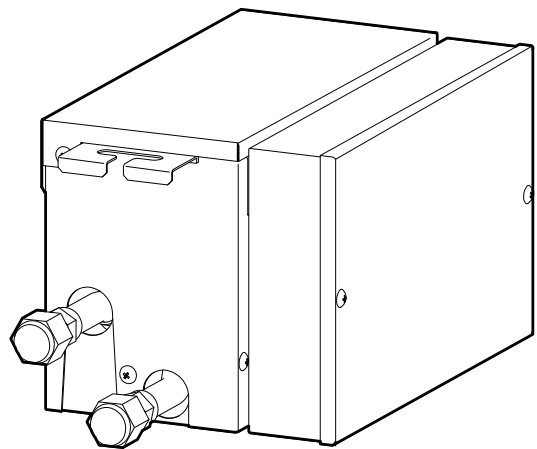


Installation Manual

*for
Cooling / Heating
Change-Over Box*

Models:

**COBS048B21S
COBS096B21S**



IMPORTANT:

*READ AND UNDERSTAND
THIS MANUAL
CAREFULLY
BEFORE INSTALLING
THIS CHANGE-OVER BOX.
KEEP THIS MANUAL FOR
FUTURE REFERENCE.*

P5414783

IMPORTANT NOTICE

- Johnson Controls pursues a policy of continuous improvement in the design and performance of products to meet regulatory requirements and industry standards. Therefore, Johnson Controls reserves the right to vary specifications without notice.
- Johnson Controls cannot anticipate every possible circumstance that might involve a potential hazard.
- This heat pump air conditioner is designed for standard air conditioning applications only. Do not use this heat pump air conditioner for other purposes, such as drying clothes, refrigerating foods, or for any other cooling or heating process.
- Do not install the unit outdoors. Do not install the unit in the following places. It may cause a fire, deformation, corrosion or failure.
 - * Places where there are high levels of oil mist (including machinery oil).
 - * Places where there are high alkalinity levels (i.e., chlorine or bromine such as over hot tubs, etc.).
 - * Places where flammable gases or liquids may be used or generated.
 - * Places with a high concentration of salts, salty mists or sprays (such as over salt-water aquariums).
 - * Places with an atmosphere of high nuisance dust. Places with organic solvent atmospheres, such as painting and cleaning locations.
- Do not install a unit in the place where drain water can leak onto the unit or electrical device failures may occur.
- Pay attention to the following points when the unit is installed in a hospital or other facility where electromagnetic waves generate from medical equipment.
 - * Do not install the unit in places where electromagnetic waves radiate to the electrical box, remote control cable or remote control switch.
 - * Install the unit at least 10 ft (3m) away from electromagnetic waves or interferences such as a radio.
- The installer and system specialist shall secure against leakage according to local regulations or standards. This system has both high and low pressure refrigerant and, as such, comprises a pressurized system. Never loosen threaded joints while the system is under pressure and never open pressurized system parts.
- No part of this manual may be reproduced without written permission from Johnson Controls.
- It is assumed that this heat pump air conditioner will be operated and serviced by English speaking people. If this is not the case, the distributor or dealer can provide or add safety, caution and operating signs in the native language.
- If you have any questions, contact your distributor.
- This manual describes the features of this heat pump air conditioner as well as for other models.

This manual should be considered as a permanent part of the air conditioning equipment and should remain with the air conditioning equipment.

CHECKING PRODUCT RECEIVED

- Upon receiving this product, inspect it for any shipping damage.
Inspect all electrical connections. Connections must be clean and tight at the terminals.
Claims for damage either apparent or concealed, should be filed immediately with the shipping company.
NOTE: Rough handling may dislocate internal components.
- Check the model number, electrical characteristics (power supply, voltage and frequency) and accessories to determine if they are correct with the ordering and shipping information, to ensure the correct unit has been shipped.
To minimize the possibility of damage after inspection, the units should be installed and reassembled as soon as possible.

The standard installation and general use of this unit is explained in this manual.

Although common processes and procedures for installing units are presented in this manual, its use for installation of units otherwise indicated in this manual is not recommended. Please contact your local agent, as the occasion arises.

Our liability shall not cover defects arising from the alteration performed by a customer without our consent in a written form.

SAFETY SUMMARY

Signal Words

- Signal words are used to identify levels of hazard seriousness.
Definitions for identifying hazard levels are provided below with their respective signal words.



: DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



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



: CAUTION used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



: NOTICE is used to address practices not related to personal injury.

NOTE

: NOTE is useful information for operation or maintenance.

SAFETY SUMMARY

DANGER

- Do not perform installation work, refrigerant piping work, condensate pump, or condensate piping and electrical wiring connection without referring to the installation manual. If the instructions are not followed, it may result in a water leakage, electric shock or a fire.
- Use the specified non-flammable refrigerant (R410A) for the outdoor unit in the refrigerant cycle. Charge only R410A into the unit. Do not charge other materials into the unit such as hydrocarbon refrigerants (propane), oxygen, flammable gases (acetylene) or poisonous gases when installing, maintaining and moving the unit. These flammables are extremely dangerous and may cause an explosion, a fire, or injury. As originally manufactured, this unit contains refrigerant installed by Johnson Controls. Johnson Controls uses only refrigerants that have been approved for use in the unit's intended country or market. Johnson Controls' distributors similarly are only authorized to provide refrigerants that have been approved for use in the countries or markets they serve. The refrigerant used in this unit is identified on the unit's faceplate and/or in the associated manuals. Any additions of refrigerant into this unit must comply with the country's requirements with regard to refrigerant use and should be obtained from JCI distributors. Use of unapproved refrigerant substitutes will void the warranties and can cause injury or death.
- Do not pour water into the indoor or outdoor unit. These units are equipped with electrical parts. Exposure to water may cause a serious electrical shock.
- Do not open the service cover or access panel for the indoor or outdoor units without turning OFF the main power supply.
- Do not touch or adjust safety devices inside the indoor unit or outdoor units. If these devices are touched or readjusted, it may cause a serious accident.
- Carefully check for escaping refrigerant gas. If there is significant leakage, it can cause difficulty in breathing. Turn OFF the main switch, and contact your service contractor if refrigerant leakage occurs.
- Make sure that the refrigerant leakage test is performed.
Refrigerant (fluorocarbon) for this unit is incombustible, non-toxic and odorless.
However if the refrigerant is leaked and comes in contact with fire, toxic gas will generate.
Because fluorocarbon is heavier than air, the floor surface will be filled with it, which could cause suffocation.
- The installer and system specialist shall secure against refrigerant leakage according to local regulations or standards.
- Use a Ground Fault Circuit Interrupter (GFCI).
In the event of fault, there is danger of an electric shock or a fire if it is not used.

SAFETY SUMMARY

WARNING

- Do not use any sprays such as insecticide, lacquer, hair spray or other flammable gases within approximately 4 ft (1.3m) from the system.
- If the circuit breaker or fuse is often activated, stop the system and contact your service contractor.
- Check that the ground wire is securely connected. If the unit is not correctly grounded, it may cause electric shock. Do not connect the ground wiring to gas piping, condensate piping, lighting conductor or ground wiring for telephones.
- Before performing any brazing work, check to ensure that there is no flammable material around. When using refrigerant, be sure to wear leather gloves to prevent injury from cold.
- Insulate electrical wiring, drain piping, and electrical components from threats posed by burrowing animals and temperature extremes. Failure to do so can, over time, deteriorate system performance.
- Secure the cables. External forces on the terminals could lead to a fire. Unauthorized modifications to this unit is prohibited for the following reasons:
 1. Modifications may create hazards which could result in death, serious injury or equipment damage.
 2. Modifications will void product warranties.
 3. Modifications may invalidate product regulatory certifications. Johnson Controls Inc. has conducted both internal and coordinated Agency testing to ensure product compliance with applicable Product Safety and Regulatory standards. Product certification is designated either on the product itself or in the product literature. The certification mark identifies the applicable standards as well as the Agency or Nationally Recognized Test Lab (NRTL) involved. If changes are made to the product, an engineering review will be needed to assess the impact to the product certification. In some instances, the changes may be such that the Agency or NRTL will require reapproval of the product by means of a field or site inspection and certification. Any person or entity making changes to the product is responsible for obtaining any necessary engineering review and reapproval.
 4. Modifications may violate OSHA standards. OSHA standards may require that only certified products be used in certain applications and modifications that result in the loss of product certification may violate those OSHA standards:

“If a product does not have NRTL approval as required by an OSHA standard, or if the product no longer meets NRTL approval requirements because of changes made to it, the product must be

 - (1) replaced with a properly approved product,
 - (2) approved by an NRTL that is recognized for testing this type of product, or
 - (3) reinspected and reapproved by an NRTL, if it was properly approved but the user has changed it.”

CAUTION

- Do not step on the unit.
- Do not put any foreign material on the unit or inside the unit.
- Provide a strong and correct foundation so that:
 - The outdoor unit is not on an incline.
 - Abnormal sound does not occur.
 - The outdoor unit will not fall down due to a strong wind or earthquake.

