INSTALLATION MANUAL

VRV IV-S System Air Conditioner

MODEL
RXTQ60TAVJUA

Installation manual
VRV IV-S System air conditioner

Manuel d’installation
Conditionneur d’air VRV IV-S System

Manual de instalación
Acondicionador de aire con sistema VRV IV-S
Keep proper distance.
Always use a licensed installer or contractor to install this product. Instruct the customer on how to operate and maintain the unit. Make sure that the unit operates properly during the startup operation.

1. SAFETY CONSIDERATIONS

Read these “SAFETY CONSIDERATIONS for Installation” carefully before installing air conditioning equipment. After completing the installation, make sure that the unit operates properly during the startup operation. Inform customers that they should store this Installation Manual with the Operation Manual for future reference.

Meanings of DANGER, WARNING, CAUTION, and NOTE Symbols:

DANGER.....Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING.....Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury

CAUTION.....Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTE.........Indicates situations that may result in equipment or property-damage accidents only.

• Refrigerant gas is heavier than air and replaces oxygen. A massive leak will result in oxygen depletion, especially in basements, and an asphyxiation hazard will result in serious injury or death.
• Do not ground units to water pipes, gas pipes, telephone wires, or lightning rods as incomplete grounding will result in a severe shock hazard resulting in severe injury or death. Additionally, grounding to gas pipes will result in a gas leak and potential explosion resulting in severe injury or death.
• If refrigerant gas leaks during installation, ventilate the area immediately. Refrigerant gas will result in producing toxic gas if it comes into contact with fire. Exposure to this gas will result in severe injury or death.
• After completing the installation work, check that the refrigerant does not leak throughout the system.
• Do not install unit in an area where flammable materials are present due to risk of explosions that will result in serious injury or death.
• Safely dispose all packing and transportation materials in accordance with federal/state/local laws or ordinances. Packing materials such as nails and other metal or wood parts, including plastic packing materials used for transportation will result in injuries or death by suffocation.

• Use only specified accessories and parts for installation work. Failure to use specified parts could result in water leakage, electric shock, or fire.
• Make sure that a separate power supply circuit is provided for this unit and that all electrical work is carried out by qualified personnel according to local, state and national regulations. An insufficient power supply capacity or improper electrical construction could result in electric shocks or fire.
• When installing the unit in a small room, take measures to keep the refrigerant concentration from exceeding allowable safety limits. Excessive refrigerant leaks, in the event of an accident in a closed ambient space, could result in oxygen deficiency.
• When installing, Improper installation could result in the unit falling and causing accidents.
• Take into account strong winds, typhoons, or earthquakes when installing. Improper installation could result in the unit falling and causing accidents.

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1. SAFETY CONSIDERATIONS

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additional protection, with the grounding system in North America, a dedicated GFCI is not necessary.

- Securely fasten the unit terminal cover (panel). If the terminal cover/panel is not installed properly, dust or water may enter the outdoor unit and could result in fire or electric shock.
- When installing or relocating the system, keep the refrigerant circuit free from substances other than the specified refrigerant (R410A) such as air. Any presence of air or other foreign substance in the refrigerant circuit could result in abnormal pressure rise or rupture, resulting in injury.
- Do not change the setting of the protection devices. If the pressure switch, thermal switch, or other protection device is shorted and operated forcibly, or parts other than those specified by Daikin are used, fire or explosion could result.

**CAUTION**

- Do not touch the switch with wet fingers. Touching a switch with wet fingers may result in electric shock.
- Do not allow children to play on or around the unit or it may result in injury.
- The heat exchanger fins are sharp enough to cut, and may result in injury if improperly used. To avoid injury wear glove or cover the fins when working around them.
- Do not touch the refrigerant pipes during and immediately after operation as the refrigerant pipes may be hot or cold, depend- ing on the condition of the refrigerant flowing through the refrigerant piping, compressor, and other refrigerant cycle parts. It may result in your hands getting burns or frosting if you touch the refrigerant pipes.
- To avoid injury, give the pipes time to return to normal tempera- ture or, if you must touch them, be sure to wear proper gloves.
- Install drain piping to proper drainage. Improper drain piping may result in water leakage and property damage.
- Insulate piping to prevent condensation.
- Be careful when transporting the product.
- Do not turn off the power immediately after stopping operation. Always wait for at least 5 minutes before turning off the power. Otherwise, water leakage may result.
- Do not use a charging cylinder. Using a charging cylinder may cause the refrigerant to deteriorate.
- Refrigerant R410A in the system must be kept clean, dry, and tight.
  (a) Clean and Dry - Foreign materials (including mineral oils such as SUNISO oil or moisture) should be prevented from getting into the system.
  (b) Tight - R410A does not contain any chlorine, does not destroy the ozone layer, and does not reduce the earth’s pro- tection against harmful ultraviolet radiation. R410A can contribute to the greenhouse effect if it is released. Therefore take proper measures to check for the tightness of the refrigerant piping installation.
- Do not change the setting of the protection devices. If the pressure switch, thermal switch, or other protection device is shorted and operated forcibly, or parts other than those specified by Daikin are used, fire or explosion could result.

**NOTE**

- Install the power supply and transmission wires for the indoor and outdoor units to at least 3.5 ft. (1 m) away from televisions or radios to prevent image interference or noise. Depending on the radio waves, a distance of 3.5 ft. (1 m) may not be sufficient to eliminate the noise.
- Dismantling the unit, treatment of the refrigerant, oil and addi- tional parts must be done in accordance with the relevant local, state, and national regulations.
- Do not use the following tools that are used with conventional refrigerants: gauge manifold, charge hose, gas leak detector, reverse flow check valve, refrigerant charge base, vacuum gauge, or refrigerant recovery equipment.
- If the conventional refrigerant and refrigerator oil are mixed in R410A, the refrigerant result in deterioration.
- This air conditioner or heat pump is an appliance that should not be accessible to the general public.
- As design pressure is 478 psi (3.3 MPa), the wall thickness of field-installed pipes should be selected in accordance with the relevant local, state, and national regulations.

**Codes and Regulations**

This product is designed and manufactured to comply with national codes. Installation in accordance with such codes and/or prevailing local codes/regulations is the responsibility of the installer. The manufacturer assumes no responsibility for equipment installed in violation of any codes or regulations. Rated performance is achieved after 72 hours of operation.

2. **INTRODUCTION**

1. This series uses R410A refrigerant. Be absolutely sure to comply with “7. PRECAUTIONS ON REFRIGERANT PIPING”, because even greater caution is needed to prevent impurities from entering R410A (mineral oils and water). The design pressure is 478psi (3.3MPa), which means that piping may be thicker than conventionally, so please refer to “7. PRECAU- TIONS ON REFRIGERANT PIPING”.
2. This is a mixed refrigerant, so charge as a liquid when adding refrigerant. (If charged as a gas, the composition of the refrigerant may change, preventing normal operation.)
3. The indoor unit must use R410A. See the catalog for indoor unit models which can be connected. (Normal operation is not possible when connected to other units.)
4. The indoor unit must use R410A. See the catalog for indoor unit models which can be connected. (Normal operation is not possible when connected to other units.)
5. The power supply of this series is single-phase, 208/230V, 60Hz.
2-1 Combination
The indoor units can be installed in the following range.
• Be sure to connect a dedicated indoor unit. See the catalog for indoor unit models which can be connected.
• Total capacity/quantity of indoor units
  (Outdoor unit) (Total capacity of indoor units) (Total quantity of indoor units)
  RXTQ60 type 8.35–21.7kW
  25.8–74.1 MBh
  9 units

2-2 Standard operation limit
Normal operation
The figures below assume following operating conditions for indoor and outdoor units:
  Equivalent pipe length .................................................... 25ft. (7.6m)
  Level difference .................................................................... 0ft. (0m)

2-3 Standard supplied accessories
Make sure that the accessories shown below are all present.
(The accessories can be found behind the front panel.)

