

DAIKIN



INSTALLATION MANUAL

VRV IV

System Air Conditioner

MODEL

RXYQ72TTJU
RXYQ96TTJU
RXYQ120TTJU
RXYQ144TTJU
RXYQ168TTJU
RXYQ192TTJU
RXYQ216TTJU
RXYQ240TTJU
RXYQ264TTJU
RXYQ288TTJU
RXYQ312TTJU
RXYQ336TTJU
RXYQ360TTJU
RXYQ384TTJU
RXYQ408TTJU

RXYQ72TYDN
RXYQ96TYDN
RXYQ120TYDN
RXYQ144TYDN
RXYQ168TYDN
RXYQ192TYDN
RXYQ216TYDN
RXYQ240TYDN
RXYQ264TYDN
RXYQ288TYDN
RXYQ312TYDN
RXYQ336TYDN
RXYQ360TYDN
RXYQ384TYDN
RXYQ408TYDN

English

Français

Español

Safety considerations

Read these Safety considerations for Installation carefully before installing an air conditioner or heat pump. After completing the installation, make sure that the unit operates properly during the startup operation.

Instruct the customer on how to operate and maintain the unit.

Inform customers that they should store this Installation Manual with the Operation Manual for future reference.

Always use a licensed installer or contractor to install this product.

Improper installation can result in water or refrigerant leakage, electrical shock, fire, or explosion.

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.

 **INFORMATION** . . . This symbol identifies useful tips or additional information.

DANGER

- 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 a severe shock hazard resulting in severe injury or death. Additionally, grounding to gas pipes will result 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 gas 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.

WARNING

- Only qualified personnel must carry out the installation work. Installation must be done in accordance with this installation manual. Improper installation could result in water leakage, electric shock, 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.
- Use only specified accessories and parts for installation work. Failure to use specified parts could result in water leakage, electric shocks, fire, or the unit falling.
- Install the air conditioner or heat pump on a foundation strong enough that it can withstand the weight of the unit. A foundation of insufficient strength could result in the unit falling and causing injuries.
- Take into account strong winds, typhoons, or earthquakes when installing. Improper installation could result in the unit falling and causing accidents.
- 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.
- Make sure that all wiring is secured, that specified wires are used, and that no external forces act on the terminal connections or wires. Improper connections or installation could result in fire.
- When wiring, position the wires so that the control box cover can be securely fastened. Improper positioning of the control box cover could result in electric shocks, fire, or the terminals overheating.
- Before touching electrical parts, turn off the unit.
- This equipment can be installed with a Ground-Fault Circuit Breaker (GFCI). Although this is a recognized measure for 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, depending 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 frostbite if you touch the refrigerant pipes. To avoid injury, give the pipes time to return to normal temperature 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 protection 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. Read the chapter Refrigerant Piping and follow the procedures.
- Since R410A is a blend, the required additional refrigerant must be charged in its liquid state. If the refrigerant is charged in a state of gas, its composition can change and the system will not work properly.
- The indoor unit is for R410A. See the catalog for indoor models that can be connected. Normal operation is not possible when connected to other units.
- Remote controller (wireless kit) transmitting distance can be shorter than expected in rooms with electronic fluorescent lamps (inverter or rapid start types). Install the indoor unit far away from fluorescent lamps as much as possible.
- Indoor units are for indoor installation only. Outdoor units can be installed either outdoors or indoors. This unit is for indoor use.
- Do not install the air conditioner or heat pump in the following locations:
 - (a) Where a mineral oil mist or oil spray or vapor is produced, for example, in a kitchen. Plastic parts may deteriorate and fall off and thus may result in water leakage.
 - (b) Where corrosive gas, such as sulfurous acid gas, is produced. Corroding copper pipes or soldered parts may result in refrigerant leakage.
- (c) Near machinery emitting electromagnetic waves. Electromagnetic waves may disturb the operation of the control system and cause the unit to malfunction.
- (d) Where flammable gas may leak, where there is carbon fiber, or ignitable dust suspension in the air, or where volatile flammables such as thinner or gasoline are handled. Operating the unit in such conditions may result in a fire.
- Take adequate measures to prevent the outdoor unit from being used as a shelter by small animals. Small animals making contact with electrical parts may result in malfunctions, smoke, or fire. Instruct the customer to keep the area around the unit clean.

⚠ NOTE

- Install the power supply and transmission wires for the indoor and outdoor units 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 additional 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.

RXYQ72TTJU	RXYQ216TTJU	RXYQ360TTJU	RXYQ72TYDN	RXYQ216TYDN	RXYQ360TYDN
RXYQ96TTJU	RXYQ240TTJU	RXYQ384TTJU	RXYQ96TYDN	RXYQ240TYDN	RXYQ384TYDN
RXYQ120TTJU	RXYQ264TTJU	RXYQ408TTJU	RXYQ120TYDN	RXYQ264TYDN	RXYQ408TYDN
RXYQ144TTJU	RXYQ288TTJU		RXYQ144TYDN	RXYQ288TYDN	
RXYQ168TTJU	RXYQ312TTJU		RXYQ168TYDN	RXYQ312TYDN	
RXYQ192TTJU	RXYQ336TTJU		RXYQ192TYDN	RXYQ336TYDN	

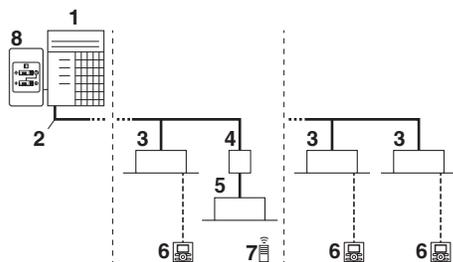
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1. Introduction

1.1. General information

This installation manual concerns the VRV IV, full inverter driven, heat pump system.



- 1 VRV IV Heat pump outdoor unit
- 2 Refrigerant piping
- 3 VRV indoor unit
- 4 Branch Provider unit (required to connect Mini-split indoor units)
- 5 Mini-split indoor units
- 6 User interface (dedicated depending on indoor unit type)
- 7 User interface (wireless, dedicated depending on indoor unit type)
- 8 Cool/Heat selector

i INFORMATION

Not all combinations of indoor units are allowed. For guidance, see 1.2. Combination and options on page 2

1.2. Combination and options

The VRV IV heat pump system can be combined with several types of indoor units and is intended for R410A use only.

For an overview which units are available you can consult the product catalogue for VRV IV.

! NOTE

To be sure your system setup (outdoor unit + indoor unit(s)) will work, you have to consult the latest technical engineering data for VRV IV heat pump.

An overview is given indicating the allowed combinations of indoor units and outdoor units. Not all combinations are allowed. They are subject to rules (combination between outdoor-indoor, single outdoor unit use, multiple outdoor unit use, combinations between indoor units, etc.) mentioned in the technical engineering data.

1.2.1. Indoor unit combinations

In general following type of indoor units can be connected to a VRV IV heat pump system. The list is non-exhaustive and depends on both outdoor unit model and indoor unit model combinations.

- VRV indoor units.
- Mini-split indoor units.
- AHU (air to air applications): AHU Integration kit is required. See latest Engineering Data Book for more details .

1.2.2. Outdoor unit combinations

Standard combinations for VRV IV heat pump system are as indicated in table below, where RXYQ192-408 consists of several RXYQ72-168 modules as indicated.

	72	96	120	144	168
RXYQ72TTJU/TYDN	1				
RXYQ96TTJU/TYDN		1			
RXYQ120TTJU/TYDN			1		
RXYQ144TTJU/TYDN				1	
RXYQ168TTJU/TYDN					1
RXYQ192TTJU/TYDN	1		1		
RXYQ216TTJU/TYDN		1	1		
RXYQ240TTJU/TYDN			2		
RXYQ264TTJU/TYDN			1	1	
RXYQ288TTJU/TYDN				2	
RXYQ312TTJU/TYDN				1	1
RXYQ336TTJU/TYDN					2
RXYQ360TTJU/TYDN			3		
RXYQ384TTJU/TYDN		1	1		1
RXYQ408TTJU/TYDN		1		1	1

To install the outdoor unit, the following optional parts are also required.

1 Refrigerant branching kit.

Description	Model name
Refnet header	KHRP26M22H9
	KHRP26M33H9
	KHRP26M72H9
	KHRP26M73HU9
Refnet joint	KHRP26M22T
	KHRP26M33T
	KHRP26M72TU9
	KHRP26M73TU9

For the selection of the optimal branching kit, please refer to 7.4. Selection of refrigerant branch kits on page 10.

2 Outdoor unit multi connection piping kit.

Number of outdoor units connected	
2	3
BHFP22P100U	BHFP22P151U

3 In order to control the cooling or heating operation from a central location, the following option can be connected:

- Cool/Heat selector: KRC19-26A
- With optional fixing box for the switch: KJB111A
- Centralized control devices (e.g., intelligent Touch Manager)

4 To instruct specific operation with an external input coming from a central control the external control adaptor (DTA104A61/62) can be used. Instructions (group or individual) can be instructed for low noise operation and power consumption limitation operation.

5 For VRV IV heat pump system it is also possible to make several commissioning field settings through a personal computer interface. For this option EKPCAB* is required which is a dedicated cable to communicate with the outdoor unit. The software for the user interface program can be obtained from your local Daikin sales office.

i INFORMATION

Refer to the technical engineering data for the latest option names.

1.3. Indoor capacity range

Total capacity of indoor units needs to be within the specified range.

<Outdoor unit>	<Total capacity index of indoor unit>
RXYQ72TTJU/TYDN	36-93
RXYQ96TTJU/TYDN	48-124
RXYQ120TTJU/TYDN	60-156
RXYQ144TTJU/TYDN	72-187
RXYQ168TTJU/TYDN	84-218
RXYQ192TTJU/TYDN	96-249
RXYQ216TTJU/TYDN	108-280
RXYQ240TTJU/TYDN	120-312
RXYQ264TTJU/TYDN	132-343
RXYQ288TTJU/TYDN	144-374
RXYQ312TTJU/TYDN	156-405
RXYQ336TTJU/TYDN	168-436
RXYQ360TTJU/TYDN	180-468
RXYQ384TTJU/TYDN	192-499
RXYQ408TTJU/TYDN	204-530

NOTE

Higher capacity than the above table can be selected, this may affect heating and cooling capacity. For additional information see technical engineering data.

1.4. Scope of the manual

This manual describes the procedures for handling, installing and connecting the VRV IV heat pump outdoor units. This manual has been prepared to ensure adequate maintenance of the unit, and it will provide help in case problems occur.

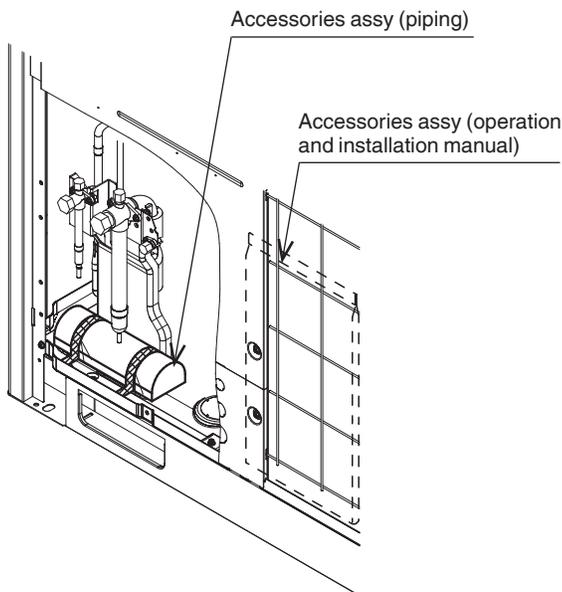
INFORMATION

The installation of the indoor unit(s) is described in the indoor unit installation manual provided with the indoor units.

2. Accessories

2.1. Accessories supplied with this unit

Confirm the following accessories are included. The storage location of the accessories is shown in the figure below.



NOTE

Do not throw away any of the accessories until installation is complete. They are needed for installation work.

Name	Clamp(1)	Clamp(2)	Vinyl tube	Manuals, etc.
Quantity	7 pcs.	1 pc.	5 pcs.	1 pc. each
Shape	(Small)	(Large)		<ul style="list-style-type: none"> Operation Manual Installation Manual REQUEST FOR THE INDICATON label (Installation records)

Name	Liquid side accessory pipe (1)	Liquid side accessory pipe (2)	Gas side accessory pipe (1)	Gas side accessory pipe (2)	L type accessory joint
Quantity	1 pc.	1 pc.	1 pc.	1 pc.	1 pc.
Shape			72-96T 120-168T		120-168T

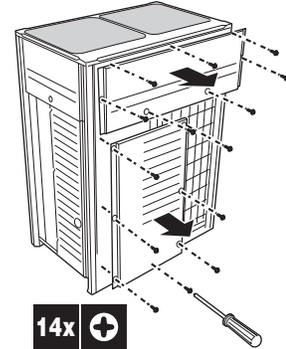
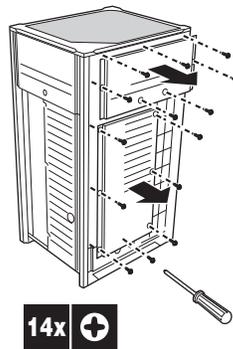
3. Overview of unit

3.1. Opening the unit

To gain access to the unit, front panels need to be opened as follows:

RXYQ72TTJU/TYDN

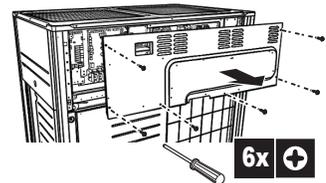
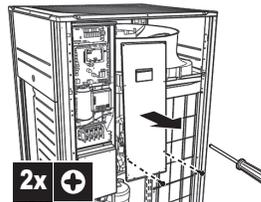
RXYQ96-168TTJU/TYDN



Once the front panel open, the electrical component box can be accessed by removing the control box cover as follows.

RXYQ72TTJU/TYDN

RXYQ96-168TTJU/TYDN



For service purposes, the push buttons on the main printed circuit board need to be accessed. To access these push buttons, the control box cover does not need to be opened. See 13. Making field settings on page 23.

DANGER: ELECTRICAL SHOCK

See Safety considerations on page i.

DANGER: DO NOT TOUCH PIPING AND INTERNAL PARTS

See Safety considerations on page i.

3.2. Technical and Electrical specifications

Refer to the Engineering Data Book for the complete list of specifications.

3.3. Main components

For main components and function of the main components, refer to the Engineering Data Book.

4. Selecting an installation location

⚠ WARNING

Be sure to provide for adequate measures in order to prevent that the unit is used as a shelter by small animals.

Small animals making contact with electrical parts can cause malfunctions, smoke or fire. Please instruct the customer to keep the area around the unit clean and clear.

In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

⚠ CAUTION

Appliance not accessible to the general public, install it in a secured area, protected from easy access.

This unit, both indoor and outdoor, is suitable for installation in a commercial and light industrial environment.

4.1. General precautions on installation

Select an installation site that meets the following requirements:

- The foundation must be strong enough to support the weight of the unit.
- Installation location is flat to prevent vibrations and noise generation and to have sufficient stability.
- The space around the unit is adequate for maintenance and servicing (refer to 5.2. Service space on page 6).
- The space around the unit allows for sufficient air circulation.
- There is no danger of fire due to leakage of inflammable gas.
- The equipment is not intended for use in a potentially explosive atmosphere.
- Select the location of the unit in such a way that the sound generated by the unit does not disturb anyone, and the location is selected according the applicable legislation.
- All piping lengths and distances have been taken into consideration (refer to 7.5. System piping (length) limitations on page 11).
- Take care that in the event of a water leak, water cannot cause any damage to the installation space and surroundings.
- When installing the unit in a small room, take measures in order to keep the refrigerant concentration from exceeding allowable safety limits in the event of a refrigerant leak, refer to 18. Caution for refrigerant leaks on page 43.

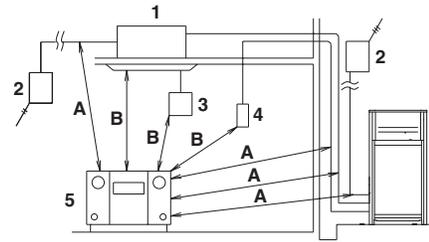
⚠ CAUTION

Excessive refrigerant concentrations in a closed room can lead to oxygen deficiency.

⚠ NOTE

The equipment described in this manual may cause electronic noise generated from radio-frequency energy. The equipment complies to specifications that are designed to provide reasonable protection against such interference. However, there is no guarantee that interference will not occur in a particular installation.

It is therefore recommended to install the equipment and electric wires keeping proper distances away from stereo equipment, personal computers, etc



- 1 Indoor unit
 - 2 Branch switch, overcurrent breaker
 - 3 Remote controller
 - 4 Cool/Heat selector
 - 5 Personal computer or radio
- A ≥ 60 in. (1500 mm)
B ≥ 40 in. (1000 mm)

An inverter air conditioner may cause electronic noise generated from AM broadcasting. Examine where to install the main air conditioner and electric wires, keeping proper distances away from stereo equipment, personal computers, etc.

Particularly for locations with weak reception, ensure there is a distance of at least 10 ft. (3 m) for indoor remote controllers, place power wiring and transmission wiring in conduits, and ground the conduits.

- The refrigerant R410A itself is nontoxic, non-flammable and is safe. If the refrigerant should leak however, its concentration may exceed the allowable limit depending on room size. Due to this, it could be necessary to take measures against leakage. Refer to 18. Caution for refrigerant leaks on page 43.
- Do not install in the following locations:
 - Locations where sulfurous acids and other corrosive gases may be present in the atmosphere. Copper piping and soldered joints may corrode, causing refrigerant to leak.
 - Locations where a mineral oil mist, spray or vapor may be present in the atmosphere. Plastic parts may deteriorate and fall off or cause water leakage.
 - Locations where equipment that produces electromagnetic waves is found. The electromagnetic waves may cause the control system to malfunction, preventing normal operation.
 - Locations where flammable gases may leak, where thinner, gasoline and other volatile substances are handled, or where carbon dust and other incendiary substances are found in the atmosphere. Leaked gas may accumulate around the unit, causing an explosion.
- When installing, take strong winds, hurricanes or earthquakes into account, improper installation may result in the unit turning over.

4.2. Weather related precautions

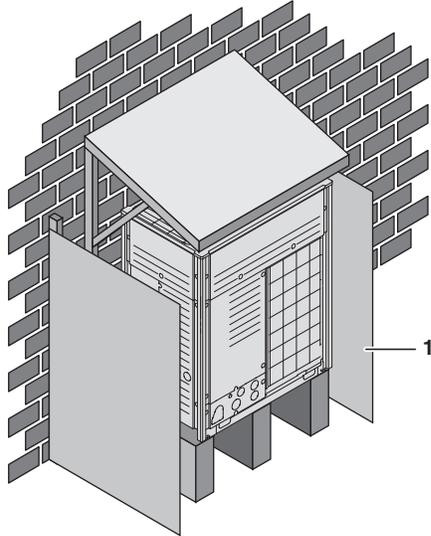
- Select a place where the rain can be avoided as much as possible.
- Be sure that the air inlet of the unit is not positioned towards the main wind direction. Frontal wind will disturb the operation of the unit. If necessary, use a screen to block the wind.
- Ensure that water cannot cause any damage to the location by adding water drains to the foundation and prevent water traps in the construction.
- Do not install the unit in areas where the air contains high levels of salt such as that near the ocean.

4.3. Selecting a location in cold climates

NOTE

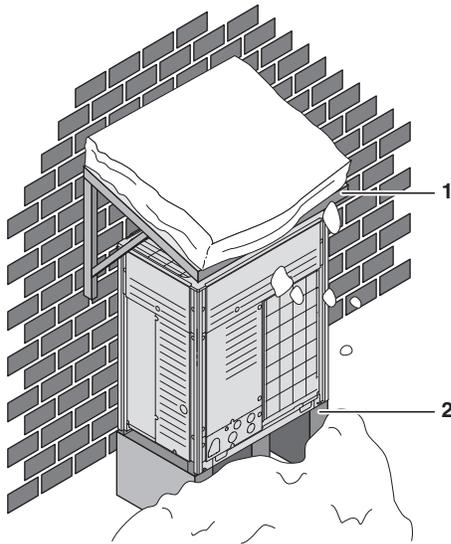
- When operating the unit in a low outdoor ambient temperature, be sure to follow the instructions described below.
- The following images are for reference only. For more details contact your local dealer.

To prevent exposure to wind and snow, install a baffle plate on the air side of the outdoor unit:



1 Baffle plate

In heavy snowfall areas it is very important to select an installation site where the snow will not affect the unit. If lateral snowfall is possible, make sure that the heat exchanger coil is not affected by the snow (if necessary construct a lateral canopy). Install the unit high enough from the ground to prevent burying in snow.



- 1 Construct a large canopy.
- 2 Construct a pedestal.

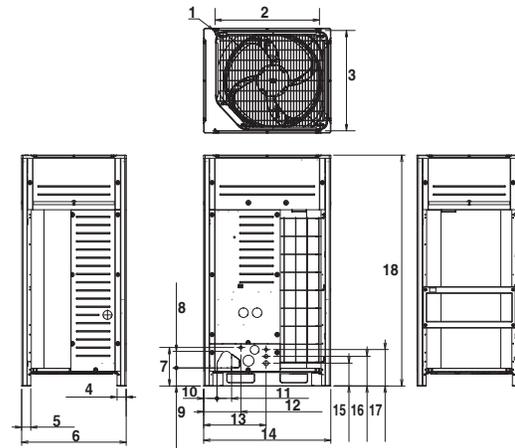
NOTE

When operating the unit in a low outdoor ambient temperature with high humidity conditions, make sure to take precautions to keep the drainholes of the unit free by using proper equipment such as the optional drainpan heater. For more information contact your local dealer.