NOTICE

- Do not install the indoor unit, outdoor unit, remote control switch and cable within approximately 10 ft (3m) of strong electromagnetic wave radiators such as medical equipment.
- After a long shutdown, apply power to the outdoor unit(s) at least 12 hours prior to operation of the system for preheating of the compressor oil.

NOTE

- It is recommended that the room will be ventilated every three to four hours.
- The heating capacity of the heat pump unit is decreased according to the outdoor air temperature. Therefore, it is recommended that auxiliary heating equipment be used in the field when the unit is installed in a low temperature region.

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1. Safety Summary



WARNING

- Do not perform installation work, refrigerant piping work or electrical wiring connection without referring to our installation manual.
- Check that the ground wire is securely connected.
- Connect a fuse of specified capacity.



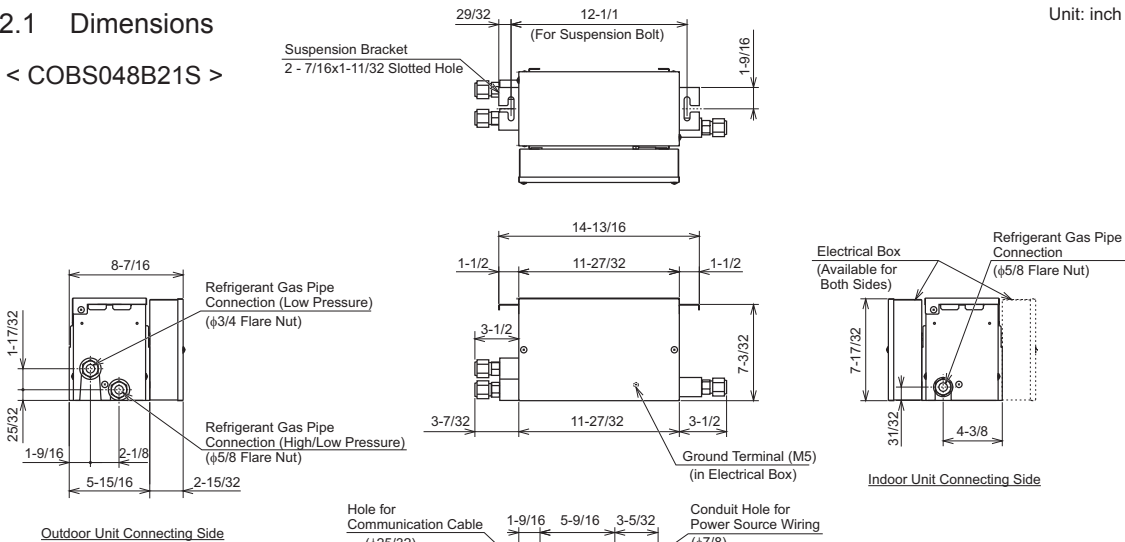
CAUTION

Do not install the Change-Over Box and cable within approximately 10 ft (3m) from strong electromagnetic wave radiators such as medical equipment.

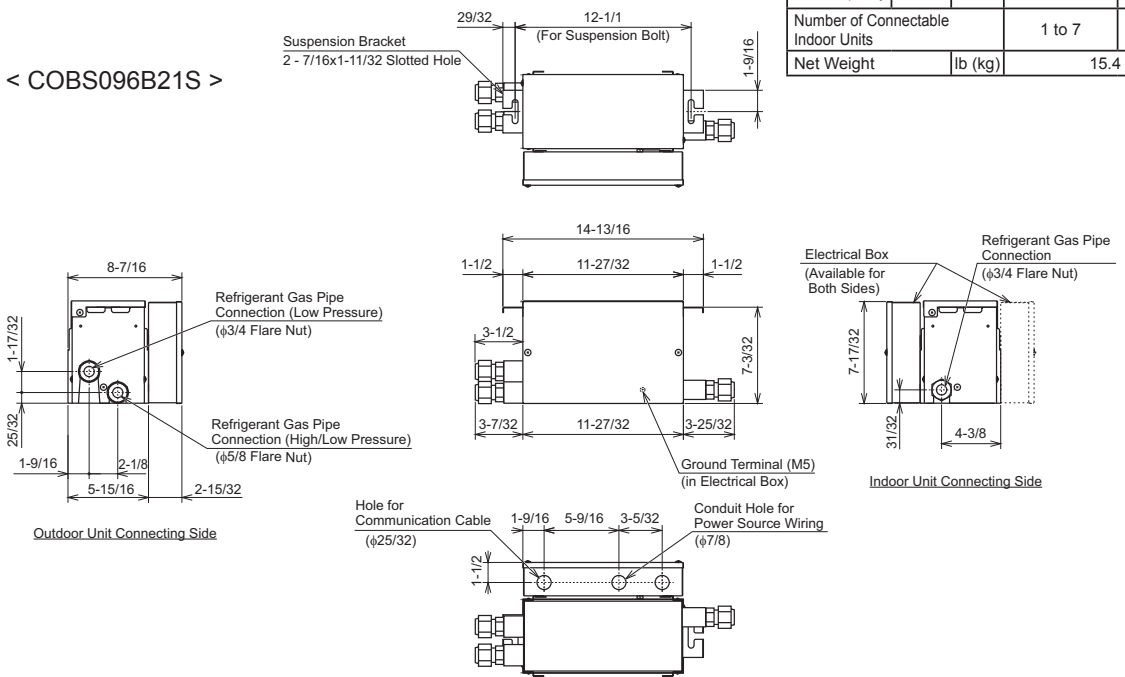
2. Structure

2.1 Dimensions

< COBS048B21S >



< COBS096B21S >



Specification

| Model | | COBS048B21S | COBS096B21S |
|--|----------|---------------------|-------------|
| Power Supply | | AC 1~ 208/230V 60Hz | |
| Refrigerant | | R410A | |
| Input | | W | 20 |
| Connectable Indoor Unit Total Capacity | single | x1000 less than 48 | 54 to 96 |
| | multiple | less than 41 | 42 to 71 |
| Number of Connectable Indoor Units | | 1 to 7 | 1 to 8 |
| Net Weight | | lb (kg) | 15.4 (7) |

Figure 2.1 Dimensions of Change-Over Box

2.2 Refrigeration Cycle

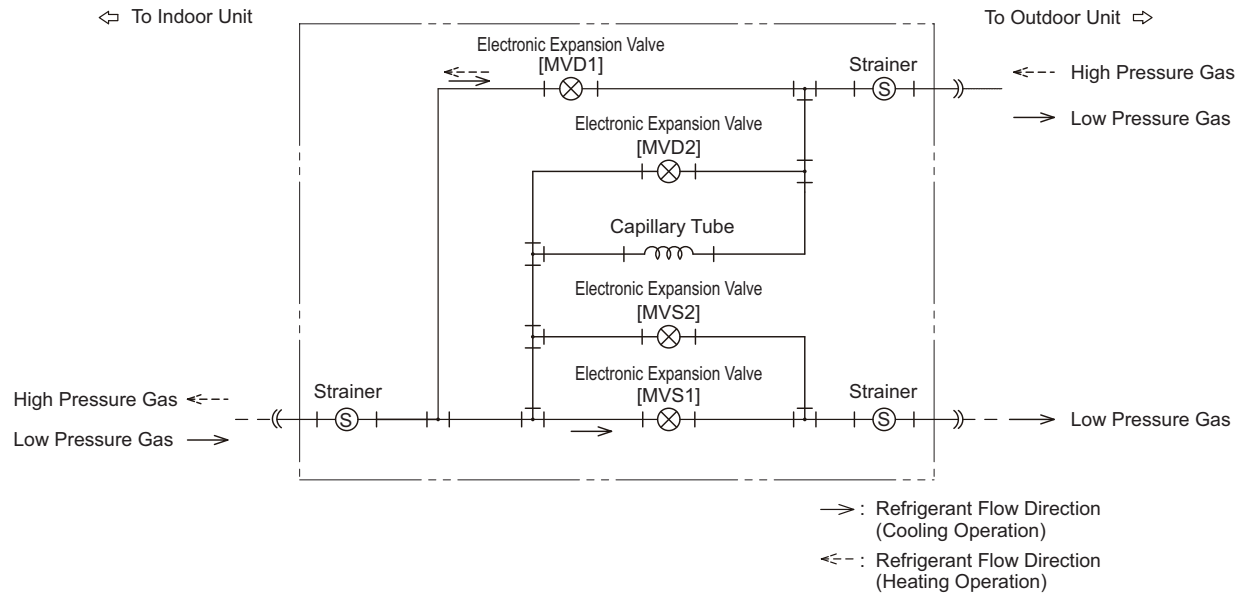


Figure 2.2 Refrigeration Cycle Diagram

2.3 Necessary Tools and Instrument List for Installation

| No. | Tool | No. | Tool |
|-----|----------------------|-----|----------------------------------|
| 1 | Handsaw | 11 | Wrench |
| 2 | Phillips Screwdriver | 12 | Charging Cylinder |
| 3 | Vacuum Pump | 13 | Gauge Manifold |
| 4 | Refrigerant Gas Hose | 14 | Cutter for Wires |
| 5 | Megohmmeter | 15 | Gas Leak Detector |
| 6 | Copper Pipe Bender | 16 | Level |
| 7 | Manual Water Pump | 17 | Clamper for Solderless Terminals |
| 8 | Pipe Cutter | 18 | Hoist (for Indoor Unit) |
| 9 | Brazing Kit | 19 | Ammeter |
| 10 | Hexagon Wrench | 20 | Voltage Meter |

3. Transportation and Handling

3.1 Transportation

Transport the product as close to the installation location as practicable before unpacking.

