



# INSTALLATION MANUAL

**CONVENI-PACK**

**LRYEQ16A7Y1**





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The original instructions are written in English. All other languages are translations of the original instructions.

## 1. FIRST OF ALL

- This document is an installation manual for the Daikin CONVENI-PACK. Before installing the unit, read this manual thoroughly, and following the instructions contained in it. After installation, do a test run to make sure the unit runs properly, and then explain how to operate and take care of the unit to the customer, using the operation manual.
- Lastly, make sure the customer keeps this manual, along with the operation manual, in a safe place.
- This manual does not describe how to install the indoor unit. Refer to the installation manual included with the indoor unit for that.

### 1-1 Safety Precautions

Please read these "Safety precautions" carefully before installing the CONVENI-PACK and be sure to install it correctly.

After completing installation, conduct a trial operation to check for faults and explain to the customer how to operate the CONVENI-PACK and take care of it with the aid of the operation manual. Ask the customer to store the installation manual along with the operation manual for future reference.

Meaning of WARNINGS and SYMBOLS

#### WARNING

Failure to follow these instructions properly may result in personal injury or loss of life.

#### CAUTION

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

#### NOTICE

Indicates a situation that could result in equipment or property damage.


#### DANGER: RISK OF BURNING

Indicates a situation that results in death or serious injury.

#### WARNING

- Ask your dealer or qualified personnel to carry out installation work.  
Do not attempt to install the CONVENI-PACK yourself. Improper installation may result in water leakage, electric shocks or fire.
- Maintenance personnel of the manufacturer or equivalent skilled personnel should install this unit.
- Install the CONVENI-PACK in accordance with the instructions in this installation manual.  
Improper installation may result in water leakage, electric shocks or fire.
- When installing the unit in a small room, take measures against to keep refrigerant concentration from exceeding allowable safety limits in the event of refrigerant leakage.  
Contact the place of purchase for more information. Excessive refrigerant in a closed ambient can lead to oxygen deficiency.
- Be sure to use only the specified accessories and parts for installation work.  
Failure to use the specified parts may result in the unit falling, water leakage, electric shocks or fire.
- Install the CONVENI-PACK on a foundation strong enough to withstand the weight of the unit.  
A foundation of insufficient strength may result in the equipment falling and causing injury.
- Carry out the specified installation work after taking into account strong winds, typhoons or earthquakes.  
Failure to do so during installation work may 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 laws and regulations and this installation manual.  
An insufficient power supply capacity or improper electrical construction may lead to electric shocks or fire.
- Make sure that all wiring is secured, the specified wires are used, and that there is no strain on the terminal connections or wires.  
Improper connections or securing of wires may result in abnormal heat build-up or fire.
- When wiring the power supply and connecting transmission wiring, position the wires so that the control box lid can be securely fastened.  
Improper positioning of the control box lid may result in electric shocks, fire or the terminals overheating.
- If refrigerant gas leaks during installation, ventilate the area immediately.  
Toxic gas may be produced if the refrigerant gas comes into contact with fire.
- After completing installation, check for refrigerant gas leakage.  
Toxic gas may be produced if the refrigerant gas leaks into the room and comes into contact with a source of fire, such as a fan heater, stove or cooker.
- Be sure to switch off the unit before touching any electrical parts.
- Do not directly touch refrigerant that has leaked from refrigerant pipes or other areas, as there is a danger of frostbite.



- Do not allow children to climb on the outside unit and avoid placing objects on the unit.  
Injury may result if the unit becomes loose and falls.
- Be sure to earth the CONVENI-PACK.  
Do not earth the unit to a utility pipe, lightning conductor or telephone earth lead. Imperfect earthing may result in electric shocks or fire.   
A high surge current from lightning or other sources may cause damage to the CONVENI-PACK.
- Tear apart and throw away plastic packaging bags so that nobody, especially children, can play with them. Possible risk: suffocation.
- If NOT factory installed, a main switch or other means for disconnection, having a contact separation in all poles providing full disconnection under overvoltage category III condition, shall be installed in the fixed wiring.
- Be sure to install an earth leakage breaker.  
Failure to install an earth leakage breaker may result in electric shocks or fire.



#### **DANGER: RISK OF EXPLOSION**

Pump down – Refrigerant leakage. If you want to pump down the system, and there is a leakage in the refrigerant circuit:

- Do NOT use the unit's automatic pump down function, with which you can collect all refrigerant from the system into the outdoor unit.  
**Possible consequence:** Self-combustion and explosion of the compressor because of air going into the operating compressor.
- Use a separate recovery system so that the unit's compressor does NOT have to operate.



#### **CAUTION**

- While following the instructions in this installation manual, install drain piping to ensure proper drainage and insulate piping to prevent condensation.  
Improper drain piping may result in indoor water leakage and property damage.
- Install the indoor and outdoor units, power cord and connecting wires at least 1 meter away from televisions or radios to prevent picture interference and noise.  
(Depending on the incoming signal strength, a distance of 1 meter may not be sufficient to eliminate noise.)
- Do not install the CONVENI-PACK in the following locations:
  1. Where there is a high concentration of mineral oil spray or vapor (e.g. a kitchen).  
Plastic parts will deteriorate, parts may fall off and water leakage could result.
  2. Where corrosive gas, such as sulphurous acid gas, is produced.  
Corroding of copper pipes or soldered parts may result in refrigerant leakage.
  3. Near machinery emitting electromagnetic radiation.  
Electromagnetic radiation may disturb the operation of the control system and result in a malfunction of the unit.
  4. Where flammable gas may leak, where there is carbon fiber or ignitable dust suspensions in the air, or where volatile flammables such as paint thinner or gasoline are handled.  
Operating the unit in such conditions may result in fire.
  5. Vehicles, ships, or other places that generate vibration or cause the CONVENI-PACK to move.  
The CONVENI-PACK may malfunction or cause oxygen deficiency accidents as a result of refrigerant leakage.
  6. Places with excessive voltage fluctuations.  
The CONVENI-PACK may malfunction.
  7. Places where fallen leaves accumulate or weeds grow thick.
  8. Places that become small animals' shelter.  
Small animals coming in contact with electrical parts can cause malfunctions, smoke, or ignition.
- The CONVENI-PACK is not intended for use in a potentially explosive atmosphere.



#### **DANGER: RISK OF BURNING**

- Do NOT touch the refrigerant piping, water piping or internal parts during and immediately after operation. It could be too hot or too cold. Give it time to return to normal temperature. If you must touch it, wear protective gloves.
- Do NOT touch any accidental leaking refrigerant.



#### **NOTICE**

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

In accordance with the applicable legislation, it might be necessary to provide a logbook with the product containing at least: information on maintenance, repair work, results of tests, stand-by periods,...

Also, at least, following information must be provided at an accessible place at the product:

- Instructions for shutting down the system in case of an emergency
- Name and address of fire department, police and hospital
- Name, address and day and night telephone numbers for obtaining service

In Europe, EN378 provides the necessary guidance for this logbook.

## **1-2 Special Notice of Product**

### **[CLASSIFICATION]**

- This CONVENI-PACK comes under the term "appliances not accessible to the general public".
- Follow the showcase to be connected for the climate class.  
(EN60335-2-89)

### **[EMC CHARACTERISTICS]**

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

### **[REFRIGERANT]**

**This System uses R410A refrigerant.**



#### **CAUTION**

This unit is already filled with a certain amount of R410A.  
Never open liquid and gas shutoff valve until the step Specified in "9. CHECKS AFTER WORK COMPLETION".

- The refrigerant R410A requires strict cautions for keeping the system clean, dry and tight.  
Read the chapter "REFRIGERANT PIPING" carefully and follow these procedures correctly.
  - A. Clean and dry  
Foreign materials (including mineral oils such as SUNISO oil or moisture) should be prevented from getting mixed into the system.
  - B. Tight  
Take care to keep the system tight when installing.  
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 slightly to the greenhouse effect if it is released.
- Since R410A is a mixed refrigerant, the required additional refrigerant must be charged in its liquid state. If the refrigerant is charged in a state of gas, its composition changes and the system will not work properly.
- Be sure to perform refrigerant replenishment. Refer to "10. CHECKS AFTER WORK COMPLETION" and the label of instructions on refrigerant replenishment on the cover surface of the control box,

### Important information regarding the refrigerant used

This product contains fluorinated greenhouse gases. Do not vent gases into the atmosphere.

Refrigerant type: R410A

Global warming potential (GWP) value: 2087.5

### To fix the fluorinated greenhouse gases label

1 Fill in the label as follows:

The diagram shows a label with the following fields:

- 1: Contains fluorinated greenhouse gases
- 2: RXXX
- 3: GWP: XXX
- 4: 1 = [ ] kg
- 5: 2 = [ ] kg
- 6: 1 + 2 = [ ] kg
- 7: GWP x kg / 1000
- 8: tCO<sub>2</sub>eq

- 1 From the multilingual fluorinated greenhouse gases label peel off the applicable language and stick it on top of 1.
- 2 Factory refrigerant charge: see unit name plate
- 3 Additional refrigerant amount charged
- 4 Total refrigerant charge
- 5 **Greenhouse gas emissions** of the total refrigerant charge expressed as tonnes CO<sub>2</sub>-equivalent
- 6 GWP = Global warming potential



### CAUTION

In Europe, the **greenhouse gas emissions** of the total refrigerant charge in the system (expressed as tonnes CO<sub>2</sub>-equivalent) is used to determine the maintenance intervals. Follow the applicable legislation.

**Formula to calculate the greenhouse gas emissions:** GWP value of the refrigerant x Total refrigerant charge [in kg] / 1000

2 The filled-in label must be adhered in the proximity of the product charging port (e.g. onto the inside of the service cover).



### WARNING

Always recover the refrigerant. Do NOT release them directly into the environment. Use a vacuum pump to evacuate the installation.

### [DESIGN PRESSURE]

Since design pressure is 4.0 MPa or 40 bar, the wall thickness of pipes should be more carefully selected in accordance with the relevant local and national regulations.

### 1-3 Disposal Requirements

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

## 2. BEFORE INSTALLATION



### CAUTION

- When installing the indoor unit, refer to the installation manual provided for the indoor unit.
- Optional accessories are required for the installation of the product. Refer to the information on optional accessory.

## 2-1 Standard Supplied Accessories

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

### Note

Do not throw away any of the accessories until installation is complete.

| Name     | Gas side accessory pipe (1) | Gas side accessory pipe (2) |
|----------|-----------------------------|-----------------------------|
| Quantity | 1 pc.                       | 1 pc.                       |
| Shape    |                             |                             |

| Name     | Liquid side accessory pipe (1) | Liquid side accessory pipe (2) |
|----------|--------------------------------|--------------------------------|
| Quantity | 1 pc.                          | 1 pc.                          |
| Shape    |                                |                                |

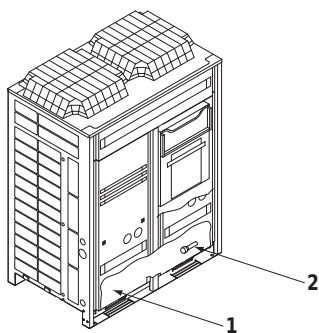
| Name     | Liquid side accessory pipe (3) | Liquid side accessory pipe (4) | Others   |
|----------|--------------------------------|--------------------------------|--|
| Quantity | 1 pc.                          | 1 pc.                          | 1 pc. about each item  |
| Shape    |                                |                                | <ul style="list-style-type: none"> <li>• Operation manual</li> <li>• Installation manual</li> <li>• Fluorinated greenhouse gas label</li> <li>• Multilingual fluorinated greenhouse gas label</li> </ul> |

## 2-2 Example of System Configuration

| Name  | Outdoor unit | Booster unit |
|-------|--------------|--------------|
| Shape |              |              |

| Name  | Indoor unit     |               |          |
|-------|-----------------|---------------|----------|
|       | Air-conditioner | Refrigeration |          |
|       |                 | Blower coil   | Showcase |
| Shape |                 |               |          |

| Name  | Indoor unit |          | Control panel (Defrost) | Warning panel | Remote controller (for air-conditioner) |
|-------|-------------|----------|-------------------------|---------------|---|
|       | Freezer     |          |                         |               |   |
|       | Blower coil | Showcase |                         |               |   |
| Shape |             |          |                         |               |   |



- 1 Manuals and labels
- 2 Accessory pipes (Installed on bottom frame)

### 2-3 Indoor Unit Constraints (Refrigeration and Freezer)

- The design pressure for the indoor unit is 2.5 MPa or more.
- Install an R410A expansion valve on each indoor unit.
- The following expansion valve types are allowed:
  - Mechanical thermostatic expansion valves: install an R410A solenoid valve on the primary side of the mechanical thermostatic expansion valve (maximum operating differential pressure of 3.5 MPa (35 bars) or over) for each individual unit.
  - Electronic expansion valve:
    - Proportional type: Only allowed if the controller can close the valve within 5 seconds from fully open to fully closed. Some proportional valves may bleed. In this case, install an R410A solenoid valve on the primary side of the expansion valve (Max. operating differential pressure of 3.5 MPa [35 bars] or over) for each indoor unit.
- Insulate the feeler block of the mechanical thermostatic expansion valve.
- Install a filter on the primary side of the solenoid valve described above for each indoor unit. Determine the filter mesh count based on the size specified by the solenoid valve and mechanical thermostatic expansion valve being used. In case a pulsating type expansion valve is used, no filter can be installed near the expansion valve.
- Route the path to the indoor unit heat exchanger so that the flow of refrigerant is from top to bottom.
- When installing a number of indoor units, be sure to install them at the same level.
- Use either off-cycle defrosting or electric heater defrosting as the defrosting type. Hot-gas defrosting models cannot be used.

### 2-4 Indoor Unit Constraints (Air Conditioning)

Indoor unit models to be connected are listed in the table below.

- Indoor unit for air conditioning that can be connected:

| Capacity class  |   |
|---|---|
| 50~80   | 100~250   |
| Individual control by remote controller is NOT allowed. | Individual control by remote controller is allowed. |

#### Restrictions

1. The minimum air conditioning total capacity...8 HP (Capacity class: 200)
2. The maximum air conditioning total capacity...12 HP (Capacity class: 300)
3. The maximum indoor unit connection number...6 or less

#### CAUTION

1. The indoor unit for air conditioning does not operate until its cooling capacity exceeds 4 HP. For this reason, do not connect remote controllers individually to the indoor unit for less than 4 HP when using heating/cooling operations. The indoor unit for air conditioning does not operate until the capacity of the indoor unit for air conditioning of CONVENI-PACK exceeds 3 HP on heating. For this reason, do not connect the remote controller individually to the indoor unit for less than 3 HP when operating the heating only machine.

2. Set up the indoor units for the air conditioning controlled by the same remote controller in the same space.

## 3. SELECTION OF LOCATION

Select a location for installation that meets the following conditions. Get the customer's permission.