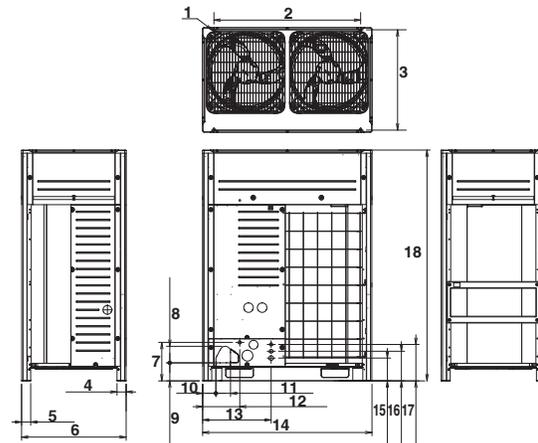
5. Dimensions and service space

5.1. Dimensions of outdoor unit

RXYQ72TTJU/TYDN



RXYQ96-168TTJU/TYDN

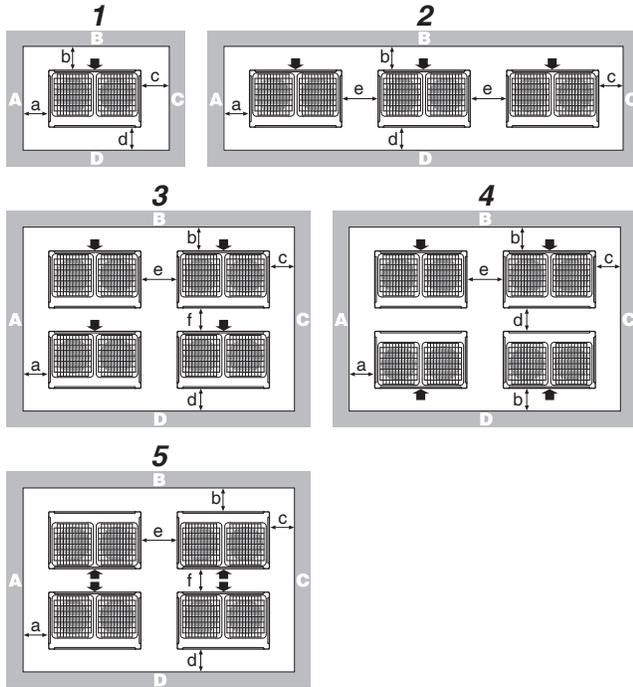


Unit: in. (mm)

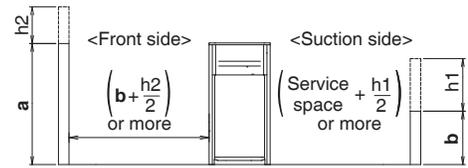
	RXYQ72TTJU/TYDN	RXYQ96-168TTJU/TYDN
1	Foundation bolt hole 9/16 (15) × 7/8 (22.5) × 4 oblong holes	
2	Pitch of foundation bolt holes	
	30-3/16 (766)	42-3/8 (1076)
3	Pitch of foundation bolt holes 28-7/16-29 (722-737)	
4	2-5/8 (67)	
5	2-5/8 (67)	
6	30-3/16 (767)	
7	11-1/8 (282)	
8	4-13/16 (122)	
9	5-3/16 (132)	
10	3-7/8 (98)	
11	4-3/16 (107)	
12	10-11/16 (272)	
13	18-1/16 (458)	19-3/4 (502)
14	36-11/16 (932)	48-7/8 (1242)
15	6-9/16 (167)	
16	8-9/16 (217)	
17	10-1/2 (267)	
18	66-11/16 (1694)	

5.2. Service space

The space around the unit is adequate for servicing and the minimum space for air inlet and air outlet is available (refer to the figure below and choose one of the possibilities).



ABCD Sides along the installation site with obstacles
 ↳ Suction side



- a 59 in. (1500 mm)
- b 19-5/8 in. (500 mm)

- In case of an installation site where sides A+B+C+D have obstacles, the wall heights of sides A+C have no impact on service space dimensions. Refer to the foregoing figure for impact of wall heights of sides B+D on service space dimensions.
- In case of an installation site where only the sides A+B have obstacles, the wall heights have no influence on any indicated service space dimensions.
- The installation space required on these drawings are for full load heating operation without considering possible ice accumulation. If the location of the installation is in a cold climate, then all dimensions above should be >19-5/8 in. (500 mm) to avoid accumulation of ice in between the outdoor units.

I INFORMATION

- The service space dimensions in above figure are based on cooling operation at 95°F (35°C) ambient temperature (standard conditions).
- If the design outdoor temperature exceeds 95°F (35°C) or the heat load exceeds maximum capacity in all the outdoor unit, take an even large space on the intake shown in figure in 5.2. Service space.

I INFORMATION

Further specifications can be found in the Engineering Data Book.

	A+B+C+D	A+B	
1	a ≥ 3/8 (10) b ≥ 11-3/4 (300) c ≥ 3/8 (10) d ≥ 19-5/8 (500)	a ≥ 2 (50) b ≥ 3-7/8 (100) c ≥ 2 (50) d ≥ 19-5/8 (500)	a ≥ 7-7/8 (200) b ≥ 11-3/4 (300)
2	a ≥ 3/8 (10) b ≥ 11-3/4 (300) c ≥ 3/8 (10) d ≥ 19-5/8 (500) e ≥ 3/4 (20)	a ≥ 2 (50) b ≥ 3-7/8 (100) c ≥ 2 (50) d ≥ 19-5/8 (500) e ≥ 3-7/8 (100)	a ≥ 7-7/8 (200) b ≥ 11-3/4 (300) e ≥ 15-3/4 (400)
3	a ≥ 3/8 (10) b ≥ 11-3/4 (300) c ≥ 3/8 (10) d ≥ 19-5/8 (500) e ≥ 3/4 (20) f ≥ 23-5/8 (100)	a ≥ 2 (50) b ≥ 3-7/8 (100) c ≥ 2 (50) d ≥ 19-5/8 (500) e ≥ 3-7/8 (100) f ≥ 19-5/8 (500)	Unit: in.(mm)
4	a ≥ 3/8 (10) b ≥ 11-3/4 (300) c ≥ 3/8 (10) d ≥ 19-5/8 (500) e ≥ 3/4 (20)	a ≥ 2 (50) b ≥ 3-7/8 (100) c ≥ 2 (50) d ≥ 19-5/8 (500) e ≥ 3-7/8 (100)	
5	a ≥ 3/8 (10) b ≥ 19-5/8 (500) c ≥ 3/8 (10) d ≥ 19-5/8 (500) e ≥ 3/4 (20) f ≥ 35-7/16 (900)	a ≥ 2 (50) b ≥ 19-5/8 (500) c ≥ 2 (50) d ≥ 19-5/8 (500) e ≥ 3-7/8 (100) f ≥ 23-5/8 (600)	

6. Inspecting, handling and unpacking the unit

6.1. Inspection

At delivery, the unit must be checked and any damage must be reported immediately to the carrier's claims agent.

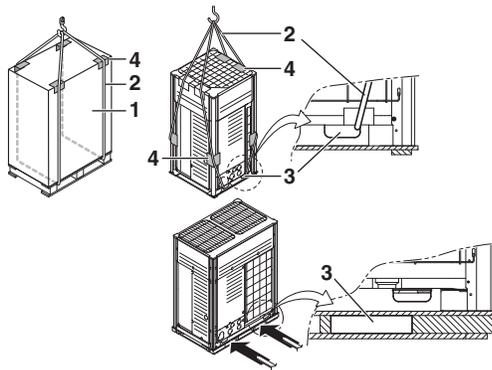
6.2. Handling

1 When handling the unit, take into account the following:

-  Fragile, handle the unit with care.
-  Keep the unit upright in order to avoid compressor damage.

2 Choose beforehand the path along which the unit is to be brought in.

3 Bring the unit as close as possible to its final installation position in its original package to prevent damage during transport.



- 1 Packaging material
- 2 Belt sling
- 3 Opening
- 4 Protector

4 Lift the unit preferably with a crane and 2 belts of at least 27 ft. (8 m) long as shown in the figure above.

Always use protectors to prevent belt damage and pay attention to the position of the unit's center of gravity.



NOTE

Use a belt sling of $\leq 3/4$ in. (20 mm) wide that adequately bears the weight of the unit.

A forklift can only be used for transport as long as the unit remains on its pallet as shown above.

6.3. Unpacking



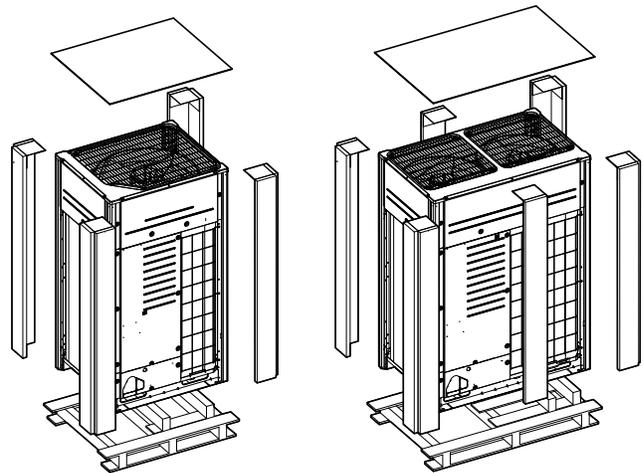
CAUTION

To avoid injury, do not touch the air inlet or aluminum fins of the unit.

Relief the unit from its packing material:

RXYQ72TTJU/TYDN

RXYQ96-168TTJU/TYDN



Take care not to damage the unit when removing the shrink foil with a cutter.



WARNING

Tear apart and throw away plastic packaging bags so that children will not play with them. Children playing with plastic bags face danger of death by suffocation.

- 1 Remove the 4 bolts fixing the unit to its pallet.
- 2 Make sure that all accessories as mentioned in 2.1. Accessories supplied with this unit on page 3 are available in the unit.

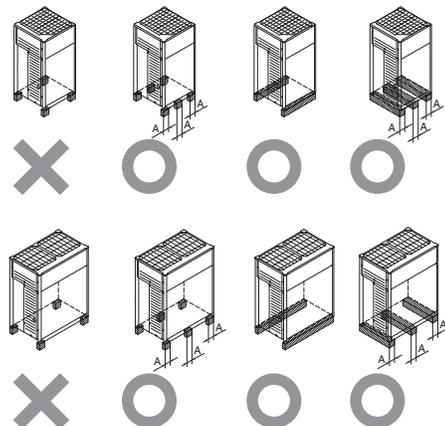
6.4. Installing the unit

Make sure the unit is installed level on a sufficiently strong base to prevent vibration and noise.



NOTE

When the installation height of the unit needs to be increased, do not use stands to only support the corners.

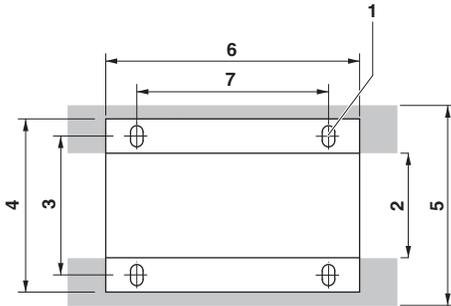


A $\geq 3-7/8$ in. (100 mm)

X Not allowed

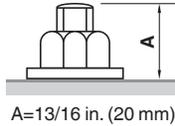
O Allowed

- The height of the foundation must at least be 5-7/8 in. (150 mm) from the floor.
In heavy snowfall areas, this height should be increased, depending on the installation place and condition.
- The unit must be installed on a solid longitudinal foundation (steel beam frame or concrete) and make sure the base under the unit is larger than the gray marked area.



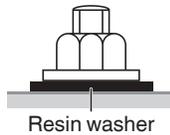
Dimensions for above figure		
1	Hole for foundation bolt	φ9/16 in. (15 mm) dia: 4 positions
2	2 Inner dimension of the base	24-7/8 in. (631 mm)
3	Distance between foundation bolt holes	29 in. (729 mm)
4	Depth of unit	30-1/8 in. (765 mm)
5	Outer dimension of the base	≥30-1/8 in. (765 mm)
6	Longitudinal foundation dimension	72T type: 36-9/6 in. (930 mm) 96-168T type: 48-13/16 in. (1240 mm)
7	Distance between foundation bolt holes	72T type: 30-3/16 in. (766 mm) 96-168T type: 42-3/8 in. (1076 mm)

- Fasten the unit in place using 4 foundation bolts M12. It is best to screw in the foundation bolts until their length remains 13/16 in. (20 mm) above the foundation surface.



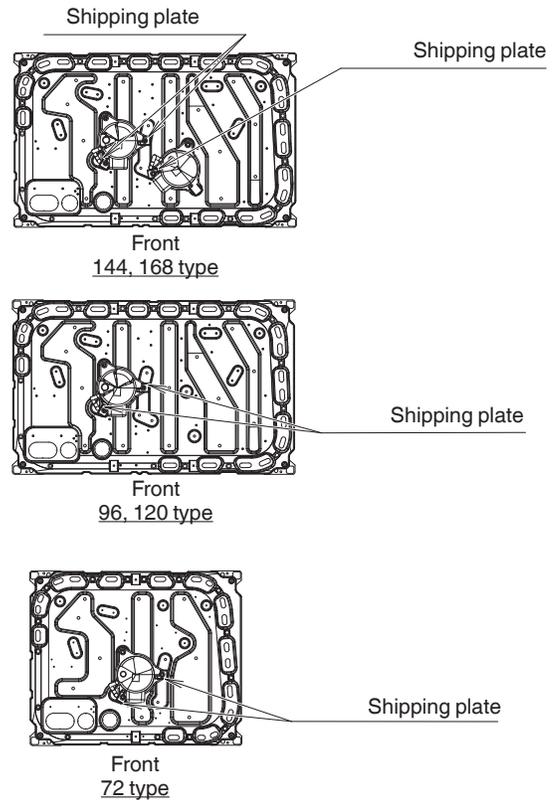
NOTE

- There are restrictions on the refrigerant pipe connecting order between outdoor unit in the case of the multi system. See 1.2.2. Outdoor unit combinations on page 2 for detail.
- When installing on a roof, make sure the roof floor is strong enough and be sure to waterproof all work.
- Make sure the area around the machine drains properly by setting up drainage grooves around the foundation.
- Drain water is sometimes discharged from the outdoor unit when it is running.
- For anti-corrosion type, use nuts with resin washers. If the paint on nut connections comes off, the anti-corrosion effect may decrease.

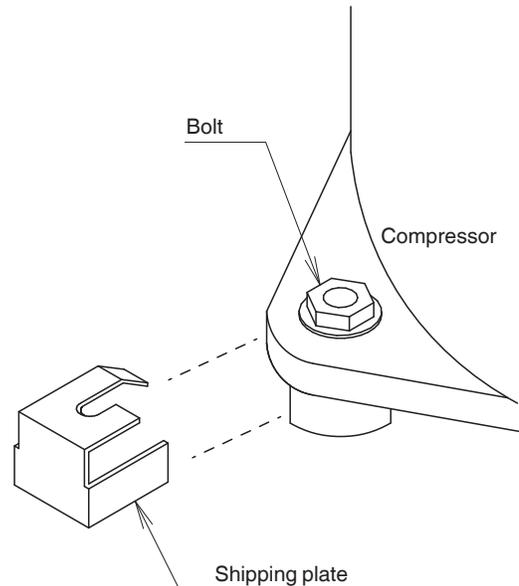


6.5. Method for removing shipping plate

The shipping plate installed over the compressor leg for protecting the unit during transport must be removed. Proceed as shown in the figure and procedure below.



- Remove shipping plates.
- Be sure to tighten compressor fixing bolts again. (9.1ft-lbf (12.3 N·m))



NOTE

If the unit is operated with the shipping plate still attached, abnormal vibration or noise may be generated.

7. Refrigerant pipe size and allowable pipe length

7.1. General information

NOTE

The refrigerant R410A requires strict cautions for keeping the system clean, dry and tight.

- Clean and dry: foreign materials (including mineral oils or moisture) should be prevented from getting mixed into the system.
- Tight: R410A does not contain any chlorine, does not destroy the ozone layer, and does not reduce earth's protection against harmful ultraviolet radiation. R410A can contribute slightly to the greenhouse effect if it is released. Therefore we should take special attention to check the tightness of the installation.

7.2. Selection of piping material

NOTE

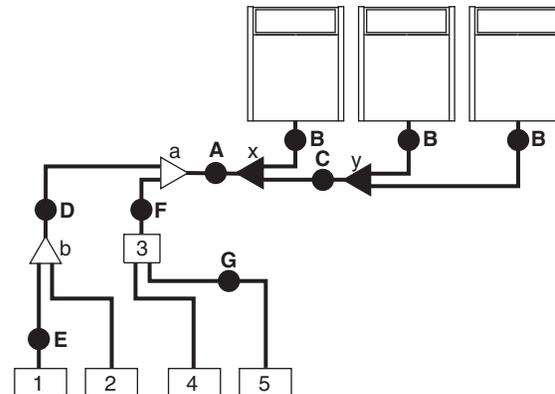
Piping and other pressure containing parts shall comply with the applicable legislation and shall be suitable for refrigerant. Use phosphoric acid deoxidized seamless copper for refrigerant.

NOTE

- 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 9. Field wiring on page 18 and 12. Checking of device and installation conditions on page 23 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 chlorine 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. or less.)
- Use the following items for the refrigerant piping.
 - Material** : Jointless phosphor-deoxidized copper pipe
 - Size** : See 7.3. Selection of piping size to determine the correct size.
 - Thickness** : Select a thickness for the refrigerant piping which complies with national and local laws.
- For piping work, follow the maximum tolerated length, difference in height, and length after a branch indicated in the 7.5. System piping (length) limitations.
- Outdoor unit multi connection piping kit and refrigerant branching kit (sold separately) are needed for connection of piping between outdoor units (in case of multi system) and piping branches.
- Use only separately sold items selected specifically according to the outdoor unit multi connection piping kit, the refrigerant branching kit selection in the 7.4. Selection of refrigerant branch kits.

7.3. Selection of piping size

Determine the proper size referring to following tables and reference figure (only for indication).



- 1, 2 VRV indoor unit
- 3 BP unit (1 module system only)
- 4, 5 Mini-split indoor unit (1 module system only)
- a, b Refrigerant branching kit
- x, y Outdoor unit multi connection piping kit

7.3.1. Piping between outdoor unit and (first) refrigerant branch kit: A, B, C

Choose from the following table in accordance with the outdoor unit total capacity type, connected downstream.

Outdoor unit capacity type	Piping outer diameter size	
	Gas pipe	Liquid pipe
RXYQ72T type	3/4 in. (19.1 mm)	3/8 in. (9.5 mm)
RXYQ96T type	7/8 in. (22.2 mm)	
RXYQ120, 144T type	1-1/8 in. (28.6 mm)	1/2 in. (12.7 mm)
RXYQ168-216T type		5/8 in. (15.9 mm)
RXYQ240T type	1-3/8 in. (34.9 mm)	3/4 in. (19.1 mm)
RXYQ264-336T type	1-5/8 in. (41.3 mm)	
RXYQ360-408T type		

7.3.2. Piping between refrigerant branch kits: D

Choose from the following table in accordance with the indoor unit total capacity type, connected downstream. Do not let the connection piping exceed the refrigerant piping size chosen by the general system model name.

Indoor unit capacity index	Piping outer diameter size	
	Gas pipe	Liquid pipe
< 54	5/8 in. (15.9 mm)	3/8 in. (9.5 mm)
54 ≤ x < 72	3/4 in. (19.1 mm)	
72 ≤ x < 111	7/8 in. (22.2 mm)	
111 ≤ x < 162	1-1/8 in. (28.6 mm)	1/2 in. (12.7 mm)
162 ≤ x < 230		5/8 in. (15.9 mm)
230 ≤ x < 300	1-3/8 in. (34.9 mm)	3/4 in. (19.1 mm)
> 300	1-5/8 in. (41.3 mm)	

Example:

Downstream capacity for E = capacity index of unit 1

Downstream capacity for D = capacity index of unit 1 + capacity index of unit 2

7.3.3. Piping between refrigerant branch kit and BP unit: F

Pipe size for direct connection on BP unit must be based on the total capacity of the connected indoor units (only in case Mini-split indoor units are connected).

Total capacity index of connected indoor units	Gas pipe	Liquid pipe
< 24	1/2 in. (12.7 mm)	1/4 in. (6.4 mm)
24 ≤ x < 57	5/8 in. (15.9 mm)	3/8 in. (9.5 mm)
> 57	3/4 in. (19.1 mm)	

Example:

Downstream capacity for F = capacity index of unit 4 + capacity index of unit 5

7.3.4. Piping between BP unit and Mini-split indoor unit: G

Only in case Mini-split indoor units are connected.

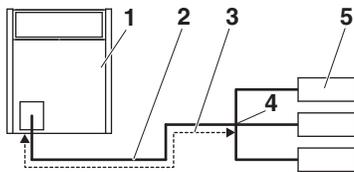
Indoor unit capacity index	Gas pipe	Liquid pipe
07, 09, 12	3/8 in. (9.5 mm)	1/4 in. (6.4 mm)
15, 18, 24	1/2 in. (12.7 mm)	

7.3.5. Piping between refrigerant branch kit and indoor unit: E

Pipe size for direct connection to indoor unit must be the same as the connection size of the VRV indoor unit.

Indoor unit capacity index	Piping outer diameter size	
	Gas pipe	Liquid pipe
07, 09, 12, 18	1/2 in. (12.7 mm)	1/4 in. (6.4 mm)
24, 30, 36, 48, 54	5/8 in. (15.9 mm)	3/8 in. (9.5 mm)
72	3.4 in. (19.1 mm)	
96	7/8 in. (22.2 mm)	

- When the equivalent pipe length between outdoor and indoor units is 295 ft. (90 m) or more, the size of the main pipes (both gas side and liquid side) must be increased. Depending on the length of the piping, the capacity may drop, but even in such a case it is possible to increase the size of the main pipes.
- Even as the length of the piping is less than 295 ft. (90 m), it is able to increase the diameter of piping to improve performance.



- Outdoor unit
- Main pipes (outdoor unit to first refrigerant branch kit)
- Increase
- First refrigerant branch kit
- Indoor unit

Size up for equivalent length for outdoor-indoor units over 295 ft. (90 m)		
Outdoor unit capacity type	Gas pipe	Liquid pipe
RXYQ72T type	3/4 in. (19.1 mm) → 7/8 in. (22.2 mm)	3/8 in. (9.5 mm) → 1/2 in. (12.7 mm)
RXYQ96T type	7/8 in. (22.2 mm) → 1 in. (25.4 mm) ^(a)	
RXYQ120T type	Increase is NOT allowed	1/2 in. (12.7 mm) → 5/8 in. (15.9 mm)
RXYQ144T type	1-1/8 in. (28.6 mm)	5/8 in. (15.9 mm) → 3/4 in. (19.1 mm)
RXYQ168-216T type	→ 1-1/4 in. (31.8 mm) ^(a)	
RXYQ240T type	Increase is NOT allowed	→ 3/4 in. (19.1 mm)
RXYQ264-336T type	1-3/8 in. (34.9 mm) → 1-1/2 in. (38.1 mm) ^(a)	3/4 in. (19.1 mm) → 7/8 in. (22.2 mm)
RXYQ360-408T type	Increase is NOT allowed	

(a) If size is NOT available, increase is NOT allowed.