CAUTION

Do not put any material on the product.

3.2 Handling of Change-Over Box

WARNING

Do not put any foreign material into the indoor unit and check to ensure that none exists in the Change-Over Box before the installation and test run. Otherwise, a fire or failure, or something similar may occur.

CAUTION

Be careful not to damage insulation materials of unit's surface when lifting.

3.3 Combination of Change-Over Box and Indoor Unit

Combination is as follows.

Table 3.1 Combination of Indoor Unit

| Change-Over Box Model | Indoor Unit | | |
|-----------------------|-------------|-----------------------------|--------------|
| | Quantity | Total Capacity (x1000Btu/h) | |
| | | Single | Multiple |
| COBS048B21S | 1 to 7 | less than 48 | less than 41 |
| COBS096B21S | 1 to 8 | 54 to 96 | 42 to 71 |

NOTES:

- Exceeding the total capacity may cause insufficient performance and abnormal sound. Be sure to connect the Change-Over Box within the allowable total capacity.
- If the indoor unit total capacity is 96000Btu/h for COBS096B21S, the performance may decrease approximately 5% in cooling and 10% in heating.

4. Change-Over Box Installation

⚠ DANGER

- Do not install the Change-Over Box in a flammable environment to avoid fire or an explosion.

⚠ WARNING

- Check to ensure that the ceiling slab is strong enough.
- Do not install the Change-Over Box outdoors. If installed outdoors, an electric hazard or electric leakage may occur.
- Installation **WARNING**: Ensure that all safety features, disconnects and interlocks are in place and functioning properly prior to putting the equipment into operation. Never by-pass or jump-out any safety device or switch.

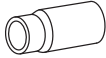
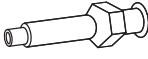
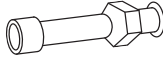
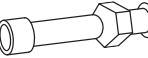
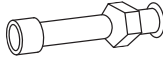
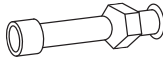



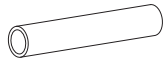




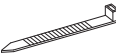
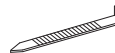


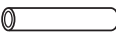
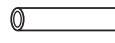
4.1 Factory-Supplied Accessories

Check to ensure that the following accessories are packed with the Change-Over Box.

NOTE

If any of these accessories are not packed with the unit, please contact your distributor.

Table 4.1 Factory-Supplied Accessories

| | | | | inch (mm) | | | |
|------|-----------------------------------|--|---|---|--|----------------------|---|
| No. | Accessory | COBS048B21S | PCS | COBS096B21S | PCS | | |
| (1) | Reducer | ID 5/8 (ID 15.88)  | ID 3/4 (ID 19.05) | 1 | - | - | |
| (2) | Accessory Pipe (for Flare Nut) | OD 1/2 (OD 12.7)  | OD 5/8 (OD 15.88) | 2 | ID 7/8 (ID 22.2)  | OD 3/4 (OD 19.05) | 2 |
| (3) | | ID 3/4 (ID 19.05)  | OD 3/4 (OD 19.05) | 1 | ID 3/4 (ID 19.05)  | OD 3/4 (OD 19.05) | 2 |
| (4) | | - | - | - | ID 3/4 (ID 19.05)  | OD 5/8 (OD 15.88) | 1 |
| (5) | | ID 5/8 (ID 16) |  | 2 |  | 1 | |
| (6) | ID 25/32 (ID 20) |  | 1 | - | - | | |
| (7) | Insulation Material | ID 7/8 (ID 22) | - | - |  | 2 | |
| (8) | | ID 1-1/2 (ID 38) |  | 2 |  | 1 | |
| (9) | | ID 1-11/16 (ID 43) |  | 1 |  | 2 | |
| (10) | Clamp |  | 6 |  | 6 | | |
| (11) | |  | 5 |  | 5 | | |
| (12) | PVC Tube | ID 7/16 (ID 11) |  | 2 |  | 2 | |

4.2 Initial Check

- Install the Change-Over Box with a proper clearance around it for maintenance working space, as shown in Figure 4.1 below.

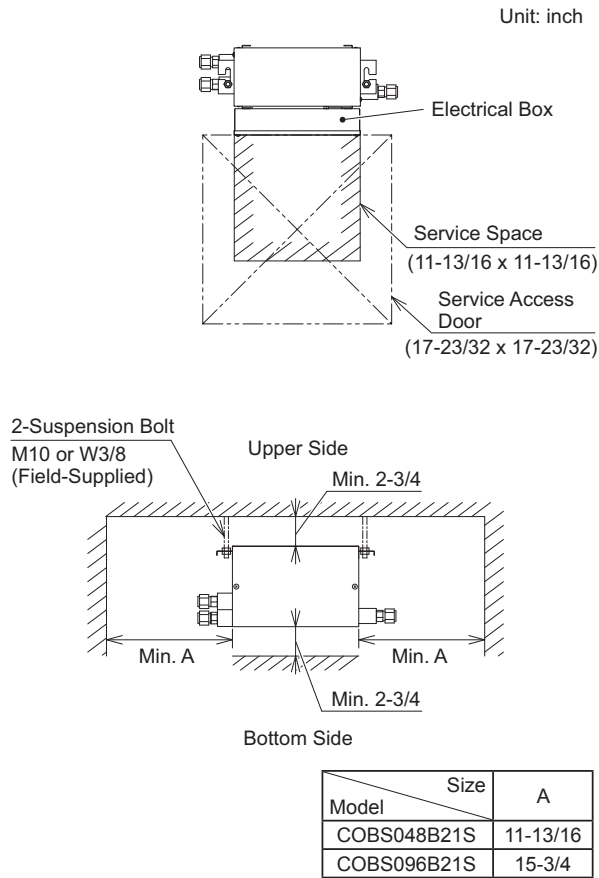


Figure 4.1 Maintenance Space

- Check to ensure that the ceiling is sufficiently strong to sustain the Change-Over Box. If the ceiling is weak, abnormal sound and vibration may occur.
- When the electronic expansion valve in the Change-Over Box is activated, a change in the typical refrigerant flow sounds may be heard or perceived from the Change-Over Box. Take the following action to minimize the sound.
 - (A) Install the Change-Over Box inside the ceiling. As for the ceiling material, select a material like a plasterboard at least 1 inch (9mm), which minimizes operation sound.
 - (B) Do not install the Change-Over Box in a place near bedrooms or hospital rooms.
- When the operation is changed to cooling/heating mode, a change in the typical refrigerant flow sounds may be heard or perceived from the Change-Over Box. Therefore, install the Change-Over Box in the ceiling of the corridor so that the refrigerant flowing sound may not be heard in the room.
- Do not install the Change-Over Box in a hot or humid place, such as a kitchen, to prevent condensation on the outer surface of the Change-Over Box. When installing the Change-Over Box in such places, apply additional insulation.
- Pay attention to the following points when the Change-Over Box is installed in a hospital or other facility where there are electronic waves from medical equipment.
 - (A) Do not install the Change-Over Box where the electromagnetic wave is directly radiated to the electrical box or intermediate wiring (transmission wiring).
 - (B) Install the Change-Over Box and components as far as practicable or at least 10 ft (3m) from the electromagnetic wave radiator.
 - (C) Install a noise filter when the power supply emits harmful noises.
- Ensure the installation place is convenient for the refrigerant piping or electrical wiring connection.
- Do not drill, or drive screws into the cabinet. Use only mounting points provided.

4.3 Suspension Bolts

Step 1

- (1) Select a final location and installation direction of the Change-Over Box. Pay careful attention to the space for the piping, wiring and maintenance.
- (2) Mount suspension bolts.
- (3) Mount the suspension bolts in the slotted hole on the electrical box side as shown in Figure 4.2.
- (4) Contact a qualified contractor or carpenter for the ceiling treatment.