1. There is no danger of fire due to leakage of inflammable gas.
2. Select the location of the unit in such a way that neither the discharged air nor the sound generated by the unit disturb anyone.
3. The foundation is strong enough to support the weight of the unit and the floor is flat to prevent vibration and noise generation.
4. The piping length between the outdoor unit and the indoor unit may not exceed the allowable piping length. (Refer to "6. REFRIGERANT PIPING")
5. Locations where the unit's suction vent and outlet vent do not generally face the wind. Wind blowing directly into the suction or outlet vents will interfere with the unit's operation. If necessary, install some kind of obstruction to block the wind.
6. The space around the unit is adequate for servicing and the minimum space for air inlet and air outlet is available. (See the "Installation Space Examples" for the minimum space requirements.)

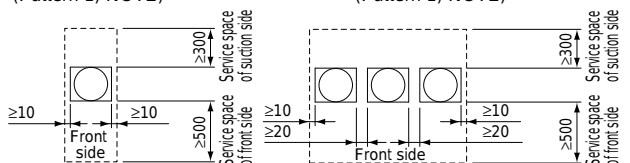
#### Installation Space Examples

- The installation space requirement shown in the following figure is a reference for cooling operation when the outdoor temperature is 32°C. If the design outdoor temperature exceeds 32°C or the heat load exceeds maximum capacity in all the outdoor unit, take an even large space on the intake shown in the following figure.
- During installation, install the units using the most appropriate of the patterns shown in the following figure for the location in question, taking into consideration human traffic and wind.
- If the number of units installed is more than that shown in the pattern in the following figure, install the units so there are no short circuits.
- As regards space in front of the unit, consider the space needed for the local refrigerant piping when installing the units.
- If the work conditions in the following figure do not apply, contact your dealer or Daikin directly.

< When installed as a single unit > < When installed in serial >

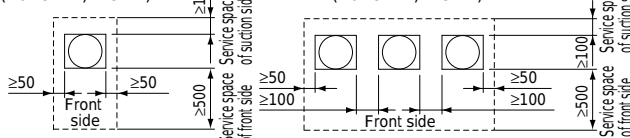
(Pattern 1) NOTE

(Pattern 1) NOTE



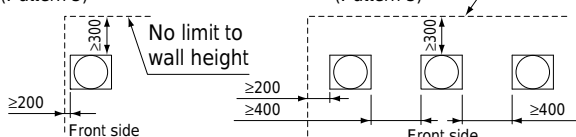
(Pattern 2) NOTE

(Pattern 2) NOTE



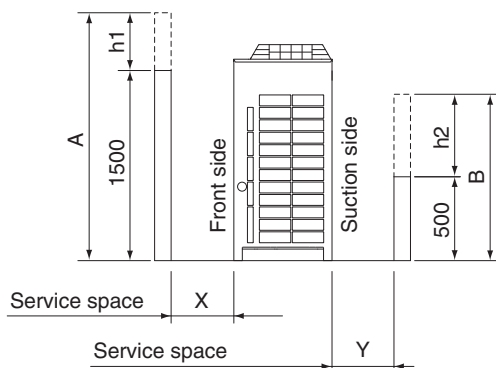
(Pattern 3)

(Pattern 3)



#### NOTE) For Patterns 1 and 2

- Wall height for front side no higher than 1500 mm.
- Wall height on the suction side no higher than 500 mm.
- Wall height for sides – no limit
- If the height is exceeded the above, calculate h1 and h2 shown in the figure below and add h1/2 to the service space of front side and h2/2 to the service space of suction side.



$$\begin{aligned} h1 &= A \text{ (Actual height)} - 1500 \\ h2 &= B \text{ (Actual height)} - 500 \end{aligned}$$

$$X = 500 + h1/2 \text{ or over}$$

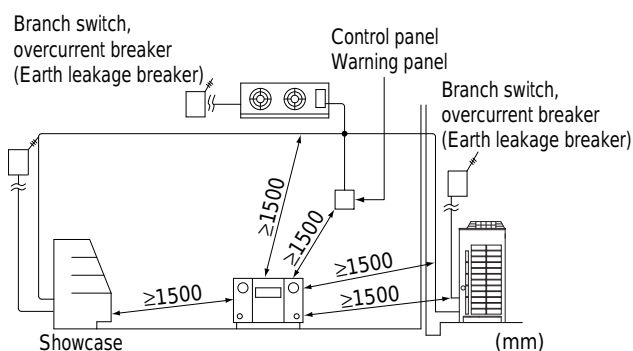
$$Y = 300 + h2/2 \text{ or over}$$

$$(Y = 100 + h2/2 \text{ or over})$$

[Values in parentheses are for pattern 2]



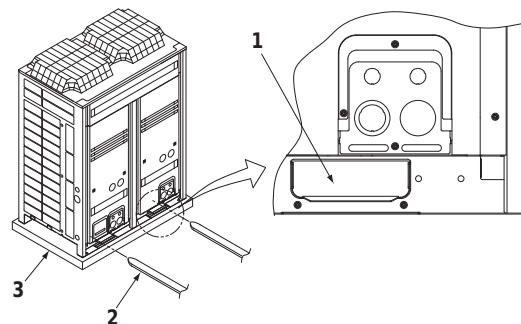
## CAUTION



1. An inverter CONVENI-PACK may cause electronic noise generated from AM broadcasting. Examine where to install the main CONVENI-PACK 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 3 meters for indoor remote controllers, place power wiring and transmission wiring in conduits, and ground the conduits.
2. When installing in a locations where there is heavy snowfall, implement the following snow measures.
  - Ensure the base is high enough that intakes are not clogged by snow.
  - Mount a snow protection hood (optional accessory)
  - Remove the rear intake grille to prevent snow from accumulating on the fins.
3. If condensate may drip on downstairs (or walkway) depending on the floor condition, take a measure such as the installation of central drain pan kit (sold separately). If the unit is installed in cold areas the drain pan should be heated by a heater (field supply) to prevent drain water from freezing.
4. The refrigerant R410A itself is nontoxic, nonflammable 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. See "Engineering Data" for details.

## 4. HANDLING THE UNIT

1. Decide on the transportation route.
2. If a forklift is to be used, preferably transport the unit with pallet first, then pass the forklift arms through the large rectangular opening at the bottom of the unit.



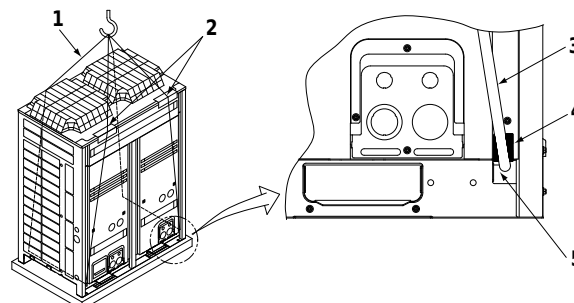
1 Opening (large)

2 Fork

3 Pallet

When lifting the unit, use a cloth sling to prevent damaging the unit. Keeping the following points in mind, hang the unit following the procedure shown in the following figure.

- Use a sling sufficiently strong to hold the mass of the unit.
- Use 2 belts of at least 8m long.
- Place extra cloth in the locations where the casing comes in contact with the sling to prevent damage.
- Hoist the unit making sure it is being lifted at its center of gravity.



1 Belt sling

2 Patch cloth

3 Belt sling

4 Patch cloth

5 Opening

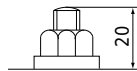
### Note

Use filler cloth on the forklift arms to prevent damaging the unit. If the paint on the bottom frame peels off, the anti-corrosion effect may decrease.

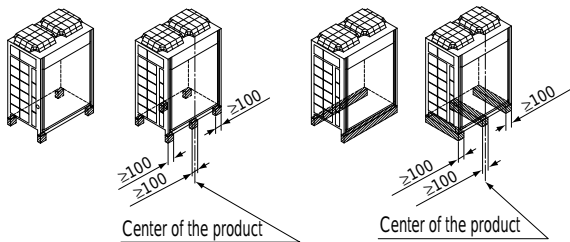


## 5. PLACING THE UNIT

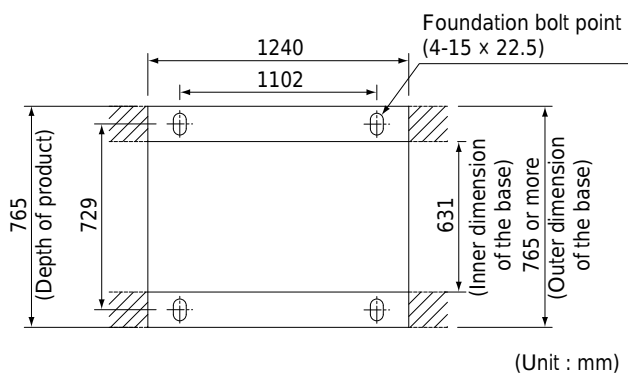
- Make sure the unit is installed level on a sufficiently strong base to prevent vibration and noise.
- The base should be bigger around than the width of the unit's legs (66 mm), and should support the unit.  
If protective rubber is to be attached, attach it to the whole face of the base.
- The height of the base should be at least 150 mm from the floor.
- Secure the unit to its base using foundation bolts. (Use four commercially available M12-type foundation bolts, nuts, and washers.)
- The foundation bolts should be inserted 20 mm.



- Corner-hole foundation  
 Independent foundation  
 Beam foundation (horizontal)  
 Beam foundation (vertical)



Base form



Base width and base bolt positions

### Note

- When installing on a roof, make sure the roof floor is strong enough and be sure to water-proof 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.
- When installed in a corrosive environment, use a nut with plastic washer to prevent the nut tightening from rust.



## 6. REFRIGERANT PIPING

### To Piping Work Contractors

- Never open the shutoff valve until the steps specified in "8. FIELD WIRING" and "9-3 Checking of Device and Installation Conditions" of piping.
- Do not use flux at the time of brazing and connecting refrigerant pipes. Use phosphorous copper brazing filler metal (BCuP-2: JIS Z 3264/B-Cu 93P-710/795: ISO 3677), which does not require flux. Chlorine-based flux causes piping corrosion. Furthermore, if fluoride is contained, the flux will have adverse influences on the refrigerant piping line, such as the deterioration of refrigerating machine oil.

### Note

Make sure the field piping and connections are not subjected to stress. When long straight piping lengths are installed, take the necessary countermeasures to prevent deformation due to thermal stresses.



### CAUTION

- All field piping must be installed by a licensed refrigeration technician and must comply with relevant local and national regulations.

### [Precautions for reuse of existing refrigerant piping / heat exchangers]

Keep the following points in mind for the reuse of existing refrigerant piping / heat exchangers.

#### A malfunction may result if there is deficiency.

- Do not use the existing piping in the following cases. Perform new piping instead.
  - The piping is different in size.
  - The strength of the piping is insufficient.
  - The compressor of the CONVENI-PACK previously used caused a malfunction.  
An adverse influence of residual substances, such as the oxidation of refrigerant oil and the generation of scale, is considered.
  - If the indoor unit or outdoor unit is disconnected from the piping for a long time.  
The intrusion of water and dust into the piping is considered.
  - The copper pipe is corroded.
  - The refrigerant of the CONVENI-PACK previously used was other than R410A (e.g., R404A / R507 or R407C).  
The contamination of the refrigerant with heterogeneity is considered.
- If there are welded connections midway on the local piping, make gas leakage checks on the welded connections.
- Be sure to insulate the connection piping.  
The liquid and gas pipe temperatures are as follows:  
Liquid pipe arrival minimum temperature  
20°C (Air-conditioning side)  
5°C (Refrigeration side)  
Gas pipe arrival minimum temperature:  
0°C (Air-conditioning side)  
-20°C (Refrigeration side)  
In the case of thickness insufficiency, add additional insulation material or renew the existing insulation material.
- Renew the insulation material if the insulation material is degraded.

### Keep the following points in mind for the reuse of existing heat exchangers

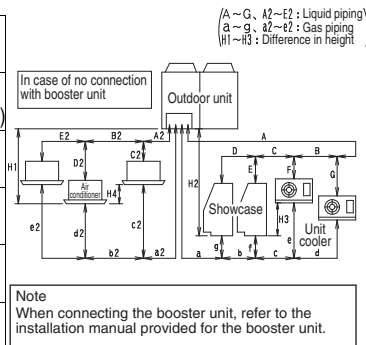
- Units with insufficient design pressure (since this product is an R410A unit) require a lower-stage design pressure of 2.5 MPa [25 bars].
- Units for which the path to the heat exchanger has been routed so that the flow of refrigerant is from bottom to top.
- Units with copper tubing or fan corrosion.
- Units that may be contaminated with foreign matter such as rubbish or other dirt.

## 6-1 Selection of Piping Material and Size

- Make sure that the inner side and outer side of the piping used is clean and free of contaminants, such as sulphur, oxide, dust, chips, oil and fat, and water. It is desirable that the maximum oil adhesion in the piping is 30 mg per 10 m.
  - Use the following type of refrigerant piping.  
Material: Seamless phosphorus deoxidized copper tube (C1220T-O for a maximum outer diameter of 15.9 mm and C1220T-1/2H for a minimum outer diameter of 19.1 mm)
- Refrigerant piping size and wall thickness: Decide the size and thickness from the following table.
- (This product uses R410A. The withstand pressure of O type may be insufficient if it is used for piping with a minimum diameter of 19.1 mm. Therefore, be sure to use 1/2 H type with a minimum thickness of 1.0 mm. If O type is used for piping with a minimum diameter of 19.1 mm, a minimum thickness of 1.2 mm will be required. In that case, be sure to perform the blazing of each joint.)**
- Be sure to perform piping work within the range specified in the following table.

### Refrigerant piping length

|  |  |
|--|--|
| Max. permissible one-way piping length (equivalent length) | $a + b + c + d1 \leq 130 \text{ m}$ (d1 is d or e whichever is longer)<br>$a2 + b2 + e1 \leq 130 \text{ m}$ (e1 is d2 or e2 whichever is longer)                                 |
| Max. branch piping length (actual length)                  | Refrigeration side: $b + c + d1 \leq 50 \text{ m}$ (d1 is d or e whichever is longer)<br>Air conditioning side: $b2 + e1 \leq 30 \text{ m}$ (e1 is d2 or e2 whichever is longer) |
| Max. difference in height between indoor and outdoor units | unit below outdoor unit<br>H1, H2 $\leq 35 \text{ m}$ (Note)   |
|  | unit above outdoor unit<br>H1, H2 $\leq 10 \text{ m}$  |
| Difference in height between unit cooler and showcase      | H3 $\leq 5 \text{ m}$  |
| Difference in height between air-conditioner indoor units  | H4 $\leq 0.5 \text{ m}$  |



Note: A trap is required at 5 m intervals from outdoor unit.

