td>
<td>9 colors</td>
</tr>
<tr>
<td>Terminal</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

These are parts for servicing sensors. Please check that the accessories shown in the right table are packed.
13. EXPLODED VIEWS AND PARTS LIST

13-1. Indoor Unit (E-Parts Assy)

<table>
<thead>
<tr>
<th>Location No.</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>401</td>
<td>43T60365</td>
<td>TERMINAL BLOCK; 3P</td>
</tr>
<tr>
<td>403</td>
<td>43T69319</td>
<td>TEMPERATURE SENSOR</td>
</tr>
<tr>
<td>404</td>
<td>43T69320</td>
<td>TEMPERATURE SENSOR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Made in Thailand)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location No.</th>
<th>Part No.</th>
<th>Description</th>
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<tbody>
<tr>
<td>405</td>
<td>43T69612</td>
<td>DISPLAY UNIT</td>
</tr>
<tr>
<td>410</td>
<td>43T62003</td>
<td>CORD CLAMP (Made in Thailand)</td>
</tr>
<tr>
<td>411</td>
<td>43T69825</td>
<td>PC BOARD</td>
</tr>
</tbody>
</table>
### 13-2. Indoor Unit

<table>
<thead>
<tr>
<th>Location No.</th>
<th>Part No.</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>201</td>
<td>43T00479</td>
<td>FRONT PANEL ASSY</td>
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<tr>
<td>202</td>
<td>43T09405</td>
<td>GRILLE OF AIR INLET (ORIGINAL)</td>
</tr>
<tr>
<td>203</td>
<td>43T03357</td>
<td>BACK BODY ASSY</td>
</tr>
<tr>
<td>204</td>
<td>43T80317</td>
<td>AIR-FILTER</td>
</tr>
<tr>
<td>205</td>
<td>43T08392</td>
<td>HORIZONTAL LOUVER</td>
</tr>
<tr>
<td>206</td>
<td>43T03313</td>
<td>HOSE, DRAIN (Made in Thailand)</td>
</tr>
<tr>
<td>207</td>
<td>43T79301</td>
<td>CAP-DRAIN</td>
</tr>
<tr>
<td>208</td>
<td>43T21363</td>
<td>MOTOR; STEPPING</td>
</tr>
<tr>
<td>209</td>
<td>43T44387</td>
<td>REFRIGERATION CYCLE ASSY</td>
</tr>
<tr>
<td>210</td>
<td>43T47353</td>
<td>PIPE; SUCTION</td>
</tr>
<tr>
<td>211</td>
<td>43T47355</td>
<td>PIPE; SUCTION</td>
</tr>
<tr>
<td>212</td>
<td>43T11319</td>
<td>PIPE SHIELD</td>
</tr>
<tr>
<td>213</td>
<td>43T19333</td>
<td>HOLDER, SENSOR (Made in Japan)</td>
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<thead>
<tr>
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<tr>
<td>210</td>
<td>43T47353</td>
<td>PIPE; SUCTION</td>
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<tr>
<td>211</td>
<td>43T47355</td>
<td>PIPE; SUCTION</td>
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<tr>
<td>212</td>
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<td>PIPE SHIELD</td>
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<tr>
<td>213</td>
<td>43T19333</td>
<td>HOLDER, SENSOR (Made in Japan)</td>
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</tbody>
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</tr>
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<td>43T03357</td>
<td>BACK BODY ASSY</td>
</tr>
<tr>
<td>204</td>
<td>43T80317</td>
<td>AIR-FILTER</td>
</tr>
<tr>
<td>205</td>
<td>43T09392</td>
<td>HORIZONTAL LOUVER</td>
</tr>
<tr>
<td>206</td>
<td>43T09392</td>
<td>HORIZONTAL LOUVER</td>
</tr>
<tr>
<td>207</td>
<td>43T79301</td>
<td>CAP-DRAIN</td>
</tr>
<tr>
<td>208</td>
<td>43T21363</td>
<td>MOTOR; STEPPING</td>
</tr>
<tr>
<td>209</td>
<td>43T44387</td>
<td>REFRIGERATION CYCLE ASSY</td>
</tr>
<tr>
<td>210</td>
<td>43T47353</td>
<td>PIPE; SUCTION</td>
</tr>
<tr>
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<td>43T47355</td>
<td>PIPE; SUCTION</td>
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<td>212</td>
<td>43T11319</td>
<td>PIPE SHIELD</td>
</tr>
<tr>
<td>213</td>
<td>43T19333</td>
<td>HOLDER, SENSOR (Made in Japan)</td>
</tr>
</tbody>
</table>