2-4 Option accessory
• Refrigerant branching kit
  REFNET joint KHRP26A22T9
  REFNET header KHRP26M22H9, KHRP26M33H9
• See “7. PRECAUTIONS ON REFRIGERANT PIPING” for details on how to connect refrigerant branch kits and how many are needed.

3. BEFORE INSTALLATION
Transporting the Unit
As shown in figure 2, bring the unit slowly. (Take care not to let hands or things come in contact with rear fins.)

4. SELECTING INSTALLATION SITE
(1) Select an installation site where the following conditions are satisfied and that meets with your customer’s approval.
• Places which are well-ventilated.
• Places where the unit does not bother next-door neighbors.
• Locations where small animals will not make nests in the unit.
• Safe places which withstand the unit’s weight and vibration and where the unit can be installed level.
• A location where there is enough space to install the unit.
• A location where there is no risk of flammable gas leaking.

(2) If the unit is installed in a location where it might be exposed to strong wind, install as per figure 3.
• 11 mph (5 m/s) or higher winds blown against the outdoor unit’s exhaust cause a deterioration in the system performance. High winds force re-circulation of the exhaust air into the inlet, which is known to cause the following effects:
  • Reduction in performance.
  • Increased frost formation in heating mode.
  • System shut down due to increased pressures.
• If very strong wind blows continuously on the air outlet side of the outdoor unit, the fan may turn in reverse at high speed and break, so install as per figure 3.

(Rerfer to figure 3)
1. Turn the air outlet side toward the building’s wall, fence or windbreak screen.
2. Air inlet grille
3. Ensure there is enough space for installing the unit.
4. Set the outlet side at a right angle to the direction of the wind
5. Strong wind
6. Blown air
(3) When installing the unit in a place frequently exposed to snow, pay special attention to the following:
- Install the outdoor unit on a stand (field supply), so that the bottom frame is more than 20 in. (500 mm) higher than the expected snow fall to prevent it from being covered by snow.
- Attach a snow hood (field supply) and a snow vistor (field supply).
- Avoid installation at the place where a snowdrift is generated.
- Further, perform the following countermeasures, since there is risk that the drain water produced at the defrost operation freezes.
- Install the outdoor unit so that its bottom place level has a sufficient height from foundation level, so that ice does not grow at the lower surface of the bottom place of the outdoor unit. (Recommended clearance: 20 in. (500 mm) or more)
- In areas where the outside air temperature drops below 32°F (0°C) for more than 12 hours continuously, install a drain-pan heater (optional accessory) on the bottom frame to prevent the drain from freezing.
- An optional drain pan heater is available when the unit is installed in a climate where the drain may freeze.
- The installer should use their local knowledge to determine if this accessory is necessary to prevent the drain from freezing.
- Do not use a concentrated drain plug (field supply).
- If there is a problem with drain dripping from the bottom frame drain, set up a roof (field supply) below the outdoor unit, or enact other countermeasures.
- Remove the rear inlet grille to prevent snow from accumulating on the rear fins.

(4) When there is possibility of short-circuit depending on the ambient situation, use the wind direction adjusting plate (optional accessory).

(5) The refrigerant gas (R410A) is a safe, non-toxic and non-flammable gas, but if it leaks into the room, the concentration may exceed tolerance levels, especially in small rooms, so steps need to be taken to prevent refrigerant leakage. See the equipment design reference for details.

(6) Inverter-type air conditioners sometimes cause static in other electrical appliances. When selecting an installation location, make sure the air conditioner and all wiring are sufficiently far away from radios, computers, stereos, and other appliances, as shown in figure 4. Particularly for locations with weak reception, ensure there is a distance of at least 9.8 ft. (3 m) for indoor remote controllers, place power supply wireing and transmission wiring in conduits, and ground the conduits. Use non-shielded wire for transmission wiring.

(Refer to figure 4)
1. Indoor unit
2. Fuse/Breaker
3. Remote controller
4. Personal computer or radio

(7) Space needed for installation
- Precautions when installing units in series-
  - The direction for interunit piping is either forward or down when installing units in series, as shown in the figure (5-10).
  - If the piping is brought out from the back, the outdoor unit will require at least 10m. from its right side.
  - (All figures represent millimeters.)

(7)-1 IN CASE OBSTACLES EXIST ONLY IN FRONT OF THE AIR INLET
When nothing is obstructing the top
1. Installation of single unit
   - In case obstacles exist only in front of the air inlet (Refer to figure 5-[1])
   - In case obstacles exist in front of the air inlet and on both sides of the unit (Refer to figure 5-[3])

When something is obstructing the top
1. Installation of single unit
   - In case obstacles exist only in front of the air inlet (Refer to figure 6-[1])
   - In case obstacles exist in front of the air inlet and on both sides of the unit (Refer to figure 6-[3])

(7)-2 IN CASE OBSTACLES EXIST IN FRONT OF THE OUTLET SIDE
When nothing is obstructing the top
1. Installation of single unit (Refer to figure 7-[1])
2. In case of installing multiple units (2 units or more) in lateral connection per row (Refer to figure 7-[2])

When something is obstructing the top
1. Installation of single unit (Refer to figure 7-[3])
2. In case of installing multiple units (2 units or more) in lateral connection per row (Refer to figure 7-[4])

(7)-3 IN CASE OBSTACLES EXIST IN FRONT OF BOTH THE AIR INLET AND OUTLET SIDES
Pattern 1: Where obstacle in front of the air outlet is higher than the unit.
- (There is no height limit for obstructions on the intake side.)

When nothing is obstructing the top
1. Installation of single unit (Refer to figure 8-[1])
2. In case of installing multiple units (2 units or more) in lateral connection per row (Refer to figure 8-[2])

When something is obstructing the top
1. Installation of single unit (Refer to figure 8-[3])
2. In case of installing multiple units (2 units or more) in lateral connection per row (Refer to figure 8-[4])

Relation of dimensions of H, A, and L are shown in the table below.

<table>
<thead>
<tr>
<th>L ≤ H</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ≤ L ≤ 1/2H</td>
<td>30(750)</td>
</tr>
<tr>
<td>1/2H &lt; L ≤ H</td>
<td>40(1000)</td>
</tr>
</tbody>
</table>

Note
- Get the lower part of the frame sealed so that air from the outlet does not bypass.
2. Series installation (up to two units) (Refer to figure 8-[4])
Relation of dimensions of H, A, and L are shown in the table below. 

<table>
<thead>
<tr>
<th>L ≤ H</th>
<th>A ≤ L</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ≤ L ≤ 1/2H</td>
<td>40 (1000)</td>
</tr>
<tr>
<td>1/2H &lt; L ≤ H</td>
<td>50 (250)</td>
</tr>
</tbody>
</table>

When nothing is obstructing the top

1. Installation of single unit (Refer to figure 8-[5])
2. In case of installing multiple units (2 units or more) in lateral connection per row (Refer to figure 8-[6])
Relation of dimensions of H, A, and L are shown in the table below. 

