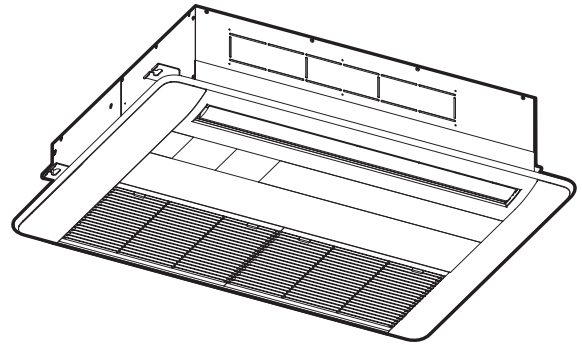


# ***Installation and Maintenance Manual***

***INVERTER-DRIVEN  
MULTI-SPLIT SYSTEM  
HEAT PUMP  
AIR CONDITIONERS***

Type	Model
1-Way Cassette	(H,Y,C)IC1006B21S
	(H,Y,C)IC1008B21S
	(H,Y,C)IC1012B21S
	(H,Y,C)IC1015B21S



## **IMPORTANT:**

***READ AND UNDERSTAND  
THIS MANUAL BEFORE  
INSTALLING THIS HEAT  
PUMP AIR CONDITIONER.  
KEEP THIS MANUAL FOR  
FUTURE REFERENCE.***

**P5417056**



## ATTENTION

Each model number and all matching model numbers within a system must have the same version of software.

Follow these steps to verify that your product model numbers have the same version of software.

- Access the main printed circuit board in each product.
- Locate a white sticker with a P-XXXX number or
- Connect a service checker and locate the ROM number.

For further assistance, please contact our Technical Support Center at **1 (844) 873-4445** and select **Option 2**.



## Important Notice

- Johnson Controls Inc. pursues a policy of continuing improvement in design and performance in its products. As such, Johnson Controls Inc. reserves the right to make changes at any time without prior notice.
- Johnson Controls Inc. cannot anticipate every possible circumstance that might involve a potential hazard.
- This heat pump air conditioning unit is designed for standard air conditioning applications only. Do not use this unit for anything other than the purposes for which it was intended for.
- The installer and system specialist shall safeguard against leakage in accordance with local pipefitter and electrical codes. The following standards may be applicable, if local regulations are not available. International Organization for Standardization: (ISO 5149 or European Standard, EN 378). No part of this manual may be reproduced in any way without the expressed written consent of Johnson Controls Inc.
- This heat pump air conditioning unit is operated and serviced in the United States of America and comes with a full complement of the appropriate Safety, Danger, and Caution, Warnings.
- If you have questions, please contact your distributor or dealer.
- This manual provides common descriptions, basic and advanced information to maintain and service this heat pump air conditioning unit which you operate as well for other models.
- This heat pump air conditioning unit has been designed for a specific temperature range. For optimum performance and long life, operate this unit within the range limits according to the table below.

### Temperature

		Maximum	Minimum
Cooling Operation	Indoor	89°F DB/73°F WB (32°C DB/23°C WB)	69°F DB/59°F WB (21°C DB/15°C WB)
	Outdoor	118°F DB (48°C DB) *	14°F DB (-10°C DB) *
Heating Operation	Indoor	80°F DB (27°C DB)	59°F DB ( 15°C DB)
	Outdoor	59°F WB (15°C WB) *	-4°F WB (-20°C WB) *

DB: Dry Bulb, WB: Wet Bulb

\* The temperature may change depending on the outdoor unit.

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

## Product Inspection upon Arrival

1. Upon receiving this product, inspect it for any damages incurred in transit. Claims for damage, either apparent or concealed, should be filed immediately with the shipping company.
2. Check the model number, electrical characteristics (power supply, voltage, and frequency rating), and any accessories to determine if they agree with the purchase order.
3. The standard utilization for this unit is explained in these instructions. Use of this equipment for purposes other than what it designed for is not recommended.
4. Please contact your local agent or contractor as any issues involving installation, performance, or maintenance arise. Liability does not cover defects originating from unauthorized modifications performed by a customer without the written consent of Johnson Controls, Inc. Performing any mechanical alterations on this product without the consent of the manufacturer will render your warranty null and void.



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## 1. Introduction

Read following sections carefully before installing this product.

Read over the "Installation and Maintenance Manual" for the outdoor unit as well.

Forward this information, and the warranty to all installers and users.

Ask end users to maintain copies for future reference.

(Refrigerant Piping Work) → (Electrical Wiring Work) → (Ref. Charge Work) → (Test Run) → (User)

- For details on wiring between the indoor unit and the outdoor unit, refer to the "Installation and Maintenance Manual" for the outdoor unit.
- For details on the optional decorative panel, refer to the "Installation and Maintenance Manual" for the optional decorative panel.
- For details on the optional controller, refer to the "Installation and Maintenance Manual" for that optional controller module.
- For details on each optional part, refer to the "Installation and Maintenance Manual" for each optional part.
- For central controller, refer to the "Installation and Maintenance Manual" for the central controller.

## 2. Safety Instructions

### Signal Words

**⚠ WARNING**

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

**⚠ CAUTION**

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

**NOTICE**

Indicates information considered important, but not hazard-related (for example, messages relating to property damage).

### General Precautions

**⚠ WARNING**

To reduce the risk of serious injury or death, read these instructions thoroughly and follow all warnings or cautions included in all manuals that accompanied the product and are attached to the unit. *Refer back to these safety instructions as needed.*

- This system should be installed by personnel certified by Johnson Controls, Inc. Personnel must be qualified according to local, state and national building and safety codes and regulations. Incorrect installation could cause leaks, electric shock, fire or explosion. In areas where Seismic "Performance requirements are specified, the appropriate measures should be taken during installation to guard against possible damage or injury that might occur in an earthquake if the unit is not installed correctly, injuries may occur due to a falling unit.
- Use appropriate Personal Protective Equipment (PPE), such as gloves and protective goggles and, where appropriate, have a gas mask nearby. Also use electrical protection equipment and tools suited for electrical operation purposes. Keep a wet cloth and a fire extinguisher nearby during brazing. Use care in handling, rigging, and setting of bulky equipment.
- When transporting, be careful when picking up, moving and mounting these units. Although the unit may be packed using plastic straps, do not use them for transporting the unit from one location to another. Do not stand on or put any material on the unit. Get a partner to help, and bend with your knees when lifting to reduce strain on your back. Sharp edges or thin aluminum fins on the air conditioner can cut fingers, so wear protective gloves.



- Do not touch or adjust any safety devices inside the indoor or outdoor units. All safety features, disengagement, and interlocks must be in place and functioning correctly before the equipment is put into operation. If these devices are improperly adjusted or tampered with in any way, a serious accident can occur. Never bypass or jump-out any safety device or switch.
- Before servicing, turn-OFF the power supply and use accepted lockout and tag out procedures at all main switches.
- This unit is the pressurized system. Never loosen threaded joints while the system is under pressure and never open pressurized system parts.
- Johnson Controls will not assume any liability for injuries or damage caused by not following steps outlined or described in this manual. Unauthorized modifications to Johnson Controls products are prohibited as they...
  - May create hazards that could result in death, serious injury or equipment damage;
  - Will void product warranties;
  - May invalidate product regulatory certifications;
  - May violate OSHA standards;

## NOTICE

Take the following precautions to reduce the risk of property damage.