### Refrigerant piping size (Refrigeration)

| Outdoor unit side                                   | Piping size (mm)   |  |   |   |
|---|--|--|---|---|
|   | Liquid pipe  |  | Gas pipe  |   |
| Piping between outdoor unit and first branch (A, a) | 50 m or less   | 50~130 m                               | 50 m or less  | 50~130 m  |
|   | $\varnothing 9.5 \times 0.8$ (O type)  | $\varnothing 12.7 \times 0.8$ (O type) | $\varnothing 28.6 \times 1.2$ (1/2H type or H type) | $\varnothing 28.6 \times 1.2$ (1/2H type or H type) |
| Piping between branching areas (B, b, C, c)         | Select the piping from the following table in accordance with the total capacity of indoor units connected downstream  |  |   |   |
|   | Total capacity of indoor units after branching   |  | Gas pipe size                                       | Liquid pipe size                                    |
|   | $x < 1.0 \text{ kW}$   |  | $\varnothing 9.5 \times 0.8$ (O type)               | $\varnothing 6.4 \times 0.8$ (O type)               |
|   | $1.0 \text{ kW} \leq x < 6.0 \text{ kW}$   |  | $\varnothing 12.7 \times 0.8$ (O type)              |   |
|   | $6.0 \text{ kW} \leq x < 9.9 \text{ kW}$   |  | $\varnothing 15.9 \times 1.0$ (1/2H type or H type) | $\varnothing 9.5 \times 0.8$ (O type)               |
|   | $9.9 \text{ kW} \leq x < 14.5 \text{ kW}$  |  | $\varnothing 19.1 \times 1.0$ (1/2H type or H type) |   |
|   | $x \geq 14.5 \text{ kW}$   |  | $\varnothing 22.2 \times 1.0$ (1/2H type or H type) | $\varnothing 12.7 \times 0.8$ (O type)              |
|   | No size after branching can exceed the size of any upstream piping.  |  |   |   |
| Piping between branching areas and each unit        | If the size of the connection pipe of the indoor unit exceeds that of the branch pipe shown in the table above, enlarge the size of the connection pipe near the indoor unit before connecting it. |  |   |   |

### (Air-Condition)

|   |  |                                   |                                   |                                   |
|---|--|-----------------------------------|-----------------------------------|-----------------------------------|
| Outdoor unit side                                     | Piping size (mm)   |                                   |                                   |                                   |
|   | Liquid pipe  |                                   | Gas pipe                          |                                   |
| Piping between outdoor unit and first branch (A2, a2) | 50 m or less   | 50~130 m                          | 50 m or less                      | 50~130 m                          |
|   | Ø9.5 × 0.8 (O type)  | Ø12.7 × 0.8 (O type)              | Ø28.6 × 1.2 (1/2H type or H type) | Ø28.6 × 1.2 (1/2H type or H type) |
| Piping between branching areas (B2, b2)               | Select the piping from the following table in accordance with the total capacity of indoor units connected downstream  |                                   |                                   |                                   |
|   | Total capacity of indoor units after branching   | Gas pipe size                     |                                   | Liquid pipe size                  |
|   | x<150  | Ø15.9 × 1.0 (1/2H type or H type) |                                   | Ø9.5 × 0.8 (O type)               |
|   | 150≤x<200  | Ø19.1 × 1.0 (1/2H type or H type) |                                   |                                   |
|   | 200≤x≤300  | Ø22.2 × 1.0 (1/2H type or H type) |                                   |                                   |
|   | No size after branching can exceed the size of any upstream piping.  |                                   |                                   |                                   |
| Piping between branching areas and each unit          | If the size of the connection pipe of the indoor unit exceeds that of the branch pipe shown in the table above, enlarge the size of the connection pipe near the indoor unit before connecting it. |                                   |                                   |                                   |

Note: \*In case the required pipe sizes (inch sizes) are NOT available, it is also allowed to use other diameters (mm sizes), taken the following into account:  
 ■ Select the pipe size nearest to the required size. See the table on the right.  
 ■ Use the suitable adapters for the change-over from inch to mm pipes (field supply).  
 ■ The additional refrigerant calculation has to be adjusted as mentioned in "Method of calculating "additional refrigerant charging quantity"

| Inch   | 6.4 mm | 9.5 mm | 12.7 mm | 15.9 mm | 18.1 mm | 22.2 mm | 28.6 mm |
|--------|--------|--------|---------|---------|---------|---------|---------|
| Metric | 6 mm   | 10 mm  | 12 mm   | 16 mm   | 18 mm   | 22 mm   | 28 mm   |

## 6-2 Selection of Refrigerant Branching

When selecting refrigerant branching, follow the rules outlined below.

|                       | Allowed  | Not allowed |
|-----------------------|--|-------------|
| Refrigerant side      | Refnet joints and headers <sup>(a)</sup><br>T-joints | —           |
| Air conditioning side | Refnet joints and headers <sup>(a)</sup>             | T-joints    |

(a) For allowed Daikin refrigerant branch kits, see table below.

### Allowed refrigerant branch kits

|                              |   |   |
|------------------------------|---|---|
| Refnet joint                 | KHRQ22M20T<br>KHRQ22M29T9<br>KHRQM64T<br>KHRQ22M75T | A |
| Refnet header <sup>(a)</sup> | KHRQ22M29H<br>KHRQ22M64H<br>KHRQ22M75H              | B |

(a) Maximum 8 branches can be connected to a header.

A: Choose the refnet joint so that incoming and outgoing piping diameters (refer to 6-1 Selection of Piping Material and Size) matches with one of the available diameters of the refnet joint.

B: Do not connect 2 or more headers in series. For the gas side choose the refnet header so that the diameter of the header is equal to the main piping diameter or equal to one size-up of the main piping diameter.

## 6-3 Protection Against Contamination when Installing Pipes

Protect the piping to prevent moisture, dirt, dust, etc. from entering the piping.

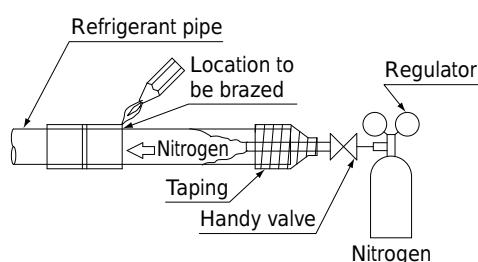
| Place   | Installation period      | Protection method      |
|---------|--------------------------|------------------------|
| Outdoor | More than a month        | Pinch the pipe         |
|         | Less than a month        | Pinch or tape the pipe |
| Indoor  | Regardless of the period |                        |

### Note

Exercise special caution to prevent dirt or dust when passing piping through holes in walls and when passing pipe edges to the exterior.

## 6-4 Pipe Connection

- Be sure to perform nitrogen permutation or nitrogen blow when brazing.



Brazing without performing nitrogen permutation or nitrogen blow into the piping will create large quantities of oxidized film on the inside of the pipes, adversely affecting valves and compressors in the refrigerating system and preventing normal operation.

- The pressure regulator for the nitrogen released when doing the brazing should be set to 0.02 MPa (about 0.2kg/cm<sup>2</sup>: Enough to feel a slight breeze on your cheek).

### Note

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

## 6-5 Drier Installation

### CAUTION

This product requires that a drier be installed on liquid piping on site. (Operating the unit without a drier installed may result in equipment failure.)

Select a drier from the following chart:

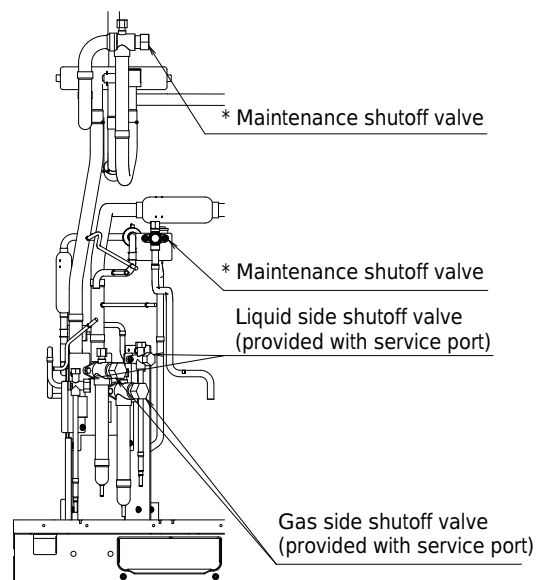
| Model       | Required dryer core (recommended type)                                    |
|-------------|---|
| LRYEQ16A7Y1 | 160g (100% molecular sieve equivalent)<br>(DML164/DML164S : Danfoss made) |

- Connect the drier to liquid pipe on the refrigeration side.
- Install the drier in a horizontal orientation wherever possible.
- Install the drier as close to the outdoor unit as possible.
- Remove the drier cap immediately before brazing (to prevent absorption of airborne moisture).
- Follow instructions in the drier instruction manual concerning drier brazing.
- Repair any burning of drier paint that occurs during drier brazing. Contact the manufacturer for more information about paint for repair use.
- Flow direction is specified for some type of the dryer. Set the flow direction according to the operation manual of the dryer. (Liquid refrigerant flows from the outdoor unit to the indoor unit.)

## 6-6 Connecting the Refrigerant Piping

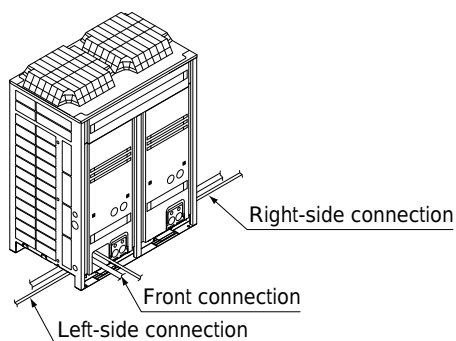
### CAUTION

- In addition to gas and liquid shutoff valves, this unit has a maintenance shutoff valve (see diagram below).
- Do not operate the maintenance shutoff valve\*. (The factory setting for the maintenance shutoff valve is "open." During operation, always leave this valve in the open position. Operating the unit with the valve in the closed position may cause the compressor to fail.)



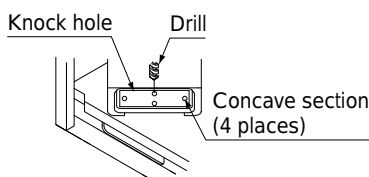
## 1. Directions to bring out the pipes

The local interunit piping can be connected either forward or to the sides (taken out through the bottom) as shown in the following figure. When passing out through the bottom, use the knock hole in the bottom frame.



### Precautions when knocking out knock holes

- Open knock hole in the base frame by drilling the 4 concave around it with a 6 mm bit.



- Be sure to avoid damaging the casing
- After knocking out the holes, we recommend you remove any burrs and paint them using the 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.

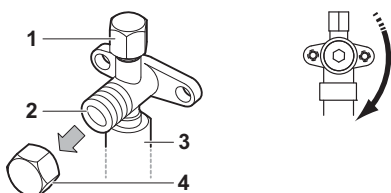
## 2. Removing Pinch Piping

### WARNING

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

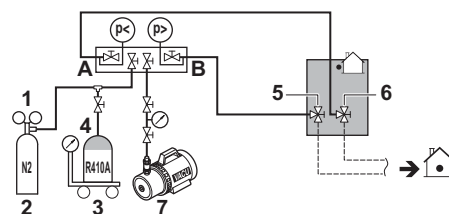
Use the following procedure to remove the pinched piping:

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



- Service port and service port cover
- Stop valve
- Field piping connection
- Stop valve cover

- Connect the vacuuming/recovery unit through a manifold to the service port of all stop valves.

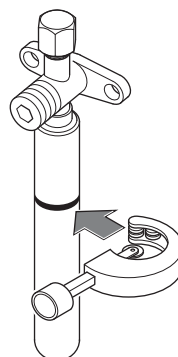


- Pressure reducing valve
  - Nitrogen
  - Weighing scales
  - Refrigerant R410A tank (siphon system)
  - Liquid line stop valve (X2, refrigerant and air conditioning side)
  - Gas line stop valve (X2, refrigerant and air conditioning side)
  - Vacuum pump
  - Valve A
  - Valve B
- Recover gas and oil from the pinched piping by using a recovery unit.

### CAUTION

Do not vent gases into the atmosphere.

- When all gas and oil is recovered from the pinched piping disconnect the charge hose and close the service ports.
- Cut off the lower part of the gas and liquid stop valve pipes along the black line. Use an appropriate tool (e.g. a pipe cutter, a pair of nippers)



### WARNING



Never remove the pinched piping by brazing.

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

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

### Operation Method of Shutoff Valves

Follow the instructions below when operating each shutoff valve.



## CAUTION

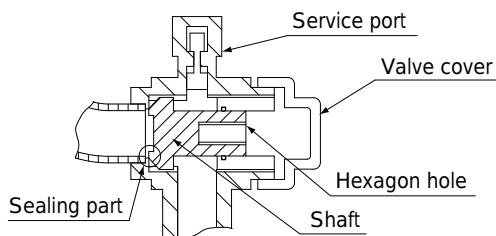
- Do not open the shutoff valve until the steps specified in **"9-3 Checking of Device and Installation Conditions"** is completed.
- Do not leave the shutoff valve opened without turning the power on, otherwise refrigerant may be condensed in the compressor and the insulation of the main power supply circuit may be degraded.
- Be sure to use an exclusive tool to handle the shutoff valve. The shutoff valve is not of back sheet type. Excessive force imposed may break the valve.
- Use a charge hose when using the service port.
- Make sure that there is no refrigerant gas leakage after the valve cover and cap are securely tightened.
- When the valve caps have to be removed, be sure to use 2 spanners.

### ⟨Tightening torque⟩

Check with the following table the sizes of shutoff valves incorporated by each model and the tightening torque values of the respective shutoff valves.

Shutoff valve sizes

|                           |       |
|---------------------------|-------|
| Liquid side shutoff valve | φ9.5  |
| Gas side shutoff valve    | φ25.4 |



| Shutoff valve sizes | Tightening torque N·m (closes clockwise) |                      |             |              |
|---------------------|--|----------------------|-------------|--------------|
|                     | Shaft (valve body)                       |                      | Valve cover | Service port |
| Ø9.5                | 5.4~6.5                                  | Hexagon wrench: 4 mm | 13.5~16.5   | 11.5~13.9    |
| Ø25.4               | 27.0~33.0                                | Hexagon wrench: 8 mm | 22.5~27.5   |              |

### ⟨Opening method⟩

- Remove the valve cover and turn the shaft anticlockwise with a hexagon wrench.
- Turn the shaft until the shaft stops.  
To fully open the Ø25.4 mm stop valve, turn the shaft until a torque between 27 and 33 N·m is achieved. Inadequate torque may cause leakage of refrigerant and breakage of the stop valve cap.
- Tighten the valve cover securely. Refer to the above table for the tightening torque according to the size.



## NOTICE

Pay attention that the mentioned torque range is applicable for Ø25.4 mm stop valve only.