<table>
<thead>
<tr>
<th>L ≤ H</th>
<th>A ≤ L</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ≤ L ≤ 1/2H</td>
<td>10 (250)</td>
</tr>
<tr>
<td>1/2H &lt; L ≤ H</td>
<td>12 (300)</td>
</tr>
</tbody>
</table>

When something is obstructing the top

1. Installation of single unit (Refer to figure 8-[7])
2. Series installation (up to two units) (Refer to figure 8-[8])
Relation of dimensions of H, A, and L are shown in the table below. 

<table>
<thead>
<tr>
<th>L ≤ H</th>
<th>A ≤ L</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ≤ L ≤ 1/2H</td>
<td>4 (100)</td>
</tr>
<tr>
<td>1/2H &lt; L ≤ H</td>
<td>8 (200)</td>
</tr>
</tbody>
</table>

Note)
1. Get the lower part of the frame sealed so that air from the outlet does not bypass.
2. Only two units at most can be installed in series.

Pattern 2: Where obstacles in front of the air outlet is lower than the unit. (There is no height limit for obstructions on the intake side.)

1. Installation of single unit (Refer to figure 8-[3])
2. Series installation (up to two units) (Refer to figure 8-[6])
Relation of dimensions of H, A, and L are shown in the table below. 

<table>
<thead>
<tr>
<th>L ≤ H</th>
<th>A ≤ L</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1/2H &lt; L ≤ H</td>
<td>12 (300)</td>
</tr>
</tbody>
</table>

Note)
1. Get the lower part of the frame sealed so that air from the outlet does not bypass.
2. Only two units at most can be installed in series.

5. PRECAUTIONS ON INSTALLATION

- Before installation, make sure the unit is level and the foundation is sturdy enough to prevent vibration and noise.
- Fasten the unit in place using 4 foundation bolts M12 or equivalent. It is best to screw in the foundation bolt until their length remains 13/16in. (20mm) above the foundation surface.

(Refer to figure 11)
1. Diagram of lower surface

<Drain pipe installation>
- Locations where drain water from the outdoor unit might be a problem.
- In such locations, for example, where the drain water might drip onto passersby, lay the drain pipe using the separately sold drain plug and seal up the drain holes in the bottom frame. For details, please contact your dealer.
- In case of installing the outdoor unit in cold climates, do not take this centralized drainage way. Otherwise, drain pipe freeze-up and ice build-up on the bottom frame may occur.
- When laying the drain pipe, at least 4in. (100mm) from the bottom of the outdoor unit is needed.
- Make sure the drainage works properly.
  (Watch out for water leaks if piping is brought out the bottom.)

(Refer to figure 12)
1. Drain plug
2. 4 tabs
3. Drain receiver
4. Insert the drain receiver into the drain plug and hook the tabs.
5. Bottom frame drain hole
6. (1) Insert the drain plug through the drain hole in the bottom frame shown in figure 13.
   (2) Turn the drain plug along the guides until it stops (approx. 40°).
7. Guide

(Refer to figure 13)
1. Air outlet side
2. Diagram of lower surface
3. Drain hole (For plug)
4. Drain hole

[How to remove the transport clasp]
- A yellow transport clasp and washer are attached to the legs of the compressor to protect the unit during transportation, so remove them as shown in figure 14.

(Refer to figure 14)
1. Compressor
2. Securing nut
3. Transport clasp (Yellow)
4. Turn in the direction of the arrow and remove.

(1) Open the sound-proof cover as shown in figure 14.
(2) Remove the securing nut.
(3) Remove the washer.
(4) Remove the transport clasp as shown in figure 14.
(5) Retighten the securing nut.
(6) Return the sound-proof cover as it was.
6. FIELD WIRING

**CAUTION**
To the electrician

- Do not operate until refrigerant piping work is completed. (Failure to adhere by this caution may lead to irreparable compressor damage.)

6-1 Wiring connection example for whole system
- Electrical wiring work should be done by a certified professional.
- Follow the "Electrical wiring diagram face plate" when carrying out any electrical wiring.
- Make sure the ground resistance is no greater than 4Ω.
- Ground the indoor and outdoor units.
- Do not connect the ground wire to gas pipes, sewage pipes, lightning rods, or telephone ground wires.
  - Gas pipes: can explode or catch fire if there is a gas leak.
  - Sewage pipes: no grounding effect is possible if hard plastic piping is used.
  - Telephone ground wires and lightning rods: dangerous when struck by lightning due to abnormal rise in electrical potential in the grounding.
- Use copper wire.
- When doing the electrical wiring, always shut off the power source before working, and do not turn on the switch until all work is complete.
- This unit has an inverter, so it must be grounded in order to reduce noise and prevent it affecting other appliances, and also to release any electrical build-up in the unit case due to leaked current.
- Do not install a power-factor improving phase-advancing capacitor under any circumstances. (Not only will this not improve the power factor, but it might cause a fire.)
- Connect the wire securely using designated wire and fix it with attached clamp without applying external pressure on the terminal parts (terminal for power wiring, terminal for transmission wiring and earth terminal). See "6-3 How to connect the power supply wiring".
- Left-over wiring should not be wrapped and stuffed into the unit.
- To prevent the power wiring from being damaged by the knock hole edges, put it in a wiring pipe or plastic tube to protect it. (See "6-3 How to connect the power supply wiring".)

**CAUTION**
- Use a power wire pipe for the power supply wiring.
- Outside the unit, make sure the weak electric wiring (i.e. for the remote controller cord, between units, etc.) and the strong electric wiring do not pass near each other, keeping them at least 2in.(50mm) apart. Proximity may cause electrical interference, malfunctions, and breakage.
- Be sure to connect the power wiring to the power wiring terminal block and secure it as described in "6-3 How to connect the power supply wiring".
- Transmission wiring should be secured as described in "6-4 Transmission wiring connection procedure".
- Secure wiring with clamp (accessory) to avoid contact with piping.
- Make sure the wiring and the front panel do not stick up above the structure, and close the cover firmly. (Refer to figure 15)

1. Fuse/Breaker
2. Power supply

6-2 How to lay the power supply wiring and transmission wiring
Let the power supply wiring and transmission wiring with a conduit pass through one of the knockout holes on the front or side cover, and let the transmission wiring with a conduit pass through another knockout hole.
- For protection from uninsulated live parts, thread the power supply wiring and the transmission wiring through the included insulation tube and secure it with the included clamp.

**<Power supply wiring>**
- Insulation tube (accessory)
- Clamp (accessory)
- Power supply wiring

**<Transmission wiring>**
- Insulation tube (accessory)
- Clamp (accessory)
- Transmission wiring

**Precautions knock out holes**
- Open the knock holes with a hammer or the like.
- After knocking out the holes, we recommend you remove burrs in the knock holes and paint the edges and areas around the edges using the repair paint to prevent rusting.
- When passing wiring through knock holes, make sure there are no burrs, and protect the wiring with protective tape.

(Refer to figure 16)
1. Stop valve attachment plate
2. Power supply wiring (including ground wire) or transmission wiring.
3. Back of unit
4. Knockout hole
5. Side of unit
6. Front of unit
7. Terminal block
8. Control Box

If small animals might enter the unit, block the knock holes with an appropriate material (field supply).
<Precautions when laying power wiring>
- Wiring of different thicknesses cannot be connected to the power terminal block.
  (Slack in the power wiring may cause abnormal heat.)
- Use sleeve-insulated round pressure terminals for connections to the power terminal block. When none are available, connect wire of the same diameter to both sides, as shown in the figure.