- Be careful that moisture, dust, or variant refrigerant compounds not enter the refrigerant cycle during installation work. Foreign matter could damage internal components or cause blockages.
- If air filters are required on this unit, do not operate the unit without the air filter set in place. If the air filter is not installed, dust may accumulate and breakdown may result.
- Do not install this unit in any place where silicon gases can coalesce. If the silicon gas molecules attach themselves to the surface of the heat exchanger, the finned surfaces repel water. As a result, any amount of drainage moisture condensate can overflow from the condensate pan and could run inside of the electrical box, possibly causing electrical failures.
- When installing the unit in a hospital or other facility where electromagnetic waves are generated from nearby medical and/or electronic devices, be prepared for noise and electronic interference Electromagnetic Interference (EMI). Do not install where the waves can directly radiate into the electrical box, controller cable, or controller. Inverters, appliances, high-frequency medical equipment, and radio communications equipment may cause the unit to malfunction. The operation of the unit may also adversely affect these same devices. Install the unit at least 10 ft. (3m) away from such devices.
- When a wireless controller is used, locate at a distance of at least 3.3 ft. (1m) between the indoor unit and electric lighting. If not, the receiver part of the unit may have difficulty receiving operation commands.
- Do not install the unit in any location where animals and plants can come into direct contact with the outlet air stream. Exposure could adversely affect the animals and plants.
- Do not install the unit with any downward slope to the side of the drain adaptor. If you do, you may have condensate water flowing back, which may cause leaks.
- Be sure the condensate hose discharges water properly. If connected incorrectly, it may cause leaks.
- Do not install the unit in any place where oil can seep onto the units, such as table or seating areas in restaurants, and so forth. For these locations or social venues, use specialized units with oil-resistant features built into them. In addition, use a specialized ceiling fan designed for restaurant use. These specialized oil-resistant units can be ordered for such applications. However, in places where large quantities of oil can splash onto the unit, such as a factory, even the specialized units cannot be used. These products should not be installed in such locations.

## Installation Precautions

### ! WARNING

To reduce the risk of serious injury or death, the following installation precautions must be followed.

- When installing the unit into...
  - A wall: Make sure the wall is strong enough to hold the unit's weight. It may be necessary to construct a strong wood or metal frame to provide added support.
  - A room: Properly insulate any refrigerant tubing run inside a room to prevent "sweating" that can cause dripping and water damage to wall and floors.



- Damp or uneven areas: Use a raised concrete pad or concrete blocks to provide a solid, level foundation for the unit to prevent water damage and abnormal vibration.
  - An area with high winds: Securely anchor the outdoor unit down with bolts and a metal frame. Provide a suitable wind baffle.
  - A snowy area: Install the outdoor unit on a raised platform that is higher than drifting snow. Provide snow protection hood.
- Do not install the unit in the following places. Doing so can result in an explosion, fire, deformation, corrosion, or product failure.
  - Explosive or flammable atmosphere
  - Where a fire, oil, steam or powder can directly enter the unit, such as nearby or above a kitchen stove.
  - Where oil (including machinery oil) may be present.
  - Where corrosive gases such as chlorine, bromine, or sulfide can accumulate, such as near a hot tub or a hot spring.
  - Where dense, salt-laden airflow is heavy, such as in coastal regions.
  - Where the air quality is of high acidity.
  - Where harmful gases can be generated from decomposition.
- Do not position the condensate pipe for the indoor unit near any sanitary sewers where corrosive gases may be present. If you do, toxic gases can seep into breathable air spaces and can cause respiratory injuries. If the condensate pipe is installed incorrectly, water leakage and damage to the ceiling, floor, furniture, or other possessions may result. If the condensate pipe becomes clogged, water may drip from the indoor unit. Do not install the indoor unit where such dripping can cause moisture damage or uneven locations: Use a raised concrete pad or concrete blocks to provide a solid, level foundation for the unit to prevent water damage and abnormal vibration.
- Before performing any brazing work, be sure that there are no flammable materials or open flames nearby.
- Perform a test run to ensure normal operation. Safety guards, shields, barriers, covers, and protective devices must be in place while the compressor/unit is operating. During the test run, keep fingers and clothing away from any moving parts.
- Clean up the site when finished, remembering to check that no metal scraps or bits of wiring have been left inside the unit being installed.

After installation work for the system has been completed, explain the “Safety Precautions,” the proper use and maintenance of this unit to the customer according to the information in all manuals that came with the system. All manuals and warranty information must be given to the user or left near the Indoor Unit.

## Refrigerant Precautions



To reduce the risk of serious injury or death, the following refrigerant precautions must be followed.

- 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 home 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 Johnson Controls distributors. Use of any non-approved refrigerant substitutes will void the warranty and will increase the potential risk of injury or death.
- If installed in a small room, take measures to prevent the refrigerant from exceeding the maximum allowable concentration in the event that refrigerant gases should escape. The installation should meet the requirements in ASHRAE Standards 15 and 34. If refrigerant gas has leaked during the installation work, ventilate the room immediately.
- Before installation is complete, make sure that the refrigerant leak test has been performed. If refrigerant gases escape into the air, turn OFF the main switch, extinguish any open flames and contact your service contractor. Refrigerant (Fluorocarbon) for this unit is odorless. If the refrigerant should leak and come into contact with open flames, toxic gas could be generated. Also, because the fluorocarbons are heavier than air, they settle to the floor, which could cause asphyxiation.



- When installing the unit, and connecting refrigerant piping, keep all piping runs as short as possible, and make sure to securely connect the refrigerant piping before the compressor starts operating. If the refrigerant piping is not connected, and the compressor activates with the stop valve opened, the refrigerant cycle is subjected to extremely high pressure, which can cause an explosion or fire.
- Tighten the flare nut with a torque wrench in the specified manner. Do not apply excessive force to the flare nut when tightening. If you do, the flare nut can crack and refrigerant leakage may occur.
- A compressor/unit comprises a pressurized system. Never loosen threaded joints while the system is under pressure and never open pressurized system parts.
- When maintaining, relocating, and disposing of the unit, dismantle the refrigerant piping after the compressor stops.

## Electrical Precautions



Take the following precautions to reduce the risk of electric shock, fire or explosion resulting in serious injury or death.

- Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause serious injury or death.
- Before servicing, open and tag all disconnect switches. Never assume electrical power is disconnected. Check with meter and equipment.
- Only use electrical protection equipment and tools suited for this installation.
- Use specified cables between units.
- Communication cable shall be a minimum of AWG18 (0.82mm<sup>2</sup>), 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 cable 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.
- Use an exclusive power supply for the air conditioner at the unit's rated voltage.
- Be sure to install circuit breakers (ground fault interrupter, isolating switch, molded case circuit breaker and so on), with the specified capacity. Ensure that the wiring terminals are tightened securely to recommended torque specifications. If a circuit breaker or fuse is frequently activated, shut down the system and contact your service contractor.
- Clamp electrical wires securely with a cable band after all wiring is connected to the terminal block. In addition, run wires securely through the wiring access channel.
- When installing the power lines, do not apply tension to the cables. Secure the suspended cables at regular intervals, but not too tightly.
- Make sure that the terminals do not come into contact with the surface of the electrical box. If the terminals are too close to the surface, it may lead to failures at the terminal connection.
- Turn OFF and disconnect the unit from the power supply when handling the service connector. Do not open the service cover or access panel to the indoor or outdoor units without turning OFF the main power supply.
- After stopping operation, be sure to wait at least five minutes before turning off the main power switch. Otherwise, water leakage or electrical breakdown may result. Disconnect the power supply completely before attempting any maintenance for electrical parts. Confirm that no residual voltage is present after disconnecting the power supply.
- Do not clean with, or pour water into, the controller as it could cause electric shock and/or damage the unit. Do not use strong detergent such as a solvent. Clean with a soft cloth.
- Check that the ground wiring is securely connected. Do not connect ground wiring to gas piping, water piping, lighting conductor, or telephone ground wiring.
- If a circuit breaker or fuse is frequently activated, shut down the system and contact your service contractor.



## **CAUTION**

- Proper handling of this unit requires two-people. Safe handling and installing the indoor unit requires the strength of two people. Mounting the unit alone may cause injury due to fall of the unit. Although the unit may be girded with steel banding, do not use it for transportation. Avoid contact with finned surfaces of the heat exchanger as sharp edges can cause severe injury to hands and fingers. Use appropriate work gloves for the job.