**Diagram of Indoor Unit**

- **Electric Parts Assembly**
- **FRONT PANEL ASSY**
- **GRILLE OF AIR INLET (ORIGINAL)**
- **BACK BODY ASSY**
- **AIR-FILTER**
- **HORIZONTAL LOUVER**
- **HOSE, DRAIN (Made in Thailand)**
- **CAP-DRAIN**
- **MOTOR; STEPPING**
- **REFRIGERATION CYCLE ASSY**
- **PIPE; SUCTION**
- **PIPE SHIELD**
- **HOLDER, SENSOR (Made in Japan)**
- **BEARING ASSY, MOLD (Made in Thailand)**
- **BEARING BASE**
- **ASSY CROSS FLOW FAN**
- **MOTOR BAND (LEFT)**
- **MOTOR BAND (RIGHT)**
- **FAN MOTOR (Made in Thailand)**
- **INSTALLATION PLATE**
- **WIRELESS REMOTE CONTROL**
- **HOLDER, REMOTE CONTROL (Made in Thailand)**
- **TERMINAL COVER**
- **CORD MOTOR LOUVER**
- **PIPE HOLDER**
13-3. Outdoor Unit

<table>
<thead>
<tr>
<th>Location No.</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>43T19334</td>
<td>FAN GUARD</td>
</tr>
<tr>
<td>2</td>
<td>43T20324</td>
<td>PROPELLER FAN</td>
</tr>
<tr>
<td>3</td>
<td>43T00482</td>
<td>FRONT CABINET</td>
</tr>
<tr>
<td>4</td>
<td>43T43403</td>
<td>CONDENSOR ASSEMBLY</td>
</tr>
<tr>
<td>5</td>
<td>43T62323</td>
<td>TERMINAL COVER</td>
</tr>
<tr>
<td>6</td>
<td>43T19341</td>
<td>FIN GUARD</td>
</tr>
<tr>
<td>7</td>
<td>43T47308</td>
<td>CAPILLARY TUBE; 1.0 DIA</td>
</tr>
<tr>
<td>8</td>
<td>43T46331</td>
<td>VALVE; PACKED 9.52 DIA (Made in Thailand)</td>
</tr>
<tr>
<td>9</td>
<td>43T47332</td>
<td>BONNET, 9.52 DIA (Made in Thailand)</td>
</tr>
<tr>
<td>10</td>
<td>43T46332</td>
<td>VALVE; PACKED 6.35 DIA (Made in Thailand)</td>
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<tr>
<td>11</td>
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<td>BONNET, 6.35 DIA (Made in Thailand)</td>
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<td>12</td>
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<td>FAN-MOTOR</td>
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<table>
<thead>
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<th>Part No.</th>
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<tbody>
<tr>
<td>13</td>
<td>43T47001</td>
<td>NUT FLANGE (Made in Japan)</td>
</tr>
<tr>
<td>15</td>
<td>43T49327</td>
<td>CUSHION, RUBBER</td>
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<tr>
<td>18</td>
<td>43T41423</td>
<td>COMPRESSOR (Made in China)</td>
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<tr>
<td>19</td>
<td>43T19337</td>
<td>PACKED VALVE COVER</td>
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<tr>
<td>20</td>
<td>43T00481</td>
<td>UPPER CABINET</td>
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<tr>
<td>21</td>
<td>43T00448</td>
<td>FIXING PLATE VALVE</td>
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<td>43T42331</td>
<td>BASE PLATE ASSEMBLY</td>
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<tr>
<td>23</td>
<td>43T79305</td>
<td>DRAIN NIPPLE</td>
</tr>
<tr>
<td>24</td>
<td>43T46351</td>
<td>REACTOR (Made in Thailand)</td>
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<tr>
<td>25</td>
<td>43T46343</td>
<td>4 WAY VALVE</td>
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<td>43T63320</td>
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<td>27</td>
<td>43T04305</td>
<td>PARTITION</td>
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<tr>
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<td>43T39325</td>
<td>MOTOR BASE</td>
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<tr>
<td>29</td>
<td>43T39334</td>
<td>MOTOR BASE CONNECTION PLATE</td>
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13-4. Outdoor Unit (E-Parts Assy)

<table>
<thead>
<tr>
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<th>Description</th>
</tr>
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<tbody>
<tr>
<td>701</td>
<td>43T62320</td>
<td>HEATSINK (Made in Thailand)</td>
</tr>
<tr>
<td>702</td>
<td>43T69819</td>
<td>PC BOARD</td>
</tr>
<tr>
<td>703</td>
<td>43T60392</td>
<td>TERMINAL-5P</td>
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<tr>
<td>704</td>
<td>43T60326</td>
<td>FUSE</td>
</tr>
<tr>
<td>705</td>
<td>43T60377</td>
<td>TEMPERATURE SENSOR</td>
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<table>
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<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>706</td>
<td>43T50304</td>
<td>SENSOR; HEAT EXCHANGER</td>
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<td>(Made in Thailand)</td>
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<tr>
<td>707</td>
<td>43T62313</td>
<td>BASE-PLATE-PC (Made in Thailand)</td>
</tr>
<tr>
<td>708</td>
<td>43T55325</td>
<td>CAPACITOR; PLASTIC-FILM</td>
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</tbody>
</table>