Follow the instructions below if the wiring gets very hot due to slack in the power wiring.
- For wiring, use the designated power wire and connect firmly, then secure using the included clamping material to prevent outside pressure being exerted on the terminal board.
- Use an appropriate screwdriver for tightening the terminal screws. A screwdriver with a small head will strip the head and make proper tightening impossible.
- Over-tightening the terminal screw may break it.

See the table below the tightening torque of the terminal screws.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Tightening torque (ft·lbf / N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M5 Power</td>
<td>1.76<del>2.15 / 2.39</del>2.91</td>
</tr>
<tr>
<td>M4 Shield</td>
<td>0.87<del>1.06 / 1.18</del>1.44</td>
</tr>
<tr>
<td>M3 Transmission</td>
<td>0.58<del>0.72 / 0.8</del>0.97</td>
</tr>
</tbody>
</table>

6-4 Transmission wiring connection procedure
- Between indoor units in the same system, pass the wiring between the units as shown in figure 18. (There is no polarity.)
  (Refer to figure 18)
  1. Terminal block (X2M)
  2. Use balance type shield wire (with no polarity).
  3. Indoor unit
  4. Under no circumstances should 208/230V be connected.
Precautions regarding the length of wiring between units
Exceeding the following limits may cause transmission malfunctions, so observe them.
Max. wiring length Max. 984ft (300m)
Total wiring length Max. 1968ft (600m)
Max. no. of branches 8

Precautions regarding wiring between units
- Do not connect 208/230V power wiring to terminals for the transmission wiring. Doing so would destroy the entire system.
- Wiring to the indoor unit should be wired to F1 and F2 (TO IN/D unit) on the outdoor unit's terminal block (X2M).

NOTE
- The above wiring should be wired using AWG18-16 stranded, non-shielded wiring.
  (See figure 18 for how to ground the shielded parts.)
- All transmission wiring is to be procured on site.

6-3 How to connect the power supply wiring

Attach a circuit breaker/GFCI.

<table>
<thead>
<tr>
<th>Model name</th>
<th>Phase and frequency</th>
<th>Voltage</th>
<th>Maximum overcurrent protective device</th>
<th>Minimum circuit ampacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>RXTQ60 type</td>
<td>1~60Hz</td>
<td>208/230V</td>
<td>35A</td>
<td>29.1A</td>
</tr>
</tbody>
</table>

CAUTION
- The wiring should be selected in compliance with local specifications. See the table above.
- Always turn off the power before doing wiring work.
- Grounding should be done in compliance with local laws and regulations.
- As shown in figure 18, when connecting the power supply wiring to the power supply terminal block, be sure to clamp securely.
- Once wiring work is completed, check to make sure there are no loose connections among the electrical parts in the control box.

7. PRECAUTIONS ON REFRIGERANT PIPING
- Do not allow anything other than the designated refrigerant to get mixed into the refrigerant cycle, such as air, nitrogen, etc. If any refrigerant gas leaks while working on the unit, ventilate the room thoroughly right away.
- Use R410A only when adding refrigerant.
- Installation tools:
  Make sure to use installation tools (gauge manifold, charge hose, etc.) that are exclusively used for R410A installations to withstand the pressure and to prevent foreign materials (e.g., mineral oils and moisture) from mixing into the system.
- Vacuum pump:
  - Use a 2-stage vacuum pump with a non-return valve.
  - Make sure the pump oil does not flow oppositely into the system while the pump is not working.
  - Use a vacuum pump which can evacuate to 500 microns.
7-1 Selecting piping material

**CAUTION**

Piping and other pressure containing parts shall comply with the applicable legislation and shall be suitable for refrigerant. Use phosphoric acid deoxidized seamless copper for refrigerant.

**CAUTION**

- All field piping must be installed by a licensed refrigeration technician and must comply with relevant local and national regulations.
- After piping work is complete, do not under any circumstances open the stop valve until 6. FIELD WIRING on page 6 and 9. POST-WORK CHECKS on page 1/2 are complete.
- Do not use flux when brazing the refrigerant piping. Use the phosphor copper brazing filler metal (B-Cu93P-710/795/ISO 3677) which does not require flux. Flux has extremely negative effect on refrigerant piping systems. For instance, if the chlorinated-based flux is used, it will cause pipe corrosion or, in particular, if the flux contains fluorine, it will damage the refrigerant oil.

- Use only pipes which are clean inside and outside and which do not accumulate harmful sulfur, oxidants, dirt, cutting oils, moisture, or other contamination. (Foreign materials inside pipes including oils for fabrication must be 0.14 gr/10 ft. (30 mg/10 m) or less.)
- Use the following items for the refrigerant piping.
  - Place Installation Protection method
  - More than a month Pinch the pipe
  - Less than a month Pinch or tape the pipe
  - Regardless of the period Pinch or tape the pipe

<table>
<thead>
<tr>
<th>Place</th>
<th>Installation</th>
<th>Protection method</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>More than a month</td>
<td>Pinch the pipe</td>
</tr>
<tr>
<td>☐</td>
<td>Less than a month</td>
<td>Pinch or tape the pipe</td>
</tr>
<tr>
<td>☐</td>
<td>Regardless of the period</td>
<td>Pinch or tape the pipe</td>
</tr>
</tbody>
</table>

7-2 Protection against contamination when installing pipes

- Wrap the piping to prevent moisture, dirt, dust, etc. from entering the piping.
- Exercise caution when passing copper piping through the through-holes and when passing them out to the outside.
- Be sure to perform a nitrogen blow when brazing. (Brazing without performing nitrogen replacement or releasing nitrogen into the piping will create large quantities of oxidized film on the inside of the pipes, adversely affecting valves and compressors in the refrigerating system and preventing normal operation.)

(Refer to figure 21)

1. Refrigerant pipe
2. Location to be brazed
3. Regulator
4. Nitrogen
5. Manual valve
6. Taping

7-4 Connecting the refrigerant piping

- The local interunit piping is connectable in four directions.

(Refer to figure 22)

1. Front panel
2. Pipe outlet panel
3. Backward
4. Sideways
5. Downward
6. Pipe outlet panel screw
7. Forward
8. Screw for front panel

- When connecting the pipes downward, remove the knockout by making four holes in the middle on the each side of the knockout with a drill.

(Refer to figure 23)

1. Drill
2. Center area around knockout hole
3. Knockout hole
4. Silt

- After knocking out the knock-out, it is recommended to apply repair paint to the edge and the surrounding end surfaces to prevent rusting.

(Refer to figure 24)

1. Bottom frame
2. Interunit piping
3. piping (accessory)

**NOTE**

Cutting out the two slits makes it possible to install as shown in figure 24. (Use a metal saw to cut out the slits.)

**Precautions when connecting pipes**

- Please refer to the Table 1 for the dimensions for processing flares.
- When connecting the flare nut, coat the flare both inside and outside with refrigerating machine oil and initially tighten by hand 3 or 4 turns before tightening firmly.
- Please refer to the Table 1 for the tightening torque. (Too much tightening will end up in splitting of the flare.)