## **NOTICE**

- The optional decorative panel can become deformed if the positioning of the indoor units suspension brackets are not stable or level. Condensation can accumulate in low spots as a result due to escaping air through any resulting gaps between the indoor unit and the decorative panel.
- Check to ensure that the condensate hose discharges moisture properly. If connected incorrectly, it can result in leakage and damage to furniture.
- Make sure to use the factory-supplied condensate hose and hose clamp. Other makes can cause moisture leakage.
- Do not bend or twist the factory-supplied condensate hose. This could compromise the seal and result in moisture leakage.
- Do not apply an excessive force to the condensate pipe connection. This can also compromise the seal properties of the connection.
- Verify that the installed unit is level with floor and ceiling surfaces. Any variance or inclination can cause moisture to back up into the condensate pan, overflow, and seepage onto ceiling or wall surfaces, and cause damage to carpeted surfaces or furniture below.
- Do not install this system in close proximity to septic sewer lines where flammable and toxic gases can coalesce.
- Inspect the condensate pan before the onset of winter to drain away all accumulated moisture in the pan.
- The heat exchanger of indoor unit overheats whenever there is a slight amount of refrigerant circulating during slowdown or stoppage. As a result, moisture in the condensate pan evaporates where it can condense on ceiling or wall surfaces.
- After the drain check is completed, insert the rubber plug again and seal the gap with a silicon sealant.

## **Electrical Installation**

## **WARNING**

In some cases, the packaged air conditioner may not be operated normally under the following cases:

- When electrical power for the packaged air conditioner is supplied from the same power transformer as the external equipment.
- When the power supply wiring for the external equipment and the packaged air conditioner are located close to each other.

Regarding that mentioned above, surge voltage may be inducted into the power supply wiring for the crated air conditioner due to a spike in power consumption for this device and an activation of the switch. Check the field regulations and standards before performing any electrical work in order to safeguard the power supply for the crated air conditioner unit.



### 3. Before Installation

#### 3.1 Combination of Outdoor Unit and Indoor Unit

The combination capacity of indoor unit against the outdoor unit is selected depending on the outdoor unit capacity. Refer to the "Installation and Maintenance Manual" for the outdoor unit to decide the required combination of indoor and outdoor units, and the combination unit capacity.

#### 3.2 Transportation and Handling

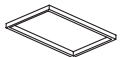
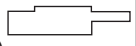
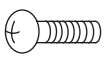









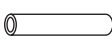

- (1) Transport the product as close to the installation location as possible before unpacking.
- (2) Do not lay any objects on the indoor unit.
- (3) The indoor unit comes crated upside-down with the foam polystyrene condensate pan positioned on top.  
Do not invert the unit until it is ready to be suspended above the floor. Inverting the unit while on the floor will crush the condensate pan. Do not handle the unit by grabbing at the polystyrene pan and other air outlets as they are fragile and will sustain damage.
- (4) The indoor unit handle is fabricated from foam polystyrene and is susceptible to breakage if any excessive force is applied as a result of mishandling of the unit during installation.



### 3.3 Factory-Supplied Accessories

- (1) Check to ensure the following accessories are packed with the indoor unit.  
The screws and washers are put in the pipe insulation.

inch (mm)

Accessory		Qty.	Purpose
Pattern Board/Template (Carton Board)		1	For Adjusting Space of False Ceiling Opening and Positioning of Unit
Checking Scale (Cut and Remove it from Carton Board)		1	
Cross Recessed Head Screws (M6)		4	For Fitting Paper Pattern
Washer with Insulation Material (M10)		4	For Unit Installation
Washer (M10)		4	
Condensate Hose		1	For Condensate Hose Connection
Hose Clamp		1	
Pipe Insulation		1	For Refrigerant Piping Connection
Pipe Insulation		1	
Cable Band		2	For Securing Wired Controller Cable
Cable Band		6	For Piping Insulation
Insulation 3/16T x 10-5/8 x 10-5/8 (5T x 270 x 270)		1	For Covering Condensate Connection
PVC Tube		2	For Separating Communication Cables and Wired Controller Cables from Power Supply Wirings 7/16 ID (11 ID)
Cable Band		5	

## NOTICE

The decorative panel, controller, branch piping, grille for front discharge, and air outlet shutter plate (for installing to clipped ceiling) are optional accessories and are not included with the indoor unit.  
If necessary, please contact your contractor.

- (2) Do not insert or leave any foreign objects inside the indoor unit and verify that no foreign objects remain inside in the indoor unit before the installation and Test Run. Failure to do this can result in equipment failure and damage to the unit.
- (3) Necessary Tools and Instrument List for Installation

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

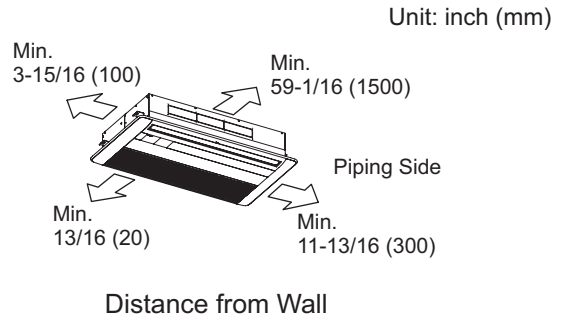
#### NOTE:

Use tools and measuring instruments (vacuum pump, gas hose, charging cylinder, and manifold gauge) exclusively for the refrigerant R410A.

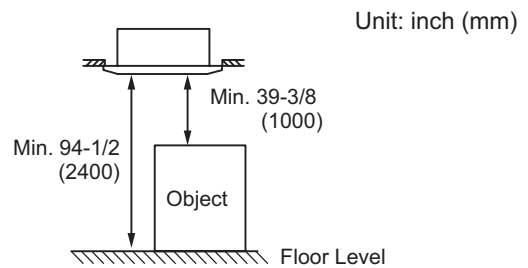
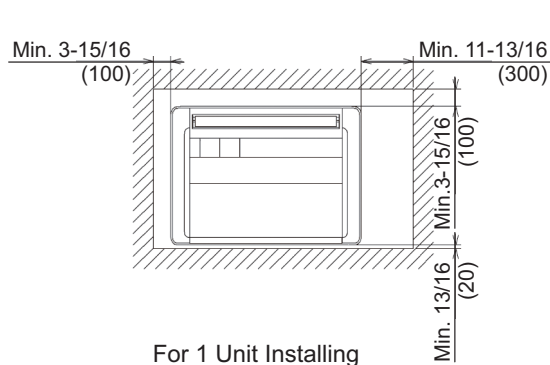


## 4. Installation Location

- (1) Install the indoor unit with a proper distance from the walls as shown in the figure on the right.



- (2) Install the indoor unit with sufficient space around it for operation and maintenance access as shown below. Do not leave combustible materials inside the service space of the indoor unit.

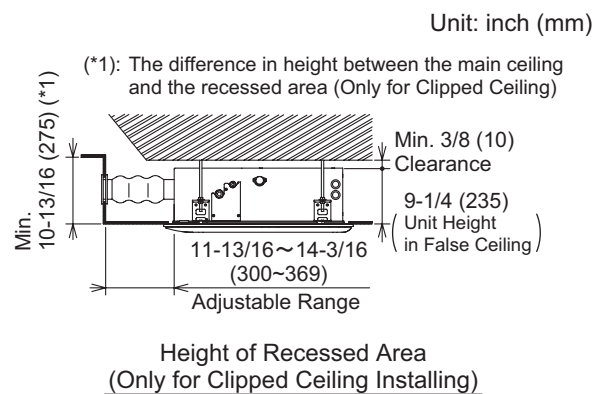


**NOTE:**  
This figure indicates the minimum service space.  
There are no obstacles which can impede the suction air and discharge air.

### Service Space

- (3) Select the installation location as follows:

- Minimum Space
- Down slope gradient of condensate pipe: 1/25 to 1/100
- The installing height for the indoor unit must be a minimum 7.9 ft (2.4m) from floor level.

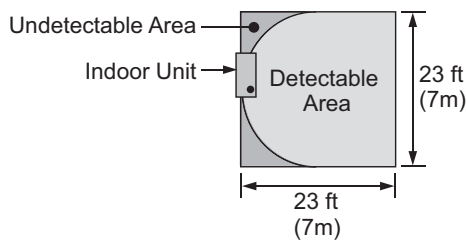


- (4) Select a suitable location for the indoor unit to allow for uniform air distribution.  
In addition, do not install where the ceiling height exceeds the heights indicated in the following table depending on the unit capacities.