7.4. Selection of refrigerant branch kits

Refrigerant refnets

For piping example, refer to 7.3. Selection of piping size on page 9.

- When using refnet joints at the first branch from the outdoor unit, choose from the following table in accordance with the capacity of the outdoor unit (example: refnet joint a - see 7.3. Selection of piping size).

Outdoor unit capacity type	Kit name
RXYQ 72, 96T type	KHRP26M33T
RXYQ 120-216T type	KHRP26M72TU9
RXYQ 240-408T type	KHRP26M73TU9

- For refnet joints other than the first branch (example refnet joint b - see 7.3. Selection of piping size), select the proper branch kit model based on the total capacity index of all indoor units connected after the refrigerant branch.

Indoor unit capacity index	Kit name
< 72	KHRP26M22T
72 ≤ x < 111	KHRP26M33T
111 ≤ x < 246	KHRP26M72TU9
≥ 246	KHRP26M73TU9

- Concerning refnet headers, choose from the following table in accordance with the total capacity of all the indoor units connected below the refnet header.

Indoor unit capacity index	Kit name
< 72	KHRP26M22H9: maximum 4 indoor units or KHRP26M33H9: maximum 8 indoor units
72 ≤ x < 111	KHRP26M33H9
111 ≤ x < 230	KHRP26M72H9
≥ 230	KHRP26M73H9



INFORMATION

Maximum 8 branches can be connected to a header.

- How to choose an outdoor multi connection piping kit (needed if the outdoor unit capacity type is 192 or more). Choose from the following table in accordance with the number of outdoor units.

Number of outdoor units	Branch kit name
2	BHFP22P100U
3	BHFP22P151U

7.5. System piping (length) limitations

7.5.1. Piping length restrictions

Make sure to perform the piping installation within the range of the maximum allowable pipe length, allowable height difference and allowable length after branching as indicated below. 3 patterns will be discussed, including VRV indoor units combined with Mini-split indoor units.

Definitions

Actual piping length: pipe length between outdoor⁽¹⁾ and indoor units.

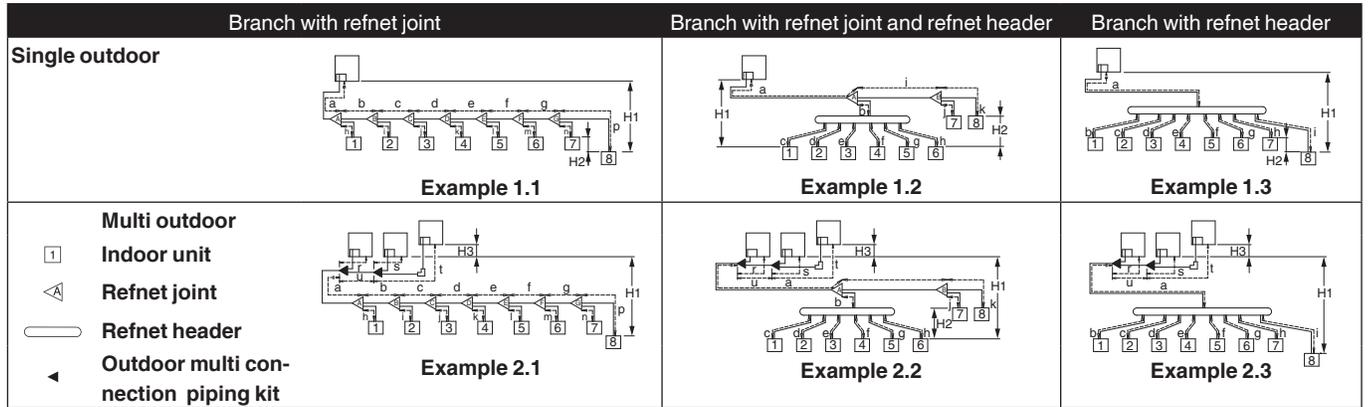
Equivalent piping length: pipe length between outdoor⁽¹⁾ and indoor units. (Assume equivalent piping length of refnet joint = 1.6 ft. (0.5 m) and refnet header = 3.3 ft. (1 m) (for calculation purposes of equivalent piping length, not for refrigerant charge calculations).)

Total piping length: total piping length from the outdoor⁽¹⁾ to all indoor units.

- (1) If the system capacity type is > 168, the distance will be from the first outdoor unit branch to indoor units.

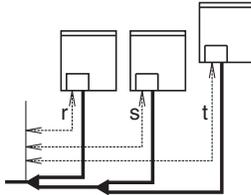
7.5.2. System only containing VRV indoor units

System setup



Difference in height between outdoor and indoor units: H1.
 Difference in height between indoor and indoor units: H2.
 Difference in height between outdoor and outdoor units: H3.
 Difference in height between outdoor and BP unit: H4.
 Difference in height between BP unit and BP unit: H5.
 Difference in height between BP unit and Mini-split indoor unit: H6.

Example 3: with standard multi layout



Maximum allowable length

- Between outdoor and indoor units (standard multi/free multi combinations)

Actual piping length	540 ft. (165 m)	Example 1.1 unit 8: $a+b+c+d+e+f+g+p \leq 540$ ft. (165 m) Example 2.1 unit 8: $a+b+c+d+e+f+g+p \leq 540$ ft. (165 m)	Example 1.2 unit 6: $a+b+h \leq 540$ ft. (165 m) unit 8: $a+i+k \leq 540$ ft. (165 m)	Example 1.3 unit 8: $a+i \leq 540$ ft. (165 m)
Equivalent length⁽²⁾	623 ft. (190 m)	—	—	—
Total piping length	3280 ft. (1000 m)	Example 1.1 $a+b+c+d+e+f+g+h+i+j+k+l+m+n+p \leq 3280$ ft. (1000 m) Example 2.1 $a+b+c+d+e+f+g+h+i+j+k+l+m+n+p \leq 3280$ ft. (1000 m)	Example 1.2 $a+b+c+d+e+f+g+h+i+j+k \leq 3280$ ft. (1000 m)	Example 1.3 $a+b+c+d+e+f+g+h+l \leq 3280$ ft. (1000 m)

- Between outdoor branch and outdoor unit (only in case ≥ 192 type)

Actual piping length	33 ft. (10 m)	Example 3 $r \leq 33$ ft. (10 m) $s \leq 33$ ft. (10 m) $t \leq 33$ ft. (10 m)
Equivalent length	43 ft. (13 m)	—

Maximum allowable height difference

H1	≤ 164 ft. (50 m) (130 ft. (40 m) ^(a) (if outdoor is located below indoor units))
H2	≤ 98 ft. (30 m)
H3	≤ 16 ft. (5 m)

- (a) Conditional extension up till 295 ft. (90 m) is possible without additional option kit:

In case the outdoor location is higher than indoor: extension is possible up till 295 ft. (90 m) and following 2 conditions must be fulfilled:

Liquid piping size up (see table Size up for equivalent length for outdoor-indoor units over 295 ft. (90 m) on page 10).

Dedicated setting on outdoor unit is required (see [2-49]= on page 35).

In case the outdoor location is lower than indoor: extension is possible up till 295 ft. (90 m) and following 6 conditions must be fulfilled:

130-197 ft. (40-60 m): minimum connection ratio connected: 80%.

197-213 ft. (60-65 m): minimum connection ratio connected: 90%.

213-262 ft. (65-80 m): minimum connection ratio connected: 100%.

262-295 ft. (80-90 m): minimum connection ratio connected: 110%.

Liquid piping size up (see table Size up for equivalent length for outdoor-indoor units over 295 ft. (90 m) on page 10).

Dedicated setting on outdoor unit is required (see [2-35]= on page 35).

Maximum allowable length after branch

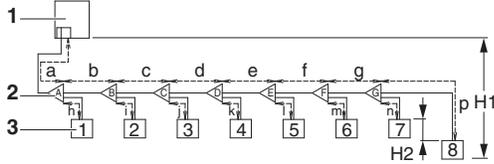
The pipe length from the first refrigerant branch kit to the indoor unit ≤ 130 ft. (40 m)

Example 1.1: unit 8: $b+c+d+e+f+g+p \leq 130$ ft. (40 m)

Example 1.2: unit 6: $b+h \leq 130$ ft. (40 m), unit 8: $i+k \leq 130$ ft. (40 m)

Example 1.3: unit 8: ≤ 130 ft. (40 m)

However, extension is possible if all below conditions are met. In this case limitation can be extended up to 295 ft. (90 m).



- 1 Outdoor units
- 2 Refnet joints (A – G)
- 3 Indoor unit (1 – 8)

a The piping length between all indoor to the nearest branch kit is ≤ 130 ft. (40 m)

Example: $h, i, j \dots p \leq 130$ ft. (40 m)

b It is necessary to increase the pipe size of the gas and liquid piping if the pipe length between the first and the farthest indoor unit is over 130 ft. (40 m).

If the increased pipe size is larger than the pipe size of the main pipe, then the pipe size of the main pipe has to be increased as well.

Increase the pipe size as follows:

$\phi 3/8 \rightarrow \phi 1/2$; $\phi 1/2 \rightarrow \phi 5/8$; $\phi 5/8 \rightarrow \phi 3/4$; $\phi 3/4 \rightarrow \phi 7/8$; $\phi 7/8 \rightarrow \phi 1^{(3)}$;
 $\phi 1-1/8 \rightarrow \phi 1-1/4^{(3)}$; $\phi 1-3/8 \rightarrow \phi 1-1/2^{(3)}$;

Example: unit 8: $b+c+d+e+f+g+p \leq 295$ ft. (90 m) and $b+c+d+e+f+g > 130$ ft. (40 m); increase the pipe size of b, c, d, e, f, g.

(3) If available on the site. Otherwise it cannot be increased.

c When the piping size is increased (step b), the piping length has to be counted as double (except for the main pipe and the pipes that are not increased in pipe size).

The total piping length has to be within limitations (see table above).

Example:

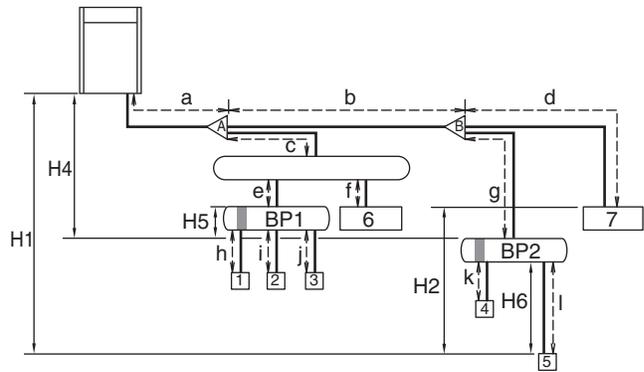
$a+b*2+c*2+d*2+e*2+f*2+g*2+h+i+j+k+l+m+n+p \leq 3280$ ft. (1000 m).

d The piping length difference between the nearest indoor from the first branch to the outdoor unit and farthest indoor to the outdoor unit is ≤ 130 ft. (40 m).

Example: The farthest indoor unit 8. The nearest indoor unit 1 $\rightarrow (a+b+c+d+e+f+g+p)-(a+h) \leq 130$ ft. (40 m).

7.5.3. System containing VRV indoor units and Mini-split indoor units

System setup



- Header
- BP unit
- 1 – 5 Mini-split indoor units
- 6, 7 VRV indoor units

Maximum allowable length

- Between outdoor unit and indoor unit.

Actual piping length	295 ft. (100 m)	Example: $a+b+g+l \leq 295$ ft. (100 m)
Equivalent length ^(a)	393 ft. (200 m)	–
Total piping length	820 ft. (250 m)	Example: $a+b+d+g+l+k+c+e+f+h+i+j \leq 820$ ft. (250 m)

(a) Assume equivalent piping length of refnet joint = 1.6 ft. (0.5 m) and refnet header = 3.3 ft. (1 m) (for calculation purposes).

- Between BP unit and indoor unit.

Indoor unit capacity index	Pipe length
<60	6.6 ft. – 49 ft. (2 – 5 m)

Remark:

Minimum allowable length between outdoor unit and first refrigerant branch kit > 16 ft. (5 m) (the refrigerant noise from the outdoor unit can be transmitted).

Example: $a > 16$ ft. (5 m)

Maximum allowable height difference

H1	≤ 164 ft. (50 m) (131 ft. (40 m) (if outdoor is located below indoor units))
H2	≤ 49 ft. (15 m)
H4	≤ 131 ft. (40 m)
H5	≤ 49 ft. (15 m)
H6	≤ 16 ft. (5 m)

Maximum allowable length after branch

The pipe length from the first refrigerant branch kit to the indoor unit ≤ 164 ft. (50 m).

Example: $b+g+l \leq 164$ ft. (50 m)

If the piping length between the first branch and BP unit or VRV indoor unit is over 65 ft. (20 m), it is necessary to increase the gas and liquid piping size between the first branch and BP unit or VRV indoor unit. If the piping diameter of the sized up piping exceeds the diameter of the piping before the first branch kit, then the latter also requires a liquid piping and gas piping size up.

8. 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.

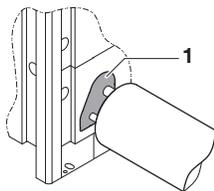
Protection against contamination when installing pipes

Take measures to prevent foreign materials like moisture and contamination from mixing into the system.

	Installation	Protection method
	More than a month	Pinch the pipe
	Less than a month	Pinch or tape pipe
	Regardless of the period	

Block all gaps in the holes for passing out piping and wiring using sealing material (field supply) (the capacity of the unit will drop and small animals may enter the machine).

Example: passing piping out through the front.



- Close the areas marked with . (When the piping is routed from the front panel.)

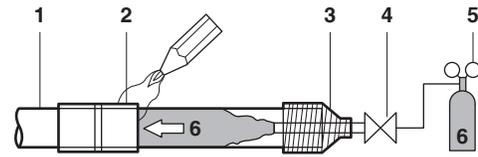
- Use clean pipes only.
- Hold the pipe end downwards when removing burrs.
- Cover the pipe end when inserting it through a wall so that no dust or dirt enters the pipe.

NOTE

- After all the piping has been connected, make sure there is no gas leak. Use Dry Nitrogen to perform a gas leak detection.
- 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.

8.1. Caution for brazing

- Make sure to blow through with Dry Nitrogen when brazing. Blowing through with Dry Nitrogen prevents the creation of large quantities of oxidized film on the inside of the piping. An oxidized film adversely affects valves and compressors in the refrigerating system and prevents proper operation.
- The Dry Nitrogen pressure should be set to 2.9 psi (0.02 MPa (i.e., just enough so it can be felt on the skin)) with a pressure-reducing valve.



- Refrigerant piping
- Part to be brazed
- Taping
- Hand valve
- Pressure-reducing valve
- Dry Nitrogen

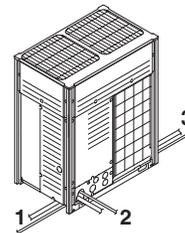
Do not use anti-oxidants when brazing the pipe joints. Residue can clog pipes and break equipment:

- Do not use flux when brazing copper-to-copper refrigerant piping. Use phosphor copper brazing filler alloy (BCuP) which does not require flux.
- Flux has an extremely harmful influence on refrigerant piping systems. For instance, if chlorine based flux is used, it will cause pipe corrosion or, in particular, if the flux contains fluorine, it will deteriorate the refrigerant oil.

8.2. Connecting the refrigerant piping

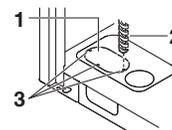
8.2.1. Decide front or side (bottom) connection

Installation of refrigerant piping is possible as front connection or side connection (when taken out from the bottom) as shown in the figure below.



- Left-side connection
- Front connection
- Right-side connection

- For side connections, the knockout hole on the bottom plate should be removed:



- Large knockout hole
- Drill
- Points for drilling

NOTE

Precautions when knocking out knockout holes:

- Be sure to avoid damaging the casing.
- After knocking out the knockout holes, we recommend you remove the burrs and paint the edges and areas around the edges using repair paint to prevent rusting.
- When passing electrical wiring through the knock holes, protect the wiring with a conduit or bushings, making sure not to damage the wiring.

8.2.2. Remove the pinched pipes

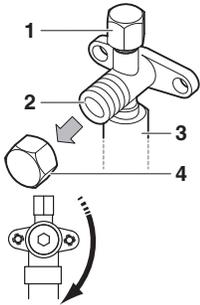
WARNING

Any gas or oil remaining inside the stop valve may blow off the pinched piping.

Failure to observe the instructions in procedure below properly may result in property damage or personal injury, which may be serious depending on the circumstances.

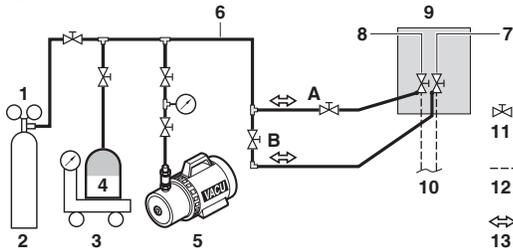
Use the following procedure to remove the pinched piping:

- 1 Remove the valve cover and make sure that the stop valves are fully closed.



- 1 Service port and service port cover
- 2 Stop valve
- 3 Field piping connection
- 4 Stop valve cover

- 2 Connect the vacuuming/recovery unit to service ports of all stop valves.



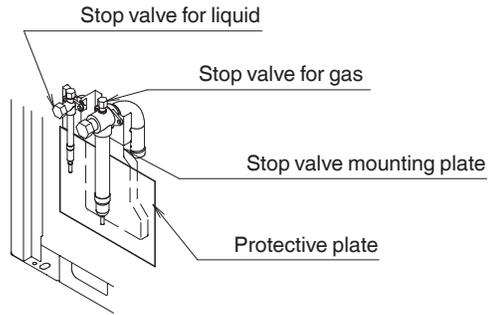
- 1 Gauge manifold
- 2 Dry Nitrogen
- 3 Measuring instrument
- 4 Refrigerant R410A tank (siphon system)
- 5 Vacuum pump
- 6 Charge hose
- 7 Gas pipe stop valve
- 8 Liquid pipe stop valve
- A Valve A
- B Valve B
- 9 Outdoor unit
- 10 To indoor unit
- 11 Stop valve
- 12 Field piping
- 13 Gas flow

- 3 Recover gas and oil from the pinched piping by using a recovery unit.

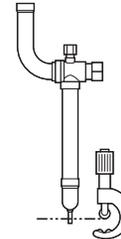
CAUTION
Do not vent gases into the atmosphere.

- 4 When all gas and oil is recovered from the pinched piping, disconnect the charge hose and close the service ports.

WARNING
When brazing at the proximity of the stop valve, be sure to protect the stop valve mounting plate with a protective plate to prevent from contacting with the burner flame.



- 5 Cut off the lower part of the smaller pinched piping with an appropriate tool such as pipe cutters. Let the remaining oil drip out in case the recovery was not complete.



Wait until all oil is dripped out.

- 6 Cut the pinched piping off with a pipe cutter just above the brazing point or marking if there is no brazing point.

WARNING

Never remove the pinched piping by brazing. Any gas or oil remaining inside the stop valve may blow off the pinched piping. Failure to observe the instructions in procedure below properly may result in property damage or personal injury, which may be serious depending on the circumstances.

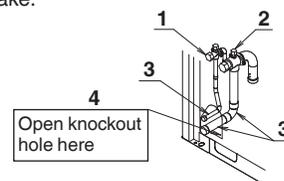
- 7 Wait until all oil is dripped out before continuing with the connection of the field piping in case the recovery was not complete.

8.2.3. Connecting refrigerant piping to the outdoor unit

- All pipings for gas and liquid over from the field connection piping kit are field supplied.

Front connection

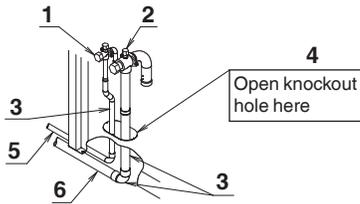
Remove the knockout hole of the piping intake and connect piping to the piping intake.



- 1 Liquid side stop valve
- 2 Gas side stop valve
- 3 Filed connection piping kit (accessory)
- 4 Knockout hole

Side (bottom) connection

Remove the knockout hole on the bottom frame and lead out the piping from the bottom frame.



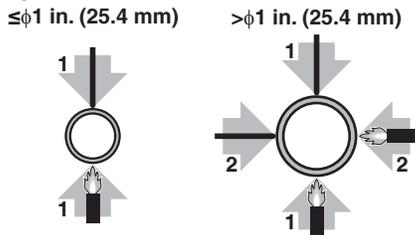
- 1 Liquid side stop valve
- 2 Gas side stop valve
- 3 Filed connection piping kit (accessory)
- 4 Knockout hole
- 5 Liquid side piping (field supply)
- 6 Gas side piping (field supply)

INFORMATION

All local inter unit piping are field supplied except the accessory pipes.

NOTE

Precautions when connecting field piping. Add brazing material as shown in the figure.



NOTE

- Be sure to use the supplied accessory pipes when carrying out piping work in the field.
- Be sure that the field installed piping does not touch other pipes, the bottom panel or side panel. Especially for the bottom and side connection, be sure to protect the piping with suitable insulation, to prevent it from coming into contact with the casing generated.

Connection from the stop valves to the field piping can be done by using accessory pipes supplied as accessory.

NOTE

Make sure that the onsite piping does not come in contact with other piping, the bottom frame or side panels of the unit.

The connections to the branch kits are the responsibility of the installer (field piping).

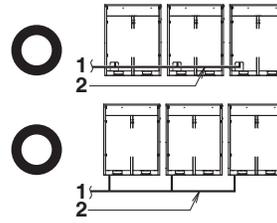
8.2.4. Precautions when connecting piping between outdoor units (multiple outdoor unit system)

- To connect the piping between outdoor units, an optional multi-connection piping kit BHFP22P100U/151U is always required. When installing the piping, follow the instructions in the installation manual that comes with the kit.
- Only proceed with piping work after considering the limitations on installing listed here and in the chapter 8.2. Connecting the refrigerant piping on page 14 always referring to the installation manual delivered with the kit.