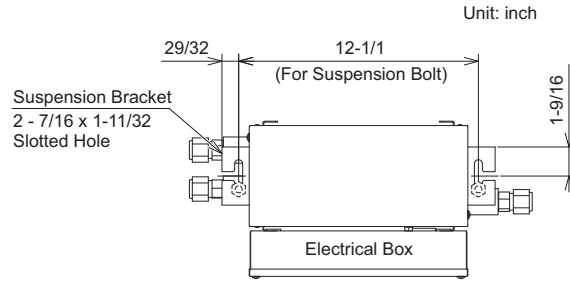
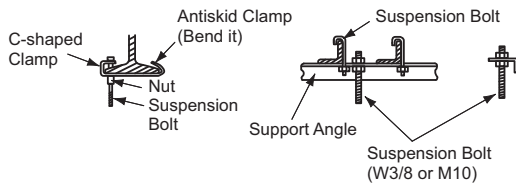


Figure 4.2 Position of Suspension Bolts

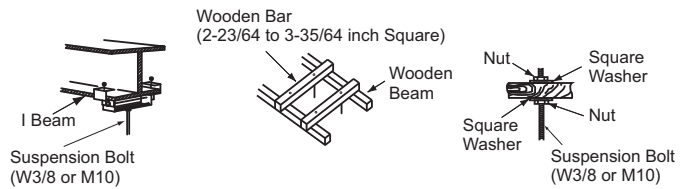
Step 2

Mount suspension bolts, as shown in Figure 4.3.

● For Steel Beam

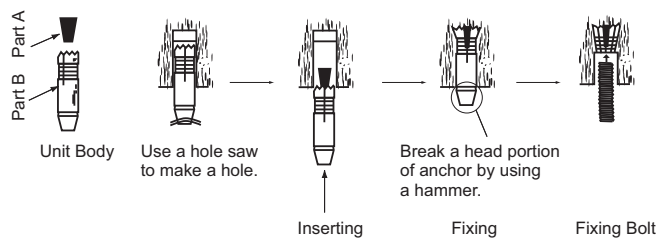


● For Wooden Beam

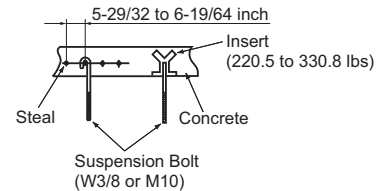


● For Concrete Slab

(1) Hole-In Anchor

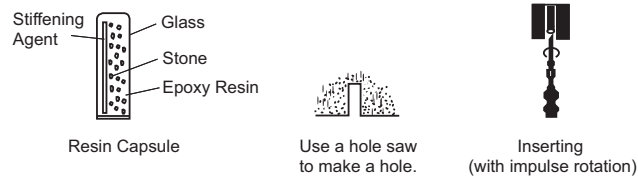


● For Reinforcing Steel

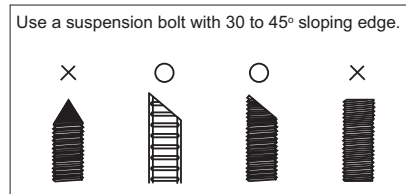


(2) Resin Capsule

Use the resin capsule within the warranty period. Resin capsules deteriorate over time and should be used within six months of the manufacturing date.



After inserting, do not rotate or put any force until resin is hardened. Required time is as shown in the table at right.



| Ambient Temp. | Time |
|---------------|-------------|
| 68°F (20°C) | Min. 30min. |
| 59°F (15°C) | Min. 1hr. |
| 50°F (10°C) | Min. 2hr. |
| 41°F (5°C) | Min. 4hr. |
| 32°F (0°C) | Min. 8hr. |

NOTE:

- Use a suspension bolt (W3/8, Metric screw thread: M10).
- Prepare washer and nut.

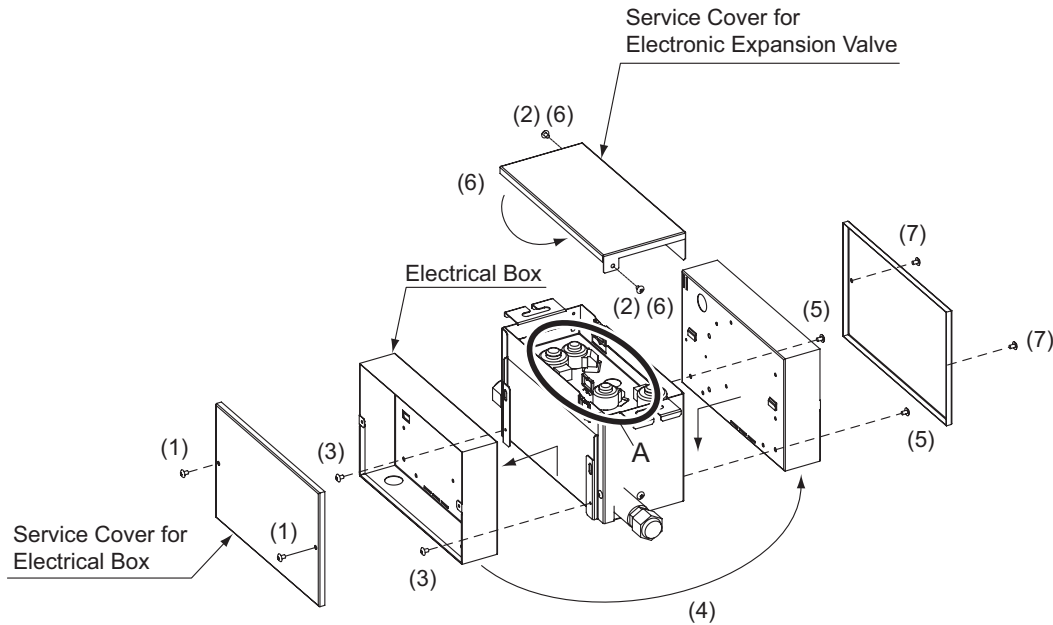
Figure 4.3 Mounting of Suspension Bolts

4.4 Installation

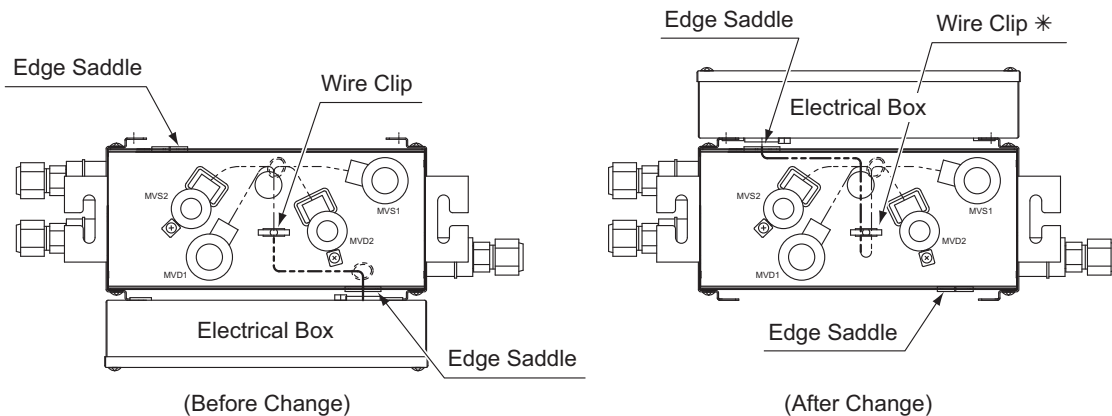
4.4.1 Changing the Location of the Electrical Box

Depending on the installation space, changing the location of the electrical box is available. When changing the location of the electrical box, follow the procedures below:

- (1) Remove the service cover for the electrical box.
- (2) Remove the service cover for the electronic expansion valve.
- (3) Remove the electrical box.
- (4) Remove the wiring from the wire clip and edge saddle, and move the electrical box. After moving the electrical box, put the wiring into the edge saddle and bound with the wire clip. (Refer to "Enlarged View of A" below.)
- (5) Mount the electrical box.
- (6) Rotate the service cover for the electronic expansion valve 180 degrees and mount it.
- (7) Mount the service cover for the electrical box.



< Enlarged View of A >



* Make sure that the wiring is bound with the wire clips in order to prevent the electrical box from entering water.

4.4.2 Marking of the Positions of the Suspension Bolts and Wiring Connections

- (1) Mark the positions of the suspension bolts, refrigerant piping connections and wiring connection.
- (2) Installation dimensions are shown in Figure 2.1.

4.4.3 Mounting and Hanging the Change-Over Box

- (1) Put nuts on each of the two suspension bolts before hanging the Change-Over Box, as shown in Figure 4.4.
- * Mounting washers are required in order to affix the suspension bracket to the suspension bolt.