Model	Max. Ceiling Height from Floor Level
(H,Y,C)IC1006B21S	9.8 ft (3m)
(H,Y,C)IC1008B21S	
(H,Y,C)IC1012B21S	11.5 ft (3.5m)
(H,Y,C)IC1015B21S	

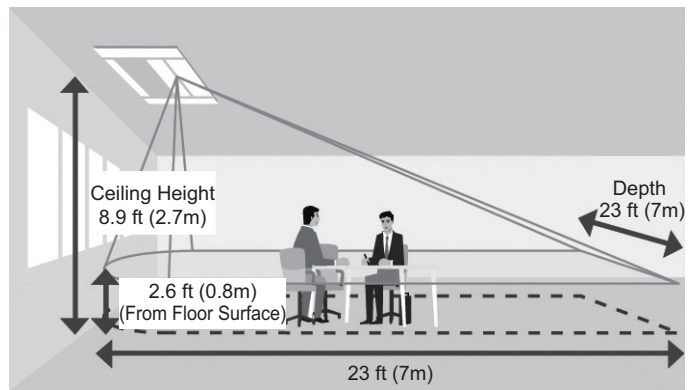


- (5) Install the unit where there are no obstacles which can impede the suction air and discharged air.
- (6) Check that the ceiling is strong enough to hang the indoor unit. Also check that the ceiling surface is flat and suitable for the decorative panel (option) installation. If the ceiling is not flat, condensate water will not flow smoothly.
- (7) Do not install the unit near a door or a window where the indoor unit come into contact with humid outside air. Otherwise, condensation may occur.
- (8) In the event that temperature and humidity levels inside the ceiling exceed 86°F (30°C)/RH (Relative Humidity) 80%, apply additional insulation materials to the external surface of the indoor unit to avoid condensation.
- (9) If installing the indoor unit to a high ceiling, the warmed air will remain near the ceiling during heating operation. Thus, a parallel installation of a circulator is recommended.
- (10) Do not install the indoor unit where airflow from the air outlet blows directly onto temperature detection devices such as an alarm device or a control device. It can result in a failure of either device.
- (11) The detecting area for the motion sensor kit (option) is shown in the figure below.



**NOTE:**

There is an area that the motion detector in the indoor unit cannot sense as shown in the graphics above.

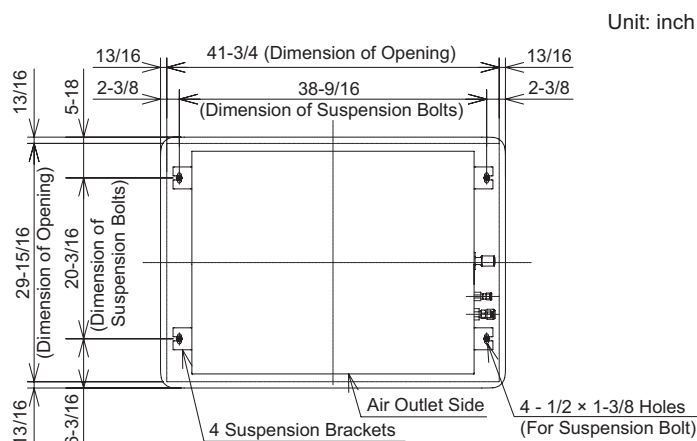




## 5. Installation Work

### 5.1 Opening of False Ceiling and Location of Suspension Bolts

- (1) Determine the final location and installation orientation of the indoor unit with respect to the space allowed for piping, wiring and maintenance.
- (2) Then cut away the false ceiling area for the indoor unit installation and install suspension bolts.
- (3) The dimensions for an opening false ceiling and location of suspension bolts are as shown below.

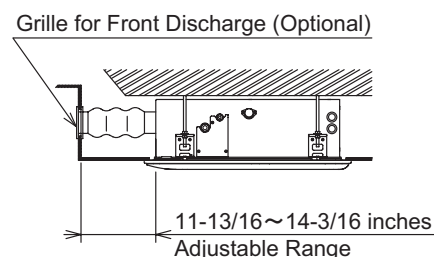


#### For a Clipped Ceiling

In the case of the installation to a clipped ceiling, adjust the distance between the grille for front discharge and the indoor unit as shown in the figure on the right.

#### NOTE:

Details of installing method of the optional parts for the grille for front discharge and the air outlet shutter plate are listed in each "Installation Manual".



- (4) Ceiling work differs depending on the building structure. Consult with a building constructor or an interior finish worker for more information.

#### NOTE:

Do not install electric lighting in too close proximity to the unit as unit operation can cause the lights to flicker.

### 5.2 Installing Suspension Bolts

- (1) Reinforce the designated opening in the false ceiling area. Use approved materials of sufficient tensile strength to allow for quality installation.
- (2) Strengthen suspension bolts with support plates as required in preparation for an earthquake. Use field-supplied M10 suspension bolts and support plates.

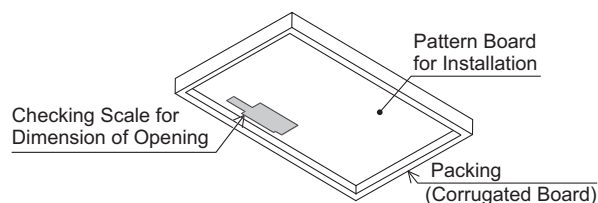
For Wooden Beam	For Steel Beam						
Install the indoor unit to the tie beam (for single-storied building) or to the second floor girder (for two-storied building ), and use sufficiently strong squared timber shown below.	Install suspension bolts so that it can withstand the indoor unit weight load.						
<div>inch (mm)</div> <table><tr><th>Interval between Beams</th><th>Squared Timber</th></tr><tr><td>≤ 35-7/16 (900)</td><td>2-3/8 (60) square</td></tr><tr><td>≤ 70-7/8 (1800)</td><td>3-9/16 (90) square</td></tr></table>	Interval between Beams	Squared Timber	≤ 35-7/16 (900)	2-3/8 (60) square	≤ 70-7/8 (1800)	3-9/16 (90) square	<p>5-7/8 to 6-5/16 inches</p> <p>Insert (221 to 331 lbs)</p> <p>Concrete</p> <p>Steel</p> <p>Suspension Bolt (W3/8 or M10)</p>
Interval between Beams	Squared Timber						
≤ 35-7/16 (900)	2-3/8 (60) square						
≤ 70-7/8 (1800)	3-9/16 (90) square						



### 5.3 Working Procedure

- (1) Size the opening to the correct dimensions to facilitate easy and repeated installation by using the pattern board (template).

The template provided for the installation comes with a scale printed on a portion of the outer packaging. Detach this area with the printed scale to use in sizing and checking the opening. Refer to the procedure shown in Item 5.

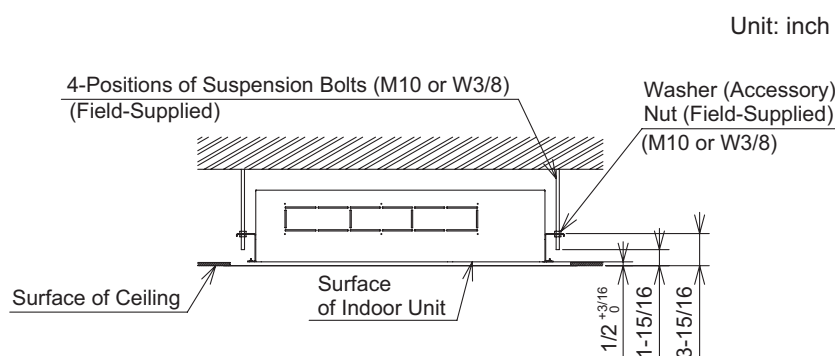


- (2) Mounting Position of Indoor Unit

The mounting position of the indoor unit is shown in the figure below.