8.2.5. Possible installation patterns and configurations

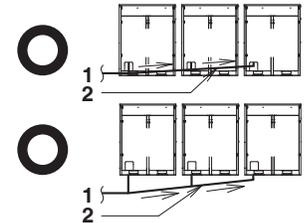
- The piping between the outdoor units must be routed level or slightly upward to avoid the risk of oil retention into the piping.

Pattern 1



- 1 To indoor unit
- 2 Piping between outdoor units

Pattern 2

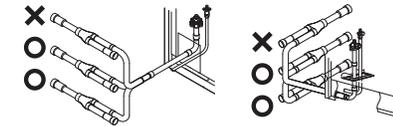


Prohibited patterns: change to pattern 1 or 2

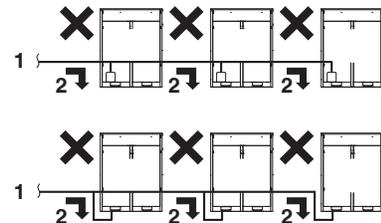


- 1 To indoor unit
- 2 Piping between outdoor units

- To avoid the risk of oil retention to the outmost outdoor unit, always connect the stop valve and the piping between outdoor units as shown in the 4 correct possibilities of the figure below.

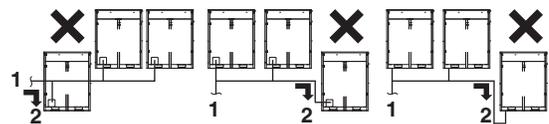


Prohibited patterns: change to pattern 1 or 2



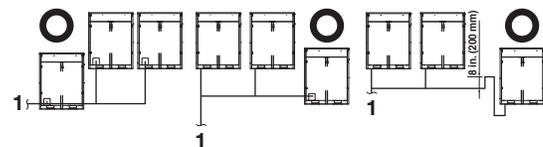
- 1 To indoor unit
- 2 Oil collects to the outmost outdoor units

Change to configuration as in figure below



- 1 To indoor unit
- 2 Oil collects to the outmost outdoor units

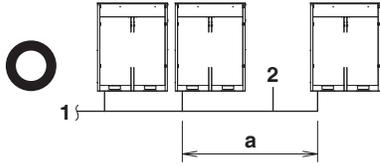
Correct configuration



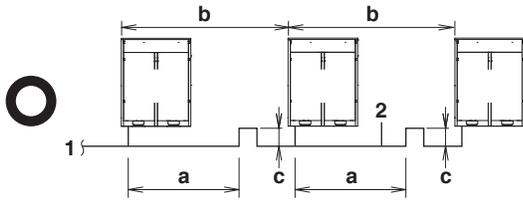
- 1 To indoor unit

- If the piping length between the outdoor units exceeds 6.5 ft. (2 m), create a rise of 8 in. (200 mm) or more in the gas line within a length of 6.5 ft. (2 m) from the kit.

If ≤ 6.5 ft. (2 m)



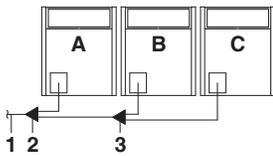
If > 6.5 ft. (2 m)



- 1 To indoor unit
- 2 Piping between outdoor units
- a ≤ 6.5 ft. (2 m)
- b ≥ 8 in. (200 mm)
- c > 6.5 ft. (2 m)

NOTE

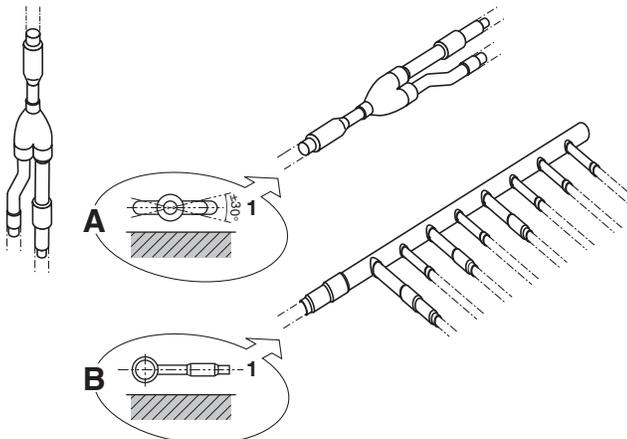
There are restrictions on the refrigerant pipe connection order between outdoor units during installation in case of a multiple outdoor unit system. Install according to following restrictions. The capacities of outdoor units A, B and C must fulfill the following restriction conditions: $A \geq B \geq C$.



- 1 To indoor unit
- 2 Outdoor unit multi connecting piping kit (first branch)
- 3 Outdoor unit multi connecting piping kit (second branch)

8.2.6. Branching the refrigerant piping

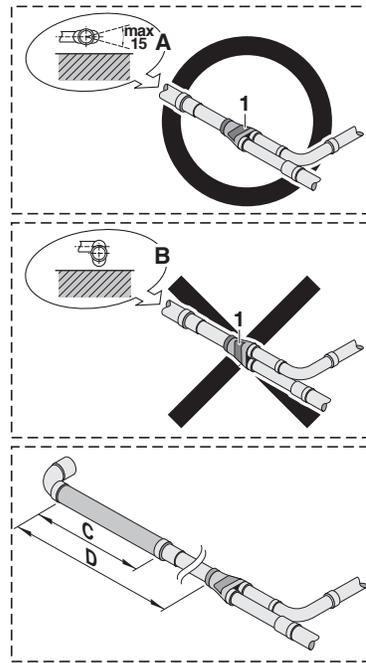
- For installation of the refrigerant branching kit, refer to the installation manual delivered with the kit.



1 Horizontal surface

- 1 Mount the refnet joint so that it branches either horizontally or vertically.
- 2 Mount the refnet header so that it branches horizontally.

- Installation of the multi connection piping kit.



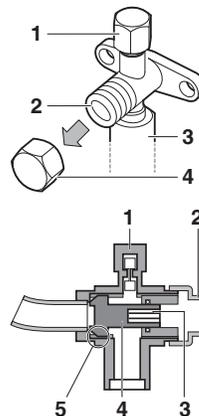
- C $> 4-3/4$ in. (120 mm)
- D $> 19-11/16$ in. (500 mm)

- 3 Install the joints horizontally, so that the caution label (1) attached to the joint comes to the top.
 - Do not tilt the joint more than 15° (see view A).
 - Do not install the joint vertically (see view B).
- 4 Make sure that the total length of the piping connected to the joint is absolute straight for more than 19-11/16 in. (500 mm). Only if a straight field piping of more than 4-3/4 in. (120 mm) is connected, more than 19-11/16 in. (500 mm) of straight section can be ensured.
- 5 Improper installation may lead to malfunction of the outdoor unit.

8.3. Guidelines for handling stop valve

8.3.1. Cautions on handling the stop valve

- Make sure to keep both stop valves open during operation.
- The figure below shows the name of each part required in handling the stop valve.
- The stop valve is factory closed.



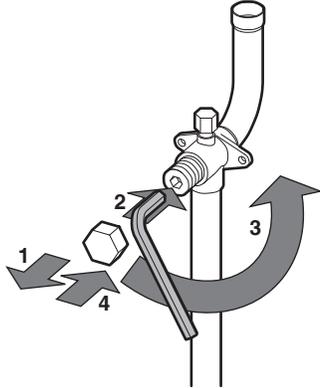
- 1 Service port and service port cover
- 2 Stop valve
- 3 Field piping connection
- 4 Stop valve cover
- 1 Service port
- 2 Cap
- 3 Hexagon hole
- 4 Shaft
- 5 Seal

8.3.2. How to use the stop valve

Opening the stop valve

- 1 Remove the valve cover.
- 2 Insert a hexagon wrench into the stop valve and turn the stop valve counterclockwise.
- 3 When the stop valve cannot be turned any further, stop turning. The valve is now open.

To fully open the $\phi 3/4$ or $\phi 1$ gas line stop valve, turn the hexagonal wrench until a torque between 19.9-24.3 ft·lbf (27-33 N·m) is achieved. Inadequate torque may cause leakage of refrigerant and breakage of the stop valve cap.

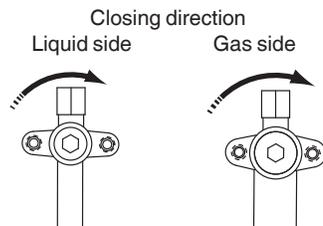


NOTE

Pay attention that mentioned torque range is applicable for opening $\phi 3/4$ and $\phi 1$ gas line stop valves only.

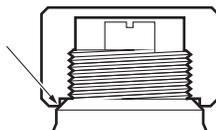
Closing the stop valve

- 1 Remove the valve cover.
- 2 Insert a hexagon wrench into the stop valve and turn the stop valve clockwise.
- 3 When the stop valve cannot be turned any further, stop turning. The valve is now closed.



8.3.3. Cautions on handling the stop valve cover

- The stop valve cover is sealed where indicated by the arrow. Take care not to damage it.
- After handling the stop valve, make sure to tighten the stop valve cover securely. For the tightening torque, refer to the table below.
- Check for refrigerant leaks after tightening the stop valve cover.



8.3.4. Cautions on handling the service port

- Always use a charge hose equipped with a valve depressor pin, since the service port is a Schrader type valve.

- After handling the service port, make sure to tighten the service port cover securely. For the tightening torque, refer to the table below.
- Check for refrigerant leaks after tightening the service port cover.

8.3.5. Tightening torques

Stop valve size	Tightening torque (Turn clockwise to close)			Service port
	Shaft (valve body)	Cap (valve cover)	Service port	
$\phi 3/8$	3.98-4.87 ft·lbf (5.4-6.6 N·m)	Hexagonal wrench 4 mm	9.95-12.17 ft·lbf (13.5-16.5 N·m)	8.48-10.3 ft·lbf (11.5-13.9 N·m)
$\phi 1/2$	5.97-7.30 ft·lbf (8.1-9.9 N·m)		13.3-16.2 ft·lbf (18.0-22.0 N·m)	
$\phi 3/4$	19.9-24.3 ft·lbf (27.0-33.0 N·m)	Hexagonal wrench 8 mm	16.6-20.3 ft·lbf (22.5-27.5 N·m)	
$\phi 1$				

9. Field wiring



NOTE

- All field wiring and components must be installed by a licensed electrician and must comply with relevant local and national regulations.
- Be sure to use a dedicated power circuit. Never use a power supply shared by another appliance.
- Never install a phase-advancing capacitor. As this unit is equipped with an inverter, installing a phase-advancing capacitor will not only deteriorate power factor improvement effect, but also may cause capacitor abnormal heating accident due to high-frequency waves.
- Only proceed with wiring work after blocking off all power.
- Always ground wires in accordance with relevant local and national regulations.
- This machine includes an inverter device. Connect ground and leave charge to eliminate the impact on other devices by reducing noise generated from the inverter device and to prevent leaked current from being charged in the outer shell of the product.
- 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 are dangerous when struck by lightning due to abnormal rise in electrical potential in the grounding.

- This equipment can be installed with a Ground-Fault Circuit Breaker (GFCI). Although this is a recognized measure for additional protection, with the grounding system in North America, a dedicated GFCI is not necessary.
- Electrical wiring must be done in accordance with the wiring diagrams and the description herein.
- Do not operate until refrigerant piping work is completed. Operating the unit before completing piping work could cause the compressor to break.
- Never remove a thermistor, sensor or similar parts when connecting power wiring and transmission wiring.
(If operated with a thermistor, sensor or similar parts removed, the compressor may be broken down.)
- Never connect the power supply in reverse-phase.
The unit cannot operate normally in reverse-phase.
If you connect in reverse-phase, replace 2 of the 3 phases.
- Make sure the electrical imbalance ratio is no greater than 2%. If it is larger than this, the unit's lifespan will be reduced.

If the ratio exceeds 4%, the unit will shut down and an malfunction code will be displayed on the indoor remote controller.

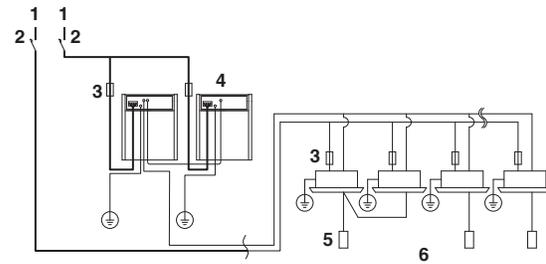
- Connect the wire securely using designated wire and fix it with attached clamp without applying external pressure on the terminal parts (terminal for power wiring, terminal for transmission wiring and ground terminal).
- If there exists the possibility of reverse-phase, lose phase, momentary blackout or the power goes on and off while the product is operating, attach a reverse-phase protection circuit locally. Running the product in reverse-phase may break the compressor and other parts.

9.1. Power circuit, safety device and cable requirements

- A power circuit (see the following table) must be provided for connection of the unit. This circuit must be protected with the required safety devices, i.e. a main switch, a slow blow fuse on each phase.
- When using residual current operated circuit breakers, be sure to use a high-speed type (0.1 second or less) 200 mA rated residual operating current.
- Use copper conductors only.
- Use insulated wire for the power cord.
- Select the power supply cable type and size in accordance with relevant local and national regulations.

RXYQ	Phase and frequency	Voltage	Minimum circuit amp.	Maximum overcurrent protective device	Transmission line selection
72TTJU	φ3, 60 Hz	208/230 V	27.6A	35A	AWG18-16
96TTJU	φ3, 60 Hz	208/230 V	36.3A	45A	AWG18-16
120TTJU	φ3, 60 Hz	208/230 V	36.3A	45A	AWG18-16
144TTJU	φ3, 60 Hz	208/230 V	55.1A	60A	AWG18-16
168TTJU	φ3, 60 Hz	208/230 V	55.1A	60A	AWG18-16
192TTJU	φ3, 60 Hz	208/230 V	27.6A+36.3A	35A+45A	AWG18-16
216TTJU	φ3, 60 Hz	208/230 V	36.3A+36.3A	45A+45A	AWG18-16
240TTJU	φ3, 60 Hz	208/230 V	36.3A+36.3A	45A+45A	AWG18-16
264TTJU	φ3, 60 Hz	208/230 V	36.3A+55.1A	45A+60A	AWG18-16
288TTJU	φ3, 60 Hz	208/230 V	55.1A+55.1A	60A+60A	AWG18-16
312TTJU	φ3, 60 Hz	208/230 V	55.1A+55.1A	60A+60A	AWG18-16
336TTJU	φ3, 60 Hz	208/230 V	55.1A+55.1A	60A+60A	AWG18-16
360TTJU	φ3, 60 Hz	208/230 V	36.3A+36.3A+36.3A	45A+45A+45A	AWG18-16
384TTJU	φ3, 60 Hz	208/230 V	36.3A+36.3A+55.1A	45A+45A+60A	AWG18-16
408TTJU	φ3, 60 Hz	208/230 V	36.3A+55.1A+55.1A	45A+60A+60A	AWG18-16
72TYDN	φ3, 60 Hz	460 V	12.3A	20A	AWG18-16
96TYDN	φ3, 60 Hz	460 V	20.6A	25A	AWG18-16
120TYDN	φ3, 60 Hz	460 V	20.6A	25A	AWG18-16
144TYDN	φ3, 60 Hz	460 V	25.9A	35A	AWG18-16
168TYDN	φ3, 60 Hz	460 V	25.9A	35A	AWG18-16
192TYDN	φ3, 60 Hz	460 V	12.3A+20.6A	20A+25A	AWG18-16
216TYDN	φ3, 60 Hz	460 V	20.6A+20.6A	25A+25A	AWG18-16
240TYDN	φ3, 60 Hz	460 V	20.6A+20.6A	25A+25A	AWG18-16
264TYDN	φ3, 60 Hz	460 V	20.6A+25.9A	25A+35A	AWG18-16
288TYDN	φ3, 60 Hz	460 V	25.9A+25.9A	35A+35A	AWG18-16
312TYDN	φ3, 60 Hz	460 V	25.9A+25.9A	35A+35A	AWG18-16
336TYDN	φ3, 60 Hz	460 V	25.9A+25.9A	35A+35A	AWG18-16
360TYDN	φ3, 60 Hz	460 V	20.6A+20.6A+20.6A	25A+25A+25A	AWG18-16
384TYDN	φ3, 60 Hz	460 V	20.6A+20.6A+25.9A	25A+25A+35A	AWG18-16
408TYDN	φ3, 60 Hz	460 V	20.6A+25.9A+25.9A	25A+35A+35A	AWG18-16

9.2. Wiring connection example for whole system



- 1 Power supply
- 2 Main switch
- 3 Fuse or circuit breaker
- 4 Outdoor unit
- 5 Remote controller
- 6 Indoor unit

This image is intended as an example only. Please follow local and national electrical code.

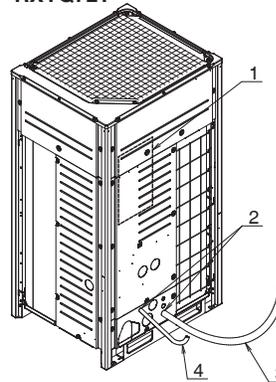
NOTE

- Make sure the low voltage wiring (i.e. for the remote controller, between units) and the power wiring do not pass near each other, keeping them at least 2 in. (51 mm) 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 9.5. Power wiring connection procedure.
- Transmission wiring should be secured as described in 9.4. Transmission wiring connection procedure.
- Secure wiring with clamp such as insulation lock ties to avoid contact with piping.
- Shape the wires to prevent the structure such as the control box cover deforming. And close the cover firmly.
- All field wiring is to be procured on site.

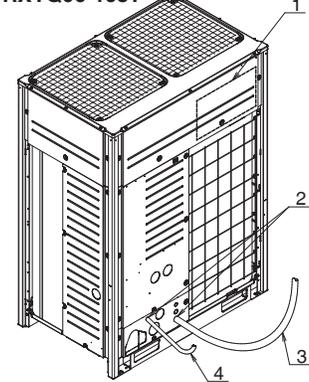
9.3. Leading wire procedure

- The power wiring and ground wiring are passed out from the power wiring hole on the front (knock hole).
- The transmission wiring is passed out from the wiring hole (knock hole) on the front of the unit.

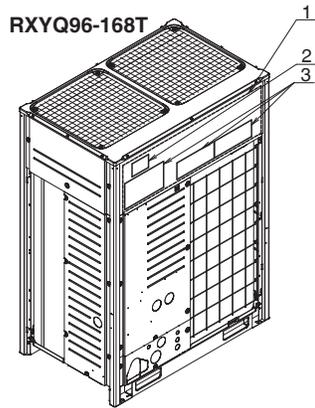
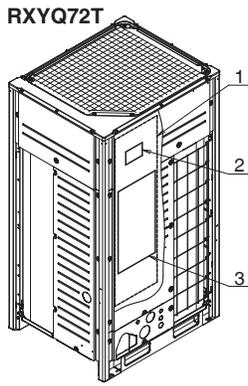
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- 1 Electric wiring diagram printed on the back of the control box cover.
- 2 Knockout hole
- 3 Power line
- 4 Transmission line



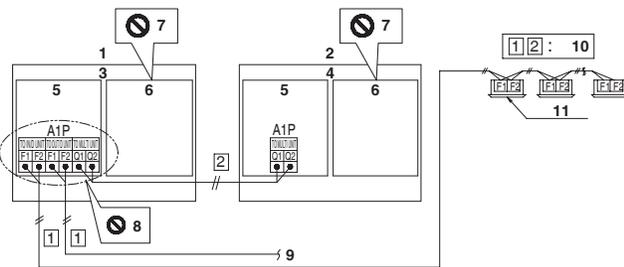
- 1 Control box cover
- 2 Inspection door
- 3 [Service precautions] Label location

NOTE

- Open the knock holes with a hammer or similar tool.
- After knocking out the holes, we recommend you remove any burrs and paint the holes with repair paint to prevent rusting. (Refer to the above figures)
- When passing wiring through the knock holes, remove burrs around the knock holes and protect the wiring with protective tape. (Refer to the above figures)
- If small animals might enter the unit, block off any gaps (hatching parts in the above figures) with material (field supply).

9.4. Transmission wiring connection procedure

- Referring to the figure below, connect the transmission wiring between outdoor unit and indoor unit, outdoor unit and outdoor unit of other system, outdoor unit and outdoor unit of same system.



- 1 Master unit (*)
- 2 Sub unit (*)
- 3 Outdoor unit A
- 4 Outdoor unit B
- 5 Control box
- 6 (Only RXYQ – TYDN) Control box (2)
- 7 (Only RXYQ – TYDN)
Do not open the control box (2) cover. (There is no work when installation.)
- 8 Never connect the power wire.
- 9 To outdoor unit of other system
- 10 Use duplex wires (No polarity)
- 11 Indoor unit

(*) : The Outdoor unit that connects the transmission wiring to an indoor unit is Master unit of the multi system. The other units are Sub units. (In this figure, Outdoor unit A is the Master unit.)
Check installation work to ensure proper operation. Onsite settings can be accomplished by operating the printed circuit board (A1P) of Master unit.

NOTE

- Do not connect the power wiring to terminals for the transmission wiring. Doing so would destroy the entire system.
 - When connecting wires to the terminal block on the printed circuit board, too much heat or tightening could damage the printed circuit board. Attach with care.
- See the table below for the tightening torque of the transmission wiring terminals.

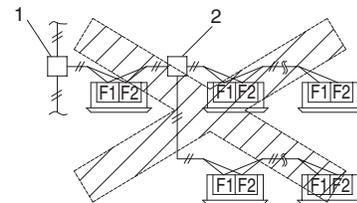
Screw size	Tightening torque
M3.5 (A1P)	0.59-0.71 ft·lbf (0.8-0.97 N·m)

- Transmission wiring (About the symbol [1]-[2], see the foregoing figure) should be done within the following limitations. If they are exceeded, transmission problems may occur.

- [1] Between outdoor unit and indoor unit
Between outdoor unit and outdoor unit of other systems
Max. wiring length : 3280 ft. (1000 m)
Max. total wiring length : 6560 ft. (2000 m)
Max. no. of branches : 16

[Note]
No branch is allowed after a branch. See the following figure.

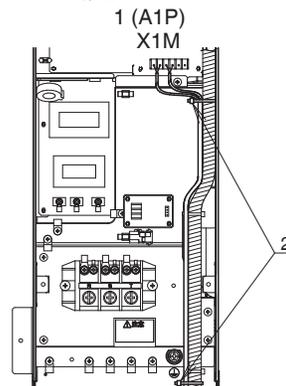
Max. no. of outdoor units of other system that can be connected : 10



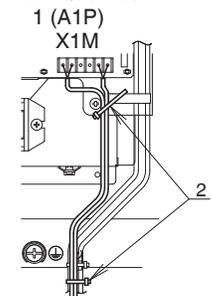
- 1 Branch
- 2 Branch after branch
- [2] Between outdoor unit and outdoor unit of same system
Max. wiring length : 100 ft. (30 m)

- The transmission wiring inside the control box should be secured using the clamp (1) as shown in the figure below.