Field-Supplied Parts

- * Suspension Bolt: 2-M10 or W3/8
- * Nut: 6-M10 or W3/8
- * Washer: 4-M10 or W3/8

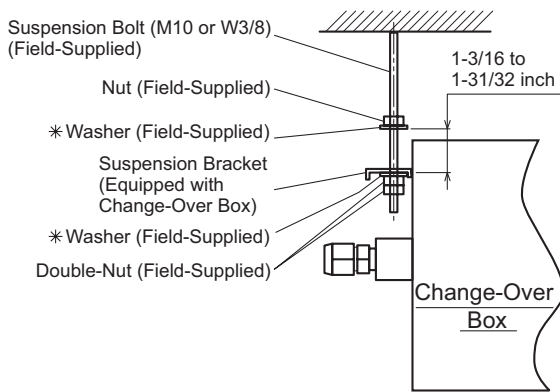


Figure 4.4 Suspension

(2) Hanging the Change-Over Box

- (a) Hang the Change-Over Box by putting hands on the bottom of the cabinet.
- (b) Insert the suspension bolt into the groove part of the suspension bracket as shown in Fig 4.5. Ensure that the washers are correctly affixed to the suspension bracket.
- (c) After the hanging work, the piping and wiring connection work is required inside the ceiling in the gap between the roof and ceiling so it is not visible. Therefore, determine the drawing direction of the pipe after selecting the installation location of the Change-Over Box. Before doing the hanging work, carry out the piping and wiring work up to the connecting positions.
- (d) Keep the Change-Over Box level to the ceiling surface. If the Change-Over Box is not level, a malfunction may occur.
- (e) Tighten the nuts of the suspension bolt with the suspension bracket after adjustment is completed.

Adhesive must be applied to the nuts in order to prevent them from loosening.

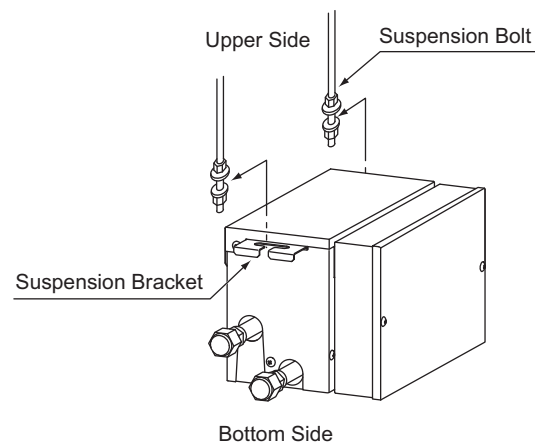


Figure 4.5 Hanging Method

5. Refrigerant Piping Work

! DANGER

Use the specified non-flammable refrigerant (R410A) for the outdoor unit in the refrigerant cycle. Do not charge material other than R410A into the unit such as hydrocarbon refrigerants (propane or something similar), oxygen, flammable gases (acetylene or etc.) or poisonous gases when installing, maintaining and moving. These flammables are extremely dangerous and may cause an explosion, a fire, and injury.

5.1 Refrigerant Piping

- (1) Prepare locally-supplied copper pipes.
- (2) Select clean copper tubes making sure there is no dust or moisture inside the tubes. Before connecting pipes, blow the inside of the tubes with nitrogen or dry air, to remove any dust or foreign materials.
- (3) Select the piping size as shown in the tables below. Furthermore, check for the flare nut and flaring dimension according to the following figure and table.

• Joint Selection

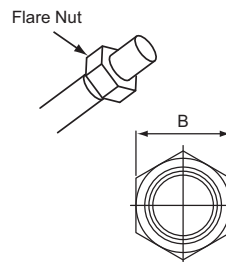
When using 1/2H material and the flaring work is not available. In this instance, use a joint selected from the chart below.

< Minimum Thickness of Joint > inch (mm)

| Diameter | R410A |
|---------------|--------------|
| 1/4 (6.35) | 0.020 (0.5) |
| 3/8 (9.52) | 0.024 (0.6) |
| 1/2 (12.7) | 0.028 (0.7) |
| 5/8 (15.88) | 0.031 (0.8) |
| 3/4 (19.05) | 0.031 (0.8) |
| 7/8 (22.2) | 0.035 (0.9) |
| 1-1/8 (28.58) | 0.039 (1.0) |
| 1-5/8 (41.28) | 0.057 (1.45) |

< Flare Nut Dimension B > inch (mm)

| Diameter | R410A |
|-------------|--------------|
| 1/4 (6.35) | 21/32 (17) |
| 3/8 (9.52) | 7/8 (22) |
| 1/2 (12.7) | 1-1/32 (26) |
| 5/8 (15.88) | 1-5/32 (29) |
| 3/4 (19.05) | 1-13/32 (36) |

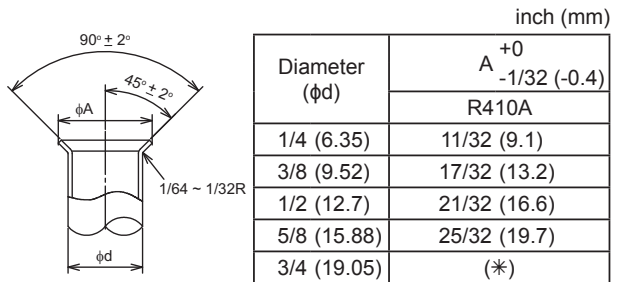


NOTE:

Do not use a joint other than those specified in the table above.

• Flaring Dimension

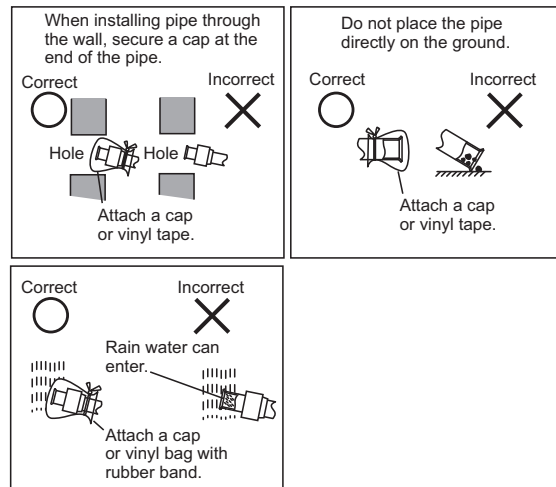
Perform the flaring work as shown below.



(*) It is impossible to perform the flaring work with 1/2H material. In this case, use an accessory pipe (with a flare).

NOTICE

• Cautions for Refrigerant Pipe Work (Example)



- Cautions for Piping Connection Work

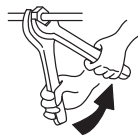
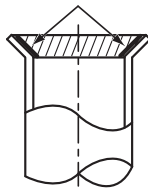
- Connect the indoor/outdoor connecting pipes. Secure the pipes and pay attention not to contact with weak materials such as ceiling materials. (Otherwise, abnormal sound may be heard due to the vibration of the piping.)
- Apply refrigerant oil slightly on the sheet surface of the pipe and flare nut before the flaring work. Then tighten the flare nut with the specified tightening torque using two wrenches. Always use a back-up wrench to prevent twisting of the copper piping within the unit assembly. Perform the flaring work on the liquid piping side before the gas piping side. Check the gas leakage after the flaring work.

NOTE:

Refrigerant oil is field-supplied.
[Ethereal Oil FVC50K, FVC68D (Idemitsu Kousan Co. Ltd.)]

- When temperature and humidity inside the ceiling exceed 80°F (27°C)/RH80%, apply additional insulation approximately 13/32 inch (10mm) thickness to the accessory insulation. It prevents condensation on the surface of the insulation (refrigerant pipe only) and possible damage to electronic components.
- Perform the air-tight leakage test 601 psi (4.15MPa) for the test pressure. Refer to the Technical Manual for the Outdoor Unit for more details.
- Perform cold insulation work by insulating and taping the flare connection and reducer connection. Also insulate all the refrigerant pipes.

Apply Refrigerant Oil.



Two wrenches required to prevent damaging the copper piping.

< Required Tightening Torque >

| Pipe Size | Tightening Torque |
|--------------|----------------------------------|
| φ1/4 (6.35) | 11 to 13 lbf-ft (14 to 18 N·m) |
| φ3/8 (9.52) | 26 to 31 lbf-ft (34 to 42 N·m) |
| φ1/2 (12.7) | 37 to 45 lbf-ft (49 to 61 N·m) |
| φ5/8 (15.88) | 51 to 60 lbf-ft (68 to 82 N·m) |
| φ3/4 (19.05) | 74 to 88 lbf-ft (100 to 120 N·m) |

⚠ CAUTION

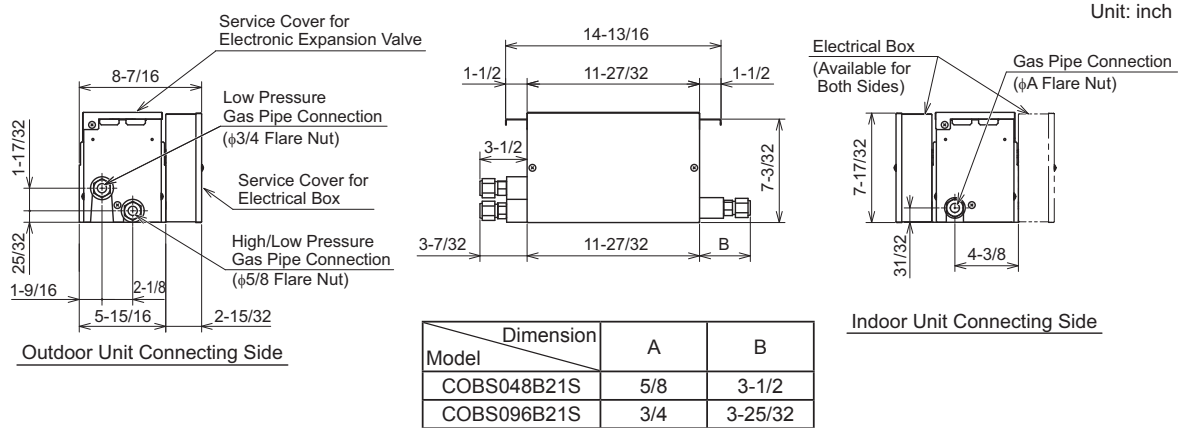
- Do not apply excessive force to the flare nut when tightening. Excessive force can result in the flare nut cracking and refrigerant leakage may occur. Use the specified tightening torque.
- For more details of the refrigerant piping work, vacuum pumping and refrigerant charge, refer to the Technical Manual for the Outdoor Unit.