**Table 1**

<table>
<thead>
<tr>
<th>Pipe size (in.)</th>
<th>Tightening torque (ft·lbf)</th>
<th>A dimension for processing flares (in.)</th>
<th>Flare shape (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø 3/8&quot; (9.5mm)</td>
<td>24.1<del>29.4 (32.7</del>38.9N·m)</td>
<td>0.504<del>0.520 (12.8</del>13.2mm)</td>
<td>R0.016<del>0.031 (0.4</del>0.8mm)</td>
</tr>
<tr>
<td>ø 5/8&quot; (15.9mm)</td>
<td>45.6<del>55.6 (61.8</del>75.4N·m)</td>
<td>0.760<del>0.776 (19.3</del>19.7mm)</td>
<td></td>
</tr>
<tr>
<td>ø 3/4&quot; (19.1mm)</td>
<td>71.7<del>87.5 (97.2</del>118.6N·m)</td>
<td>0.929<del>0.945 (23.6</del>24.0mm)</td>
<td></td>
</tr>
</tbody>
</table>
• If a torque wrench is not available, there is a place where the tightening torque will suddenly increase if a normal wrench is used to tighten the flare nut. From that position, further tighten the flare nut the angle shown below.

After all the piping has been connected, use nitrogen to perform a gas leak check.

Precautions for connecting pipes
• Be careful not to let the interunit piping come into contact with the compressor terminal cover. Adjust the height of the insulation material on liquid pipe when it has the possibility of getting in contact with the terminal. Also make sure that the interunit piping does not touch the mounting bolt of the compressor.

(Refer to figure 25)
  1. Compressor
  2. Corking, etc.
  3. Insulation material
  4. Bolts
  5. Interunit piping

• If installing the outdoor unit higher than the indoor unit, caulk the space around insulation and tubes because condensation on the check valve can seep through to the indoor unit side.

[Preventing foreign objects from entering]
• Plug the pipe through-holes with putty or insulating material (pre-cured locally) to stop up all gaps, as shown in figure 26. (Figure 26 indicates the forward case. Do the same in case of other directions.) Insects or small animals entering the outdoor unit may cause a short in the control box.

(Refer to figure 26)
  1. Putty or insulating material
  2. (field supply)

7-5 Heat insulation of piping
• Highly recommended to insulate the interunit piping (liquid and gas-side) and the refrigerant branch kit. (Not insulating them may cause leaking.)

The insulation dimension is recommended as following:

<table>
<thead>
<tr>
<th>Pipe size</th>
<th>Further tightening angle</th>
<th>Recommended arm length of tool (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8” (9.5mm)</td>
<td>60°~ 90°</td>
<td>Approx. 7 7/8 (200mm)</td>
</tr>
<tr>
<td>5/8” (15.9mm)</td>
<td>30°~ 60°</td>
<td>Approx. 11 13/16 (300mm)</td>
</tr>
<tr>
<td>3/4” (19.1mm)</td>
<td>20°~ 35°</td>
<td>Approx. 17 11/16 (450mm)</td>
</tr>
</tbody>
</table>

CAUTION
For local insulation, be sure to insulate all the way to the pipe connections inside the machine. Exposed piping may cause leaking or burns on contact.

---

d) The highest temperature that the gas-side piping can reach is around 248°F (120°C), so be sure to use insulating material which is very resistant.
(The highest temperature that the gas-side piping can reach is around 248°F [120°C], so be sure to use insulating material which is very resistant.)

---

Refrigerant oil

<table>
<thead>
<tr>
<th>Pipe size</th>
<th>Further tightening angle</th>
<th>Recommended arm length of tool (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8” (9.5mm)</td>
<td>60°~ 90°</td>
<td>Approx. 7 7/8 (200mm)</td>
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<tr>
<td>3/4” (19.1mm)</td>
<td>20°~ 35°</td>
<td>Approx. 17 11/16 (450mm)</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Ambient temperature: 86°F (30°C), humidity : Below 80% RH</th>
<th>Ambient temperature: 86°F (30°C), humidity : 80% RH and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum thickness : 9/16 inch (15mm)</td>
<td>Minimum thickness : 3/4 inch (20mm)</td>
</tr>
</tbody>
</table>

---

When using commercial copper pipes and fittings, observe the following:

a) Insulation of pipes should be done after performing air tight test and vacuum drying on page 11.
b) Heat transfer rate: 0.041 to 0.052W/Mk (0.024 to 0.030BTU/hr°F (0.035 to 0.045kcal/mh°C)).
c) Be sure to use insulation that is designed for use with HVAC Systems.
### Example of connection

#### Connection of 8 indoor units

**Heat pump system**

- **Branch with refnet joint**
  - Outdoor unit
  - REFNET joint (A-G)
  - Indoor units (1-8)

- **Branch with refnet joint and refnet header**
  - Outdoor unit
  - REFNET joint (A-B)
  - REFNET header
  - Indoor units (1-8)

- **Branch with refnet header**
  - Outdoor unit
  - Refnet header
  - Indoor units (1-8)

#### Maximum allowable length

- **Between outdoor and indoor units**
  - Actual pipe length
  - Total extension length

- **Between outdoor and indoor units**
  - Equivalent length
  - Total extension length

- **Between outdoor and indoor units**
  - Difference in height
  - Difference in height
  - Difference in height

#### Refrigerant branch kit selection

- Use the outdoor unit capacity type to select the branch kit.

<table>
<thead>
<tr>
<th>Outdoor unit capacity type</th>
<th>Refrigerant branch kit name</th>
</tr>
</thead>
<tbody>
<tr>
<td>RXTQ60 type</td>
<td>KHRP26A22T9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outdoor unit capacity type</th>
<th>Refrigerant branch kit name</th>
</tr>
</thead>
<tbody>
<tr>
<td>RXTQ60 type</td>
<td>KHRP26M33H9 (Max. 8 branch)</td>
</tr>
</tbody>
</table>

#### Pipe size selection

- For outdoor unit connection pipe size:
  - Gas pipe: 3/8” (9.5mm)
  - Liquid pipe: 1/4” (6.4mm)
- For indoor unit connection pipe size:
  - Gas pipe: 1/2” (12.7mm)
  - Liquid pipe: 3/8” (9.5mm)

#### How to calculate the additional refrigerant to be charged

- Additional refrigerant to be charged is calculated using the following formula:

  \[ R = \sum (d_i \times c_i) \]

- Example for refrigerant branch using refnet joint and refnet header

  \[ R = \sum (d_i \times c_i) \]

  - \( d_i \): Gas pipe length
  - \( c_i \): Liquid pipe length

  \[ R = 69 \times 0.054 + 63 \times 0.022 = 5.04 \text{ (kg)} \]
7-7 Air tight test and vacuum drying

After doing the piping, perform the following inspections.

Air tight test

Be sure to use nitrogen gas. (See the figure ("Stop valve operation procedure") for the location of the service port.)

[Procedure]
Pressurize from the liquid pipes and gas pipes to 550psi(3.8MPa) (and not above 550psi(3.8MPa)). If there is no pressure drop over the next 24 hours, the equipment has passed the test.

If the pressure drops, check for leakage positions. (Confirm that there is no leakage, then release nitrogen.)

If a FXTQ indoor unit is used, only pressurize to 450psi(3.1MPa).

Vacuum drying

Use a vacuum pump that can create a vacuum down to at least 500 microns.

[Procedure]
Operate the vacuum pump for at least 2 hours from both the liquid and gas pipes and decrease the pressure to at least 500 microns.