Field-Supplied Parts

- Suspension Bolts (M10 or W3/8) ... Qty.: 4
- Nuts (M10 or W3/8)..... Qty.: 8



## NOTICE

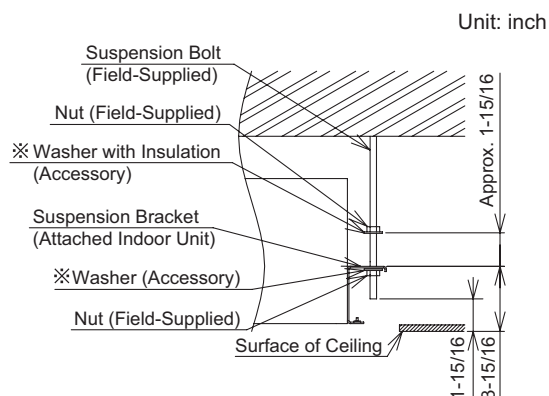
The optional decorative panel can become deformed if any one of the unit suspension brackets are not installed correctly. If the unit is not level, condensation can form and settle due to gaps and escaping air between the unit and the decorative panel.

- (3) Mounting Nuts and Washers

Mount nuts and washers onto the suspension bolts before mounting the indoor unit.

#### NOTE:

- ※ Make sure to use washers (accessory) for installing the suspension bolts to the suspension brackets. Install the washer with the insulation side facing down for suspended installation applications. This way, the washers themselves remain in position on the suspension bolts during the installation phase.



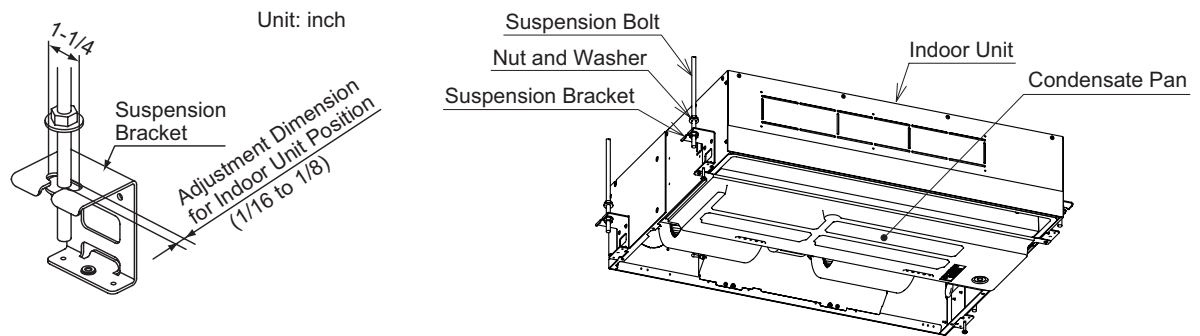


#### (4) Mounting the Indoor Unit

- Hoist the indoor unit but do not apply any force against the condensate pan (the air outlet portions and the condensate pan portion). If there is insufficient access for a hoist, the work must be performed manually by two skilled installers.
- Suspend the unit by handling the suspension brackets at all four corners of the unit. Do not apply any pressure onto the polystyrene condensate pan or pan outlets during the installation process.
- Insert the suspension bolts into the notches of the suspension brackets to capture the unit. Secure the unit using nuts and washers. Then check that the washers serve as stoppers at the rising parts of the suspension brackets.

**NOTE:**

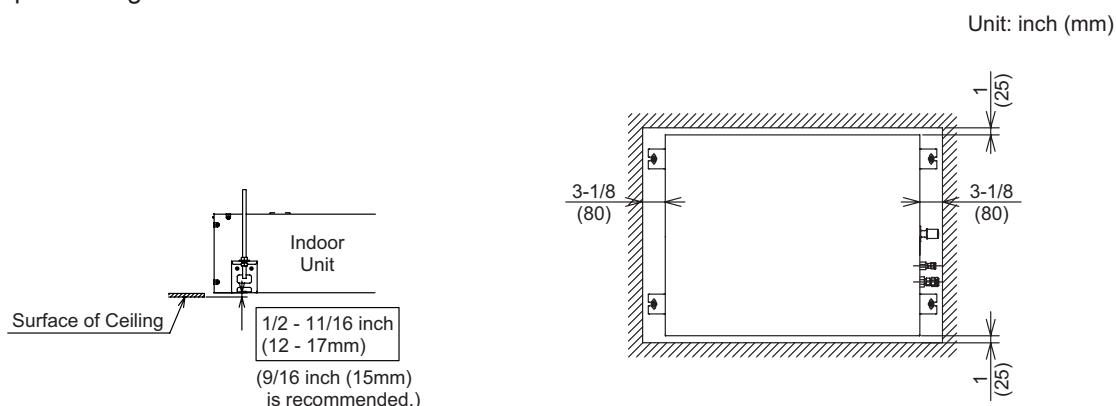
After securing the unit, piping and electric power needs to be installed inside the ceiling area adjacent to the unit. If a false ceiling is already in place, determine the proper pathway for piping and electrical lines before the unit is installed.



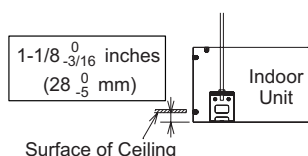


(5) Spatial adjustments to accommodate the unit into a false ceiling:

- Adjust the position of the indoor unit as shown in the figure below and keep the mounting position of the unit within 1/2 - 11/16 inch (12 - 17mm). [ 9/16 inch (15mm) is recommended. ]
- The pattern board (template) for the installation and the checking scale are printed on the packing. Cut away the printed scale used for sizing the opening from the outer packing and use for positioning the indoor unit.



- When utilizing the optional panel spacer, the indoor unit mounting position is different from the standard one. Make sure to adjust the indoor unit mounting position as shown in the figure below. As for the panel spacer, the pattern board (template) and the checking scale are also printed on the corrugated board of its packing.



When Space Panel is Used

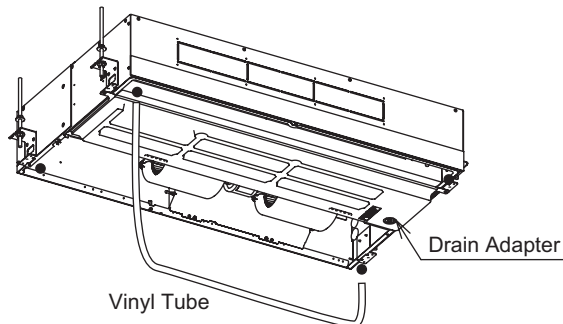
<p>(a) False ceiling applications:</p> <p>When installing the indoor unit to the false ceiling with an opening:</p> <ul style="list-style-type: none"> <li>• Cut off the scale for measuring the dimension of the opening.</li> <li>• Adjust the clearance between the indoor unit and the opening, as shown in the figure.</li> </ul>	<p>Check the dimension of opening at each side.</p> <p>Checking Scale for Dimension of Opening</p> <p>Attach the scale to the bottom surface.</p> <p>Attach the scale to the ceiling surface.</p>
<p>(b) False ceiling applications (without opening):</p> <p>If there is no opening in the existing false ceiling, provide an opening in it before mounting the indoor unit:</p> <ul style="list-style-type: none"> <li>• Cut off the checking scale for dimension of the opening from packing to adjust the opening of the false ceiling.</li> <li>• Cut out the false ceiling along the outline of the pattern board.</li> <li>• After hooking up the indoor unit, adjust the position according to the procedure (a) above.</li> </ul>	<p>Dimension of Opening</p> <p>Condensate Pan Portion</p> <p>Packing (Corrugated Board)</p> <p>Pattern Board</p> <p>Cut a pattern board out by box cutter</p>
<p>(c) Incomplete false ceiling applications (panel not in place):</p> <ul style="list-style-type: none"> <li>• Cut off the checking scale for dimension of the opening from packing to adjust the opening of the false ceiling.</li> <li>• Cut off the condensate pan portion of the packing as shown in the figure.</li> <li>• Attach the pattern board to the indoor unit with the screw (M6), as shown in the figure.</li> <li>• Specify the location of the opening.</li> <li>• Adjust the position of the indoor unit as the procedure (a) above after ceiling is completed with the panel.</li> </ul>	<p>Suspension Bolt</p> <p>Indoor Unit</p> <p>Ceiling Surface</p> <p>Screw (M6)</p> <p>Pattern Board</p>



- (6) Tighten the nuts on the suspension brackets after adjustments are completed. LockTite thread lock compound to the suspension bolts and nuts in order to prevent them from loosening. Adjust the indoor unit into correct position, using the scale of the pattern board (template).