5.2 Refrigerant Piping Work

Provide the refrigerant pipe in the field.

Make sure that the refrigerant pipe is connected to the same refrigerant cycle unit.

(1) Position of Piping Connection



(2) Selecting Piping Size

- Select the size for the high/low pressure gas pipe, low pressure gas pipe and gas pipe according to Table 5.1. The size depends on the indoor unit total capacity connected downstream of the Change-Over Box.
- When the piping size from Table 5.1 and the piping connection size for Change-Over Box from Table 5.2 are different, use an accessory pipe according to Section 5.2(3).
- As for the multi-kit branch or header branch, refer to the Technical Manual for the Outdoor Unit.

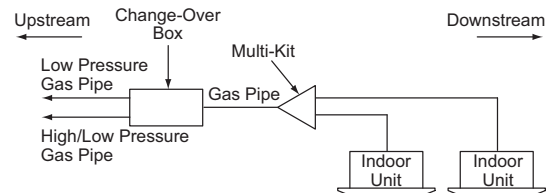
Table 5.1 Connected Indoor Unit Capacity and Piping Size

| Model | Connected Indoor Unit Capacity | Low Pressure Gas Pipe | High/Low Pressure Gas Pipe | Gas Pipe |
|-------------|--------------------------------|-----------------------|----------------------------|--------------|
| | x1000Btu/h | inch (mm) | inch (mm) | inch (mm) |
| COBS048B21S | 6~17 | φ5/8 (15.88) | φ1/2 (12.7) | φ1/2 (12.7)* |
| | 18~29 | φ5/8 (15.88) | φ1/2 (12.7) | φ5/8 (15.88) |
| | 30~41 | φ3/4 (19.05) | φ5/8 (15.88) | φ5/8 (15.88) |
| COBS096B21S | 42~59 | φ3/4 (19.05) | φ5/8 (15.88) | φ3/4 (19.05) |
| | 60~71 | φ7/8 (22.2) | φ3/4 (19.05) | φ7/8 (22.2) |

*: When a branch is located downstream of the Change-Over Box and also the connected indoor unit capacity is 6~17kBtu/h, use φ5/8 inch (φ15.88mm) for the gas pipe.

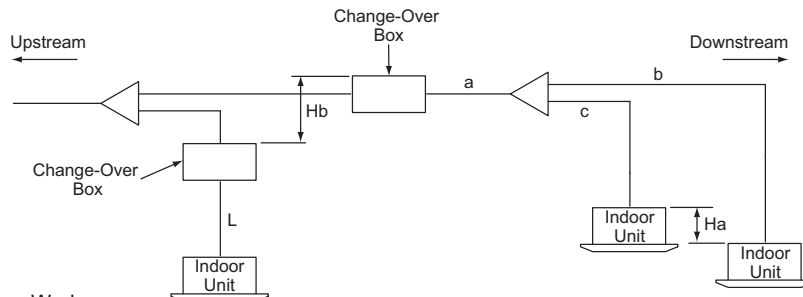
Table 5.2 Piping Connection Size for Change-Over Box

| Model | Low Pressure Gas Pipe | High/Low Pressure Gas Pipe | Gas Pipe |
|-------------|-----------------------|----------------------------|--------------|
| | inch (mm) | inch (mm) | inch (mm) |
| COBS048B21S | φ3/4 (19.05) | φ5/8 (15.88) | φ5/8 (15.88) |
| COBS096B21S | φ3/4 (19.05) | φ5/8 (15.88) | φ3/4 (19.05) |



• Piping Work for Change-Over Box

Perform piping work for the Change-Over Box according to the following table.



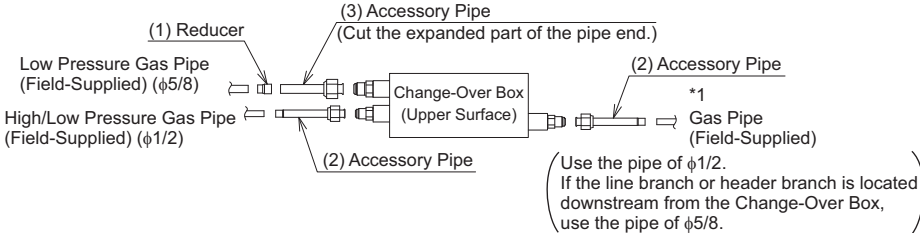
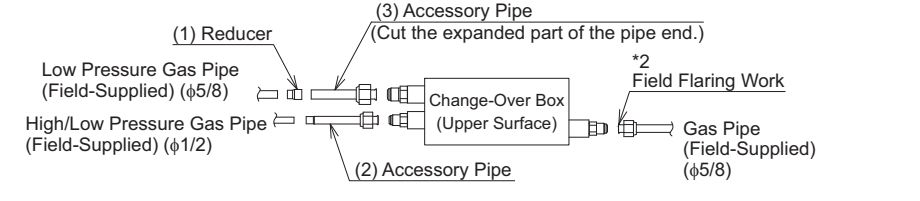
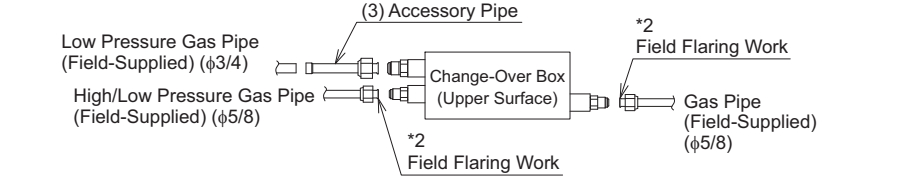
Condition of Piping Work

| Item | | Allowable Piping Length | |
|--|------------|-------------------------|--------------------|
| Total Piping Length between Change-Over Box and Indoor Unit | L a+b+c | COBS048B21S | within 98 ft (30m) |
| | | COBS096B21S | within 32 ft (10m) |
| Height Difference between Indoor Units Connected to the Same Change-Over Box | Ha | within 13 ft (4m) | |
| Height Difference between Change-Over Boxes | Hb | within 49 ft (15m) | |

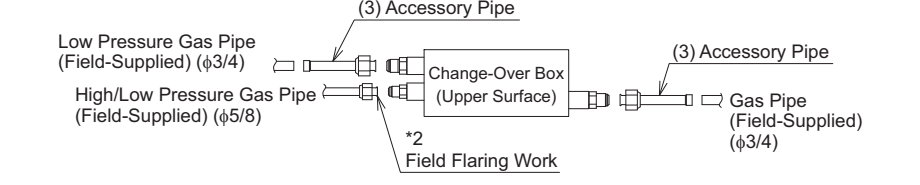
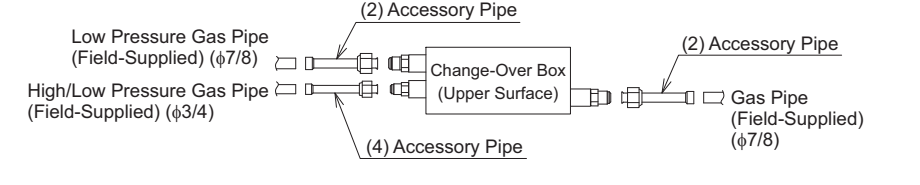
(3) Piping Connection

Perform the piping connection according to Table 5.1.

Unit: inch

| Connected Indoor Unit Capacity (x 1000Btu/h) | COBS048B21S |
|--|---|
| 6 to 17 |  |
| 18 to 29 |  |
| 30 to 41 |  |

Unit: inch

| Connected Indoor Unit Capacity (x 1000Btu/h) | COBS096B21S |
|--|--|
| 42 to 59 |  |
| 60 to 71 |  |

*1: When a branch is located downstream of the Change-Over Box and also the connected indoor unit capacity is 6~17 kBtu/h, perform the flaring work of the field gas pipe and connect it to the Change-Over Box.