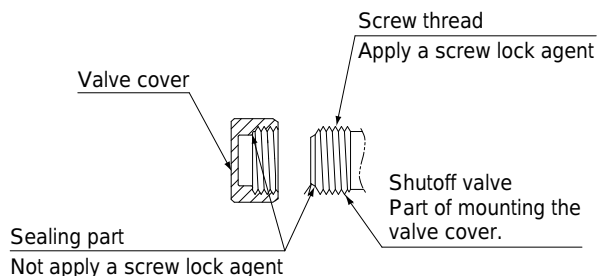
### ⟨Closing method⟩

- Remove the valve cover and turn the shaft clockwise with a hexagon wrench.
- Tighten the shaft until the shaft comes in contact with the sealing part of the valve.
- Tighten the valve cover securely. Refer to the above table for the tightening torque according to the size.

### ⟨Handling Precautions for Valve Cover⟩

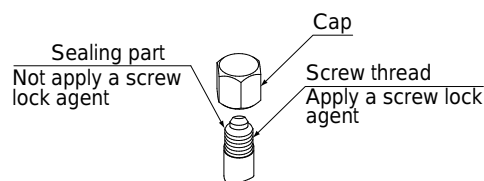
- Be careful not to damage the sealing part.
- At the time of mounting the valve cover, apply a screw lock agent to the screw thread.
- Do not apply a screw lock agent (for flare nut use) to the sealing part.

- Be sure to tighten the valve cover securely after operating the valve. Refer to **"Operation Method of Shutoff Valves"** for the tightening torque of the valve.



### ⟨Handling Precautions for Service Port⟩

- Work on the service port with a charge hose provided with a pushing rod.
- At the time of mounting the cap, apply a screw lock agent to the screw thread.
- Do not apply a screw lock agent (for flare nut use) to the sealing part.
- Be sure to tighten the cap securely after the work. Refer to **"Operation Method of Shutoff Valves"** for the tightening torque of the cap.



## CAUTION

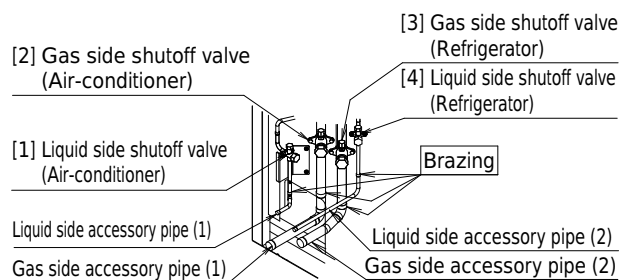
**Apply a screw lock agent to the valve cover mount and the screw thread of the service port.**

Otherwise, dew condensation water will intrude inside and freeze. Therefore, refrigerant gas leakage or a compressor malfunction may result from the cap deformation or damage.

## 3. Connecting refrigerant piping to outdoor units

### If connected to the front

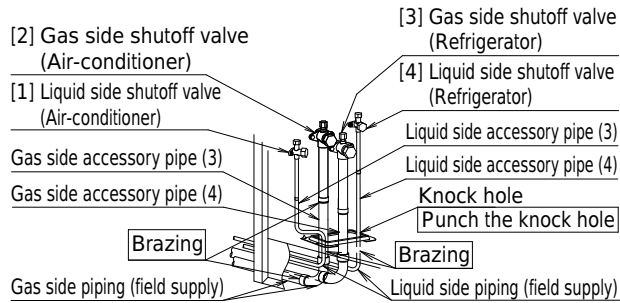
Remove the shutoff valve cover to connect.





### When connected at lateral side (bottom)

Remove the knock hole on the bottom frame and route the piping under the bottom frame.



### CAUTION

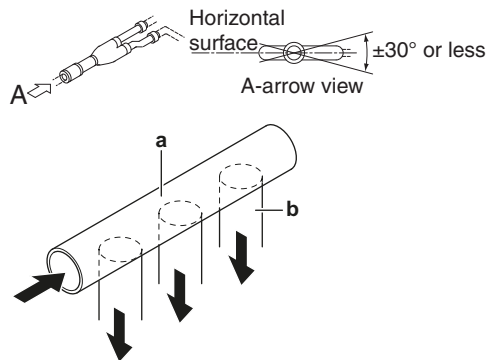
- Check that the on-site piping does not come in contact with other piping, the bottom frame, or side plate of the product.

### Precautions for Piping

Perform piping branching with the following conditions kept in mind.

#### Liquid piping

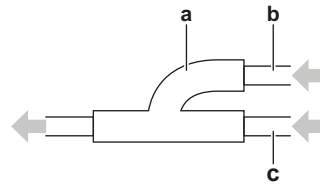
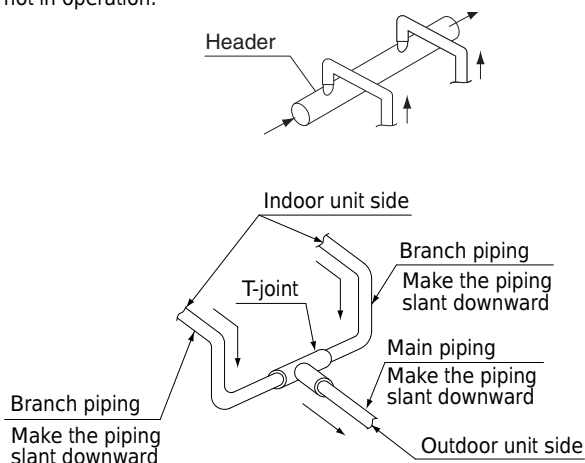
- At the time of branching the liquid piping, in case of joint, branch it horizontally. This will prevent an uneven flow of refrigerant.
- At the time of branching the liquid piping, in case of header, branch it downwards.



- a Header
- b Branch piping downwards

#### Gas piping

- At the time of branching gas piping, branch it so that the branched piping will be located above the main piping (see the illustration below). This will prevent the stay of refrigerant oil in the indoor unit not in operation.



- a Joint
- b Branch pipe
- c Main pipe

- Make sure that the horizontal portion of the gas piping and the refnet header slant downward to the outdoor unit (see the illustration above).
- If the outdoor unit is located above, make a trap on the gas pipe at 5 m intervals from outdoor unit. This will ensure the smooth returning of oil in the piping slanting upward.

### Liquid and Gas Piping

Be sure to insulate the refrigerant branching (refnet joints and header, T-joints) with thickness equal to insulation thickness of connecting piping.

## 7. Expansion Valve Selection

This model has a larger degree of subcooling (subcooling ratio = condensing temperature - liquid refrigerant temperature at outdoor unit outlet) for the liquid refrigerant of a refrigerator than that of refrigerators without a subcooling mechanism as it cools the liquid refrigerant with a plate type heat exchanger.

When selecting an expansion valve for the load, select one based on the subcooling ratio for the liquid refrigerant in the following table.

- Calculated example: The subcooling ratio with evaporative temperature at -10°C and condensing temperature at 45°C is equal to 19K (liquid refrigerant temperature at 26°C).

| Subcooling ratio (K) (subcooling ratio = condensing temperature - liquid refrigerant temperature) |                         |       |       |       |       |       |       |       |       |      |      |     |      |
|---|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-----|------|
| Condensing temperature  | Evaporative temperature | -45°C | -40°C | -35°C | -30°C | -25°C | -20°C | -15°C | -10°C | -5°C | -0°C | 5°C | 10°C |
| 20°C  |                         | 31K   | 28K   | 26K   | 23K   | 20K   | 18K   | 15K   | 13K   | 11K  | 9K   | 6K  | 4K   |
| 25°C  |                         | 31K   | 29K   | 26K   | 24K   | 21K   | 19K   | 16K   | 14K   | 12K  | 10K  | 8K  | 6K   |
| 30°C  |                         | 32K   | 29K   | 27    | 24K   | 22K   | 19K   | 17K   | 15K   | 13K  | 11K  | 9K  | 7K   |
| 35°C  |                         | 32K   | 30K   | 27K   | 25K   | 23K   | 20K   | 18K   | 16K   | 14K  | 12K  | 10K | 9K   |
| 40°C  |                         | 32K   | 30K   | 28K   | 26K   | 23K   | 21K   | 19K   | 17K   | 16K  | 14K  | 13K | 10K  |
| 45°C  |                         | 33K   | 31K   | 29K   | 26K   | 24K   | 22K   | 21K   | 19K   | 17K  | 15K  | 14K | 12K  |
| 50°C  |                         | 34K   | 31K   | 29K   | 27K   | 25K   | 24K   | 22K   | 20K   | 18K  | 17K  | 15K | 14K  |
| 55°C  |                         | 34K   | 32K   | 30K   | 28K   | 27K   | 25K   | 23K   | 22K   | 20K  | 18K  | 17K | 16K  |

The liquid temperature in the booster unit is further decreased.

The liquid temperature of the refrigeration showcase inlet is approximately +10 degrees of the target evaporating temperature of the outdoor unit.

## 8. FIELD WIRING

### To Electric Engineering Contractors

- Be sure to install an earth leakage breaker. The product incorporates inverter equipment. In order to prevent the malfunctioning of the earth leakage breaker, make sure that the earth leakage breaker withstands harmonic interference.
- Do not operate the CONVENI-PACK until refrigerant piping work is completed, or otherwise the compressor will malfunction.
- Do not remove any electrical components such as thermistors or sensors when connecting power supply wires or transmission wires. The compressor may malfunction if the CONVENI-PACK is operated with such electrical components removed.



#### CAUTION

- 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 earth 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 hull 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:** dangerous when struck by lightning due to abnormal rise in electrical potential in the grounding.

- Be sure to install an earth leakage circuit breaker.  
This unit uses an inverter, so install the earth leakage circuit breaker that be capable of handling high harmonics in order to prevent malfunctioning of the earth leakage circuit breaker itself.
- Earth leakage circuit breaker which are especially for protecting ground-faults should be used in conjunction with main switch or fuse for use with wiring.

- Electrical wiring must be done in accordance with the wiring diagrams and the description herein.
- Do not operate until refrigerant piping work is completed.  
(If operated before complete the piping work, the compressor may be broken down.)
- Never remove thermistor, sensor or etc. when connecting power wiring and transmission wiring.  
(If operated with thermistor, sensor or etc. removed, the compressor may be broken down.)
- This product have reversed phase protection detector that only works when the power is turned on. If there exists black out or the power goes on and off which the product is operating, attach a reversed phase protection circuit. Running the product in reversed phase may break the compressor and other parts.
- Attach the power wire securely. Introducing power with a missing N-phase or with a mistaken N-phase will break the unit.
- Never connect the power supply in reversed phase.  
The unit can not operate normally in reversed phase.  
If you connect in reversed phase, replace two of the three phases.
- Make sure the electrical unbalance 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 earth terminal).
- Install a switch that allows you to switch all poles from the main power supply.

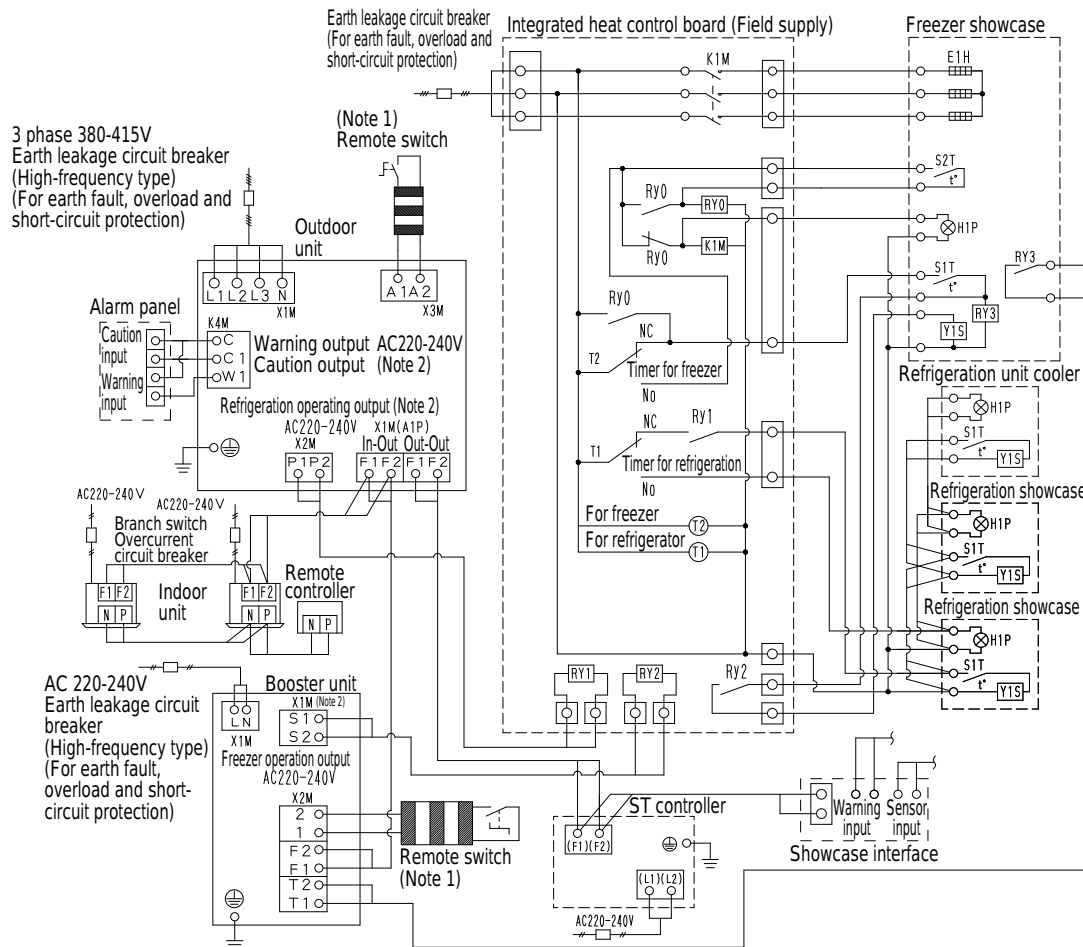
## 8-1 Example of Wiring Entire System

Note:1. For Remote switch, use non-voltage contact for microcurrent (not more than 1mA, 12VDC)

Note:2. Total capacity for warning, alarm : 0.5A or less at AC 220 to 240V.

Capacity for operation output : 0.5A or less at AC 220 to 240V.

|                               |   |  |
|-------------------------------|---|--|
| T1 ...Timer for refrigeration | E1H ...Electromagnetic contactor (Defrost heater) | S1T ...Thermostat for inner temperature adjustment |
| T2 ...Timer for freezer       | H1P ...Defrost lamp                               | S2T ...Defrost completion thermostat               |
| RY0~RY3 ...Relay              |   | Y1S ...Solenoid valve                              |



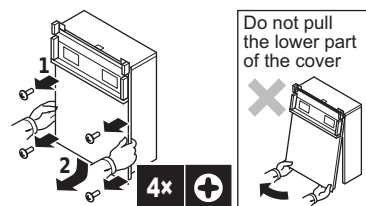
### Note

- Use conduit for power supply wiring.
- Make sure the weak electric wiring (i.e. for the remote controller, between units, etc.) and the power wiring do not pass near each other, keeping them at least 50 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 **"8-3 Procedure for Incoming Wiring"**.
- Do not connect the power supply to the terminal block for the transmission wiring for warning, alarm, operation output, and remote operation switch. Otherwise the entire system will be damaged.
- Transmission wiring should be secured as described in **"8-4 Procedure for Power Supply Wiring"**.
- 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 lid deforming. And close the cover firmly.