Leave at below 500 microns for at least 1 hour and make sure that the vacuum gauge does not rise. (If it does rise, there is either still moisture in the system or a leak.)

Cases where moisture might enter the piping (i.e., if doing work during the rainy season, if the actual work takes long enough that condensation may form on the inside of the pipes, if rain might enter the pipes during work, etc.)

After performing the vacuum drying for 2 hours, pressurize to 7.2psi(0.05MPa) (i.e., vacuum breakdown) with nitrogen gas, then depressurize down to at least 500 microns a for an hour using the vacuum pump (vacuum drying). (If the pressure does not reach at least 500 microns even after depressurizing for at least 2 hours, repeat the vacuum breakdown - vacuum drying process.) Leave as a vacuum for 1 hour after that, and make sure the vacuum gauge does not rise.

(Refer to figure 27)
1. Decompression valve
2. Nitrogen
3. Vacuum pump
4. Valve (Open)
5. Charge hose
6. Stop valve service port
7. Indoor unit
8. Gas line stop valve (Close)
9. Liquid line stop valve (Close)
10. Indicates local procurement
11. Outdoor unit

NOTE
The stop valve must always be turned to "closed". Otherwise the refrigerant in the outdoor unit will pour out.

Stop valve operation procedure

Precautions when handling the stop valve

- The names of parts needed to operate the stop valve are shown in the figure below. The unit is shipped from the factory with the stop valve turned to the "closed" position.
- Since the side boards may be deformed if only a torque wrench is used when loosening or tightening flare nuts, always lock the stop valve with a wrench and then use a torque wrench.
- In cases where the unit is run in heating mode when the outside temperature is low or in other situations where the operating pressure might drop, seal the gas-side flare nut on the stop valve with silicon sealant or the like to prevent it from freezing.

Stop valve operation procedure

Have a hex wrench ready (size: 0.2in.(4mm) and 0.3in.(6mm)).

Opening the valve
1. Place the hex wrench on the valve stem and turn counter-clockwise.
2. Stop when the valve stem no longer turns. It is now open.

Close the valve
1. Place the hex wrench on the valve stem and turn clockwise.
2. Stop when the valve stem no longer turns. It is now closed.

Precautions for handling valve cap

- A seal is attached to the point indicated by the arrow. Take care not to damage it.

Precautions for handling servicing port

- Use a push-rod-provided charging hose for operation.
- Be sure to tighten the valve cap securely after operation.

<table>
<thead>
<tr>
<th>Liquid-side tightening torque</th>
<th>Gas-side tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0 ~ 12.2 ft·lbf</td>
<td>16.6 ~ 20.3 ft·lbf</td>
</tr>
<tr>
<td>13.5 ~ 16.5 N·m</td>
<td>22.5 ~ 27.5 N·m</td>
</tr>
</tbody>
</table>

NOTE
- Use a push-rod-provided charging hose for operation.
- Be sure to tighten the valve cap securely after operation.
- Tightening torque ...............8.5 ~ 10.3 ft·lbf (10.8 ~ 14.7 N·m)
8. ADDITIONAL REFRIGERANT CHARGE

WARNING

• When leaving the unit with the power on, be sure to switch with another person doing the installation or close the front panel.

8-1 Before adding refrigerant

• Make sure the following work and inspection is complete, in accordance with the installation manual.
  • Piping
  • Wiring
  • Airtightness test, Vacuum drying

8-2 Checking the refrigerant tank

• Check whether the tank has a siphon pipe before charging and place the tank so that the refrigerant is charged in liquid form. (See the figure below.)

8-3 Adding refrigerant

Filling after calculating the amount of refrigerant to add

1. Calculate the amount of refrigerant to add as described in "Calculating the amount of refrigerant to add" in "7. PRECAUTIONS ON REFRIGERANT PIPING".
2. After the vacuum drying is finished, open valve A and charge the calculated amount of refrigerant through the service port for the liquid-side stop valve.
3. Close valve A after charging is complete.

Note: If all the refrigerant to be added cannot be charged using the above procedure, right-hand the procedure below and re-charge the refrigerant.

If all the refrigerant could not be added

Add refrigerant using the following procedure. See the "Service Precautions" plate attached to the outdoor unit for details on the settings for adding refrigerant.

9. POST-WORK CHECKS

Perform the following checks after work is complete.

(1) Drain pipe connection, removal of transport clasp → See "5. PRECAUTIONS ON INSTALLATION".
(2) Incorrect power supply wiring, loose screws → See "6-3 How to connect the power supply wiring".
(3) Incorrect transmission wiring, loose screws → See "6-4 Transmission wiring connection procedure".
(4) Incorrect refrigerant piping connections → See "7. PRECAUTIONS ON REFRIGERANT PIPING".
(5) Piping sizes, use of insulation → See "7-1 Selecting piping material".
(6) Heat insulation of piping → See "7-5 Heat insulation of piping".
(7) Stop valve check → Make sure both the liquid-side and gas-side stop valves are open.
(8) Record of Amount of Refrigerant Added → Record it on "Record of Amount of Refrigerant Added" on the "Service Precautions" plate.
(9) Measuring the insulation of the main power circuit → Use a 500V mega-tester.
  • Do not use the mega-tester for weak currents other than 208/230V.

10. TEST RUN

This unit is equipped with a crank case heater to ensure smooth startup. Be sure to turn the power on at least 6 hours before operation in order to have power running to the crank case heater.

WARNING

When leaving the unit with the power on, be sure to switch with another person doing the installation or close the front panel.

Precautions before turning the power on

• Using insulating sheets, tape electric parts as described in the "Service Precautions" plate on the back of the front panel.
• All indoor units connected to the outdoor unit operate automatically. Complete work on the indoor units in order to ensure maximum safety.

10-1 Power On--Check Operation

• Make sure to perform the check operation after installation.
  (If the air conditioner is operated using the indoor remote controller without performing the check operation, the malfunction code "U3" is displayed in the indoor remote controller, and normal operation is disabled.)
• When making settings on the outdoor unit PC board (A1P) after turning the power on, do not touch anything other than the push-button switches and dip switches.
  (See the "Service Precautions" plate for the locations of the push-button switches (BS1-5) and dip switches (DS1-1, 2) on the PC board (A1P).)
<Precautions During Check Operation>

- If operation is performed within 12 minutes of the indoor and outdoor units being turned on, H2P will light up, and the compressor will not run.

Only perform operation after checking that the LED display is as shown in "10-1 Power On–Check Operation" table. In order to ensure uniform refrigerant distribution, it may take up to around 10 minutes for the compressor to start up after the unit begins running. This is not a malfunction.

- Each indoor unit cannot be checked individually for problems. After this operation is complete, run the unit normally using the remote controller.

- The check run cannot be performed in cooling or other modes.

- Operation begins running. This is not a malfunction.

- The system will not run even if the “operate/stop” button on the remote controller is pressed.

10-2 Temperature control operation checklist

[Set the master unit (the indoor unit with rights of selection cooling or heating)]

- After check operation is complete, displays of all the connected remote controllers will flash “Switching mode”.

- Ask the customer which indoor unit to set as the master unit. (Setting the most frequently used indoor unit as the master unit is recommended.)

- Press the mode-switch button on the remote controller for the master unit.

- That remote controller will then become the remote controller for switching between cooling and heating.

- All other remote controllers will display “Switching mode”.