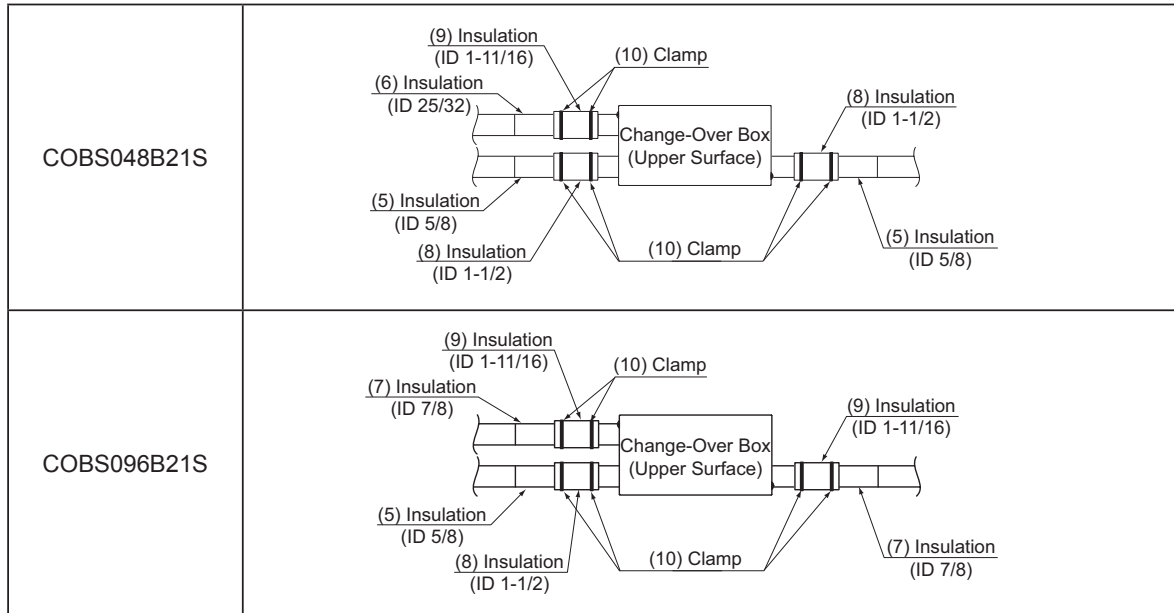
*2: Refer to Section 5.1 for the flaring work.

NOTE:

The accessory numbers are listed in Table 4.1.

(4) Piping Insulation

Unit: inch



NOTES:

1. The accessory numbers are listed in Table 4.1.
2. When the humidity inside the ceiling is high, apply additional insulation to the flare nut connection. Refer to Table 4.2 for more details.

6. Electrical Wiring

! WARNING

- **LOCK ALL ELECTRICAL POWER SUPPLY SWITCHES IN THE OFF POSITION BEFORE INSTALLING THE UNIT. FAILURE TO DISCONNECT POWER SUPPLY MAY RESULT IN ELECTRICAL SHOCK OR EVEN DEATH.**
- Turn off the main power switch to the Change-Over Box, the indoor unit and the outdoor unit before electrical wiring work or a periodical check is performed.
- Insulate electrical wiring, drain piping, and electrical components from threats posed by burrowing animals and temperature extremes. Failure to do so can over time, deteriorate system performance.
- Power wiring to the equipment must conform to National and Local Codes (NEC) by a professional electrician. Provide each unit with its own separate electrical circuit, means of circuit protection, and electrical disconnect switch. Follow current National Electrical Code ANSI/NFPA 70, CSA C22.1 C.E.C. Part 1, and state and local codes. Failure to provide these shut-off means could cause electrical shock or fire, resulting in damage, injury or death.
- Secure the cables. External forces on the terminals could lead to a fire.
- Tighten screws according to the following torque.
M4: 0.7 to 1.0 lbf·ft (1.0 to 1.3 N·m) (TB1, TB2)

! CAUTION

- Wrap the field-supplied insulation around the wires, and plug the wiring connection hole with the seal material to protect the product from any condensate water or insects.
- Tightly secure the wires with the cable clamp inside the Change-Over Box.
- Do not connect the ground wire to the gas pipe, condensate pipe or lightning conductor.
Gas pipe: An explosion and ignition may occur when gas leaks.
Water pipe: There is no effect of ground wire when a hard vinyl pipe is used.
Lightning conductor: The ground electric potential abnormally increases when a lightning conductor is used.

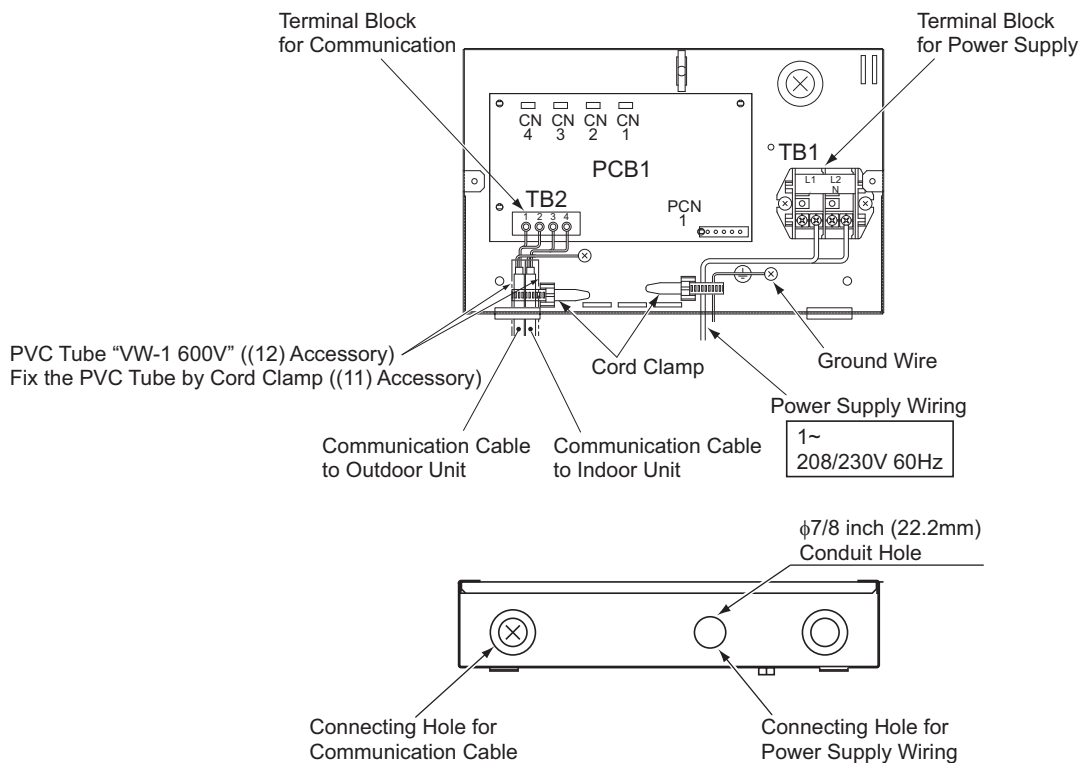
6.1 General Check

- (1) Make sure that the field-selected electrical components (main switches, fuses, GFCI (Ground Fault Circuit Interrupter), wires, conduit connectors and wire terminals) are properly selected according to the electrical data indicated in Table 6.1. Make sure that the components comply with National Electrical Code (NEC).
- (2) Communication cabling must be a minimum of 18-Gauge, 2-Conductor, Stranded Copper. Shielded cable must be considered for applications and routing in areas of high EMI and other sources of potentially excessive electrical noise to reduce the potential for communication errors. When shielded cabling is applied, proper bonding and termination of the cable shield is required as per Johnson Controls guidelines. Plenum and riser ratings for communication cables must be considered per application and local code requirements.
- (3) Use shielded communication cable for communication cabling between the indoor and the outdoor unit (Max. 3,281 ft (1,000m)), and connect the shielded part to the ground screw in the electrical box.
- (4) Make sure that the power supply voltage is within $\pm 10\%$ of the rated voltage.
- (5) Check the capacity of the electrical wires. If the power supply capacity is too low, the system cannot be started due to the voltage drop.
- (6) Make sure that the ground wire is connected.

6.2 Electrical Wiring

The electrical wiring connection for the Change-Over Box is shown in Figure 6.1.

- (1) Turn OFF the main power switch and take off the electrical box cover of Change-Over Box.
- (2) Connect the power supply wiring to L1 and L2 on the terminal block TB1, and connect ground wire to the terminals in the electrical box.
- (3) Connect the communication cable to "1", "2", "3" and "4" on the terminal block TB2 mounted on PCB1.
- (4) Tightly clamp the wires using the cord clamp inside the electrical box.
- (5) Fix the electrical box cover after completing the wiring work.



NOTE:

The accessory numbers are listed in Table 4.1.