## 8-2 To Open the Electrical Component Box of the Outdoor Unit

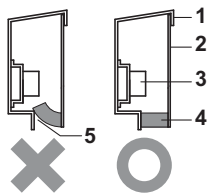
### Note

Do not apply excessive force when opening the electronic component box cover. Excessive force can deform the cover, resulting in entering of water to cause equipment failure.



### Note

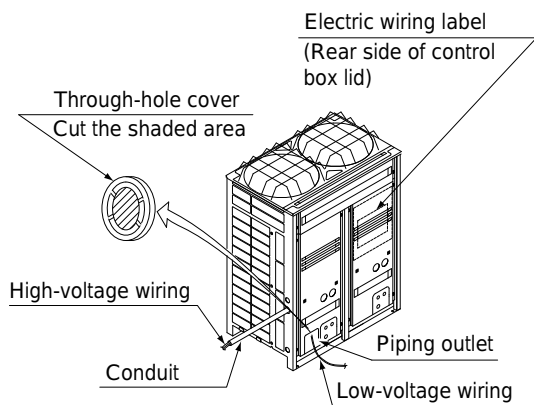
When closing the unit the electrical component box cover, make sure that the sealing material on the lower back side of the cover is not caught and bend towards the inside.



- 1 Electrical component box cover
- 2 Front side
- 3 Power supply terminal block
- 4 Sealing material
- 5 Moisture and dirt could enter
- X Not allowed
- O Allowed

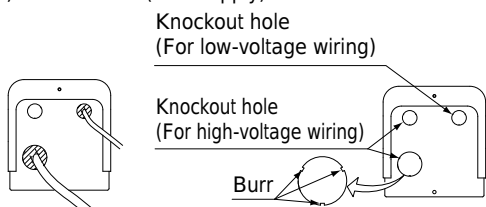
### 8-3 Procedure for Incoming Wiring

- Route high-voltage wiring (power supply wiring, earth wires, and warning/alarm/operation wiring) through wiring openings located on the side or front of the unit (knock holes) or on the bottom frame (knock holes).
- Route low-voltage wiring (for remote operating switches) through wiring openings (knock holes) located on the front of the unit or through wiring intakes.



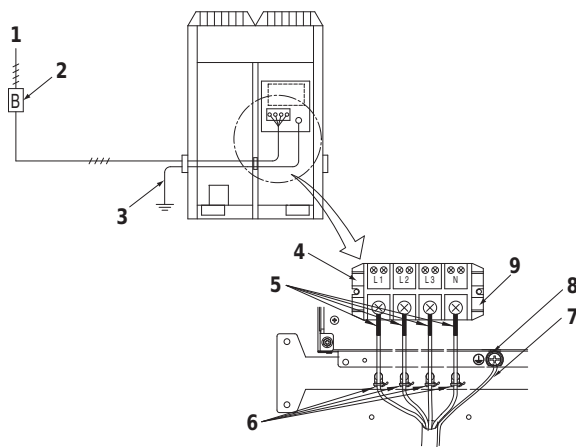
### Note

- Open the knock holes with a hammer or the like.
- After knocking out the holes, we recommend you remove any burrs and paint them using the 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.
- If small animals might enter the unit, block off any gaps (hatching parts) with material (field supply).

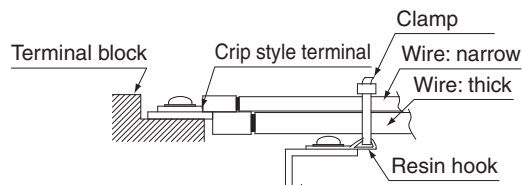


### 8-4 Procedure for Power Supply Wiring

#### (Procedure for Power Supply Wiring)



- 1 Power supply (3 phase 380~415)
- 2 Overcurrent circuit breaker (earth leakage circuit breaker), all pole disconnection switch
- 3 Earth wire
- 4 Power supply terminal block
- 5 Mount insulation sleeves
- 6 Fix the power supply wiring for phases L1, L2, L3, and N, respectively, to the resin clamp.
- 7 Earth wire
- Perform wiring so that the earth wire will not come in contact with lead wires of the compressor. Otherwise, noise generated may have a bad influence on other equipment.
- 8 Ground terminal
- 9
  - When two 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 two wires simultaneously to the resin hook using a clamp.



#### Power circuit, safety device, and cable requirements (X1M~X4M terminal block)

- 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 and an earth leakage circuit breaker.
- When using residual current operated circuit breakers, be sure to use a high-speed type (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.
- Specifications for local wiring are in compliance with IEC60245.
- Use wire type H05VV when protected pipes are used.
- Use wire type H07RN-F when protected pipes are not used.

|             | Phase and frequency | Voltage  | Minimum circuit amp. | Recommended fuses |
|-------------|---------------------|----------|----------------------|-------------------|
| LRYEQ16A7Y1 | φ3, 50Hz            | 380-415V | 35.2A                | 40A               |

## Point for attention regarding quality of the public electric power supply

This equipment complies with respectively:

- EN/IEC61000-3-11<sup>(1)</sup> provided that the system impedance  $Z_{sys}$  is less than or equal to  $Z_{max}$  and
- EN/IEC61000-3-12<sup>(2)</sup> provided that the short-circuit power  $S_{sc}$  is greater than or equal to the minimum  $S_{sc}$  value

at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with respectively:

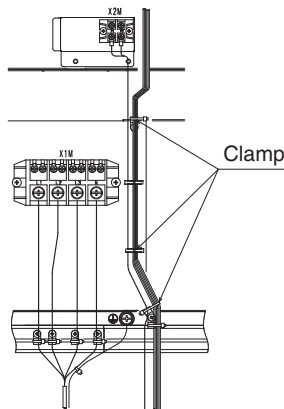
- $Z_{sys}$  less than or equal to  $Z_{max}$  and
- $S_{sc}$  greater than or equal to the minimum  $S_{sc}$  value.

|             | $Z_{max}$ ( $\Omega$ ) | minimum $S_{sc}$ value |
|-------------|------------------------|------------------------|
| LRYEQ16A7Y1 | 0.24                   | 1020KVA                |

- (1) European/International Technical Standard setting the limits for voltage changes.  
Voltage fluctuations and flicker in public low-voltage supply systems for equipment with rated current  $\leq 75A$
- (2) European/International Technical Standard setting the limits for harmonic currents produced by equipment connected to public low-voltage systems with input current  $> 16A$  and  $\leq 75A$  per phase.

## Operation output wiring connections

- Connect operation output wiring to the X2M terminal block and clamp as indicated by the following diagram:



X2M wire specifications

|                         |                           |
|-------------------------|---------------------------|
| Electric wire thickness | 0.75~1.25 mm <sup>2</sup> |
| Max. wiring length      | 130 m                     |

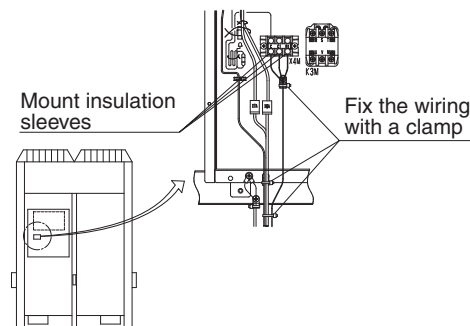


## CAUTION

- Refer to the "8-1 Example of Wiring Entire System" by all means when connecting the operation output wiring.  
A compressor failure may result if the operating output wiring is not connected.

## Warning, alarm wiring connections

- Connect warning, alarm wiring to the X4M terminal block and clamp as indicated by the following diagram:



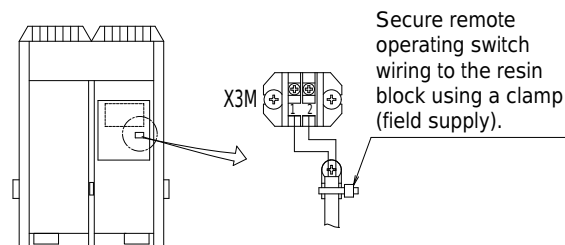
X4M wire specifications

|                         |                           |
|-------------------------|---------------------------|
| Electric wire thickness | 0.75~1.25 mm <sup>2</sup> |
| Max. wiring length      | 130 m                     |

Note: Be sure to insulate the mating equipment.

## Remote operating switch wiring connections

- When installing a remote operating switch, clamp as indicated by the following diagram:



X3M wire specifications

|                         |                           |
|-------------------------|---------------------------|
| Electric wire thickness | 0.75~1.25 mm <sup>2</sup> |
| Max. wiring length      | 130 m                     |

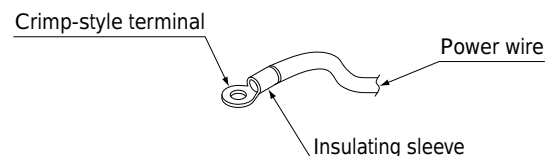


## CAUTION

- For Remote switch, use non-voltage contact for microcurrent (not more than 1mA, 12VDC)
- If the remote operating switch will be used to start and stop the unit, set the operating switch to "REMOTE".

## <Precautions for Terminal Connections>

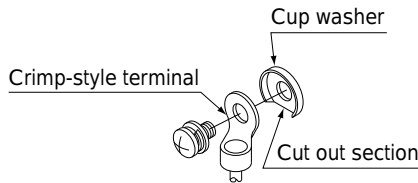
- Be sure to use ring-type crimp-style terminals provided with insulation sleeves.
- Use specified electric wires for the wiring and secure the wiring so that external force will not be imposed on the terminal block.



- Use an appropriate screwdriver to tighten the terminal screws. Small-sized screwdriver will damage the screw heads and cannot tighten the screws properly.
- Do not tighten the terminal screws in excess, otherwise the screws may be damaged.
- Refer to the following table for the tightening torque values of the terminal screws.
- Take out the earth wire from the notch of the cup washer and lay the wire carefully so that other wires will not be caught by the washer. Otherwise, the earth wire may not contact sufficiently and the earthing effect of the wire may be lost.



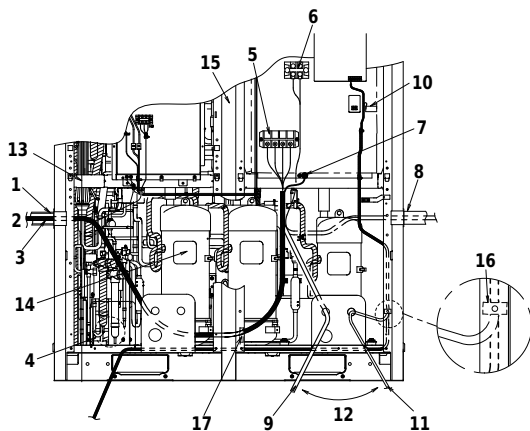
- Do not finish strand wire with solder.



| Screw size                       | Tightening torque (N·m) |
|----------------------------------|-------------------------|
| M8 (Power supply terminal block) | 5.5 - 7.3               |
| M8 (Earth)                       |                         |
| M4 (X2M)                         | 2.39 - 2.91             |
| M3.5 (X3M)                       | 0.79 - 0.97             |

## 8-5 Procedure for Wiring Inside Units

- Referring to the following figure, secure and wire the power and transmission wiring using clamps.
- Lay the ground wire so that it will not come in contact with the lead wires of the compressor. Other equipment will be adversely affected if the ground wire comes in contact with the lead wires of the compressor.
- Make sure all wiring do not contact to the pipes (hatching parts in the figure).
- The transmission wiring must be at least 50 mm away from the power wiring.
- After wiring work is completed, check to make sure there are no loose connections among the electrical parts in the control box.



- Conduit
- Perform wiring carefully so that the wiring will not come in contact with the port
- When routing high-voltage wiring (power supply wiring, earth wires, and warning/alarm/operation output wiring) from the left side
- Connecting local piping
- Power supply terminal block (X1M)
- X2M terminal block for operation output
- Earth terminal block
- When routing high-voltage wiring (power supply wiring, earth wires, and warning/alarm/operation output wiring) from the right side
- When routing high-voltage wiring (power supply wiring, earth wires, and warning/alarm/operation output wiring) from the front
- Remote operating switch terminal block (X3M)
- When routing remote operating switch wiring through a wiring opening
- Separate by at least 50 mm
- Stay
- Perform wiring carefully so that the sound insulation of the compressor will not come off
- Support
- Fixed to the rear side of the support with a clamp (field supply)
- Fixed to the rear side of the support with a clamp (field supply)

## CAUTION

On completion of electrical work, check that there are no disconnected connectors or terminals of any electrical parts in the control box.

## 9. INSPECTION AND PIPE INSULATION



**For piping work contractor, electrical work contractor, and trial run workers**

- Never open the shutoff valve until the insulation measurement of the main power supply circuit is finished. The measured insulation value will become lower if the measurement is made with the shutoff valve opened.
- On completion of inspection and refrigerant charging, open the shutoff valve. The compressor will malfunction if the CONVENI-PACK is operated with the shutoff valve closed.

### 9-1 Air Tight Test/Vacuum Drying



**Refrigerant is enclosed in the unit.**

**Be sure to keep both liquid and gas shutoff valves closed at the time of an airtight test or vacuum drying of the local piping.**

**[For piping work contractor]**

On completion of piping work, make the following inspection precisely.

- To ensure that the CONVENI-PACK withstand pressure properly and prevent the penetration of foreign substances, be sure to use R410A-dedicated tools.

|                               |   |
|-------------------------------|---|
| Gauge manifold<br>Charge hose | • To ensure that the CONVENI-PACK withstand pressure properly and prevent the penetration of foreign substances (water, dirt, and dust), use an R410A-dedicated gauge manifold and charge hose. R410A-dedicated tools and R407C-dedicated tools are different in screw specification. |
| Vacuum pump                   | • Pay the utmost attention so that the pump oil will not flow backward into the system while the pump is not in operation.<br>• Use a vacuum pump that can vacuum down to -100.7kPa (5 Torr or -755mmHg).   |
| Gas for airtight<br>test use  | • Nitrogen gas  |

#### Air tight

Pressurize the high-pressure section of the system (liquid piping) to 4.0 MPa (40 bar) and the low-pressure section of the system (gas piping) to the design pressure (\*1) of the indoor unit (field supply) from the service port (\*2) (do not exceed the design pressure). The system is considered to have passed if there is no decrease in the pressure over a period of 24 hours.