**NOTE:**

While adjusting the clearance spacing between the indoor unit and the ceiling surface, keep the indoor unit level. Otherwise, it may cause a malfunction of the float switch. Verify the vertical alignment of the unit with a level.



Verify the vertical alignment at each corner (●) of the unit with a level or by pouring water to the clear vinyl tube as shown in the figure.

**NOTE:**

Mount the indoor unit correctly without a downward slope from the drain adapter side. Otherwise it may cause water leakage.

## NOTICE

- Install the decorative panel in accordance with the "Installation Manual" for the decorative panel.
- Confirm that all connections between the unit and the decorative panel (except one-way airflow type for clipped ceiling) and are secure.
- The details for installation work for the wired controller shall be according to the "Installation Manual" for the wired controller.



## 6. Refrigerant Piping Work

### **⚠ DANGER**

Use the specified non-flammable refrigerant (HFC R410A) for the outdoor unit refrigerant cycle. Do not charge the unit with anything other than HFC R410A, such as hydrocarbon refrigerants (propane and Isobutene), oxygen, and other flammable gases (acetylene, ammonia, and so forth), or any poisonous gases when installing, maintaining and moving the unit. These substances are volatile and dangerous and can result in fire, explosion, and serious or fatal injuries.

For details of refrigerant piping work, vacuum pump and refrigerant charging, refer to the "Installation and Maintenance Manual" for the outdoor unit.

### 6.1 Piping Materials

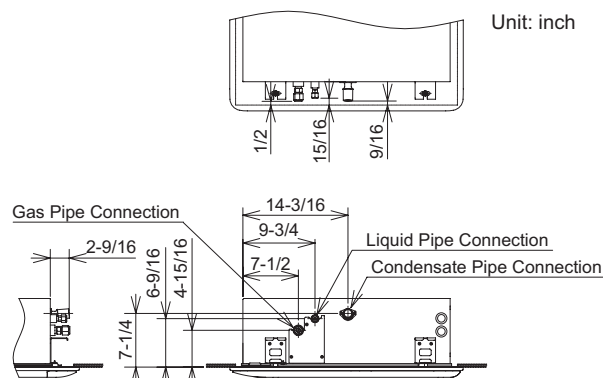
- (1) Tolerances of refrigerant piping length depends on the combination with the outdoor unit. Refer to the "Installation and Maintenance Manual" for the outdoor unit.
- (2) Select the piping size from the following table.

Table 6.1 Piping Size

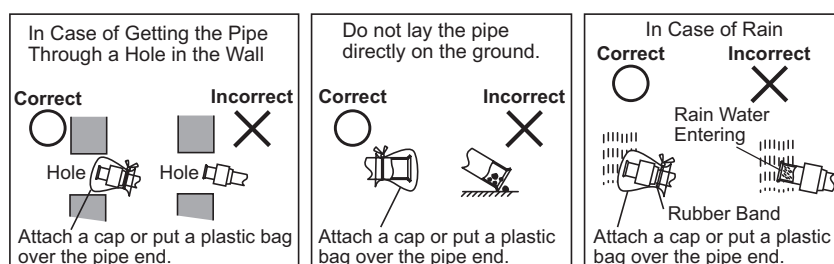
Model	Gas Piping	Liquid Piping
(H,Y,C)IC1006B21S	1/2 (12.7)	1/4 (6.35)
(H,Y,C)IC1008B21S		
(H,Y,C)IC1012B21S		
(H,Y,C)IC1015B21S		

inch (mm)

### (3) Piping Connections



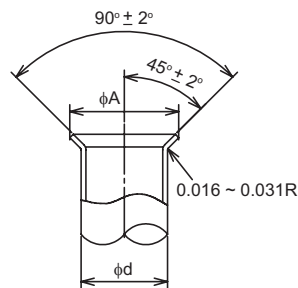
- (4) Prepare field-supplied copper pipes.
- (5) Select clean copper pipes. Make sure there is no dust or moisture inside.
- (6) The refrigerant oil for the refrigerant R410A is susceptible to moisture, an oxide film, and fatty oil. Take special care during the installation so that moisture, contaminations or old refrigerant oil will not enter the refrigerant cycle. Otherwise, impurities may adhere to the expansion valve and may prevent proper operation.
- (7) When cutting piping, do not use conventional tools such as saws or grinding wheel cutting disks that produce harmful metallic filings and burrs that can damage a refrigerant system. Use a pipe cutter to eliminate metal filings produced by the cutting operation. After the cut is made, blow out each pipe with dry compressed air or nitrogen to remove this residue before making pipe connections.





## 6.2 Piping Connection

- (1) Perform the flaring work as shown below.



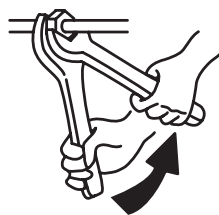
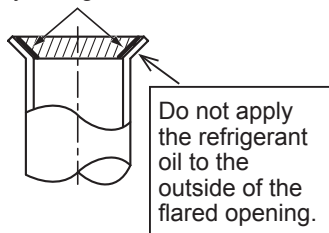
Diameter (d)	inch (mm) A <sup>+0</sup> -0.02 (-0.4)
1/4 (6.35)	0.36 (9.1)
3/8 (9.52)	0.52 (13.2)
1/2 (12.7)	0.65 (16.6)
5/8 (15.88)	0.78 (19.7)

- (2) Use specific flare nut attached to the unit. (The flare nut is based on JIS B 8607.)
- (3) Verify that there are no scratches, burrs stuck to internal surfaces, or surface deformations at the flared opening.
- (4) Before tightening the flare nut, apply the refrigerant oil (Field-Supplied) in a thin layer over the flare. (Do not apply the oil on other portions.) Tighten the flare nut for the liquid pipe to the specified torque with two wrenches. Then, tighten the flare nut for the gas pipe in the same way. After the tightening, check that no refrigerant leak occurs.

### NOTES:

1. Refrigerant oil is field-supplied.  
[Ethereal Oil FVC50K, FVC68D (Idemitsu Kousan Co. Ltd.)]
2. If the refrigerant oil comes into contact with decorative panel, it may cause a crack. Use with caution.

Apply Refrigerant Oil.



Required Tightening Torque

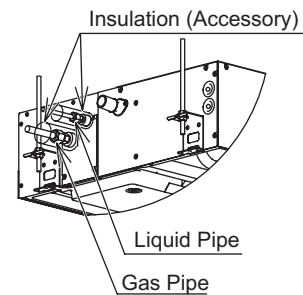
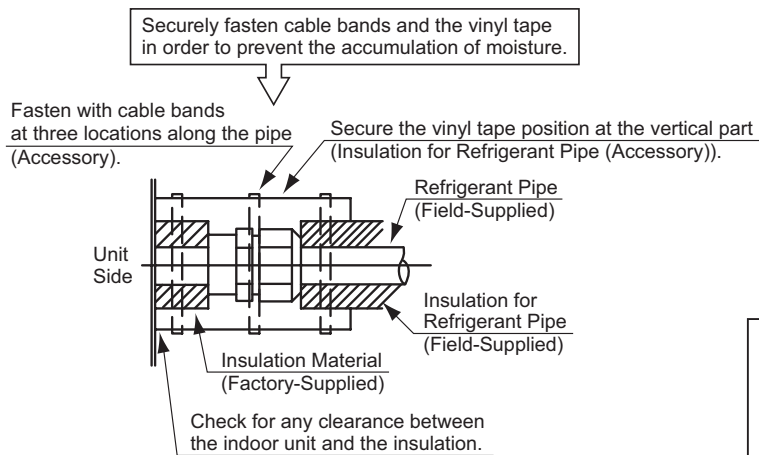
(JIS B 8607)