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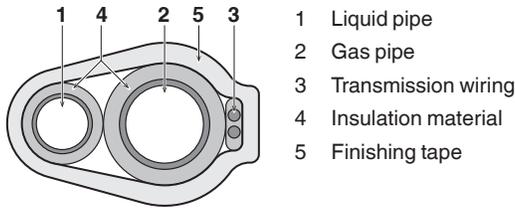


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- 1 In the control box
- 2 Clamp (1) (accessory)

- Outside the units, the transmission wiring must be finished simultaneously with the local refrigerant piping, and wound with tape (field supply) as shown in the figure below.

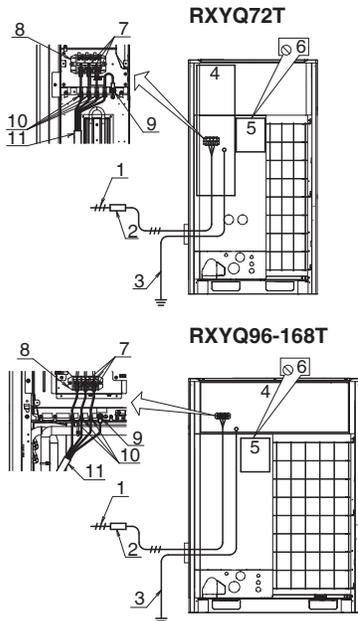


- For multi system:

- 1 Transmission wiring between outdoor units in the same piping system must be connected to terminals Q1 and Q2 (TO MULTI UNIT).
Connecting the wires to the F1, F2 (TO OUT/D UNIT) terminals results in system malfunction.
- 2 Wiring to other systems should be connected to terminals F1 and F2 (TO OUT/D UNIT) on the printed circuit board of the master unit. The outdoor unit that connects transmission wiring to indoor unit is the master unit. The others are sub unit.

9.5. Power wiring connection procedure

- Be sure to connect the power supply wiring to the power supply terminal block and hold it in place using the included clamp as shown in the figure below.
- The L1, L2 and L3 phases of the power wiring should be secured separately to the hook using the included clamp (1).
- The ground wiring should be bound to the power wiring using the included clamp (1) to prevent outside force from being applied to the terminal area.

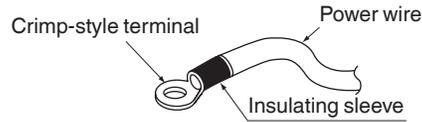


- 1 Power supply
(MODEL TYDN: 3 – 460 V 60 Hz)
(MODEL TTJU: 3 – 208/230 V 60 Hz)
- 2 Branch switch, Overcurrent breaker
- 3 Ground wire
- 4 Control box
- 5 (Only RXYQ – TYDN)
Control box (2)

- 6 (Only RXYQ – TYDN)
Do not open the control box (2) cover.
(There are no work when installation.)
- 7 Attach insulation sleeves
- 8 Power supply terminal block
- 9 Ground terminal
- 10 Clamp (1) (accessory)
- 11 Vinyl tube (accessory)

⚠ CAUTION

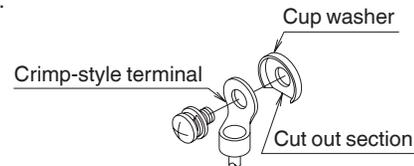
- Be sure to use crimp-style terminal with insulating sleeves for connections. (See the figure below.)



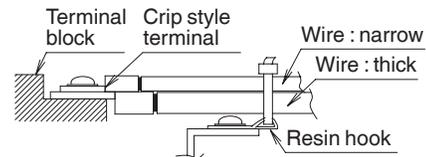
- For wiring, use the designated power wire and connect firmly, then secure to prevent outside pressure being exerted on the terminal board.
- Use an appropriate screwdriver for tightening the terminal screws. A screwdriver with a small head will strip the head and make proper tightening impossible.
- Over-tightening the terminal screws may break them. See the following table for the tightening torque of the terminal screws.

Screw size	Tightening torque
M8 Power terminal	4.20-5.09 ft·lbf (5.7-6.9 N·m)
M8 Ground terminal	7.15-8.63 ft·lbf (9.7-8.63 N·m)

- When pulling the ground wire out, wire it so that it comes through the cut out section of the cup washer. (See the figure below.) An improper ground connection may prevent a good ground from being achieved.

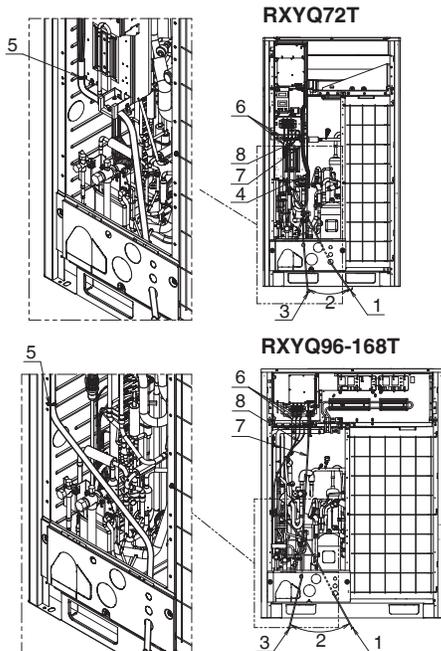


- When 2 wires are connected to a single terminal, connect them so that the rear sides of the crimp contacts face each other. Also, make sure the thinner wire is on top, securing the 2 wires simultaneously to the resin hook using the included clamp (1).



9.6. Procedure for Wiring Inside Units

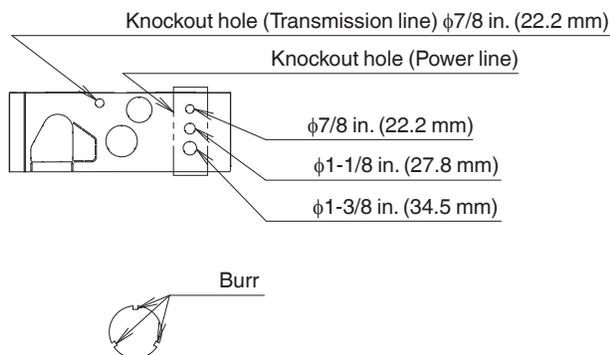
- Referring to the figure below, secure and wire the power and transmission wiring using the included clamp (1) and (2).
- Wire so that the ground wiring does not come into contact with the compressor lead wiring.
If they touch, this may have an adverse effect on other devices.
- The transmission wiring must be at least 2 in. (51 mm) away from the power wiring.
- Make sure all wiring do not contact to the pipes (hatching parts in the below figure).



- 1 Power/ground wires.
- 2 Clear over 2 in. (50 mm)
- 3 Transmission wiring
- 4 Clamp (1) (accessory)
- 5 Clamp (2)(accessory)
- 6 Power wiring
- 7 Transmission wiring
- 8 Ground wire

Precautions when knocking out knockout holes

- To punch out a knockout hole, hit it with a hammer.
 - Open an appropriate hole as needed.
 - After knocking out the holes, trim off the burr, then we recommend you to paint the edges and areas around the edges using the repair paint to prevent rusting.
 - Power line: Open a knockout hole as shown at right and connect it using a conduit.
- Choose an appropriate knockout hole for conduit size suitable for the power and ground line to be used.
- Transmission line: Connect it using a conduit in the knockout hole on the left.



NOTE

- After wiring work is completed, check to make sure there are no loose connections among the electrical parts in the control box.

10. Air tight test and vacuum drying

- After finished piping work, carry out air tight test and vacuum drying.

NOTE

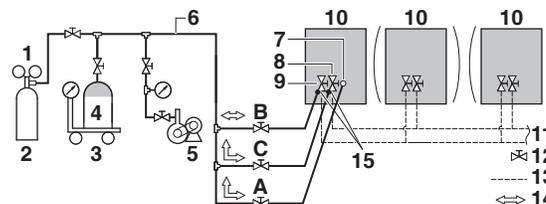
- Always use nitrogen gas for the air tightness test.
- Absolutely do not open the stop valve until the main power circuit insulation measurement has been completed. (Measuring after the stop valve is opened will cause the insulation value to drop.)

<Needed tools>

Gauge manifold Charge hose valve	<ul style="list-style-type: none"> • To prevent entry of any impurities and insure sufficient pressure resistance, always use the special tools dedicated for R410A. • Use charge hose that have pushing stick for connecting to service port of stop valves or refrigerant charge port.
Vacuum pump	<ul style="list-style-type: none"> • The vacuum pump for vacuum drying should be able to lower the pressure to 500 microns. • Take care the pump oil never flow backward into the refrigerant pipe during the pump stops.

<The system for airtight test and vacuum drying>

- Referring to the figure below, connect a nitrogen tank, refrigerant tank, and a vacuum pump to the outdoor unit.
- The refrigerant tank and the charge hose connection to refrigerant charge port or the valve A in the figure below are needed in 14. Charging refrigerant on page 26.

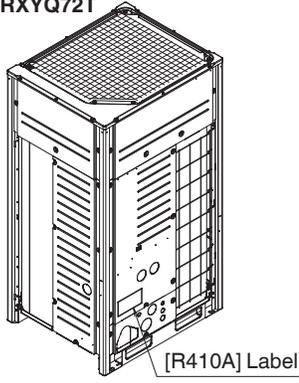


- 1 Pressure reducing valve
- 2 Nitrogen
- 3 Measuring instrument
- 4 Refrigerant R410A tank (siphon system)
- 5 Vacuum pump
- 6 Charge hose
- 7 Refrigerant charge port
- 8 Gas line stop valve
- 9 Liquid line stop valve
- 10 Outdoor unit
- 11 To indoor unit
- 12 Stop valve
- 13 Field piping
- 14 Gas flow
- 15 Stop valve service port
- A Valve A
- B Valve B
- C Valve C

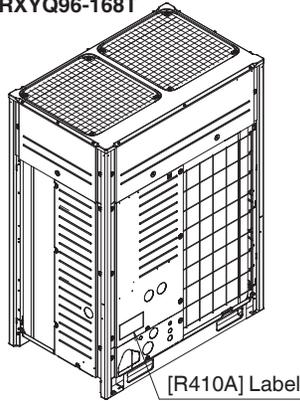
NOTE

- The air-tightness test and vacuum drying should be done using the service ports of equalizer pipe, gas pipe and liquid pipe stop valve. See the [R410A] Label attached to the front panel of the outdoor unit for details on the location of the service port (See the figure below).

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- See 14.3. Method for adding refrigerant on page 27 for details on handling the stop valve.
- The refrigerant charge port is connected to unit pipe. When shipped, the unit contains the refrigerant, so use caution when attaching the charge hose.

<Air tight test>

Pressurize the liquid pipe, gas pipe, and equalizer pipe from the service ports of each stop valve to 550 psi (3.8 MPa) (do not pressurize more than 550 psi (3.8 MPa)). If the pressure does not drop within 24 hours, the system passes the test. If there is a pressure drop, check for leaks, make repairs and perform the air tight test again.

<Vacuum drying>

Evacuate the system from the liquid pipe and gas pipe stop valve service ports by using a vacuum pump for more than 2 hours and bring the system to 500 microns or less. After keeping the system under that condition for more than 1 hour, check if the vacuum gauge rises or not. If it rises, the system may either contain moisture inside or have leaks.

NOTE

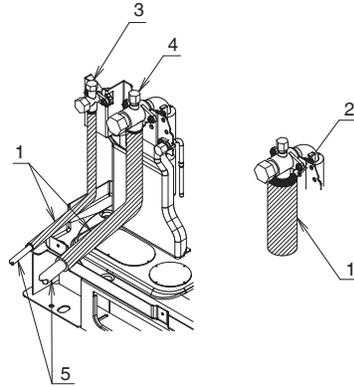
During the rainy season, moisture might enter the piping. If working during a rainy season and the work takes long enough for condensation to form inside the pipes, take the following precautions:

After evacuating the system for 2 hours, pressurize the system to 7.25 psi (0.05 MPa) (vacuum break) with nitrogen gas and evacuate the system again using the vacuum pump for 1 hour to 500 microns or less (vacuum drying). If the system cannot be evacuated to 500 microns within 2 hours, repeat the operation of vacuum break and vacuum drying. Then, after leaving the system in a vacuum for 1 hour, confirm that the vacuum gauge does not rise.

11. Pipe insulation

- Insulation of pipes should be done after performing 10. Air tight test and vacuum drying on page 22.
- Always insulate the liquid piping, the gas piping, the equalizer pipes (between the outdoor units for the outdoor multi system) and pipe connections.
- Failing to insulate the pipes may cause leaking or burns. Be sure to use insulation designed for HVAC equipment.

- Reinforce the insulation on the refrigerant piping according to the installation environment. Condensation might form on the surface of the insulation. Refer to the below.
 - Ambient temperature : 86°F (30°C), humidity : 75% to 80% RH : minimum thickness : 9/16 in. (15 mm).
 - If the ambient temperature exceeds 86°F (30°C) and the humidity 80% RH, then the minimum thickness is 3/4 in. (20 mm). See the Engineering data book for detail.
- If there is a possibility that condensation on the stop valve might drip down into the indoor unit through gaps in the insulation and piping because the outdoor unit is located higher than the indoor unit, this must be prevented by caulking the connections. (Refer to the following figure.)



- 1 Insulation material
- 2 Caulking, etc.
- 3 Liquid pipe stop valve
- 4 Gas pipe stop valve
- 5 Connection pipe

12. Checking of device and installation conditions

Be sure to check the followings.

For those doing electrical work

- 1 Make sure there is no faulty transmission wiring or loosening of a nut. See 9.4. Transmission wiring connection procedure on page 20.
- 2 Make sure there is no faulty power wiring or loosening of a nut. See 9.5. Power wiring connection procedure on page 21.
- 3 Has the insulation of the main power circuit deteriorated? Measure the insulation and check the insulation is above regular value in accordance with relevant local and national regulations.

For those doing pipe work

- 1 Make sure piping size is correct. See 7.2. Selection of piping material on page 9 and 7.4. Selection of refrigerant branch kits on page 10.
- 2 Make sure insulation work is done. See 11. Pipe insulation.
- 3 Make sure there is no faulty refrigerant piping. See 8. Precautions on refrigerant piping on page 14.

13. Making field settings

To continue the configuration of the VRV IV heat pump system, it is required to give some input to the logic board of the unit. This chapter will describe how manual input is possible by operating the push buttons/DIP switches on the logic board and reading the feedback from the 7 segment displays.

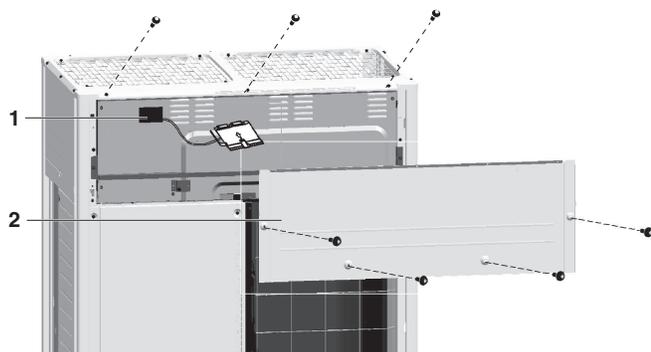
For VRV IV heat pump system it is alternatively possible to make several commissioning field settings through a personal computer interface (for this, option EKPCAB* is required). The installer can prepare the configuration (off-site) on PC and afterwards upload the configuration to the system. How to connect the cable is described in 13.3. Connecting the PC configurator to the outdoor unit on page 25.

The contents of the actual settings is discussed and explained in 15.2. Monitoring function and field settings on page 32.

13.1. Accessing the push buttons on the logic board

It is not required to open the complete control box to access the push buttons on the logic board and read out the 7 segment display (s).

To access you can remove the front inspection door of the front panel (see figure). Now you can open the inspection door of the control box front panel (see figure). You can see 3 push buttons and 3 seven-segment displays and DIP switches.

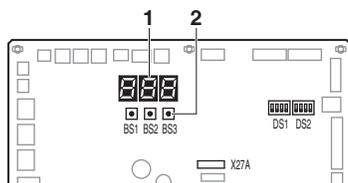


- 1 Front panel
- 2 Main printed circuit board with 3 seven-segment display and 3 push buttons

Operate the switches and push buttons with an insulated stick (such as a closed ballpoint pen) to avoid touching of live parts.



Location of the segment displays, buttons and DIP switches:



- | | |
|-----------------|---------------------------|
| BS1 MODE | for changing the set mode |
| BS2 SET | for field setting |
| BS3 | RETURN for field setting |
| DS1, DS2 | DIP switches |
| 1 | 7 segment displays (3x) |
| 2 | Push buttons |

Segment display indications:

- | | |
|--|----------|
| | Off |
| | Blinking |
| | On |

13.2. Operating the push buttons and DIP switches on the logic board

13.2.1. Operating the push buttons

By operating the push buttons it is possible to:

- Perform special actions (automatic refrigerant charge, test run, etc).
- Perform field settings (demand operation, low noise, etc).

Below procedure explains how to operate the push buttons to reach the required mode in the menu, select the correct setting and modify the value of the setting. This procedure can be used any time special settings and regular field setting are discussed in this manual (see 15.2. Monitoring function and field settings on page 32).

Setting definition: [A-B]=C; A=mode; B=setting; C=setting value. A, B and C are numerical values for field settings. Parameter C has to be defined. It can be chosen from a set (0, 1, 2, 3, 4, 5, ...) or regarded as an ON/OFF (1 or 0) depending on the contents. This is informed when the field setting is explained (see 15.2. Monitoring function and field settings on page 32).

— **i** INFORMATION —

During special operation (e.g., automatic refrigerant charging, test run, etc.) or when an malfunction happened, information will contain letters and numerical values.

Functions of the push button switches which are located on the outdoor printed circuit board (A1P)

Turn on the power supply of the outdoor unit and all indoor units. When the communication between indoor units and outdoor unit (s) is established and normal, the segment indication state will be as follows (default situation when shipped from factory):

When turning on the power supply, the display flashes on and off. First checks of the power supply are executed (1 – 2 min).



When no trouble occurs: lighted as indicated (8 – 10 min).



Ready for operation: blank display indication as indicated.



When above situation cannot be confirmed after 12 min, the malfunction code can be checked on the indoor unit user interface and the outdoor unit segment display. Solve the malfunction code accordingly. The communication wiring should be checked at first.

— **i** INFORMATION —

Be sure to turn the power on at least 6 hours before operation in order to have power running to the crank case heater.

Accessing modes

BS1 is used to change the mode you want to access.

- Access mode 1
Push BS1 one time. Segment indication changes to:



- Access mode 2
Push BS1 for at least 5 seconds. Segment indication changes to:



INFORMATION

If you get confused in the middle of the process, push BS1. Then it returns to idle situation (no indication on segment displays: blank, refer to Functions of the push button switches which are located on the outdoor printed circuit board (A1P) on page 24.).

Mode 1

Mode 1 is used to set basic settings and to monitor the status of the unit (15.2. Monitoring function and field settings on page 32).

- Changing and access the setting in mode 1:
Once mode 1 is selected (push BS1 one time), you can select the wanted setting. It is done by pushing BS2. Accessing the selected setting's value is done by pushing BS3 one time.
- To quit and return to the initial status, press BS1.

Example:

Checking the content of parameter [1-10] (to know how many indoor units are connected to the system).

[A-B]=C in this case defined as: A=1; B=10; C=the value we want to know/monitor:

- Make sure the segment indication is displayed in operational default mode as shipped from factory.
- Push BS1 one time; result segment display:



Result: mode 1 is accessed.

- Push BS2 10 times; result segment display:



Result: mode 1 setting 10 is addressed.

- Push BS3 one time; the value which is returned (depending on the actual field situation), is the amount of indoor units which are connected to the system.
Result: mode 1 setting 10 is addressed and selected, return value is monitored information
- To leave the monitoring function, push BS1 one time, you will return to the default situation when shipped from factory.

Mode 2

Mode 2 is used to set field settings of the outdoor unit and system.

- Changing and access the setting in mode 2:
Once mode 2 is selected (push BS1 for more than 5 seconds), you can select the wanted setting. It is done by pushing BS2. Accessing the selected setting's value is done by pushing BS3 one time.
- To quit and return to the initial status, press BS1.
- Changing the value of the selected setting in mode 2:
 - Once mode 2 is selected (push BS1 for more than 5 seconds) you can select the wanted setting. It is done by pushing BS2.
 - Accessing the selected setting's value is done by pushing BS3 one time.
 - Now BS2 is used to select the required value of the selected setting.
 - When the required value is selected, you can define the change of value by pushing BS3 one time.
 - Press BS3 again to start operation according to the chosen value.

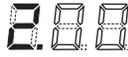
Example:

Checking the content of parameter [2-18] (to define the high static pressure setting of the outdoor unit's fan).

[A-B]=C in this case defined as: A=2; B=10; C=the value we want to know/change

Make sure the segment indication is as during normal operation (default situation when shipped from factory).

- Push BS1 for over 5 seconds; result segment display:



Result: mode 2 is accessed.

- Push BS2 18 times; result segment display:



Result: mode 2 setting 18 is addressed.

- Push BS3 one time; the value which is returned (depending on the actual field situation), is the status of the setting. In the case of [2-18], default value is 0, which means the function is not active.
Result: mode 2 setting 18 is addressed and selected, return value is the current setting situation.
- To change the value of the setting, push BS2 till the required value appears on the segment indication. When achieved, define the setting value by pushing BS3 one time. To start operation according to the chosen setting, confirm again by pushing BS3.
- To leave the monitoring function, push BS1 two times, you will return to the default situation when shipped from factory.