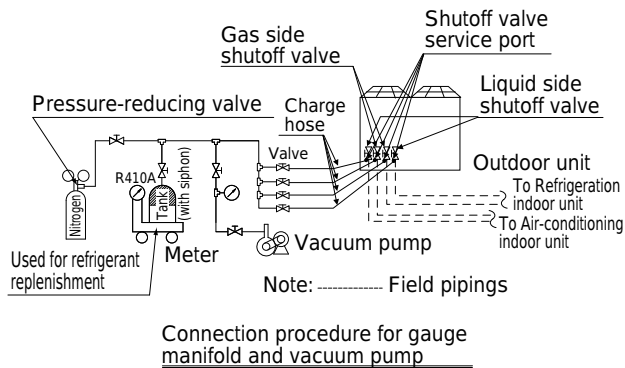
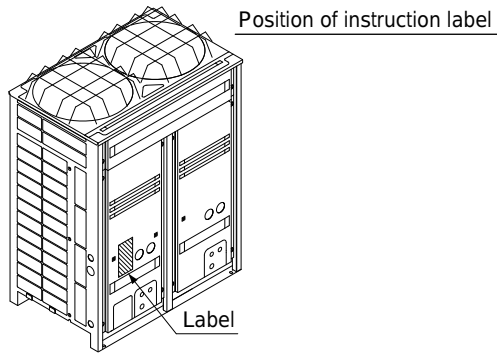
If there is a decrease in the pressure, check for and repair leaks.

#### Vacuum drying

Connect a vacuum pump to the service ports (\*) of both the liquid and gas pipes for at least 2 hours and vacuum the unit down to -100.7 kPa or below. Then leave the unit for at least 1 hour at a pressure of -100.7 kPa or below and check that the vacuum gage reading will not rise. If the pressure rises, there is residual water in the system or the system has leakage.

- \*1 Contact the manufacturer in advance for more information about the design pressure of the indoor unit (field supply).

- \*2 Refer to the instruction label on the front panel of the outdoor unit (below) for the position of the service port.



#### CAUTION

- Conduct an airtight test and vacuum drying precisely through the service ports of both liquid and gas shutoff valves.
- Use charge hoses (provided with a pushing rod each) when using the service ports.

#### In case of possible water intrusion into piping

Perform the above mentioned vacuum drying for 2 hours first in the following cases:

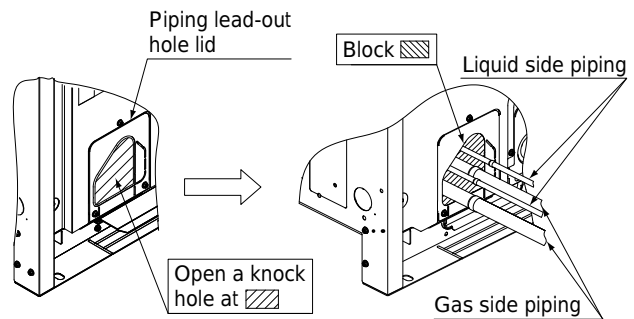
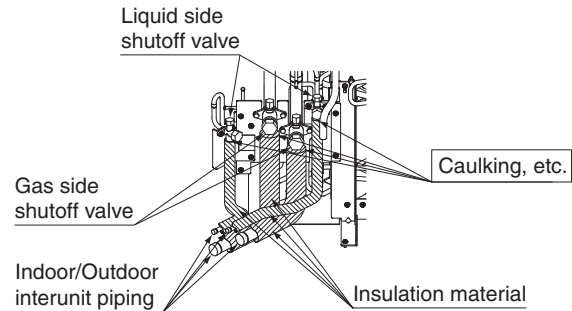
The product is installed in the rainy season, there is a fear of dew condensation resulting in the piping because the installation work period is long, or there is a fear of rainwater intrusion into the piping for other reasons.

Then **impose a pressure of up to 0.05 MPa** with nitrogen gas (for vacuum destruction) and **vacuum the unit down to -100.7 kPa or below for 1 hour with a vacuum pump** (for vacuum drying). Repeat vacuum destruction and vacuum drying if the pressure does not reach -100.7 kPa or below after a minimum of 2 hours' vacuuming. Leave the vacuum state for 1 hour then, and check that the vacuum gauge reading will not rise.

#### 9-2 Thermal Insulation Work

- Be sure to perform thermal insulation of the piping after the airtight test and vacuum drying.
- Be sure to perform the thermal insulation of the liquid and gas pipes in the connecting piping. Otherwise, water leakage may result.
- Be sure to insulate liquid and gas connection piping. Failure to do so may result in water leakage. Consult the following chart as a general guide when selecting the insulation thickness.
- Liquid pipe arrival minimum temperature
  - 20°C (Air-conditioning side)
  - 5°C (Refrigeration side)
- Gas pipe arrival minimum temperature
  - 0°C (Air-conditioning side)
  - 20°C (Refrigeration side)
- Reinforce the insulation material for the refrigerant piping according to the environment of thermal installation. Otherwise, the surface of the insulation material may result in dew condensation.

- If the dew condensation water on the shutoff valves is likely to flow to the indoor unit side through the clearance between the insulation material and piping because the outdoor unit is installed above the indoor unit or for some other reasons, perform appropriate treatment such as the caulking of the joints (see the illustrations below).
- Attach the cover of the piping outlet with a knock hole opened. If there is a feature of small animals intruding through the piping outlet, cover the piping outlet with a blocking material (field supply) on completion of the steps of "**11. REFRIGERANT REPLENISHMENT**" (see the illustrations below). Use the piping outlet for jobs required during the steps of "**11. REFRIGERANT REPLENISHMENT**" (e.g., a job of taking in the charge hose).



#### Note

- 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.

#### 9-3 Checking of Device and Installation Conditions

Be sure to check the followings.

##### <For those doing electrical work>

See "**8-3 Procedure for Incoming Wiring**".

- Make sure there is no faulty power wiring or loosening of a nut. See "**8-4 Procedure for Power Supply Wiring**".
- 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>

- Make sure piping size is correct. See "**6-1 Selection of Piping Material and Size**".
- Make sure insulation work is done. See "**9-2 Thermal Insulation Work**".
- Make sure there is no faulty refrigerant piping. See "**6. REFRIGERANT PIPING**".

## 10. CHECKS AFTER WORK COMPLETION

- Make sure the following works are complete in accordance with the installation manual.
  - Piping work
  - Wiring work
  - Air tight test/Vacuum drying
  - Installation work for indoor unit
  - Installation work for booster unit  
(In case of the booster unit connection)

## 11. REFRIGERANT REPLENISHMENT



**For refrigerant filling contractor**

Use R410A for refrigerant replenishment.

The R410A refrigerant cylinder is painted with a pink belt.

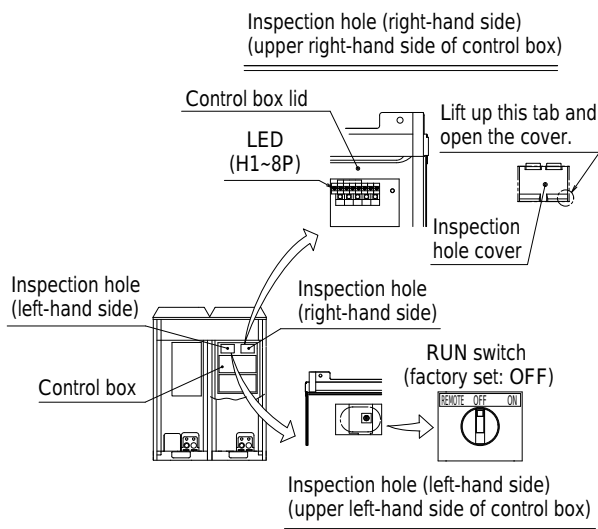


**Warning**



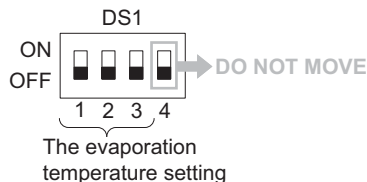
**Electric Shock Warning**

- Securely close the control box lid before turning power on.
- Before turning power on, check through the inspection hole (on the left-hand side) of the control box lid that the RUN switch is set to OFF.  
If the RUN switch is set to ON, the fan may rotate.
- Use an insulated rod to operate the push buttons via the EL. COMPO. BOX's inspection door.  
There is a risk of electric shock if you touch any live parts, since this operation must be performed with the power on.
- Check the LED indicators on the PCB (A1P) of the outdoor unit through the inspection hole (on the right-hand side) of the control box lid after the outdoor unit is turned on (see the illustration).  
(The compressor will not operate for approximately 10 minutes after the outdoor unit and air-conditioning indoor unit are turned on. H2P will be turned off when in a condition to be able to operate a system. (H3P continues blink state))



### [Setting the target evaporating temperature]

Setting by dip switches



Refer to the following table for the evaporation temperature.

- The evaporation temperature is set up by dip switches (DS1).

| The evaporation temperature setting |                           | <div> <div>ON</div> <div>OFF</div> <div> <div>■ the position of switches</div> </div> </div> |       |
|-------------------------------------|---------------------------|--|-------|
| DS1                                 | 10°C<br>(Factory Setting) | DS1  | 0°C   |
|                                     | 20°C                      |  | +5°C  |
|                                     | 15°C                      |  | +10°C |
|                                     | 5°C                       | 1 2 3 4  |       |
| 1 2 3 4                             |                           |  |       |



**WARNING**

Make sure there is no oxygen in the system. Refrigerant may only be charged after performing the leak test and the vacuum drying.



**WARNING**

- Use protective gear (e.g., protective gloves and glasses) at the time of refrigerant filling.
- Pay attention to the rotation of the fan whenever the front panel is opened while working.  
The fan can rotate continuously for a while after the outdoor unit stops operating.

### [Refrigerant Replenishment Work]



**CAUTION**

- Refer to the **Operation Method of Shutoff Valves** for the control method of the shutoff valves.
- Never replenish liquid refrigerant directly from a gas line.**  
**Liquid compression may cause the compressor to fail.**



**WARNING**

- Do not close the liquid stop valve fully, when the refrigerant is charged into the outdoor unit.
- Please do not completely close the liquid stop valve while the outdoor unit is stopping. The field liquid piping might burst because of liquid seal.

- The unit is factory charged. The refrigerant must be noted for this product. Calculate the amount of refrigerant replenishment according to the procedures on "Method of calculating "additional refrigerant charging quantity"" on page 20.
- In case re-charge is required, refer to the nameplate of the unit. It states the type of refrigerant and necessary amount.
- Take the following procedure for refrigerant replenishment.  
Refer to "**9-1 Air Tight Test/Vacuum Drying**" for the connection of the refrigerant cylinder.
  - Turn on the indoor unit and control panel.  
Do not turn on the outdoor unit.
  - Replenish refrigerant from the service port of the shutoff valve on the liquid side.
  - If the calculated amount of refrigerant cannot be filled, take the following steps to operate the system and continue refrigerant replenishment.
    - Open the gas shutoff valve all the way and adjust the opening of the liquid stop valve.
    - [Warning/Electric Shock Warning]**  
Turn ON the power to the outdoor unit.
    - [Warning/Electric Shock Warning]**  
Turn the operation switch of the outdoor unit on and replenish refrigerant while the outdoor unit is in operation.
    - Turn off the operation switch of the outdoor unit after the specified amount of refrigerant is replenished.
    - [Caution]**  
Fully open the shutoff valves on the gas and liquid sides promptly. Otherwise, a piping explosion may result from liquid sealing.

\*1 The cylinder's internal pressure will drop when there is little refrigerant remaining in the cylinder, making it impossible to charge the unit, even if the liquid shutoff valve opening is adjusted. In this situation, replace the cylinder with one that has more refrigerant remaining.

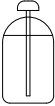

Additionally, if the piping length is long, replenishing while the liquid shutoff valve is fully closed may lead to activation of the protection system, causing the unit to stop operation.

1. After the work is completed, apply a screw lock agent (for flare nuts) to the screws of the shutoff valves and service ports. Refer to the "Handling Precautions for Valve Cover" and "Handling Precautions for Service Port" in "6-6 Connecting the Refrigerant Piping" for the handling of the valve covers and service ports.
2. After the refrigerant replenishment is completed, fill out the item "total amount of refrigerant replenishment". Refer to page 18 of this manual.

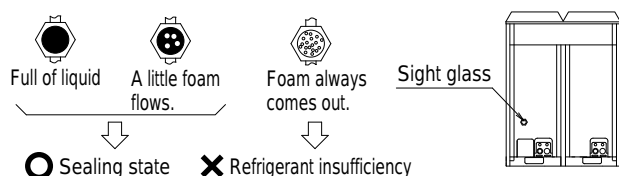
#### [Precautions for refrigerant cylinder]

At the time of refrigerant filling, check whether the siphon tube is provided. Then locate the cylinder so that the refrigerant will be filled in the state of liquid (see table below).

R410A is a mixed refrigerant, the composition of which may change and the normal operation of the system may not be possible if the refrigerant is filled in the state of gas.

| Cylinder provided with siphon tube.  |   |
|--|---|
|   | Stand the cylinder upright and fill the refrigerant. (There is a siphon tube inside, which makes it possible to replenish the refrigerant in the state of liquid without setting the cylinder upside down.) |
| Other cylinders  |   |
|  | Stand the cylinder upside down and fill the refrigerant. (Pay attention so that the cylinder will not topple down.)   |

#### [Check through sight glass]



#### CAUTION

- **Fully open the shutoff valves on the liquid and gas sides after the refrigerant replenishment is finished.**

The compressor will malfunction if the system is operated with the shutoff valves closed.

- **Apply a screw lock agent to the screws of the valve cover mounting parts and service ports.**

(Otherwise, dew condensation water will intrude and freeze inside and cause cap deformation or damage, which may result in refrigerant gas leakage or compressor malfunctions.)



#### CAUTION

When the refrigerant charging procedure is done or when pausing, close the valve of the refrigerant tank immediately, remaining pressure might charge additional refrigerant. **Possible consequence:** Incorrect refrigerant amount.

## 12. TEST RUN



#### For test run operators

Do not operate the outdoor unit alone on a trial basis.

When you connect a booster unit, refer to the installation manual attached to the booster unit before a test run.

#### Test run procedure

Use the following procedure to perform a test run after installation work is complete for the entire system:

1. Fully open the shutoff valves on the gas and liquid side of the outdoor unit.
2. Check that the electric accessory box lids of the outdoor unit, the indoor unit (air-conditioner, refrigeration showcase, refrigeration unit cooler) and the piping cover of the outdoor unit are closed. Then turn on the outdoor and indoor units (air conditioner, refrigeration showcase, refrigeration unit cooler).
3. Turn on the operation switch from the inspection door of the outdoor unit. (The outdoor fan rotates in about 10 minutes after the operation switch is turned on and the compressor starts.)
4. Push the ON/OFF button on the remote controller of the outdoor unit (air-conditioner) to operate the unit.
5. Check the sealing condition through the sight glass of the outdoor unit. In case of shortage of refrigerant, check if the refrigerant is charged to the specified level.
6. Check the following on each unit.

|                           |   |
|---------------------------|---|
| Refrigeration showcase    | Cold air should be blowing and the temperature should decrease to the preset level.       |
|                           | The electronic expansion valve should be controlled on an appropriate superheated degree. |
|                           | The unit should start defrosting operation by the time set on the timer.                  |
| Refrigeration unit cooler | Cold air should be blowing and the temperature should decrease to the preset level.       |
|                           | The electronic expansion valve should be controlled on an appropriate superheated degree. |
|                           | The unit should start defrosting operation by the time set on the timer.                  |
| Air-conditioner           | Cold air (or hot air) should be blowing.  |

7. Be sure to turn off the operation switch before turning off the power.

#### Error diagnosis

- Check the following if nothing is displayed on the remote controller during the test run.