<With wired remote controller>

- After check operation is complete, the timer lamps on all the indoor units which are connected will flash.

- Ask the customer which indoor unit to set as the master unit. (Setting the most frequently used indoor unit as the parent unit is recommended.)

- Press the mode-switch button on the remote controller for the master unit.

- A beeping sound will be emitted and the timer lamps on all the indoor units will go off.

- That indoor unit will be the indoor unit which has the right to switch between cooling and heating.

For details, see the operation manual which comes with the unit.

- After check operation is complete, checking the temperature control using normal operation.

(Heating is not possible if the outdoor temperature is 75°F (24°C) or higher. See the included operation manual.)

(1) Make sure the indoor and outdoor units are operating normally.

(2) Run each indoor unit one at a time and make sure the corresponding outdoor unit is also running.

(3) Check to see if any other outdoor unit with normal operation.

(4) Press the fan direction and fan strength buttons on the indoor unit to see if they operate properly.

<Precautions during temperature control checks>

- For around 5 minutes after the compressor stops, the compressor will not run even if the “operate/stop” button on the remote controller is pressed.

- When the system operation is stopped by the remote controller, the outdoor units may continue operating for further 1 minutes at maximum.

- Malfunction code “U3” is displayed if check operation is not performed using the test run button but the first time after installation. Perform the check operation in accordance with "10-1 Power On–Check Operation".
(Check on a remote controller connected to the indoor unit.)

<table>
<thead>
<tr>
<th>Malfunction code</th>
<th>Installation error</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3</td>
<td>The step valve of an outdoor unit is left closed.</td>
<td>Open the gas-side step valve and the liquid-side step valve.</td>
</tr>
<tr>
<td></td>
<td>Refrigerant overcharge.</td>
<td>Recalculate the required amount of refrigerant from the piping length and correct the refrigerant charge level by recovering any excessive refrigerant with a refrigerant recovery machine.</td>
</tr>
<tr>
<td>F6</td>
<td>The step valve of an outdoor unit is left closed.</td>
<td>Open the gas-side step valve and the liquid-side step valve.</td>
</tr>
<tr>
<td></td>
<td>Refrigerant overcharge.</td>
<td>Recalculate the required amount of refrigerant from the piping length and correct the refrigerant charge level by recovering any excessive refrigerant with a refrigerant recovery machine.</td>
</tr>
<tr>
<td></td>
<td>Insufficient refrigerant.</td>
<td>Check if the additional refrigerant charge has been finished correctly. Recalculate the required amount of refrigerant from the piping length and add an adequate amount of refrigerant.</td>
</tr>
<tr>
<td></td>
<td>Insufficient refrigerant.</td>
<td>Check if the additional refrigerant charge has been finished correctly. Recalculate the required amount of refrigerant from the piping length and add an adequate amount of refrigerant.</td>
</tr>
<tr>
<td></td>
<td>Insufficient supply voltage</td>
<td>Check to see if the supply voltage is supplied properly.</td>
</tr>
<tr>
<td></td>
<td>No power is supplied to an outdoor unit</td>
<td>Turn the power on for the outdoor unit.</td>
</tr>
<tr>
<td></td>
<td>No dedicated indoor unit is being used</td>
<td>Check the indoor unit. If it is not a dedicated unit, replace the indoor unit.</td>
</tr>
<tr>
<td></td>
<td>The step valve of an outdoor unit is left closed.</td>
<td>Open the gas-side step valve and the liquid-side step valve.</td>
</tr>
<tr>
<td></td>
<td>The right indoor unit piping and wiring are not properly connected to the outdoor unit.</td>
<td>Make sure that the right indoor unit piping and wiring are properly connected to the outdoor unit.</td>
</tr>
<tr>
<td></td>
<td>If the transmission wiring has not been connected or it has shorted.</td>
<td>Make sure the transmission wiring is correctly attached to terminals (X3M-F1/F2 TO IN/D UNIT) on the outdoor unit circuit board.</td>
</tr>
</tbody>
</table>

• When using a central controller, see the installation manual or service manual which came with the central controller.

[If nothing is displayed on the remote controller]

• There might be a problem with the connections or communication between the indoor unit and the remote controller. Make sure all the wiring is properly connected.

CAUTION

To the pipe-layer, To the electrician

After the test run, when handing the unit over to the customer, make sure the front panel of the unit and all screws are attached.

10-3 Final charge adjustment

It is not necessary to do this final adjustment normally, but perform the following operation only when the most adequate refrigerant charge for the best performance is required and the piping length between the outdoor and indoor units is less than 50ft(15m).

The outdoor temperature must be between 60°F(16°C) and 97°F(36°C).

Run the system for 30 minutes in cooling by the forced operation using the field setting mode 2. No. 6 (value: 0: OFF, 1:ON) (Refer to Service Manual.) to allow pressures to stabilize.

Check subcooling of outdoor unit at LSV. Systems should have the target subcooling in the table below.

<table>
<thead>
<tr>
<th>Model</th>
<th>Target subcooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>RXTQ60-</td>
<td>14±1°F(7.76±0.56°C)</td>
</tr>
</tbody>
</table>

11. ENERGY SAVING AND OPTIMUM OPERATION

RXTQ- units are equipped with advanced energy saving functionality. Depending on the priority, emphasis can be put on energy saving or comfort level. Several parameters can be selected, resulting in the optimal balance between energy consumption and comfort for the particular application.

Several patterns are available and explained below. Modify the parameters to the needs of your building and to realize the best balance between energy consumption and comfort.

Refer to Service Manual for changing the field settings.

Setting definition:[A-B]=C; A=mode,B=setting NO., C=setting value.

11-1 Three main operation methods are available:

• Basic
  The refrigerant temperature is fixed independent from the situation. It corresponds to the standard operation which is known and can be expected from/under previous VRV systems:
  • To activate this operation method under cooling operation: change field setting [2-8]=2.
  • To activate this operation method under heating operation: change field setting [2-9]=2.

• Automatic(default)
  The refrigerant temperature is set depending on the outdoor ambient conditions. As such adjusting the refrigerant temperature to match the required load (which is also related to the outdoor ambient conditions).
  E.g., when your system is operating in cooling, you do not need as much heating under low outdoor ambient temperatures (e.g., 77°F(25°C)) as under high outdoor ambient temperatures (e.g., 95°F(35°C)).
  Using this idea, the system automatically starts increasing its refrigerant temperature, automatically reducing the delivered capacity and increasing the system’s efficiency.
  • To activate this operation method under cooling operation: change field setting [2-8]=3(default).
  E.g., when your system is operating in heating, you do not need as much heating under high outdoor ambient temperatures (e.g., 59°F(15°C)) as under low outdoor ambient temperatures (e.g., 23°F(−5°C)).
  Using this idea, the system automatically starts decreasing its refrigerant temperature, automatically reducing the delivered capacity and increasing the system’s efficiency.
  • To activate this operation method under heating operation: change field setting [2-9]=1 (default).
• **Hi-sensible (cooling)**
The refrigerant temperature is set higher (cooling) compared to basic operation. The focus under high sensible mode is improved comfort for the customer. The selection method of indoor units is important and has to be considered as the available capacity is not the same as under basic operation. For details concerning to Hi-sensible applications, please contact your dealer.

- To activate this setting under cooling operation: change field setting [2-8] to the appropriate value, matching the requirements of the pre-designed system containing a high sensible solution.