13.2.2. Operating the DIP switches

By operating the DIP switches it is possible to:

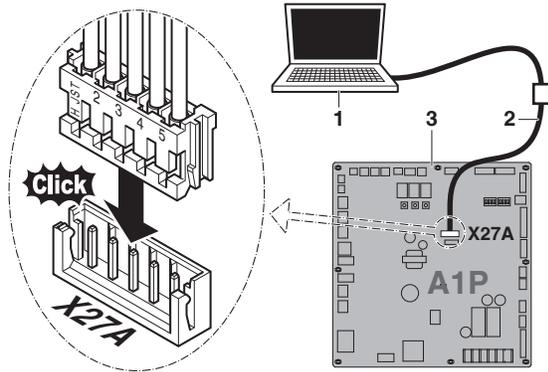
What to do with DIP switch DS1	
1	Cool/Heat selector (refer to the manual of the Cool/Heat selector switch) OFF=not installed=factor setting
2-4	NOT USED DO NOT CHANGE THE FACTORY SETTING
What to do with DIP switch DS2	
1-4	NOT USED DO NOT CHANGE THE FACTORY SETTING

13.3. Connecting the PC configurator to the outdoor unit

Connection of the optional PC configurator cable to the outdoor unit has to be done on A1P. Connect the EKPCAB* cable to the 5-pin blue connector X27A.

CAUTION

Works executed on the outdoor unit are best done under dry weather conditions to avoid water ingress.



- 1 PC
- 2 Cable (EKPCAB*)
- 3 Outdoor unit main printed circuit board

14. Charging refrigerant

14.1. Precautions

NOTE

- Refrigerant cannot be charged until field wiring has been completed.
- Refrigerant may only be charged after performing the leak test and the vacuum drying.
- When charging a system, care shall be taken that its maximum permissible charge is never exceeded, in view of the danger of liquid hammer.
- Charging with an unsuitable substance may cause explosions and accidents, so always ensure that the appropriate refrigerant R410A is charged.
- Refrigerant containers shall be opened slowly.
- Always use protective gloves and protect your eyes when charging refrigerant.
- When the refrigerant system is to be opened, refrigerant must be treated according to the applicable legislation.

DANGER

See Safety considerations on page i.

- To avoid compressor breakdown. Do not charge the refrigerant more than the specified amount.
- This outdoor unit is factory charged with refrigerant and depending on pipe sizes and pipe lengths some systems require additional charging of refrigerant. See 14.2. Calculating the additional refrigerant charge.
- In case recharge is required, refer to the nameplate of the unit. It states the type of refrigerant and necessary amount.

14.2. Calculating the additional refrigerant charge

NOTE

The refrigerant charge of the system must be less than 210 lbs. (100 kg). This means that in case the calculated total refrigerant charge is equal to or more than 209 lbs. (95 kg) you must divide your multiple outdoor system into smaller independent systems, each containing less than 209 lbs. (95 kg) refrigerant charge. For factory charge, refer to the unit nameplate.

14.2.1. How to calculate the additional refrigerant to be charged

Additional refrigerant to be charged=R (lbs.). R should be rounded off in units of 0.1 lbs.

$$R=[(X_1 \times \phi 7/8) \times 0.249+(X_2 \times \phi 3/4) \times 0.175+(X_3 \times \phi 5/8) \times 0.121+(X_4 \times \phi 1/2) \times 0.081+(X_5 \times \phi 3/8) \times 0.040+(X_6 \times \phi 1/4) \times 0.015]+[A]+[B]$$

X1...6 = Total length (ft. (m)) of liquid piping size at Øa

* In units of 0.1 kg, additional refrigerant to be charged=R (kg).

$$R=[(X_1 \times \phi 22.2) \times 0.37+(X_2 \times \phi 19.1) \times 0.26+(X_3 \times \phi 15.9) \times 0.18+(X_4 \times \phi 12.7) \times 0.12+(X_5 \times \phi 9.5) \times 0.059+(X_6 \times \phi 6.4) \times 0.022]+[A]+[B]$$

Parameter [A]

The amount of refrigerant by the module

Outdoor unit capacity type	The amount of refrigerant
RXYQ 72-120T type	0.0 lbs. (0.0 kg)
RXYQ 144T type	8.8 lbs. (4.0 kg)
RXYQ 168T type	9.9 lbs. (4.5 kg)

Parameter [B]	Total indoor unit capacity CR ^(a)	RXYQ	
		72T	96 - 168T
Piping length ≤ 98 ft. (30 m)	> 105%	1.10 lbs. (0.5 kg)	
Piping length > 98 ft. (30 m)	70%<CR≤85%	0.66 lbs. (0.3 kg)	1.10 lbs. (0.5 kg)
	85%<CR≤105%	1.54 lbs. (0.7 kg)	2.20 lbs. (1.0 kg)
	> 105%	2.65 lbs. (1.2 kg)	3.31 lbs. (1.5 kg)

Example for refrigerant branch using REFNET joint and REFNET header for systems and each pipe length as shown below. (Example 2.2, 7.5.2. System only containing VRV indoor units on page 12)

Outdoor system: RXYQ264TTJU (RXYQ144TTJU + RXYQ120TTJU)
Total capacity of indoor unit: 116%

a: φ3/4 × 60 ft.	e: φ3/8 × 15 ft.	i: φ1/2 × 20 ft.	s: φ1/2 × 15 ft.
b: φ5/8 × 15 ft.	f: φ3/8 × 15 ft.	j: φ3/8 × 20 ft.	
c: φ3/8 × 15 ft.	g: φ1/4 × 15 ft.	k: φ3/8 × 20 ft.	
d: φ3/8 × 15 ft.	h: φ1/4 × 30 ft.	r: φ1/2 × 10 ft.	

$$R = \frac{60 \times 0.175}{a} + \frac{15 \times 0.121}{b} + \frac{45 \times 0.081}{i, r, s} + \frac{100 \times 0.040}{c, d, e, f, j, k} + \frac{45 \times 0.015}{g, h} + \frac{8.8}{RXYQ144TTJU} + \frac{3.31 + 3.31}{116\%}$$

$$= 36.055 \Rightarrow \underline{36.0 \text{ lbs.}}$$

Round off in units of 0.1 lbs.

INFORMATION

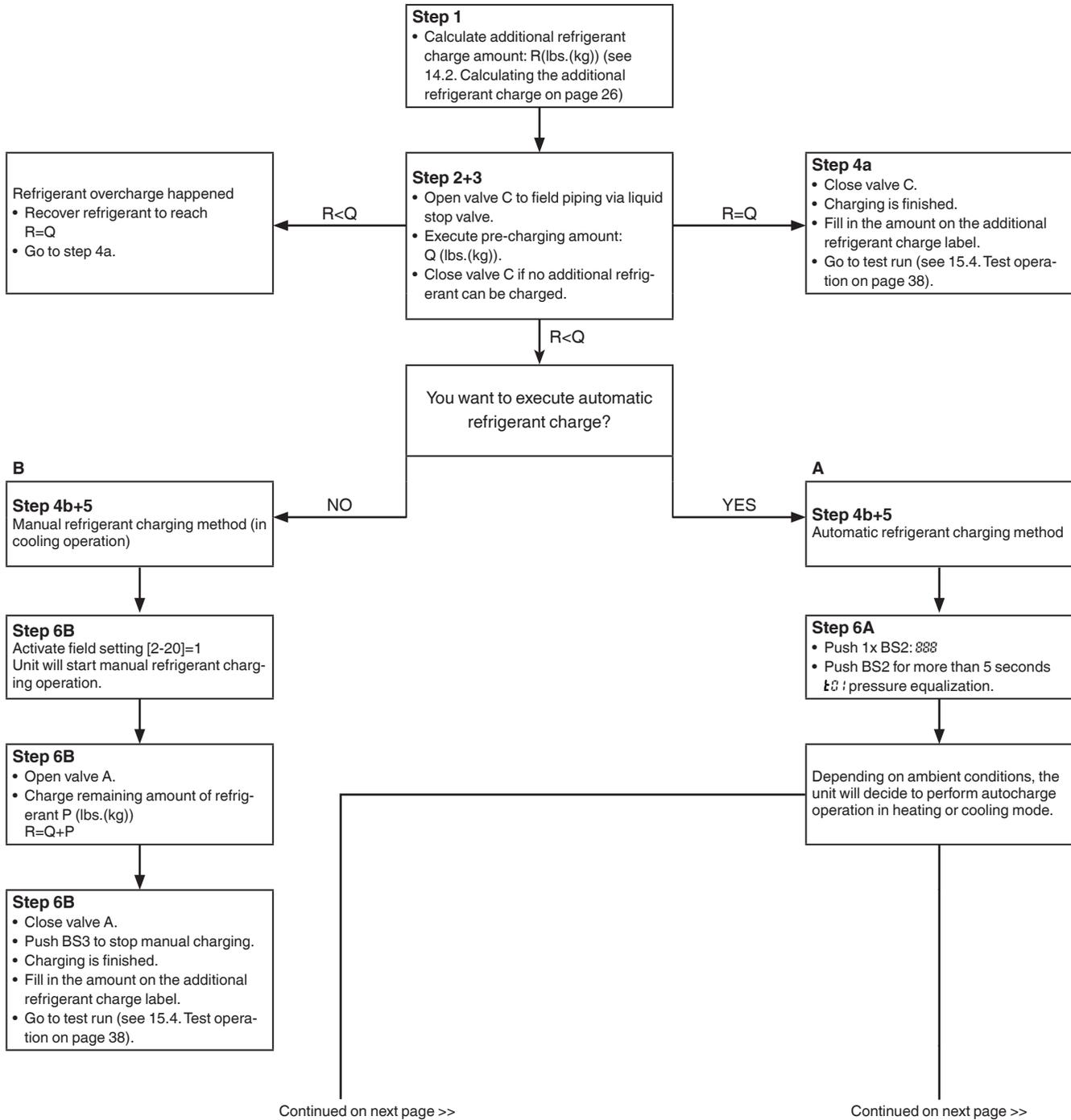
- When using multi models, add the sum of individual capacity types.
- Piping length is considered the distance from the outdoor unit to the farthest indoor unit.

When selecting indoor unit, following table with connection ratio limitation has to be respected. More detailed information can be found in Engineering Data Book.

Used indoor units	Total capacity CR ^(a)	Allowable capacity connection ratio	
		VRV	Mini-split
VRV	50 – 200%	50 – 200%	–
VRV + Mini-split	80 – 130%	0 – 130%	0 – 130%
Mini-split	80 – 130%	–	80 – 130%

14.3. Method for adding refrigerant

14.3.1. Flow chart



<< Continuation of previous page

Heating charging
(t22 startup control)
(t23 waiting for stable heating)

t23 is flashing

- Push BS2 within 5 minutes.
- Open valve A.

Display show t23 and low pressure value with an interval of 1 second.

- Add additional refrigerant amount P (lbs.(kg)).
- Close valve A.
- Push BS3 to stop operation.
- Ending code t2% will appear.

- Push BS2.
- TA check will be performed.

- t2X will appear. (X is variable)
- Push BS1.
- Charging is finished.
- Fill in the amount on the additional refrigerant charge label.
- Go to test run (see 15.4. Test operation on page 38).

Following codes appear: E-2 (indoor temperature out of range) and E-3 (outdoor temperature out of range).

- Push BS1 to leave program.
- Charging is finished.
- Fill in the amount on the additional refrigerant charge label.
- Go to test run (see 15.4. Test operation on page 38).

<< Continuation of previous page

Cooling charging
(t22 startup control)
(t23 waiting for stable cooling)

t23 is flashing

- Push BS2 within 5 minutes.
- Open valve A.

Display show t23 and low pressure value with an interval of 1 second. Refrigerant will be charged automatically.

P% = charging nearly finished
P3 = charging finished
OR

P (lbs.(kg)) was added during auto-charge
R=Q+P

- Close valve A.
- Push BS1 to leave program.
- Charging is finished.
- Fill in the amount on the additional refrigerant charge label.
- Go to test run (see 15.4. Test operation on page 38).

During gray conditions

If following codes appear: E-2 (indoor temperature out of range) and E-3 (outdoor temperature out of range).

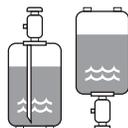
In this case, perform automatic charging procedure again.

See figure Location of valves next page for more information refer to the text in this chapter.

Be sure to charge the specified amount of refrigerant in liquid state. Since this refrigerant is a mixed refrigerant, adding it in gas form may cause the refrigerant composition to change, preventing normal operation.

- Before charging, check whether the refrigerant cylinder is equipped with a siphon tube or not.

Charge the liquid refrigerant with the cylinder in upright position.



Charge the liquid refrigerant with the cylinder in upside-down position.

- Be sure to use tools exclusively for R410A to ensure required pressure resistance and to prevent foreign materials from mixing into the system.

NOTE

Charging with an unsuitable substance may cause explosions and accidents, so always make sure that the appropriate refrigerant (R410A) is charged. Refrigerant containers must be opened slowly.

CAUTION

- When charging a system, charging over the permissible quantity can cause liquid hammer.
- Always use protective gloves and protect your eyes when charging refrigerant.
- When the refrigerant charging procedure is done or when pausing, close the valve of the refrigerant tank immediately. If the tank is left with the valve open, the amount of refrigerant which is properly charged may get off point. More refrigerant may be charged by any remaining pressure after the unit has stopped.

NOTE

- If the power of some units is turned off, the charging procedure cannot be finished properly.
- In case of a multiple outdoor system, turn on the power of all outdoor units.
- Make sure to turn ON the power 6 hours before starting the operation. This is necessary to warm the crankcase by the electric heater.
- If operation is performed within 12 minutes after the indoor and outdoor units are turned on, the compressor will not operate before the communication is established in a correct way between outdoor unit(s) and indoor units.
- Before starting charging procedures, check if the segment display indication of the outdoor unit A1P printed circuit board is as normal (see Functions of the push button switches which are located on the outdoor printed circuit board (A1P) on page 24). If a malfunction code is present, see 15.5. Malfunction code list on page 39.
- Make sure all connected indoor units are recognized (see 15.2. Monitoring function and field settings on page 32).
- Close the front panel before any refrigerant charge operation is executed. Without the front panel attached the unit cannot judge correctly whether it is operating properly or not.

NOTE

In case of maintenance and the system (outdoor unit+field piping+indoor units) does not contain any refrigerant any more (e.g., after refrigerant reclaim operation), the unit has to be charged with its original amount of refrigerant (refer to the nameplate on the unit) by pre-charging before the automatic charging function can be started.

14.3.2. Charging method

As explained during vacuum drying method, once vacuum drying is finished, additional refrigerant charging can start.

There are two methods to charge additional refrigerant. Use the selected method following the described procedure below.

- Adding refrigerant by using the automatic refrigerant charging function. See A. Adding refrigerant by using the automatic charging function on page 30. This method uses an automated method for charging refrigerant.
- Adding refrigerant by using the manual refrigerant charging function. See B. Adding refrigerant by using the manual charging function on page 30. This method uses a manual method for charging refrigerant.

INFORMATION

Adding refrigerant using the automatic refrigerant charging function is not possible when or Mini-split indoor units are connected to the system.

A flow chart is available which gives an overview of the possibilities and actions to be taken (see 14.3.1. Flow chart on page 27).

To speed up the process of pre-charging refrigerant for large systems, it is recommended to first charge a portion of the refrigerant before performing automatic or manual charging. This step is included in below procedure. This step can be skipped, charging will take longer in such a case.

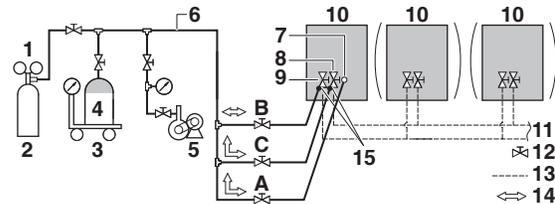
Follow the steps as described below and take into account whether you want to use the automatic charge function or not.

- 1 Calculate the additional amount of refrigerant to be added using the formula mentioned in 14.2. Calculating the additional refrigerant charge on page 26.
- 2 The first 22 lbs. (10 kg) of additional refrigerant can be charged without outdoor unit operation.

If the additional refrigerant amount is smaller than 22 lbs. (10 kg), perform the pre-charging procedure as explained in step 3 and 4a below.

If the additional refrigerant charge is larger than 22 lbs. (10 kg), perform step 3 till the end of the procedure.

- 3 Pre-charging can be done without compressor running by connecting the refrigerant bottle only to the liquid stop valve service port (open valve C). Make sure that the stop valves are closed (valve A and B+liquid line stop valve+gas line stop valve+equalizer line stop valve).



- 1 Pressure reducing valve
- 2 Nitrogen
- 3 Measuring instrument
- 4 Refrigerant R410A tank (siphon system)
- 5 Vacuum pump
- 6 Charge hose
- 7 Refrigerant charge port
- 8 Gas line stop valve
- 9 Liquid line stop valve
- 10 Outdoor unit
- 11 To indoor unit
- 12 Stop valve
- 13 Field piping
- 14 Gas flow
- 15 Stop valve service port
- A Valve A
- B Valve B
- C Valve C

- 4 a) If the calculated additional refrigerant amount is reached by above pre-charging procedure, close valve C.
b) If the total amount of refrigerant could not be charged by precharging, then close valve C and go to step 5. Follow step 6 depending on the chosen charging method.

INFORMATION

If the total additional refrigerant amount was reached in step 4 (by pre-charging only), record the amount of refrigerant that was added on the additional refrigerant charge label provided with the unit and attach it on the back side of the front panel. Perform the test procedure as described in 15.4. Test operation on page 38.

- 5 After pre-charging, perform the refrigerant charge operation as shown below and charge the remaining refrigerant of the additional charging amount through valve A. Open the liquid and gas side stop valves. Valves A, B and C must remain closed!

NOTE

- The refrigerant charging port is connected to the piping inside the unit. The unit's internal piping is already factory charged with refrigerant, so be careful when connecting the charge hose.
- After adding the refrigerant, do not forget to close the lid of the refrigerant charging port. The tightening torque for the lid is 8.48 to 10.3 ft·lbf (11.5 to 13.9 N·m).
- In order to ensure uniform refrigerant distribution, it may take the compressor ±10 minutes to start up after the unit has started operation. This is not a malfunction.

A. Adding refrigerant by using the automatic charging function

INFORMATION

The automatic refrigerant charging has limits as described below. Out of these limits, the system cannot operate the automatic refrigerant charging:

- Outdoor temperature: 32°F (0°C) DB -109°F (43°C) DB.
- Indoor temperature: 50°F (10°C) DB - 89°F (32°C) DB.
- Total indoor unit capacity: 80% (VRV indoor units only).

6A The remaining additional refrigerant charge can be charged by operating the outdoor unit by means of the automatic refrigerant charge operation mode.

Depending on the ambient limitation conditions (see above), the unit will automatically decide which operation mode will be used to fulfill the automatic refrigerant charge: cooling or heating. If above conditions are fulfilled, cooling operation will be selected. If not, heating mode will start.

Procedure

- Idle (default) screen is shown.
- Push BS2 once, indication **888**.
- Push BS2 for more than 5 seconds, wait while the unit is preparing for operation. Segment display indication: **101** (pressure control is executed):
 - In case heating operation is started: indication **122** till **123** will be displayed (start up control; waiting stable heating operation).
 - In case cooling operation is started: indication **102** till **103** will be displayed (start up control; waiting stable cooling operation).
- When **123** or **103** starts flashing (ready for charging), push BS2 within 5 minutes. Open valve A. If BS2 is not pushed within 5 minutes, a malfunction code will appear:
 - Heating operation: **125** will be flashing. Push BS2 to restart the procedure.
 - Cooling operation: malfunction code **P2** will appear. Push BS1 to abort and restart the procedure.

Heating (middle segment indicates 2)

Charging will continue, the segment indication intermittently shows the current low pressure value and the status indication **123**.

When the remaining additional refrigerant amount is charged, close valve A immediately and push BS3 to stop charging operation.

After BS3 is pushed, the ending code **125** will appear. When BS2 is pushed, the unit will check whether the ambient conditions are favorable to execute the test run.

- If **101**, **102**, or **103** appears, push BS1 to finish the automatic charging function procedure. The ambient conditions are favorable to execute the test run.

- If the unit indicates **E-2**, or **E-3**, the ambient conditions are NOT favorable to execute the test run. Push BS1 to finish the automatic charging procedure.

INFORMATION

In case a malfunction code occurred during this automatic charging procedure, the unit will stop and indicate **125** flashing. Push BS2 to restart the procedure.

Cooling (middle segment indicates 0)

Automatic charging will continue, the segment indication shows the current low pressure value and the status indication **103** intermittent.

If the segment indication/user interface of indoor unit shows **P2** code, charging is almost finished. When the unit stops operating, close valve A immediately and check whether the segment indication/user interface of indoor unit shows **P3**. This indicates the automatic charging in cooling program was finished successfully.

INFORMATION

When the charging amount is little, the **P2** code may not be displayed, but instead the **P3** code will be displayed immediately.

When the required (calculated) additional refrigerant amount is already charged before **P2** or **P3** indication appears, close valve A and wait till **P3** is displayed.

If during the cooling operation for the automatic refrigerant charge the ambient conditions go beyond the allowable for this operation mode, the unit will indicate on the segment display the code **E-2** in case indoor temperature is out of range or **E-3** in case the outdoor temperature is out of range. In this case, when the additional refrigerant charging was not finished, step 6A has to be repeated.

INFORMATION

- When a malfunction is detected during the procedure (e.g. in case of closed stop valve), a malfunction code will be displayed. In that case, refer to 15.5. Malfunction code list on page 39 and solve the malfunction accordingly. Resetting the malfunction can be done by pushing BS1. The procedure can be restarted from 6A.).
- Aborting the automatic refrigerant charge is possible by pushing BS1. The unit will stop and return to idle condition.

Perform the test procedure as described in 15.4.2. Test operation on page 38.

B. Adding refrigerant by using the manual charging function

6B The remaining additional refrigerant charge can be charged by operating the outdoor unit by means of the manual refrigerant charge operation mode:

- Turn on the power of the indoor units and outdoor unit.
- Take all the precautions mentioned in **start-up and configuration** into account.
- Activate outdoor unit setting [2-20]=1 to start manual refrigerant charge mode. Refer to page 33 for details.
Result: The unit will start operation. Valve A can be opened. Charging of remaining additional refrigerant can be done. When the remaining calculated additional refrigerant amount is added, close valve A and push BS3 to stop the manual refrigerant charging procedure.

INFORMATION

The manual refrigerant charge operation will automatically stop within 30 minutes. If charging is not completed after 30 minutes, perform the additional refrigerant charging operation again.

Perform the test procedure as described in 15.4.2. Test operation on page 38.

INFORMATION

- When a malfunction is detected during the procedure (e.g., in case of closed stop valve), a malfunction code will be displayed. In that case, refer to 15.5. Malfunction code list on page 39 and solve the malfunction accordingly. Resetting the malfunction can be done by pushing BS3. The procedure can be restarted from 6B).
- Aborting the manual refrigerant charge is possible by pushing BS3. The unit will stop and return to idle condition.