Pipe Size	Tightening Torque
$\phi 1/4$ inch (6.35 mm)	10.3 - 13.3 ft·lbs (14 - 18 N·m)
$\phi 3/8$ inch (9.52 mm)	25.1 - 31.0 ft·lbs (34 - 42 N·m)
$\phi 1/2$ inch (12.7 mm)	36.1 - 45.0 ft·lbs (49 - 61 N·m)
$\phi 5/8$ inch (15.88 mm)	50.2 - 60.5 ft·lbs (68 - 82 N·m)

- (5) Wherever buried piping exists on site, make sure there is a service doorway to provide adequate access to inspect piping sockets and elbows, and for interconnecting parts.
- (6) Piping must be reinforced to withstand earthquakes so as not to be damaged by an external force.
- (7) Do not tightly secure refrigerant piping to accommodate expansion and contraction.
- (8) Prevent the pipes from contacting weak portions such as wall, ceiling, or something similar. (Otherwise, an abnormal sound may be heard due to vibration of the piping.)
- (9) Leak test all piping and connections. The procedures should be performed in accordance with the "Installation and Maintenance Manual" for the outdoor unit.
- (10) If temperature and humidity inside the ceiling exceed 80.6°F (27°C)/RH80%, condensation occurs on the surface of the accessory insulation. Wrap additional insulation (approximately 3/16~3/8 inch (5~10mm) thickness) around the accessory insulation of the refrigerant pipe as a preventive measure.



- (11) Insulate each flare connection without gap with accessory insulations to prevent condensation. Then insulate each refrigerant pipe as well.



- Connect the gas piping after the connection work for liquid piping.
- Insulate the flare nut connections with accessory insulation.
- Wrap the accessory insulations to the piping connections without gap.

- (12) If a leak detecting foam is used, avoid contact with the decorative panel as it could cause damage. If the foam does come in contact with the decorative panel, remove completely with a clean cloth.

## ! WARNING

- Do not apply excessive force to the flare nut when tightening. If applied, the flare nut may crack due to stress fracture and refrigerant leakage may occur. Use the correct torque specifications.
- Make sure that a refrigerant leak test has been performed. Refrigerant (Fluorocarbon) for this unit is non-flammable, non-toxic, and odorless. If the refrigerant should somehow escape and come into contact with flame, toxic gas will form. This gas is heavier than air and will settle near floor areas and spread where it can cause suffocation to those nearby.



## 7. Condensate Piping

### **! WARNING**

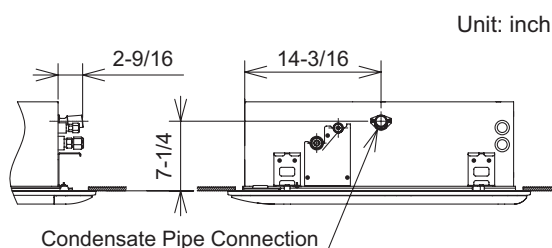
Do not run condensate piping into underground areas near sanitary or sewage lines where toxic and corrosive gas can seep into the system. This creates a pathway for the flow of poisonous gas to penetrate inhabited areas.

### **NOTICE**

- Check to ensure that the condensation condensate pipe discharges moisture properly. If connected incorrectly, it can cause structural damage to indoor wall and ceiling surfaces and damage to furniture and carpeting.
- Avoid sloping the condensate pipe upward as this impede drainage. Moisture can settle back into the unit and it cause the water leakage when unit operation stops.
- Do not connect condensation drainage with sanitary or sewer lines or any other condensate pipe.
- When the main condensate pipe is connected with other indoor units, the connected position of each indoor unit must be higher than the main pipe. The pipe size of the main condensate pipe must be large enough according to the unit size and number of units.
- After performing condensate piping work and electrical wiring, check to ensure that water outflow is as smooth as in the following procedure.

Perform condensate piping work and attach the insulations before attempting any refrigerant piping work.

- (1) The position of the condensate pipe connection is shown in the figure below.



- (2) Prepare a polyvinyl chloride (PVC) pipe with 1-1/4 inches (32mm) outer diameter VP25. [VP25 (based on JIS K 6741) is recommended.]

- (3) Connecting Condensate Piping

#### NOTE:

Follow procedures (b) and (c) to install the factory supplied condensate hose and pipe without adhesive.

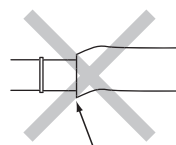
- (a) Connect the factory-supplied condensate hose at the condensate pipe connection using PVC adhesive. Clean the affected surfaces apply the adhesive and cure in accordance with manufacturer's instructions.
- (b) Insert the condensate hose completely. If it is not inserted properly, or if it is twisted, water leakage can occur.

Condensate Pipe Connection

Condensate Hose

Insert the condensate pipe completely.

**(Correct)**

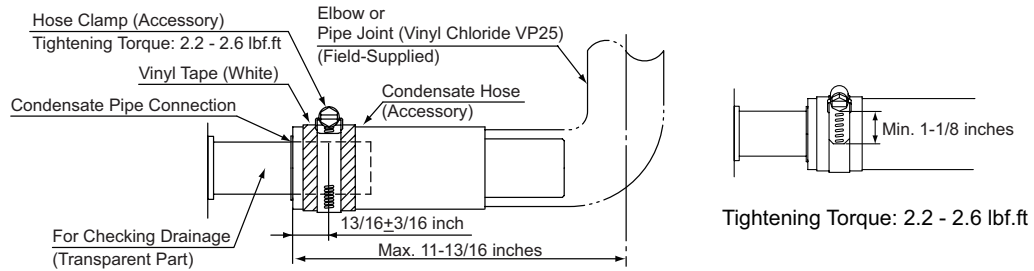


Condensate hose is twisted, or the condensate pipe is incompletely inserted.

**(Incorrect)**



- (c) Attach the factory-supplied hose clamp to the vinyl tape (white) attached to the condensate hose. The hose clamp shall be 13/16 inch (20mm) away from the end face of the condensate hose. Then tighten the hose clamp to make sure that it is approximately 1-1/8 inches (28mm) in length from the screw to the edge of the hose clamp as shown in the figure below.

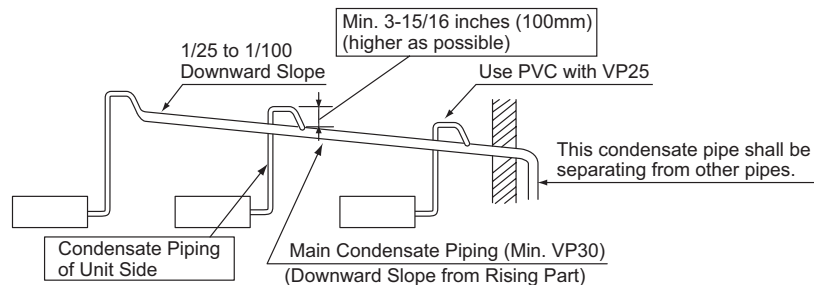


## NOTICE

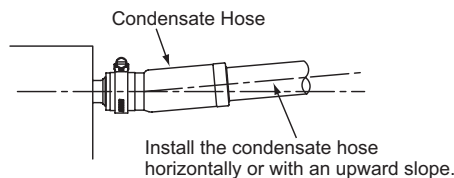
- Make sure to use the factory-supplied condensate hose and hose clamp. Other makes are more susceptible to moisture leakage.
- Do not bend or twist the factory-supplied condensate hose. Sealing properties of the hose can be compromised.
- Do not apply an excessive force to condensate pipe connections. They can be easily damaged.

### (4) On-site Condensate Piping Work

- Connect the factory-supplied condensate hose to the condensate pipe connection using the polyvinyl chloride adhesive.
- When cleaning the connection surface, applying the adhesive, inserting, retaining and curing the condensate pipe, refer to information given by the adhesive manufacturer.
- Install the support parts at an interval of 3.3 ft to 4.9 ft (1m to 1.5m) in order not to bend the condensate pipe.
- Install condensate piping with a downward slope of 1/25 to 1/100 as shown below.