##### <Indoor unit (air-conditioner)>

1. Is the power turned on?
2. Is the wire broken or incorrectly wired (between the power, the indoor unit and the remote controller)?
3. Has the fuse on PCB melted?

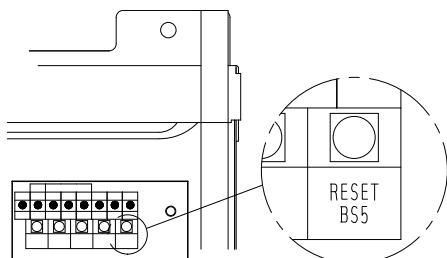
- Take the following action if you find a malfunction code on the remote controller during the test run.

| Malfunction code | Defect at installation                           | Action to be taken   |
|------------------|--|--|
| E3, E4           | Shutoff valves closed                            | Fully open the shutoff valves.   |
| L4               | The air passage is blocked.                      | Remove obstacles blocking the air passage.   |
| U1               | Reverse-phase of the power supply                | Exchange two wires out of three power supply wires.  |
| U2               | Voltage drop                                     | Check the voltage drop.  |
| U4, UF           | Wrong wiring of transmission lines between units | Check the connection of transmission lines between the outdoor unit and the air conditioner. |
| UA               | In the case of system discrepancy                | Check if the air conditioner is connected as should be assembled.                            |
| E2               | Electric leak                                    | See *1.  |

\*1

Set the operating switch to the "OFF" position to reset the power supply and then return the switch to the "ON" position to restart the unit. If the problem persists, refer to the Service Manual.

- If you have changed the power wire and the transmission line, keep the power of the indoor unit (air conditioner, refrigeration showcase, refrigeration unit cooler) and the integrated heat control board turned on, turn off the operation switch of the outdoor units and never fail to press the push button switch (BS5) on PCB (A1P) in the electric accessory box (right) of the outdoor unit for at least 10 seconds (Open the inspection door (right) on the upper right portion of the electric accessory box and operate the push button switch (BS5) using an insulating rod). (See the right figure.)



Inspection door (right)  
(Upper right portion of the electric accessory box)

- Refer to the Service Manual for other malfunction codes.



#### CAUTION

- Do not disconnect the power supply for 1 minute after setting the operating switch to "ON". Electric leak detection is performed for several seconds after the operating switch is set to "ON" and each compressor starts operating, so disconnecting the power supply during that time will result in a false detection.



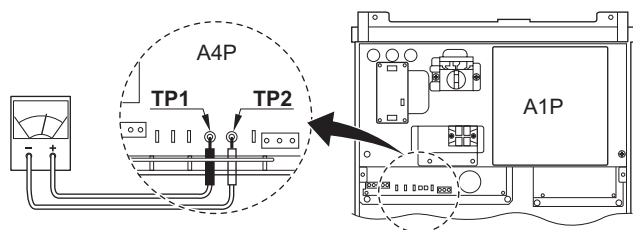
#### For dealers

- After the test run is finished, check that the piping cover and front panel are mounted.
- At the time of delivery to the customer, use the Operation Manual and fully explain the handling of the equipment.
- For precautions at the time of delivery, refer to the provided Installation Manual for each unit as well.

## 13. MAINTENANCE AND SERVICE

When performing service to inverter equipment:

- Do NOT open the electrical component box cover for 10 minutes after the power supply is turned OFF.
- Measure the voltage between terminals on the terminal block for power supply with a tester and confirm that the power supply is shut OFF. In addition, measure points as shown in the picture below, with a tester and confirm that the voltage of the capacitor in the main circuit is less than 50 V DC.



- To prevent damaging the PCB, touch a non-coated metal part to eliminate static electricity before pulling out or plugging in connectors.
- Pull out junction connectors 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.)

|                     |                    |
|---------------------|--------------------|
| Junction connectors | X1A, X2A, X3A, X4A |
|---------------------|--------------------|

- After the service is finished, plug the junction connector back in. Otherwise the malfunction code E7 will be displayed and normal operation will not be performed.

For details refer to the wiring diagram labeled on the back of the service 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.

#### [Checklist for yearly maintenance of the outdoor unit]

Check the following at least once a year:

- Outdoor unit heat exchanger.  
The heat exchanger of the outdoor unit can get blocked up due to dust, dirt, leaves, etc. It is recommended to clean the heat exchanger yearly. A blocked heat exchanger can lead to too low pressure or too high pressure leading to worse performance.
- Pressure containing parts  
In case of corrosion contact your dealer.

#### Method of calculating "additional refrigerant charging quantity"

- This product must fill the refrigerant in the field.

Calculate the amount of refrigerant replenishment according to the following points and note the amount of the refrigerant in a list shown below.

- The amount of the refrigerant for the liquid piping is calculated from the liquid piping size and the piping length of the system. (Calculate the refrigerant additional charging quantity by rounding off to the number in 0.1 kg.)
- Total each piping size amount of the refrigerant.---(1)
- The amount of the refrigerant for the indoor unit of the refrigeration is calculated from the capacity of the connected showcase as below table 1).
  - Total all the refrigeration showcase capacities.
  - Total all the freezer showcase capacities.
  - Total all the blower coil capacities.
  - Calculate the amount of the refrigeration by the total capacities and the table 1) below of each indoor unit.
- The amount of the refrigerant for the each indoor unit of the Air-conditioner calculated from the capacity of the connected indoor unit as below table 2).
- Total each indoor unit amount of the refrigerant.---(2)
- Total the amount of the refrigerant of table below(1), (2), and (3). ---(4)
- Check sealing conditions through the sight glass at the time of test run.  
If the sight glass has not been sealed yet (due to the shortage of refrigerant), charge additional refrigerant by 0.5 kg.

#### Note

The upper limit quantity of refrigerant adjustment at the time of the test run assumes 0.1 times of the quantity of refrigerant which calculated from the capacity of connected indoor units.  
(5)≤(2)×0.1

- Fill the amount of the refrigerant replenishment on this label.---(5)



9. Calculate the amount of all refrigerant filling in this system.---(7)

| Inch piping  |                    | Metric piping    |                    |                     |  |
|--|--------------------|------------------|--------------------|---------------------|--|
| Liquid pipe size   | Refrigerant amount | Liquid pipe size | Refrigerant amount | Pipe length (m)     | Total amount of refrigerant (kg)               |
| Ø6.4   | 0.02               | Ø6.0             | 0.018              |                     | (a)  |
| Ø9.5   | 0.06               | Ø10.0            | 0.066              |                     | (b)  |
| Ø12.7  | 0.12               | Ø12.0            | 0.097              |                     | (c)  |
| Ø15.9  | 0.19               | Ø16.0            | 0.19               |                     | (d)  |
| (1) Subtotal [(a)+(b)+(c)+(d)]                                     |                    |                  |                    |                     |  |
| Indoor unit  |                    |                  |                    | Total capacity (kW) | Amount of refrigerant (Refer to table 1 and 2) |
| Refrigeration showcase   |                    |                  |                    |                     | (A)  |
| Frozen showcase  |                    |                  |                    |                     | (B)  |
| Blower coil  |                    |                  |                    |                     | (C)  |
| Air-conditioning unit  |                    |                  |                    |                     | (D)  |
| (2) Subtotal [(A)+(B)+(C)+(D)]                                     |                    |                  |                    |                     |  |
| (3) Constant amount of additional filling                          |                    |                  |                    |                     | 3.5  |
| (4) Total of the amount of refrigerant replenishment [(1)+(2)+(3)] |                    |                  |                    |                     |  |
| (5) Amount of refrigerant replenishment at the time of test run.   |                    |                  |                    |                     |  |
| (6) Amount of initial filling                                      |                    |                  |                    |                     | 11.5   |
| (7) Total additional charging amount [(4)+(5)+(6)]                 |                    |                  |                    |                     |  |

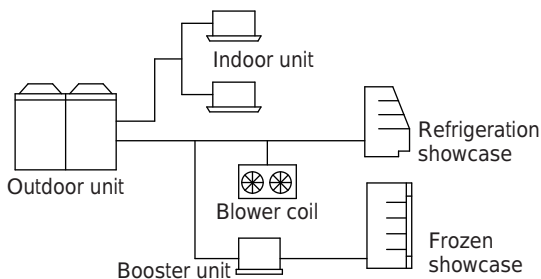


Table 1) Capacity and amount of refrigerant of the indoor unit (Showcase and Blower coil)

| Total capacity of showcase or blower coil (*Note.) | Amount of refrigerant (kg) |        |             |
|--|----------------------------|--------|-------------|
|  | Refrigeration              | Frozen | Blower coil |
| Less than 5kW                                      | 1.1                        | 1.4    | 0.6         |
| From 5kW to less than 10kW                         | 2.3                        | 3.2    | 1.2         |
| From 10kW to less than 15kW                        | 3.4                        | 5.2    | 1.7         |
| From 15kW to less than 20kW                        | 4.6                        | —      | 2.3         |
| 20kW or more                                       | 5.9                        | —      | 3.0         |

#### Note

- Case of showcase, the condition of capacity (evaporating temperature)  
Refrigeration :-10°C  
Frozen :-35°C
- Case of blower coil, the condition of capacity is 10°C (Td).

Table 2) The amount of refrigerant of the indoor unit for air-conditioning

| VRV indoor | 50     | 63     | 71     | 80     |
|------------|--------|--------|--------|--------|
| FXFQ-A     | 0.7 kg | 0.7 kg | —      | 0.9 kg |
| FXUQ-A     | —      | —      | 0.8 kg | —      |
| FXHQ-A     | —      | 0.9 kg | —      | —      |
| FXKQ-MA    | —      | 0.7 kg | —      | —      |
| FXCQ-A     | 0.5 kg | 0.7 kg | —      | 0.8 kg |
| FXSQ-A     | 0.3 kg | 0.6 kg | —      | 0.5 kg |
| FXMQ-P     | 0.5 kg | 0.7 kg | —      | 0.7 kg |
| FXMQ-MB    | —      | —      | —      | —      |
| FXLQ-P     | 0.8 kg | 0.8 kg | —      | —      |
| FXNQ-A     | 0.8 kg | 0.8 kg | —      | —      |

| VRV indoor | 100    | 125    | 200    | 250    |
|------------|--------|--------|--------|--------|
| FXFQ-A     | 0.9 kg | 1 kg   | —      | —      |
| FXFQ-A     | 0.9 kg | 1 kg   | —      | —      |
| FXUQ-A     | 0.8 kg | —      | —      | —      |
| FXHQ-A     | 1.1 kg | —      | —      | —      |
| FXKQ-MA    | —      | —      | —      | —      |
| FXCQ-A     | —      | 1.1 kg | —      | —      |
| FXSQ-A     | 1 kg   | 1 kg   | —      | —      |
| FXMQ-P     | 1.2 kg | 1.2 kg | —      | —      |
| FXMQ-MB    | —      | —      | 2.1 kg | 2.4 kg |
| FXLQ-P     | —      | —      | —      | —      |
| FXNQ-A     | —      | —      | —      | —      |

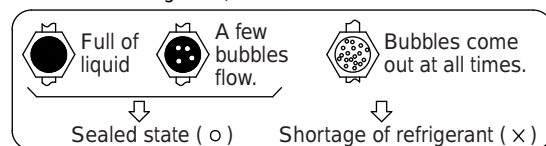
| Biddle Air Curtain | Refrigerant charge |
|--------------------|--------------------|
| CYVS100DK80*       | 1.0 kg             |
| CYVS150DK80*       | 1.5 kg             |
| CYVS200DK100*      | 1.9 kg             |
| CYVS250DK140*      | 2.4 kg             |
| CYVM100DK80*       | 1.0 kg             |
| CYVM150DK80*       | 1.5 kg             |
| CYVM200DK100*      | 1.9 kg             |
| CYVM250DK140*      | 2.4 kg             |
| CYVL100DK125*      | 1.4 kg             |
| CYVL150DK200*      | 2.1 kg             |
| CYVL200DK250*      | 2.9 kg             |
| CYVL250DK250*      | 3.6 kg             |