Information which may occur during additional refrigerant charging procedures:

P8: Indoor unit freeze up prevention

Action: Close valve A immediately. Reset malfunction by pushing BS1. Retry auto charge procedure.

P2: Abnormal low pressure drop

Action: Close valve A immediately. Reset malfunction by pushing BS1. Check following items before retry auto charge procedure:

- Check if the gas side stop valve is opened correctly.
- Check if the valve of the refrigerant cylinder is opened.
- Check if the air inlet and outlet of the indoor units are not obstructed.

Ē - 2: Indoor temperature is out of range.

Ē - 3: Outdoor temperature is out of range.

Ē - 5: An indoor unit which is not compatible with automatic refrigerant charge functionality is installed (e.g., Mini-split indoor unit, etc.)

Other malfunction code: close valve A immediately. Confirm the malfunction code and take corresponding action, 15.5. Malfunction code list on page 39.

14.3.3. Final charge adjustment

It is not necessary to do this final adjustment normally, but perform the following operation only when if the most adequate refrigerant for the best performance is required.

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

Purge gauge lines. Connect service gauge manifold to the service port between the compressor and the reversing valve in each outdoor unit. Run the system for 30 minutes in cooling by the forced operation using the field setting mode [2-6] (value 0: OFF, 1:ON) (Refer to 15.2. Monitoring function and field settings.) to allow pressures to stabilize, then check subcooling as detailed in the following sections.

Subcooling = Sat. Liquid Temp. – Liquid Line Temp.

- 1 Temporarily install a thermometer on the liquid line between the coil and the EV in each outdoor unit. Ensure the thermometer makes adequate contact and is insulated for best possible readings. Use liquid line temperature to determine sub cooling.
- 2 Check subcooling for each outdoor unit and calculate the average subcooling of the outdoor unit. Systems should have a subcooling of 11±3°F (6±2°C).
 - a. If average subcooling is low, add charge to raise subcooling to 11±3°F (6±2°C) (The maximum additional charge is 4.4 lbs. (2kg))
 - b. If average subcooling is high, remove charge to lower the subcooling to 11±3°F (6±2°C)

14.3.4. Checks after adding refrigerant

- Are the stop valves for liquid and gas open?
- Is the amount of refrigerant, that has been added, recorded on the refrigerant charge label?



NOTE

Make sure to open all stop valves after (pre-) charging the refrigerant. Operating with the stop valves closed will damage the compressor.

15. Start-up and configuration



INFORMATION

It is important that all information in this chapter is read sequentially by the installer and that the system is configured as applicable.



DANGER: ELECTRICAL SHOCK

See Safety considerations on page i.

15.1. Checks before initial start up

After the installation of the unit, first check the following items. Once all below checks are fulfilled, the unit must be closed, only then can the unit be powered up.

1 Installation

Check that the unit is properly installed, to avoid abnormal noises and vibrations when starting up the unit.

- 2 **Field wiring**
Be sure that the field wiring has been carried out according to the instructions described in 9. Field wiring on page 18, according to the wiring diagrams and according to the applicable legislation.
- 3 **Power supply voltage**
Check the power supply voltage on the local supply panel. The voltage must correspond to the voltage on the identification label of the unit.
- 4 **Ground wiring**
Be sure that the ground wires have been connected properly and that the ground terminals are tightened.
- 5 **Insulation test of the main power circuit**
Using a megatester for 500 V, check that the insulation resistance of 1 MΩ or more is attained by applying a voltage of 500 V DC between power terminals and ground. Never use the megatester for the transmission wiring.
- 6 **Fuses, circuit breakers, or protection devices**
Check that the fuses, circuit breakers, or the locally installed protection devices are of the size and type specified in 9. Field wiring on page 18. Be sure that neither a fuse nor a protection device has been bypassed.
- 7 **Internal wiring**
Visually check the control box and the inside of the unit on loose connections or damaged electrical components.
- 8 **Pipe size and pipe insulation**
Be sure that correct pipe sizes are installed and that the insulation work is properly executed.
- 9 **Stop valves**
Be sure that the stop valves are open on both liquid and gas side.
- 10 **Damaged equipment**
Check the inside of the unit on damaged components or squeezed pipes.
- 11 **Refrigerant leak**
Check the inside of the unit on refrigerant leakage. If there is a refrigerant leak, try to repair the leak. If the repair is unsuccessful, call your local dealer. Do not touch any refrigerant which has leaked out from refrigerant piping connections. This may result in frostbite.
- 12 **Oil leak**
Check the compressor for oil leakage. If there is an oil leak, try to repair the leak. If the repairing is unsuccessful, call your local dealer.
- 13 **Air inlet/outlet**
Check that the air inlet and outlet of the unit is not obstructed by paper sheets, cardboard, or any other material.
- 14 **Record the contents of field setting.**
Record them on the accessory **REQUEST FOR THE INDICATION** label.
And attach the label on the back side of the front panel.
- 15 **Record the installation date.**
Record the installation date on the accessory **REQUEST FOR THE INDICATION** label.
And attach the label on the back side of the front panel.

15.2. Monitoring function and field settings

The operation of the outdoor unit can further be defined by changing some field settings. Next to making field settings it is also possible to confirm the current operation parameters of the unit. The setting can also be performed via the PC configuration software.

Below relevant Monitoring mode (mode 1) and Field setting mode (mode 2) settings are explained in detail. How to access them, how to change the value of the settings and how to confirm them is explained in 13. Making field settings on page 23. In that chapter, an example is given on how to make a setting. It is advised to check this procedure before accessing, checking and changing below settings.

Once the default situation of the segment indication is confirmed (see 13. Making field settings on page 23), the mode 1 and mode 2 can be accessed.

Making settings is done via the master outdoor unit.

15.2.1. Mode 1

Mode 1 can be used to monitor the current situation of the outdoor unit. Some field setting contents can be monitored as well.

Below the settings in mode 1 are explained.

- [1-0]= shows whether the unit you check is a master, sub 1 or sub 2 unit
- No indication=undefined situation
 - 0=outdoor unit is master unit
 - 1=outdoor unit is sub 1 unit
 - 2=outdoor unit is sub 2 unit

Master, sub 1 and sub 2 indications are relevant in multiple outdoor unit system configurations. The allocation of which outdoor unit is master, sub 1 or sub 2 are decided by the unit's logic.

The master unit should be used to input field settings in mode 2.

- [1-1]= shows the status of low noise operation.
- 1=unit is currently operating under low noise restrictions
 - 0=unit is currently not operating under low noise restrictions

Low noise operation reduces the sound generated by the unit compared to nominal operating conditions.

Low noise operation can be set in mode 2. There are two methods to activate low noise operation of the outdoor unit system.

The first method is to enable an automatic low noise operation during night time by field setting. The unit will operate at the selected low noise level during the selected time frames. The second method is to enable low noise operation based on an external input. For this operation an optional accessory is required.

- [1-2]= shows the status of power consumption limitation operation.
- 1=unit is currently operating under power consumption limitation
 - 0=unit is currently not operating under power consumption limitations

Power consumption limitation reduces the power consumption of the unit compared to nominal operating conditions.

Power consumption limitation can be set in mode 2. There are two methods to activate power consumption limitation of the outdoor unit system.

The first method is to enable a forced power consumption limitation by field setting. The unit will always operate at the selected power consumption limitation.

The second method is to enable power consumption limitation based on an external input. For this operation an optional accessory is required.

- [1-5]= shows the current T_e target parameter position.
Refer to 15.3. Energy saving and optimum operation on page 35 for more details about the contents of this value.

- [1-6]= shows the current T_c target parameter position. Refer to 15.3. Energy saving and optimum operation on page 35 for more details about the contents of this value.
- [1-10]= shows the total number of connected indoor units. It can be convenient to check if the total number of indoor units which are installed match the total number of indoor units which are recognized by the system. In case there is a mismatch, it is advised to check the communication wiring path between outdoor and indoor units (F1/F2 communication line).
- [1-13]= shows the total number of connected outdoor units (in case of multiple outdoor system). It can be convenient to check if the total number of outdoor units which are installed matches the total number of outdoor units which are recognized by the system. In case there is a mismatch, it is advised to check the communication wiring path between outdoor and outdoor units (Q1/Q2 communication line).
- [1-17]= shows the latest malfunction code.
- [1-18]= shows the 2nd last malfunction code.
- [1-19]= shows the 3rd last malfunction code. When the latest malfunction codes were reset by accident on an indoor unit user interface, they can be checked again through this monitoring settings. For the content or reason behind the malfunction code see 15.5. Malfunction code list on page 39, where most relevant malfunction codes are explained. Detailed information about malfunction codes can be consulted in the service manual of this unit.
- [1-38]= shows the number of Mini-split indoor units connected to the system.
- [1-40]= shows the current cooling comfort setting. See 15.3. Energy saving and optimum operation on page 35 for more details about this setting.
- [1-41]= shows the current heating comfort setting. See 15.3. Energy saving and optimum operation on page 35 for more details about this setting.

15.2.2. Mode 2

Mode 2 is used to change the field settings of the system. Consulting the current field setting value and changing the current field setting value is possible.

In general, normal operation can be resumed without special intervention after changing field settings.

Some field settings are used for special operation (e.g., 1 time operation, recovery/vacuuming setting, manual adding refrigerant setting, etc.). In such a case, it is required to abort the special operation before normal operation can restart. It will be indicated in below explanations.

- [2-0]= Cool/Heat selection setting
Cool/Heat selection setting is used in case the optional Cool/Heat selector (KRC19-26A) is used. Depending on the outdoor unit setup (single outdoor unit setup or multi outdoor unit setup), the correct setting should be chosen. More details on how to use the Cool/Heat selector option can be found in the manual of the Cool/Heat selector.
Default value=0.
 - 0=Each individual outdoor unit can select Cool/Heat operation (by Cool/Heat selector if installed), or by defin-

ing master indoor user interface (see setting [2-83] on page 35)

- 1=Master unit decides Cool/Heat operation when outdoor units are connected in multiple system combination (a)
 - 2=Sub unit for Cool/Heat operation when outdoor units are connected in multiple system combination (a)
- Change [2-0]=0, 1 or 2 in function of required functionality.

- [2-8]= T_e target temperature during cooling operation
Default value=0

Value [2-8]	T _e target
0	Auto (default)
2	43°F (6°C)
3	45°F (7°C)
4	46°F (8°C)
5	48°F (9°C)
6	50°F (10°C)
7	52°F (11°C)

Change [2-8]=0, 2-7 in function of required operation method during cooling.

For more information and advice about the impact of these settings, see 15.3. Energy saving and optimum operation on page 35.

- [2-9]= T_c target temperature during heating operation
Default value=0

Value [2-9]	T _c target
0	Auto (default)
1	106°F (41°C)
3	109°F (43°C)
6	115°F (46°C)

Change [2-9]=0, 1, 3 or 6 in function of required operation method during heating.

For more information and advice about the impact of these settings, see 15.3. Energy saving and optimum operation on page 35.

- [2-12]= Enable the low noise function and/or power consumption limitation via external control adaptor (DTA104A61/62)
If the system needs to be running under low noise operation or under power consumption limitation conditions when an external signal is sent to the unit, this setting should be changed. This setting will only be effective when the optional external control adaptor (DTA104A61/62) is installed.
Default value=0.
To activate this function change [2-12]=1.

- [2-18]= Fan high static pressure setting
In order to increase the static pressure the outdoor unit fan is delivering, this setting should be activated. For details about this setting, see technical specifications.
Default value=0.
To activate this function change [2-18]=1.

- [2-20]= Manual additional refrigerant charge
In order to add the additional refrigerant charge amount in a manual way (without automatic refrigerant charging functionality), following setting should be applied.
Further instructions regarding the different ways to charge additional refrigerant into your system can be found in chapter 14.3. Method for adding refrigerant on page 27.

Default value=0.

To activate this function change [2-20]=1.

To stop the manual additional refrigerant charge operation (when the required additional refrigerant amount is charged), push BS3. If this function was not aborted by pushing BS3, the unit will stop its operation after 30 minutes. If 30 minutes was not sufficient to add the needed refrigerant amount, the function can be reactivated by changing the field setting again.

[2-21]= Refrigerant recovery/vacuuming mode

In order to achieve a free pathway to reclaim refrigerant out of the system or to remove residual substances or to vacuum the system it is necessary to apply a setting which will open required valves in the refrigerant circuit so the reclaim of refrigerant or vacuuming process can be done properly. Default value=0.

To activate function change [2-21]=1.

To stop the refrigerant recovery/vacuuming mode, push BS3. If BS3 is not pushed, the system will remain in refrigerant recovery/vacuuming mode.

[2-22]= Automatic low noise setting and level during night time

By changing this setting, you activate the automatic low noise operation function of the unit and define the level of operation. Depending on the chosen level, the noise level will be lowered (3: Level 3<2: Level 2<1: Level 1).

The start and stop moments for this function are defined under setting [2-26] and [2-27].

Default value=0.

To activate function change [2-22]=1, 2 or 3.

[2-25]= Low noise operation level via the external control adaptor

If the system needs to be running under low noise operation conditions when an external signal is sent to the unit, this setting defines the level of low noise that will be applied (3: Level 3<2: Level 2<1: Level 1).

This setting will only be effective when the optional external control adaptor (DTA104A61/62) is installed and the setting [2-12] was activated.

Default value=2.

To activate function change [2-25]=1, 2 or 3.

[2-26]= Low noise operation start time

Change [2-26]=1, 2 or 3 in function of required timing.

Default value=2.

Value [2-26]	Start time automatic low noise operation (approximately)
1	8:00 p.m.
2	10:00 p.m. (default)
3	12:00 a.m.

This setting is used in conjunction with setting [2-22].

[2-27]= Low noise operation stop time

Default value=3.

Value [2-27]	Start time automatic low noise operation (approximately)
1	6:00 a.m.
2	7:00 a.m.
3	8:00 a.m. (default)

This setting is used in conjunction with setting [2-22].

[2-30]= Power consumption limitation level (step 1) via the external control adaptor (DTA104A61/62)

If the system needs to be running under power consumption limitation conditions when an external signal is sent to the unit, this setting defines the level power consumption limitation that will be applied for step 1. The level is according to the table.

Default value=3.

Change [2-30]=1, 2, 3, 4, 5, 6, 7 or 8 in function of required limitation.

Value [2-30]	Power consumption limitation (approximately)
1	60%
2	65%
3	70% (default)
4	75%
5	80%
6	85%
7	90%
8	95%

[2-31]= Power consumption limitation level (step 2) via the external control adaptor (DTA104A61/62)

If the system needs to be running under power consumption limitation conditions when an external signal is sent to the unit, this setting defines the level power consumption limitation that will be applied for step 2. The level is according to the table.

Default value=1.

Change [2-31]=1, 2 or 3 in function of required limitation.

Value [2-31]	Power consumption limitation (approximately)
1	40% (default)
2	50%
3	55%

[2-32]= Forced, all time, power consumption limitation operation (no external control adaptor is required to perform power consumption limitation)

If the system always needs to be running under power consumption limitation conditions, this setting activates and defines the level power consumption limitation that will be applied continuously. The level is according to the table. Default value=0 (OFF).

Value [2-32]	Restriction reference
0	Function not active (default)
1	Follows [2-30] setting
2	Follows [2-31] setting

Change [2-32]=0, 1 or 2 in function of required limitation.

[2-34]= Indoor unit fan tap setting

Indoor units fan speed limitation related to connection capacity and outdoor air temperature for energy saving.

Default value=0

Value [2-34]	Indoor unit fan tap setting
0	Fan speed is limited to L tap when indoor units capacity \geq 130%.
1	In heating mode, fan speed is limited to L tap when indoor units capacity \geq 130%.
2	Fan speed follows a setting of the remote controller (not limited by indoor units connection capacity).
3	Fan speed is limited to L tap when outdoor air temperature goes down to below 85.1°F (29.5°C). It returns to remote controller setting when outdoor air temperature goes up to over 90.5°F (32.5°C).
4	Fan speed is limited to L tap when outdoor air temperature goes down to below 74.3°F (23.5°C). It returns to remote controller setting when outdoor air temperature goes up to over 79.7°F (26.5°C).
5	Fan speed is limited to L tap when outdoor air temperature goes down to below 66.7°F (19.3°C). It returns to remote controller setting when outdoor air temperature goes up to over 72.1°F (22.3°C).

[2-35]= Height difference setting

Default value=1

In case the outdoor unit is installed in the lowest position (indoor units are installed on a higher position than outdoor units) and the height difference between the highest indoor unit and the outdoor unit exceeds 131 ft. (40 m), the setting [2-35] should be changed to 0.

Other changes/limitations to the circuit apply, for more information see 7.5.2. System only containing VRV indoor units on page 12.

[2-49]= Height difference setting

Default value=0

In case the outdoor unit is installed in the highest position (indoor units are installed on a lower position than outdoor units) and the height difference between the lowest indoor unit and the outdoor unit exceeds 164 ft. (50 m), the setting [2-49] has to be changed to 1.

Other changes/limitations to the circuit apply, for more information see 7.5.2. System only containing VRV indoor units on page 12.

[2-81]= Cooling comfort setting

Default value=1

Value [2-81]	Cooling comfort setting
0	Eco
1	Mild (default)
2	Quick
3	Powerful

Change [2-81]=0, 1, 2 or 3 in function of required limitation. This setting is used in conjunction with setting [2-8].

For more information and advice about the impact of these

settings, see 15.3. Energy saving and optimum operation.

[2-82]= Heating comfort setting

Default value=1

Value [2-82]	Heating comfort setting
0	Eco
1	Mild (default)
2	Quick
3	Powerful

Change [2-82]=0, 1, 2 or 3 in function of required limitation. This setting is used in conjunction with setting [2-9].

For more information and advice about the impact of these settings, see 15.3. Energy saving and optimum operation.

[2-83]= Master user interface allocation in case VRV indoor units and Mini-split indoor units are used at the same time

By changing setting [2-83], you can allow the VRV indoor unit to be the operation mode selector (system power OFF/ON is required after applying this setting).

- [2-83]=1 Mini-split indoor unit has mode selection right (default setting).
- [2-83]=0 VRV indoor unit has mode selection right.

15.3. Energy saving and optimum operation

This VRV IV heat pump system is equipped with advanced energy saving functionality. Depending on the priority, emphasizes 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.

15.3.1. 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]=6.

- **Automatic**

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 cooling 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]=0 (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]=0 (default).

• **Hi-sensible/economic (cooling/heating)**

The refrigerant temperature is set higher/lower (cooling/heating) compared to basic operation. The focus under high sensible mode is comfort feeling 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.

Value [2-8]	T _e target
3	45°F (7°C)
4	46°F (8°C)
5	48°F (9°C)
6	50°F (10°C)
7	52°F (11°C)

- To activate this setting under heating operation: change field setting [2-9] to the appropriate value, matching the requirements of the pre-designed system containing a high sensible solution.

Value [2-9]	T _c target
1	106°F (41°C)
3	109°F (43°C)

15.3.2. 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 [2-81]=3.

This setting is used in conjunction with setting [2-8].

- To activate the powerful comfort setting under heating operation, change field setting [2-82]=3.

This setting is used in conjunction with setting [2-9].

• **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 [2-81]=2.

This setting is used in conjunction with setting [2-8].

- To activate the quick comfort setting under heating operation, change field setting [2-82]=2.

This setting is used in conjunction with setting [2-9].

• **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.

The start up condition is different from the powerful and quick comfort setting.

- To activate the mild comfort setting under cooling operation, change field setting [2-81]=1.

This setting is used in conjunction with setting [2-8].

- To activate the mild comfort setting under heating operation, change field setting [2-82]=1.

This setting is used in conjunction with setting [2-9].

• **Eco**

The original refrigerant temperature target, which is defined by the operation method (see above) is kept without any correction, unless for protection control.

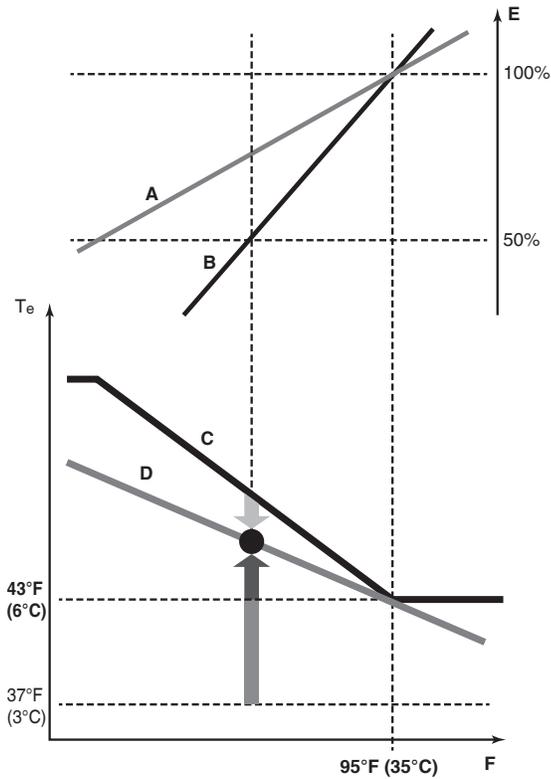
- To activate the mild comfort setting under cooling operation, change field setting [2-81]=0.

This setting is used in conjunction with setting [2-8].

- To activate the mild comfort setting under heating operation, change field setting [2-82]=0.

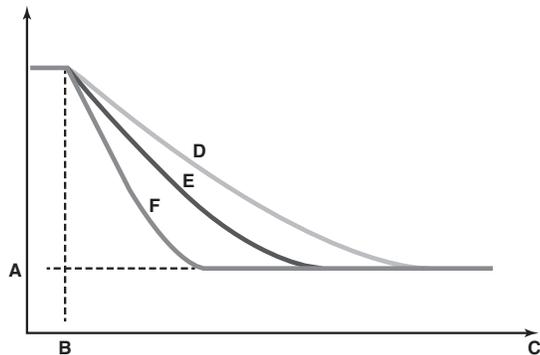
This setting is used in conjunction with setting [2-9].