Figure 6.1 Electrical Wiring Connection

6.3 Electrical Wiring Connection

- (1) Perform the electrical wiring work for the Change-Over Boxes. Select the wire size according to the table below.
- (2) Pay attention to the marks on the terminal block when connecting wires for Change-Over Box and I.U./O.U. Refer to “Example of Electrical Wiring” for the wiring connection on the next page.

Table 6.1 Electrical Data and Recommended Wiring, Breaker Size

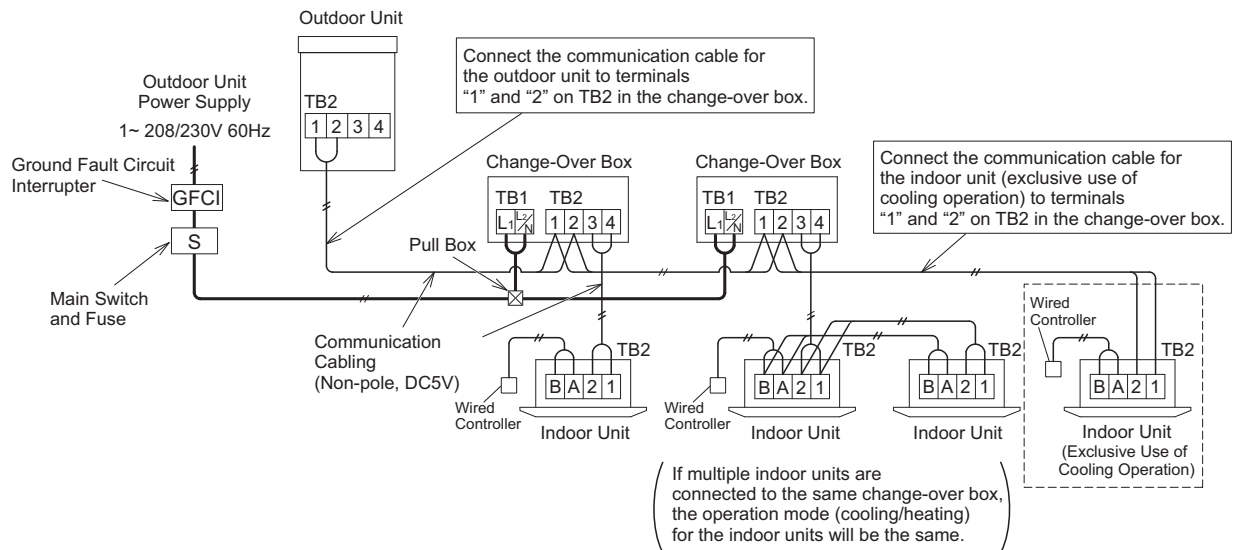
| Model | Power Supply | Minimum Wire Thickness (AWG [mm ²]) | | | | Ground Fault Circuit Interrupter Breaker | | Main Switch | | MCA (Minimum Circuit Ampacity) (A) |
|----------------------------|-------------------------|---|-----------|--------------------|-------------------------------------|--|--------------------------------|---------------------|----------|--|
| | | Power Supply Wiring Size | | Ground Wiring Size | Communi- cation Cable Size | Nominal Current (A) | Nominal Sensitive Current (mA) | Nominal Current (A) | Fuse (A) | |
| | | Main | Branch | | | | | | | |
| COBS048B21S COBS096B21S | 1~, 208/230V 60Hz | 14 [2.1] | 18 [0.82] | 18 [0.82] | 18 [0.82] | 15 | 30 | 15 | 15 | 0.1 |

NOTES:

- 1) Follow local codes and regulations when selecting field wires.
- 2) Use a shielded communication cable for the communication and take shielding ground on the ground terminal. Communication cabling must be a minimum of 18-Gauge, 2-Conductor, Stranded Copper. Shielded cable must be considered for applications and routing in areas of high EMI and other sources of potentially excessive electrical noise to reduce the potential for communication errors. When shielded cabling is applied, proper bonding and termination of the cable shield is required as per Johnson Controls guidelines. Plenum and riser ratings for communication cables must be considered per application and local code requirements.
- 3) Select the Ground Fault Circuit Interrupter Breaker whose activation speed is 0.1 sec. or less.
- 4) Total operating current must be less than 12A.

• Example of Electrical Wiring

The following figure shows an example of electrical wiring around the Change-Over Boxes.



NOTE:

- (1) Do not apply excessive voltage to the communication cabling DC5V (non-pole) between the outdoor unit and the Change-Over Box, between the Change-Over Box and the indoor unit or between Change-Over Boxes.
- (2) Use 2-Core shielded communication cable for the communication cable. (Do not use 3-Core cable or over.)
- (3) Connect the communication cable for the outdoor unit to terminals "1" and "2" on TB2 in the Change-Over Box.
- (4) Connect the communication cabling for the indoor unit exclusively for cooling operation to the terminal "1" and "2" on TB2 in the Change-Over Box.
- (5) For a Change-Over Box in the same refrigerant cycle, an electrical power supply can be supplied by one main switch.
- (6) Do not connect the power supply line (208/230V) to the terminal block for transmission line.
- (7) Connect the ground wire for the outdoor/indoor units and Change-Over Box. When ground resistance is less than 100 ohms, ground wiring work should be performed by the qualified electrician.
- (8) Insert the communication cabling into the PVC tube "VW-1 600V" (Accessory) to separate them from the power supply wiring in the Change-Over Box.

6.4 Setting of DIP Switches

DSWs on the PCB1 are set before shipping as shown below and no setting is required.

• DSW1



• DSW101



• DSW301



NOTE

The "■" mark indicates the position of DIP switches. Figures show setting before shipment.

CAUTION

Before setting DIP switches, turn OFF power the source and set the position of the DIP switches. If the switches are set without turning OFF the power supply, the switches cannot function.

7. Test Run

NOTICE

Refrigerant piping and connecting wires should be connected to the same refrigerant cycle system. If they are connected to the dissimilar refrigerant cycle systems, a malfunction may occur.

! WARNING

- **Special Attention Regarding Refrigerant Gas Leakage**

Make sure that the entire VRF system meets ASHRAE Standard 15, or any local codes, regarding Safety.

The ASHRAE Standard 15 provides safeguards for life, limb, health, and property, and prescribes safety requirements.

The standard is recognized as the main guide for personal safety involving refrigeration systems. It strives to ensure a safe application of refrigerant systems by limiting the maximum charge as follows so that a complete discharge due to a leak into a small, occupied, and enclosed room can never exceed the allowable limit.

Perform a test run according to the "Installation and Maintenance Manual" of the outdoor unit.

! WARNING

- **Do not operate the system until all the check points are cleared.**

(A) Check to ensure that the electrical resistance is more than 1 megohm by measuring the resistance between ground and the terminal block in the electrical box. If not, do not operate the system until the electrical leakage is found and repaired.

(B) Check to ensure that the stop valves of the outdoor unit are fully opened, and then start the system.

(C) Apply power to the outdoor unit(s) at least 12 hours prior to operation of the system for preheating of the compressor oil.

- **Pay attention to the following items while the system is running.**

(A) Do not touch any of the parts by hand at the discharge gas side, since the compressor chamber and the pipes at the discharge side are heated higher than 194°F (90°C).

8. Safety and Control Device Setting

Change-Over Box

| | | |
|--------------------------|--------------------------|---|
| Model | COBS048B21S, COBS096B21S | |
| For Control Circuit Fuse | A | 5 |

R410A QUICK REFERENCE GUIDE

Refer to Installation Instructions for specific installation requirements.

- R410A Refrigerant operates at 50-70 percent higher pressures than R22. Be sure that servicing equipment and replacement components are designed to operate with R410A.
- R410A Refrigerant cylinders are rose colored.
- Recovery cylinder service pressure rating must be 400 psig. DOT 4BA400 or DOT BW400.
- Recovery equipment must be rated for R410A.
- Do not use R410A service equipment on R22 systems. All hoses, gages, recovery cylinders, charging cylinders and recovery equipment must be dedicated for use on R410A systems only.
- Manifold sets must be at least 700 psig high side, and 180 psig low side, with 550 psig retard.
- All hoses must have a service pressure rating of 800 psig.
- Leak detectors must be designed to detect HFC refrigerants.
- Systems must be charged with refrigerant. Use a commercial-type metering device in the manifold hose.
- R410A can only be used with PVE or POE type oils.
- POE type oils rapidly absorb moisture from the atmosphere.
- Vacuum pumps will not remove moisture from POE type oils.
- Do not use liquid line driers with a rated working pressure rating less than 600 psig.
- Do not install suction line driers in the liquid line.
- A liquid line drier is required on every unit.
- Do not use an R22 EEV. If a EEV is to be used, it must be an R410A EEV.
- Never open system to atmosphere when under vacuum.
- If system must be opened for service, recover and evacuate system, then break the vacuum with dry nitrogen and replace filter driers, as required.