### Table: Value to target

<table>
<thead>
<tr>
<th>Value</th>
<th>To target</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>46°F (8°C)</td>
</tr>
<tr>
<td>5</td>
<td>48°F (9°C)</td>
</tr>
<tr>
<td>6</td>
<td>50°F (10°C)</td>
</tr>
<tr>
<td>7</td>
<td>52°F (11°C)</td>
</tr>
</tbody>
</table>

**11-2 Several comfort settings are available**

For each of above modes a comfort level can be selected. The comfort level is related to the timing and the effort (energy consumption) which is put in achieving a certain room temperature by temporarily changing the refrigerant temperature to different values in order to achieve requested conditions more quickly.

- **Powerful**
  Overshoot (during heating operation) or undershoot (during cooling operation) is allowed compared to the requested refrigerant temperature, in order to achieve the required room temperature very fast. The overshoot is allowed from the start up moment.
  In case of cooling operation the evaporating temperature is allowed to go down to 37°F (3°C) on temporary base depending on the situation.
  In case of heating operation the condense temperature is allowed to go up to 120°F (49°C) on temporary base depending on the situation.
  When the request from the indoor units becomes more moderate, the system will eventually go to the steady state condition which is defined by the operation method above.
  - To activate the powerful comfort setting under cooling operation, change field setting [2-41]=3.
  - To activate the powerful comfort setting under heating operation, change field setting [2-42]=3.

- **Quick**
  Overshoot (during heating operation) or undershoot (during cooling operation) is allowed compared to the requested refrigerant temperature, in order to achieve the required room temperature very fast. The overshoot is allowed from the start up moment.
  In case of cooling operation the evaporating temperature is allowed to go down to 43°F (6°C) on temporary base depending on the situation.
  In case of heating operation the condense temperature is allowed to go up to 115°F (46°C) on temporary base depending on the situation.
  When the request from the indoor units becomes more moderate, the system will eventually go to the steady state condition which is defined by the operation method above.
  - To activate the quick comfort setting under cooling operation, change field setting [2-41]=2.
  - To activate the quick comfort setting under heating operation, change field setting [2-42]=2.

- **Mild**
  Overshoot (during heating operation) or undershoot (during cooling operation) is allowed compared to the requested refrigerant temperature, in order to achieve the required room temperature very fast. The overshoot is not allowed from the start up moment. The start up occurs under the condition which is defined by the operation mode above.
  In case of cooling operation the evaporating temperature is allowed to go down to 43°F (6°C) on temporary base depending on the situation.
  In case of heating operation the condense temperature is allowed to go up to 115°F (46°C) on temporary base depending on the situation.
  When the request from the indoor units becomes more moderate, the system will eventually go to the steady state condition which is defined by the operation method above.
  - To activate the mild comfort setting under cooling operation, change field setting [2-41]=1.
  - To activate the mild comfort setting under heating operation, change field setting [2-42]=1.

- **Eco**
  The original refrigerant temperature target, which is defined by the operation method (see above) is kept without any correction, unless for protection control.
  - To activate the mild comfort setting under cooling operation, change field setting [2-41]=0.
  - To activate the mild comfort setting under heating operation, change field setting [2-42]=0.

- **Mild**
  The original refrigerant temperature target, which is defined by the operation method (see above) is kept without any correction, unless for protection control.
  - To activate the mild comfort setting under cooling operation, change field setting [2-41]=0.
  - To activate the mild comfort setting under heating operation, change field setting [2-42]=0.

This setting is used in conjunction with setting [2-8].
Example: Automatic mode during cooling

- A Actual load curve
- B Virtual load curve (initial capacity automatic mode)
- C Virtual target value (initial evaporation temperature value automatic mode)
- D Required evaporation temperature value
- E Load factor
- F Outside air temperature
- $T_e$ Evaporating temperature
- Quick
- Powerful
- Mild

Room temperature evolution:

- A Indoor unit set temperature
- B Operation start
- C Operating time
- D Mild
- E Quick
- F Powerful

Example: Automatic mode during cooling

- A Virtual load curve (default automatic mode peak capacity)
- B Load curve
- C Virtual target value (initial condensation temperature value automatic mode)
- D Design temperature
- E Load factor
- F Outside air temperature
- $T_c$ Condensing temperature
- Quick
- Powerful
- Mild

Room temperature evolution:

- A Indoor unit set temperature
- B Operation start
- C Operating time
- D Mild
- E Quick
- F Powerful
No matter which control is selected, variations on the behavior of the system are still possible due to protection controls to keep the unit operating under reliable conditions. The intentional target, however, is fixed and will be used to obtain the best balance between energy consumption and comfort, depending on the application type.

12. CAUTION FOR REFRIGERANT LEAKS

Points to note in connection with refrigerant leaks

Introduction

The installer and system specialist shall secure safety against leakage according to local regulations or standards. The following standards may be applicable if local regulations are not available.

The VRV System, like other air conditioning systems, uses R410A as refrigerant. R410A itself is an entirely safe non-toxic, non-combustible refrigerant. Nevertheless care must be taken to ensure that air conditioning facilities are installed in a room which is sufficiently large. This assures that the maximum concentration level of refrigerant gas is not exceeded, in the unlikely event of major leak in the system and this in accordance to the local applicable regulations and standards.

Maximum concentration level

The maximum charge of refrigerant and the calculation of the maximum concentration of refrigerant is directly related to the humanly occupied space in to which it could leak.

The unit of measurement of the concentration is lb./ft$^3$ (the weight in lb. of the refrigerant gas in 1ft$^3$ volume of the occupied space).

Compliance to the local applicable regulations and standards for the maximum allowable concentration level is required.

Pay a special attention to the place, such as a basement, etc. where refrigerant can stay, since refrigerant is heavier than air.

Procedure for checking maximum concentration

Check the maximum concentration level in accordance with steps 1 to 4 below and take whatever action is necessary to comply.

1. Calculate the amount of refrigerant (lb.) charged to each system separately.

   amount of refrigerant in a single unit system (amount of refrigerant with which the system is charged before leaving the factory) + additional charging amount (amount of refrigerant added locally in accordance with the length or diameter of the refrigerant piping) = total amount of refrigerant (lb.) in the system

NOTE • Where a single refrigerant facility is divided into 2 entirely independent refrigerant systems then use the amount of refrigerant with which each separate system is charged.

2. Calculate the smallest room volume (ft$^3$) Incase like the following, calculate the volume of (A), (B) as a single room or as the smallest room.

   A. Where there are no smaller room divisions

   B. Where there is a room division but there is an opening between the rooms sufficiently large to permit a free flow of air back and forth.

(Where there is an opening without a door or where there are openings above and below the door which are each equivalent in size to 0.15% or more of the floor area.)

3. Calculating the refrigerant density using the results of the calculations in steps 1 and 2 above.

   \[ \frac{\text{size (ft}^3)\text{ of smallest room in which there is an indoor unit installed}}{\text{total volume of refrigerant in the refrigerant system}} \leq \text{maximum concentration level (lb./ft}^3) \]

   If the result of the above calculation exceeds the maximum concentration level then make similar calculations for the second then third smallest room and so until the result falls short of the maximum concentration.

4. Dealing with the situations where the result exceeds the maximum concentration level.

   Where the installation of a facility results in a concentration in excess of the maximum concentration level then it will be necessary to revise the system. Please consult your Daikin supplier.