Example: Automatic mode during cooling



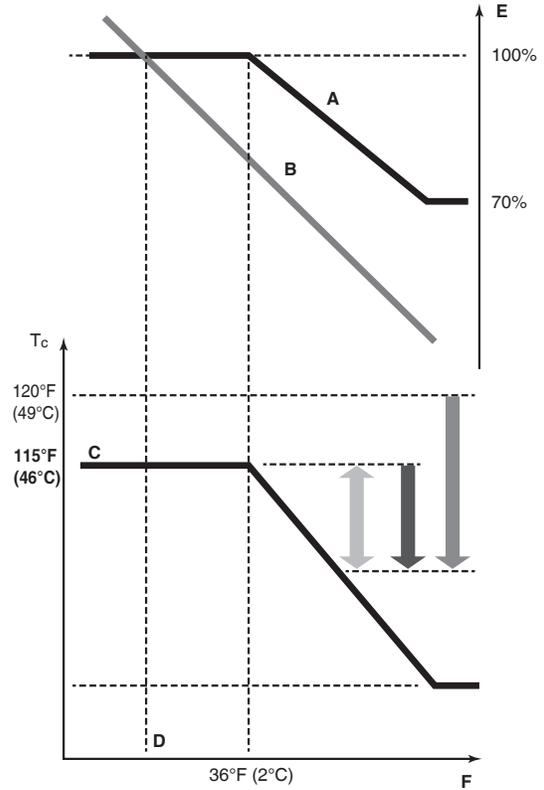
- A Actual load curve
- B Virtual load curve (initial capacity automatic mode)
- C Virtual target value (initial evaporation temperature value automatic mode)
- D Required evaporation temperature value
- E Load factor
- F Outside air temperature
- Te Evaporating temperature
- Quick
- Powerful
- Mild

Room temperature evolution:



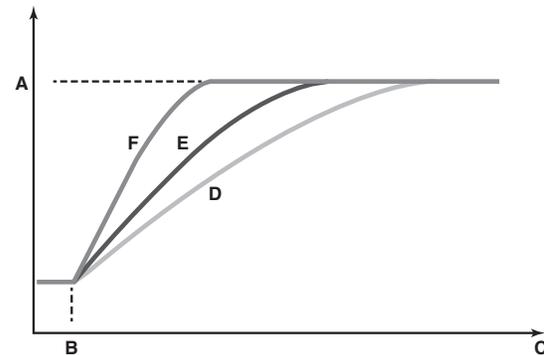
- A Indoor unit set temperature
- B Operation start
- C Operating time
- D Mild
- E Quick
- F Powerful

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
- Tc 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.

15.4. Test operation

After installation and once the field settings are defined, the installer is obliged to verify correct operation. Therefore a test run must be performed according to the procedures described below.

15.4.1. Precautions before starting test operation

During test operation, the outdoor unit and the indoor units will start up:

- Make sure that the preparations of all indoor units are finished (field piping, electrical wiring, air purge, etc.). See installation manual of the indoor units for details.

⚠ CAUTION

Do not insert fingers, rods or other objects into the air inlet or outlet. When the fan is rotating at high speed, it will cause injury.

⚠ CAUTION

Do not perform the test operation while working on the indoor units. When performing the test operation, not only the outdoor unit, but the connected indoor unit will operate as well. Working on an indoor unit while performing a test operation is dangerous.

⚠ CAUTION

- During tests never pressurize the appliances with a pressure higher than the maximum allowable pressure (as indicated on the nameplate of the unit).
- If refrigerant gas leaks, ventilate the area immediately. Toxic gas may be produced if refrigerant gas comes into contact with fire.
- Never directly touch any accidental leaking refrigerant. This could result in severe wounds caused by frostbite.
- Test run is possible for ambient temperatures between -4°F and 95°F (-20°C and 35°C).

⚠ DANGER: DO NOT TOUCH PIPING AND INTERNAL PARTS

See Safety considerations on page i.

⚠ DANGER: ELECTRICAL SHOCK

See Safety considerations on page i.

- Provide a logbook and machine card.
In accordance with the applicable legislation, it may be necessary to provide a logbook with the equipment containing at least: information on maintenance, repair work, results of tests, stand-by periods, etc.

ℹ INFORMATION

Note that during the first running period of the unit, required power input may be higher. This phenomenon originates from the compressor that requires a 50 hour run elapse before reaching smooth operation and stable power consumption. Reason is that the scroll is made out of iron and that it takes some time to smooth the surfaces that make contact.

⚠ NOTE

To protect the compressor, be sure to turn on the power supply 6 hours before starting operation.

15.4.2. Test operation

The procedure below describes the test operation of the complete system. This operation checks and judges following items:

- Check of wrong wiring (communication check with indoor units).
- Check of the stop valves opening.
- Judgment of piping length.

Mini-split indoor units are present in the system, above 2 checks will not be performed.

On top of this system test operation, indoor units operation should also be checked separately.

- Make sure to carry out the system test operation after the first installation. Otherwise, the malfunction code U3 will be displayed on the user interface and normal operation or individual indoor unit test run cannot be carried out.
- Abnormalities on indoor units cannot be checked for each unit separately. After the test operation is finished, check the indoor units one by one by performing a normal operation using the user interface. Refer to the indoor unit installation manual for more details concerning the individual test run.

ℹ INFORMATION

- It may take 10 minutes to achieve a uniform refrigerant state before the compressor starts.
- During the test operation, the refrigerant running sound or the magnetic sound of a solenoid valve may become loud and the display indication may change.
These are not malfunctions.

Procedure

- 1 Close all front panels in order to not let it be the cause of misjudgment.
- 2 Make sure all field settings you want are set; see 15.2. Monitoring function and field settings on page 32.
- 3 Turn ON the power to the outdoor unit and the connected indoor units.

⚠ NOTE

Be sure to turn on the power 6 hours before operation in order to have power running to the crankcase heater and to protect the compressor.

- 4 Make sure the default (idle) situation is existing; see 13.2. Operating the push buttons and DIP switches on the logic board on page 24. Push BS2 for 5 seconds or more. The unit will start test operation.

- The test operation is automatically carried out, the outdoor unit display will indicate **E3** and the indication **Test operation** and **Under centralized control** will display on the user interface of indoor units.

Steps during the automatic system test run procedure:

- **E01**: control before start up (pressure equalization)
- **E02**: cooling start up control
- **E03**: cooling stable condition
- **E04**: communication check
- **E05**: stop valve check
- **E06**: pipe length check
- **E07**: refrigerant amount check
- **E08**: detailed refrigerant situation check
- **E09**: pump down operation
- **E10**: unit stop

- During the test operation, it is not possible to stop the unit operation from a user interface. To abort the operation, press BS3. The unit will stop after ±30 seconds.

5 Check the test operation results on the outdoor unit segment display.

- Normal completion: no indication on the segment display (idle)
- Abnormal completion: indication of malfunction code on the segment display

Refer to 15.4.3. Correcting after abnormal completion of the test operation to take actions for correcting the abnormality. When the test operation is fully completed, normal operation will be possible after 5 minutes.

15.4.3. Correcting after abnormal completion of the test operation

The test operation is only completed if there is no malfunction code displayed on the user interface or outdoor unit segment display. In case of a displayed malfunction code, perform correcting actions as explained in the malfunction code table. Carry out the test operation again and confirm that the abnormality is properly corrected.

i **INFORMATION**

Refer to the installation manual of the indoor unit for other detailed malfunction codes related to indoor units.

15.5. Malfunction code list

In case of a displayed malfunction code, perform correcting actions as explained in the malfunction code table.

After correcting the abnormality, press BS3 to reset the malfunction code and retry operation.

The malfunction code which is displayed on the outdoor unit will indicate a main malfunction code and a sub code. The sub code indicates more detailed information about the malfunction code. The malfunction code will be displayed intermittent.

Example:

Main code Sub code
E3 - **001**

With an interval of 1 second, the display will switch between main code and sub code.

Malfunction code		Contents	Solution
Main code	Sub code Master/sub 1/sub 2		
E3	01/03/05	High pressure switch was activated (S1PH, S2PH) – A1P (X3A; X4A).	Check stop valve situation or abnormalities in (field) piping or airflow over air cooled coil.
	02/04/06	<ul style="list-style-type: none"> Refrigerant overcharge Stop valve closed 	<ul style="list-style-type: none"> Check refrigerant amount+recharge unit. Open stop valves.
	13/14/15	Stop valve closed (liquid)	Open liquid stop valve.
	18	<ul style="list-style-type: none"> Refrigerant overcharge Stop valve closed 	<ul style="list-style-type: none"> Check refrigerant amount+recharge unit. Open stop valves.
E4	01/02/03	Low pressure malfunction: <ul style="list-style-type: none"> Stop valve closed Refrigerant shortage Indoor unit malfunction 	<ul style="list-style-type: none"> Open stop valves. Check refrigerant amount+recharge unit. Check the user interface's display or Transmission wiring between the outdoor unit and the indoor unit.
E9	01/05/08	Electronic expansion valve malfunction (subcool) (Y2E) – A1P (X21A)	Check connection on printed circuit board or actuator.
	04/07/10	Electronic expansion valve malfunction (main) (Y1E) – A1P (X23A)	Check connection on printed circuit board or actuator.
F3	01/03/05	Discharge temperature too high (R21T/R22T): <ul style="list-style-type: none"> Stop valve closed Refrigerant shortage 	<ul style="list-style-type: none"> Open stop valves. Check refrigerant amount+recharge unit.
	20/21/22	Compressor casing temperature too high (R8T): <ul style="list-style-type: none"> Stop valve closed Refrigerant shortage 	<ul style="list-style-type: none"> Open stop valves. Check refrigerant amount+recharge unit.
F6	02	<ul style="list-style-type: none"> Refrigerant overcharge Stop valve closed 	<ul style="list-style-type: none"> Check refrigerant amount+recharge unit. Open stop valves.
H9	01/02/03	Ambient temperature sensor malfunction (R1T) – A1P (X18A)	Check connection on printed circuit board or actuator.

Malfunction code		Contents	Solution
Main code	Sub code Master/sub 1/sub 2		
U3	16/22/28	Discharge temperature sensor malfunction (R21T): open circuit – A1P (X29A)	Check connection on printed circuit board or actuator.
	17/23/29	Discharge temperature sensor malfunction (R21T): short circuit – A1P (X29A)	Check connection on printed circuit board or actuator.
	18/24/30	Discharge temperature sensor malfunction (R22T): open circuit – A1P (X29A)	Check connection on printed circuit board or actuator.
	19/25/31	Discharge temperature sensor malfunction (R22T): short circuit – A1P (X29A)	Check connection on printed circuit board or actuator.
	47/49/51	Compressor casing temperature sensor malfunction (R8T): open circuit – A1P (X29A)	Check connection on printed circuit board or actuator.
	48/50/52	Compressor casing temperature sensor malfunction (R8T): short circuit – A1P (X29A)	Check connection on printed circuit board or actuator.
U5	01/03/05	Suction temperature sensor malfunction (R3T) – A1P (X30A)	Check connection on printed circuit board or actuator.
U6	01/02/03	De-icing temperature sensor malfunction (R7T) – A1P (X30A)	Check connection on printed circuit board or actuator.
U7	06/07/08	Liquid temperature sensor (after subcool HE) malfunction (R5T) – A1P (X30A)	Check connection on printed circuit board or actuator.
U8	01/02/03	Liquid temperature sensor (coil) malfunction (R4T) – A1P (X30A)	Check connection on printed circuit board or actuator.
U9	01/02/03	Gas temperature sensor (after subcool HE) malfunction (R6T) – A1P (X30A)	Check connection on printed circuit board or actuator.
U8	06/08/10	High pressure sensor malfunction (S1NPH): open circuit – A1P (X32A)	Check connection on printed circuit board or actuator.
	07/09/11	High pressure sensor malfunction (S1NPH): short circuit – A1P (X32A)	Check connection on printed circuit board or actuator.
U7	06/08/10	Low pressure sensor malfunction (S1NPL): open circuit – A1P (X31A)	Check connection on printed circuit board or actuator.
	07/09/11	Low pressure sensor malfunction (S1NPL): short circuit – A1P (X31A)	Check connection on printed circuit board or actuator.
U7	14/15/16	Transmission outdoor unit - inverter: A3P transmission trouble – A1P (X20A, X28A)	<ul style="list-style-type: none"> • Check connection. • Correct phase order.
	19/20/21	Transmission outdoor unit - inverter: A4P transmission trouble – inverter: A3P (X41A): RXYQ72 - inverter: A5P transmission trouble – inverter: A3P (X41A): RXYQ96/120 - inverter: A7P transmission trouble – inverter: A6P (X41A): RXYQ144/168	<ul style="list-style-type: none"> • Check connection.
	24/25/26	Transmission outdoor unit - inverter: A4P transmission trouble – inverter: A5P (X4A): RXYQ96/120 - inverter: A4P transmission trouble – inverter: A7P (X4A): RXYQ144/168	<ul style="list-style-type: none"> • Check connection.
	30/31/32	Transmission outdoor unit - inverter: A6P transmission trouble – inverter: A3P (X41A, X61A): RXYQ144/168	<ul style="list-style-type: none"> • Check connection. • Correct phase order.
P ;	01/02/03	INV1 unbalanced power supply voltage	Check if power supply is within range.
	07/08/09	INV2 unbalanced power supply voltage	Check if power supply is within range.
U ;	01/05/07	<ul style="list-style-type: none"> • Reversed power supply phase • A9P: PRINTED CIRCUIT BOARD (OPEN PHASE PROTECTION) malfunction – A1P (X36A): RXYQ96/120TYDN 	<ul style="list-style-type: none"> • Correct phase order. • Check connection. • Check fuse.
	04/06/08	Reversed power supply phase	Correct phase order.

Malfunction code		Contents	Solution
Main code	Sub code Master/sub 1/sub 2		
U2	01/08/11	INV1 voltage power shortage or open phase	<ul style="list-style-type: none"> • Check if power supply is within range. • Correct phase order.
	02/09/12	INV1 reversed or open power supply phase	<ul style="list-style-type: none"> • Check if power supply is within range. • Correct phase order.
	22/25/28	INV2 voltage power shortage or open phase	<ul style="list-style-type: none"> • Check if power supply is within range. • Correct phase order.
	23/26/29	INV2 reversed or open power supply phase	<ul style="list-style-type: none"> • Check if power supply is within range. • Correct phase order.
U3	03	<ul style="list-style-type: none"> • Malfunction code: System test run not yet executed (system operation not possible). • Reversed or open power supply phase • Faulty wiring to Q1/Q2 or indoor – outdoor 	<ul style="list-style-type: none"> • Execute system test run. • Correct phase order. • Check (Q1/Q2) wiring.
	04		
	05		
	06		
	07		
	08		
U4	01	Faulty wiring to Q1/Q2 or indoor – outdoor	Connect transmission wiring of indoor unit to “TO IN/D UNIT (F1, F2)” and transmission wiring of other outdoor unit to “TO OUT/D UNIT (F1, F2)”.
	03	Malfunction of connected indoor unit.	Check the malfunction code of indoor unit and resolve it.
	04	System test run abnormal ending	Execute test run again.
U7	01	Faulty wiring to Q1/Q2 or indoor – outdoor	Connect transmission wiring of indoor unit to “TO IN/D UNIT (F1, F2)” and transmission wiring of other outdoor unit to “TO OUT/D UNIT (F1, F2)”.
	02	Faulty wiring to Q1/Q2 or indoor – outdoor	Connect transmission wiring of indoor unit to “TO IN/D UNIT (F1, F2)” and transmission wiring of other outdoor unit to “TO OUT/D UNIT (F1, F2)”.
	11	<ul style="list-style-type: none"> • Too many indoor units are connected to F1/F2 line • Faulty wiring between units 	<ul style="list-style-type: none"> • Check indoor unit amount and total capacity connected. • Check connection.
U9	01	System mismatch. Wrong type of indoor units combined (R410A, R407C, Mini-split, etc). Indoor unit malfunction.	Check if other indoor units have malfunction and confirm indoor unit mix is allowed.
U8	03	Connection malfunction over indoor units or type mismatch (R410A, R407C, Mini-split, etc).	Check if other indoor units have malfunction and confirm indoor unit mix is allowed.
	18	Connection malfunction over indoor units or type mismatch (R410A, R407C, Mini-split, etc).	Check if other indoor units have malfunction and confirm indoor unit mix is allowed.
	20	Wrong combination (different series (e.g. RXYQ and REYQ), or different type (e.g. P type and T type)).	Correct the units combination.
	31 49	Wrong combination of outdoor units.	Correct the units combination.
UH	01	Auto address malfunction (inconsistency)	Check if transmission wired unit amount matches with powered unit amount (by monitor mode) or wait till initialization is finished.
UF	01	Auto address malfunction (inconsistency)	Check if transmission wired unit amount matches with powered unit amount (by monitor mode) or wait till initialization is finished.
	05	Stop valve closed or wrong (during system test run)	Open stop valves.

Malfunction code		Contents	Solution
Main code			
<i>Auto charging related</i>			
P2		Unusual low pressure on suction line	Close valve A immediately. Push BS3 to reset. Check following items before retrying autocharge procedure: <ul style="list-style-type: none"> • Check if the gas side stop valve is opened correctly. • Check if the valve of the refrigerant cylinder is opened. • Check if the air inlet and outlet of the indoor unit are not obstructed.
P8		Freeze-up prevention indoor unit	Close valve A immediately. Push BS3 to reset. Retry autocharge procedure.
PE		Automatic charging nearly finished	Prepare for autocharge stopping.
PS		Automatic charging finished	Finish autocharge mode.

16. Operation of the unit

Once the unit is installed and test operation of outdoor unit and indoor units is finished, the operation of the system can start.

For operating the indoor unit, the user interface of the indoor unit should be switched ON. Refer to the indoor unit operation manual for more details.

17. Maintenance and service

17.1. Maintenance introduction

In order to ensure optimal operation of the unit, a number of checks and inspections should be carried out on the unit at regular intervals, preferably yearly.

This maintenance shall be carried out by the installer or service agent.

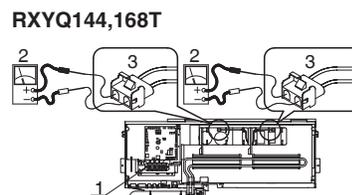
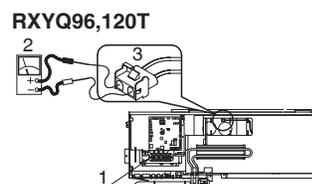
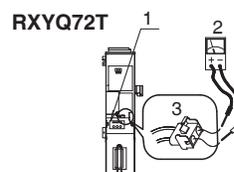
17.2. Service precautions

— **⚠ DANGER: DO NOT TOUCH PIPING AND INTERNAL PARTS** —
See Safety considerations on page i.

— **⚠ CAUTION** —

When performing service to inverter equipment:

- 1 Do not open the control box cover for 10 minutes after the power supply is turned off.
- 2 Measure the voltage between terminals on the terminal block for power supply with a tester and confirm that the power supply is turn off. In addition, measure points as shown in the figure below, with a tester and confirm that the voltage of the capacitor in the main circuit is less than 50 V DC.



- 1 Terminal block for power supply
- 2 Tester
- 3 White connector

- 3 To prevent damaging the printed circuit board, touch a noncoated metal part to eliminate static electricity before pulling out or plugging in connectors.
- 4 Pull out junction connectors X1A, X2A (X3A, X4A) for the fan motors in the outdoor unit before starting service operation on the inverter equipment. Be careful not to touch the live parts. (If a fan rotates due to strong wind, it may store electricity in the capacitor or in the main circuit and cause electric shock.)
- 5 After the service is finished, plug the junction connector back in. Otherwise the malfunction code E7 will be displayed on the user interface or on the outdoor unit segment display and normal operation will not be performed.

For details refer to the wiring diagram labelled on the back of the control box cover.

Pay attention to the fan. It is dangerous to inspect the unit while the fan is running. Make sure to turn off the main switch and to remove the fuses from the control circuit located in the outdoor unit.

NOTE

Play it safe. For protection of the printed circuit board, touch the control box casing by hand in order to eliminate static electricity from your body before performing service.

17.3. Service mode operation

Refrigerant recovery operation/vacuumping operation is possible by applying setting [2-21]. Refer to 13.2. Operating the push buttons and DIP switches on the logic board on page 24 for details how to set mode 2.

When vacuuming/recovery mode is used, check very carefully what should be vacuumed/recovered before starting. See installation manual of the indoor unit for more information about vacuuming and recovery.

17.3.1. Vacuuming method

- 1 When the unit is at standstill, set the unit in [2-21]=1.
- 2 When confirmed, the indoor and outdoor unit expansion valves will fully open. At that moment the segment display indication=t.01 and the user interface of all indoor units indicate TEST (test operation) and  (external control) and the operation will be prohibited.
- 3 Evacuate the system with a vacuum pump.
- 4 Press BS3 to stop vacuuming mode.

17.3.2. Refrigerant recovery operation method

This should be done by a refrigerant reclaimer. Follow the same procedure as for vacuuming method.

18. Caution for refrigerant leaks

18.1. Introduction

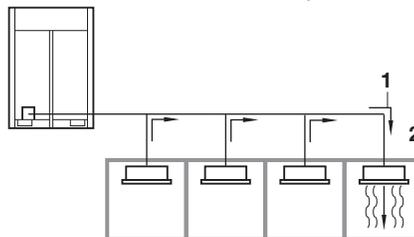
The installer and system specialist shall secure safety against leakage according to local regulations or standards. The following standards may be applicable if local regulations are not available. The VRV System, like other air conditioning systems, uses R410A as refrigerant. R410A itself is an entirely safe non-toxic, non-combustible refrigerant. Nevertheless care must be taken to ensure that air conditioning facilities are installed in a room that 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 lbs./ft.³ (kg/m³) (the weight in lbs. (kg) of the refrigerant gas in 1 ft.³ (1 m³) volume of the occupied space).

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



- 1 Direction of the refrigerant flow
- 2 Room where refrigerant leak has occurred (outflow of all the refrigerant from the system).

Pay special attention to places, such as basements 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 2 below and take whatever action is necessary to comply.

- 1 Calculate the amount of refrigerant (lbs. (kg)) charged to each system separately.

Amount of refrigerant in a single unit system (amount of refrigerant with which the system is charged before leav- ing the factory)	+	Additional charging amount (amount of re- frigerant added locally in accordance with the length or diameter of the refrigerant piping)	=	Total amount of refrigerant (lbs. (kg)) in the system
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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 Follow local code requirements (ASHRAE-15 2007 & ASHRAE-34 2007).

19. Disposal requirements

Dismantling of the unit, treatment of the refrigerant, of oil and of other parts must be done in accordance with relevant local and national legislation.



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