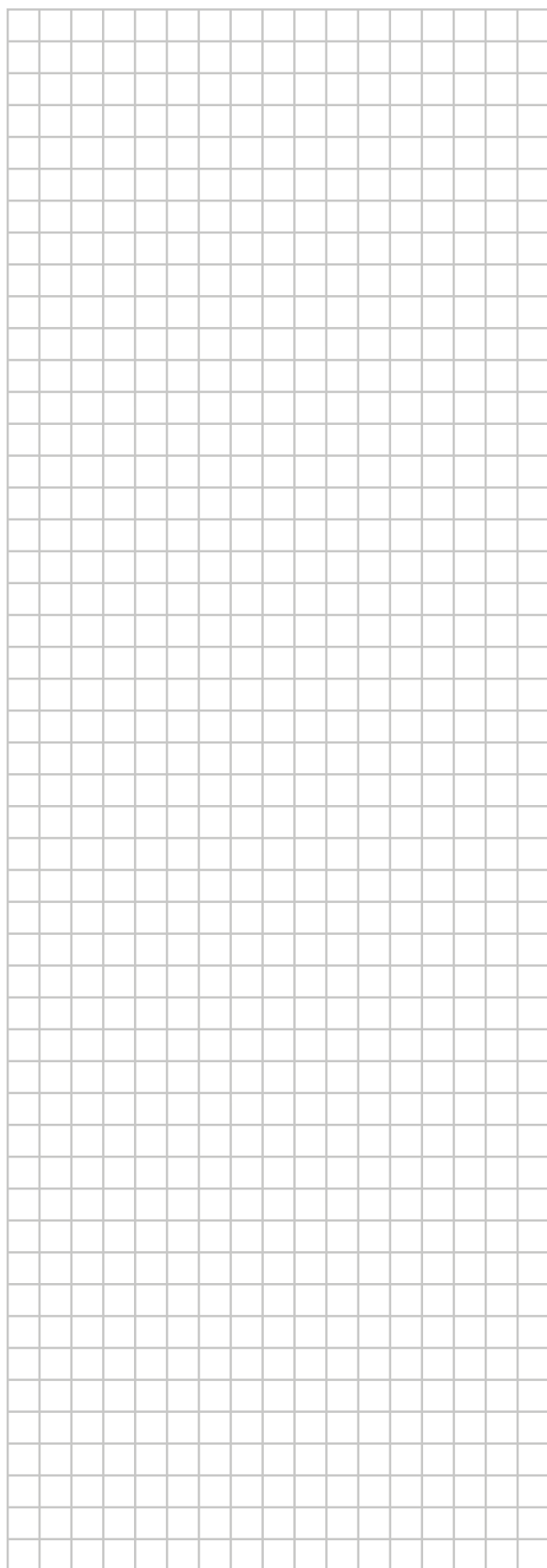
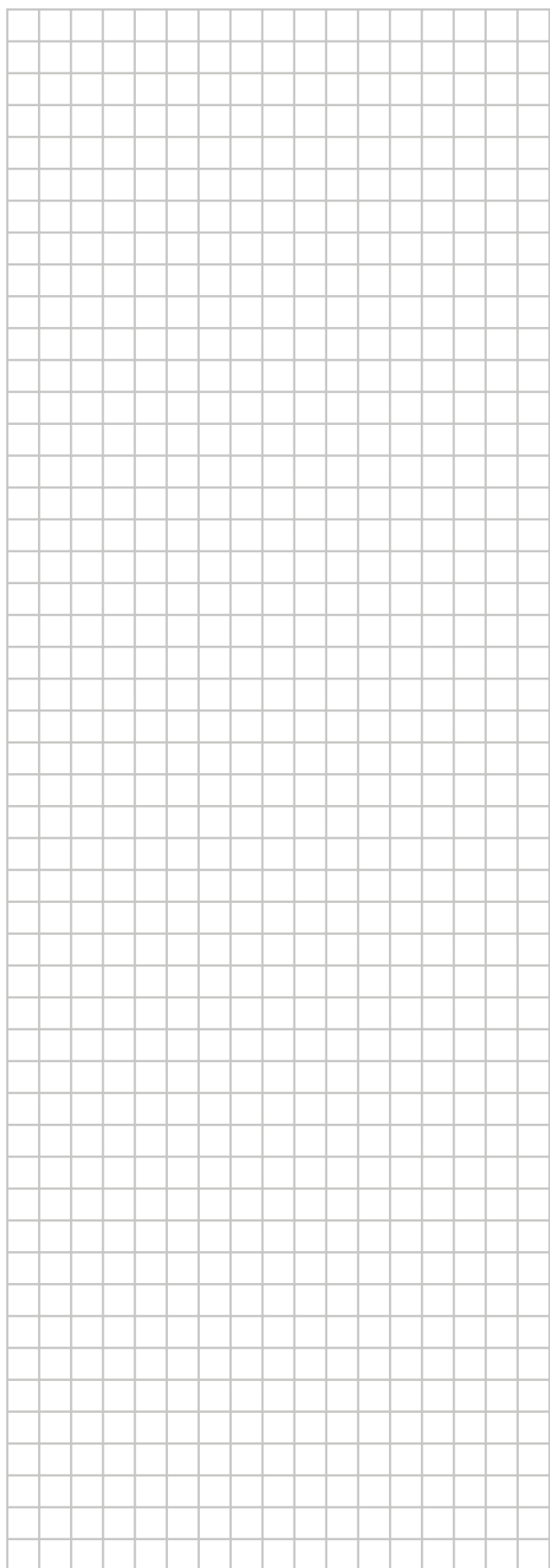
\*Calculate for each unit.

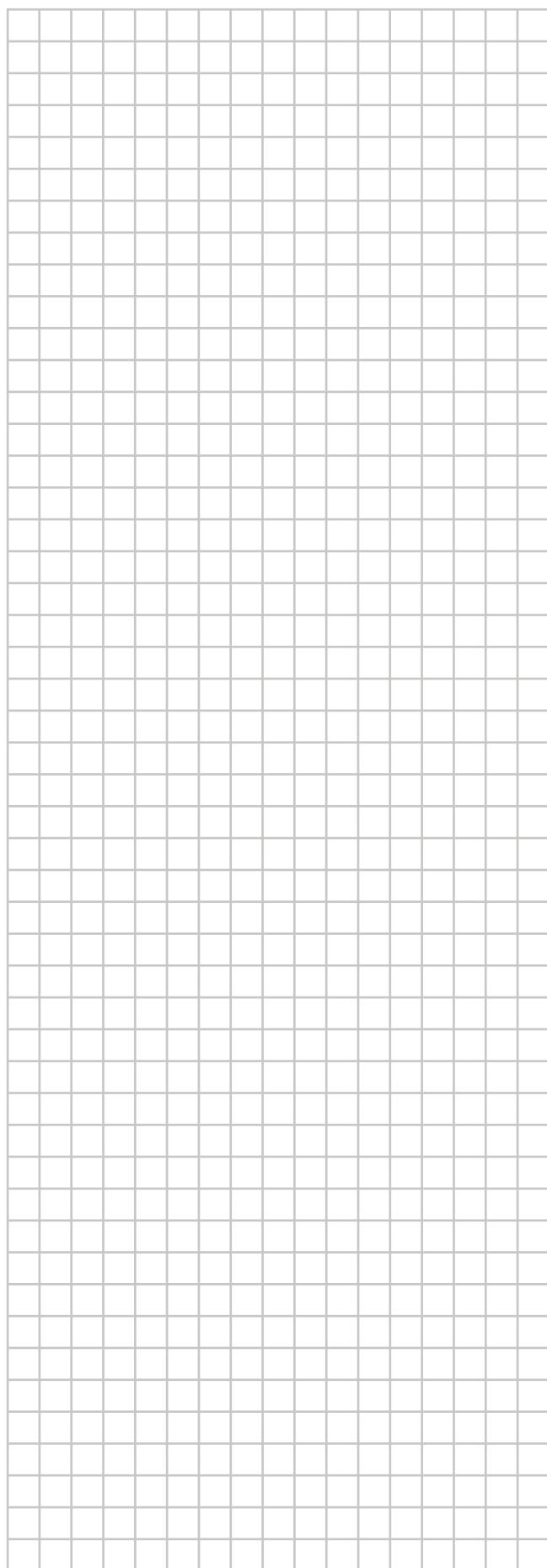
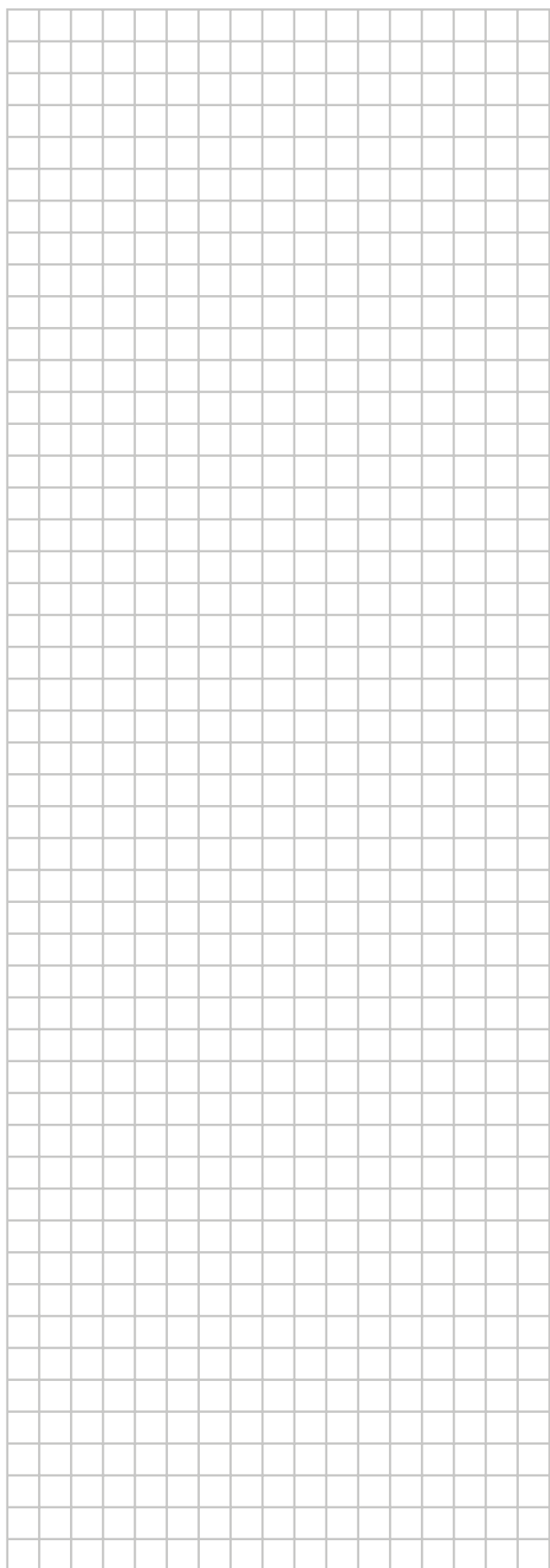
\*\*The total amount of refrigerant for air conditioning can't exceed 4.1 kg.

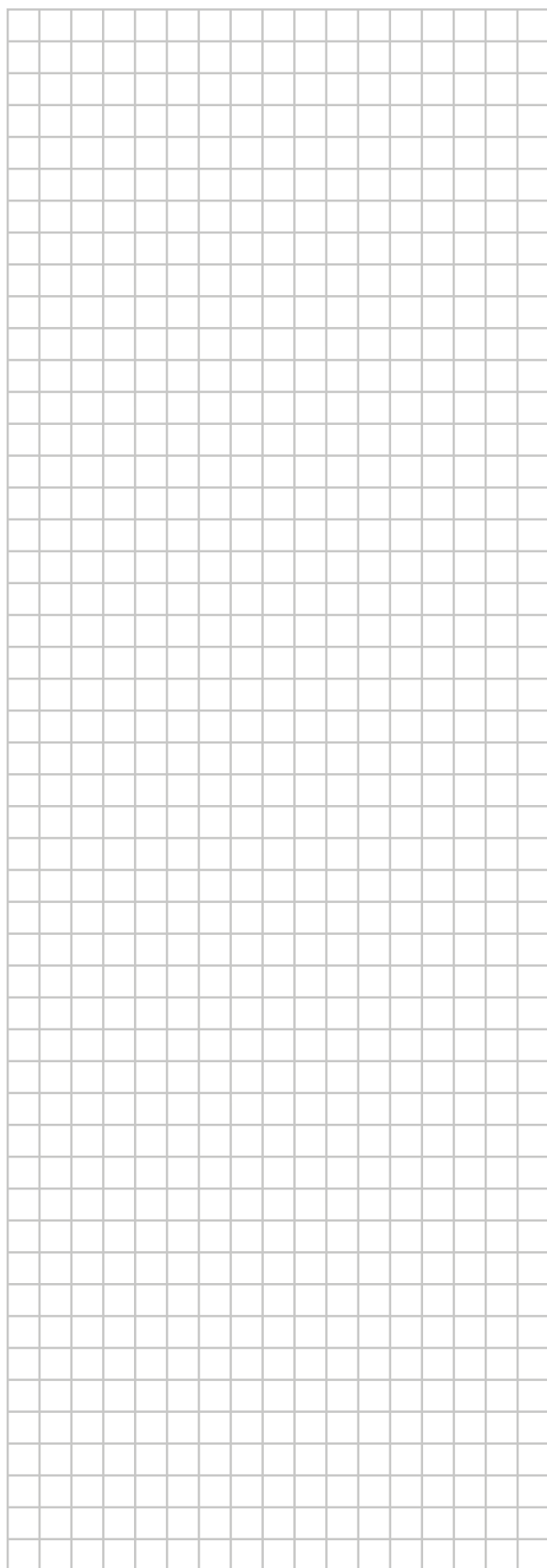
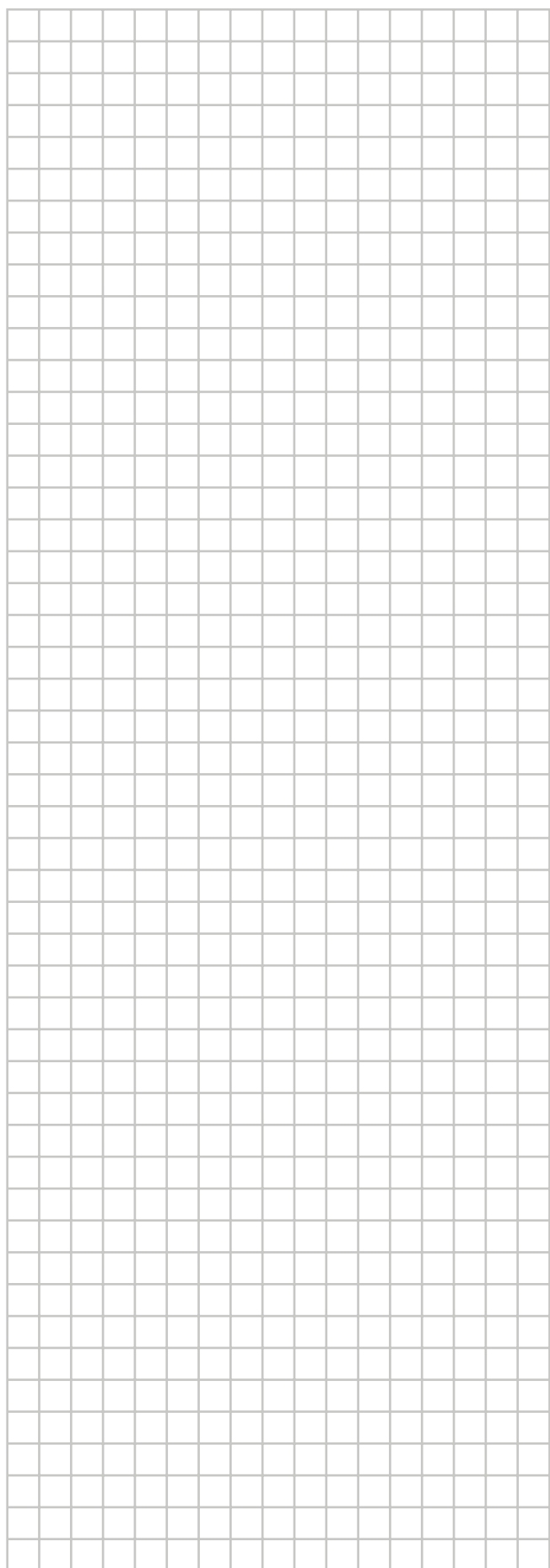
\*\*\*In case a mix of VRV indoor and air curtains is installed the capacity indoor ratio of the air curtains is 45% or less of the total connected capacity indoor.

Figure 1)

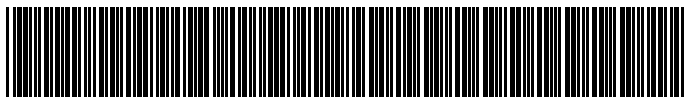








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4P448939-1A 2016.07