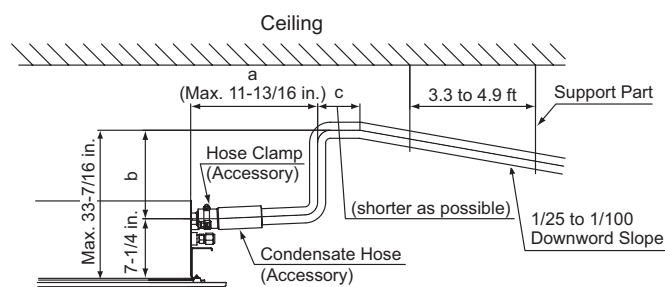


- (e) Install the condensate hose horizontally or slightly on an upward slope to prevent air pockets from forming inside it. If air pockets form, moisture can settle back into the unit, which could result in undesired sluicing, bubbling noises and spillover into the room after unit operation has stopped.



### (f) Raising Condensate Piping

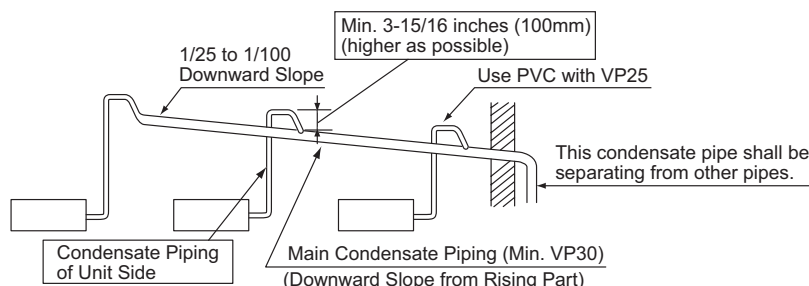
In case of raising the condensate pipe, install it according to the dimension shown in the figure below. The total condensate piping length of a+b+c shall be within 39-3/8 inches (1,000mm).





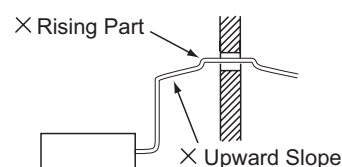
#### (g) Installing Main Condensate Piping

- Install the main condensate pipe on a downward slope to make sure that it is lower than each rising part of the condensate pipe from the indoor unit.
- The size for the main condensate pipe must be VP30 or more (nominal diameter 1-3/16 inches (30mm), outer diameter 1-1/2 inches (38mm)) according to the number of the connected indoor units.



## NOTICE

- Do not allow condensate pipe to rise or incline upward. Otherwise, the condensate water will flow back into the unit and may cause water leaks when the unit is not in operation.

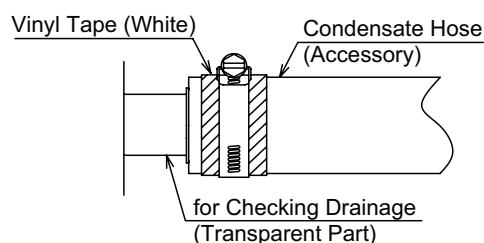
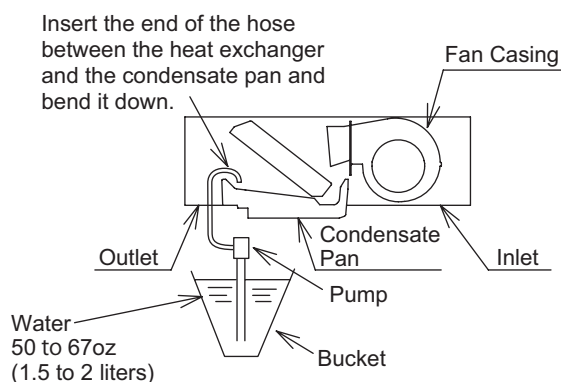


Incorrect Installation of Condensate Piping

#### (5) Drainage and Water Leakage Check

After performing the condensate piping work and the electrical wiring work, check to ensure that water flows smoothly according to the following procedures.

- Drainage Operation by Float Switch
  - The following are regular procedures to check the float switch operation.
  - a) Turn ON the power supply.
  - b) Pour 50 to 67oz (1.5 to 2 liters) of water gradually into the condensate pan.
  - c) Check to ensure that water flows smoothly inside the transparent condensate pipe and drained out fully at the pipe end, and that no leaks occur.
  - d) If the end of the condensate pipe cannot be checked visually, pour another 50 to 67oz (1.5 to 2 liters) of water into the condensate pan. If the water overflows from the condensate pan, there might be some failure inside the condensate pipe. Recheck the condensate pipe.



Position for Checking Drainage

Be careful that water does not splash onto electrical parts such as the fan motor, float switch or thermistors.



## NOTICE

- The heat exchanger is heated since the slight amount of refrigerant circulates inside the indoor unit during stoppage. As a result, moisture in the condensate pan evaporates, which causes condensation issues.
- After the drain check is completed, insert the rubber plug again and seal the gap using a silicon sealant.
- Simplified Operation of Drain-up Mechanism

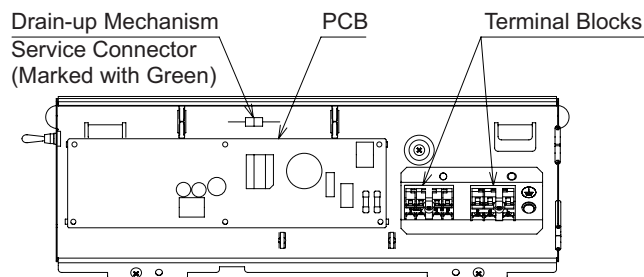
The following are the simplified operation procedures of the drain-up mechanism.

- a) Turn OFF the power supply.
- b) Disconnect the service connector (marked with green).

**NOTE:**

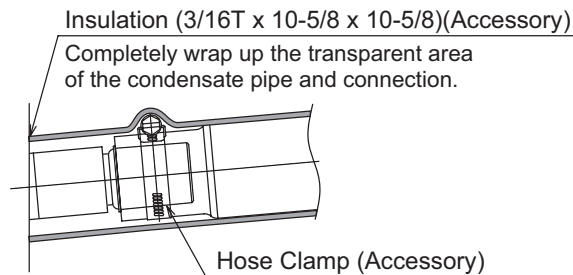
Make sure to hold the connector part. Do not take out and plug in the connector frequently (more than two or three times).

- c) Turn ON the power supply and start the simplified operation of the drain-up mechanism.
- d) Turn OFF the power supply.
- e) Reconnect the service connector.



- (6) Insulate the condensate pipe connection and the condensate hose after connecting them. If improperly insulated, condensation can occur.

Unit: inch



- (7) Insulate the condensate piping with insulation wrap.



## 8. Electrical Wiring

### **WARNING**

- All electrical work must be done as outlined in this manual and in accordance with this manual. Substandard work can result in fire and damage to the unit.
- Use specified cables between units and choose the cables correctly. If not, an electrical shock or fire may occur.
- Do not open the service cover or access panel for the indoor or outdoor units without turning OFF the main power supply. It can result in an electrical shock.
- Turn OFF the main power switch of the indoor unit and the outdoor unit before attempting any electrical wiring work or a periodical check is performed. If not, it will result in an electric shock or a fire.
- Check to ensure that the indoor fan and the outdoor fan have stopped before attempting any electrical wiring work or for any scheduled electrical work that is being performed.
- Tighten screws according to the following torque.

M3.5: 0.9 ft·lbs (1.2 N·m)

M4: 0.7 to 1.0 ft·lbs (1.0 to 1.3 N·m)

### **CAUTION**

- Secure all cables together with cable bands and seal the connecting hole against the onslaught of moisture and insects.
- Run the electrical wiring through the connecting hole in the side cover when using conduit.
- Secure the wired controller cable using the cable band inside the electrical box.

#### 8.1 General Check

- (1) Make sure that the field-selected electrical components (main power switches, circuit breakers, wires, conduit connectors and wire terminals) are properly selected according to the electrical data given in the "Engineering Manual". Make sure that the components comply with the National Electrical Code (NEC).
- (2) Confirm that the power supply voltage is within  $\pm 10\%$  of the rated voltage.
- (3) Verify the capacity of the electrical wires.  
If the power supply capacity is too low, the system cannot be started due to the voltage drop.
- (4) Check to ensure that the ground wiring is connected.

#### 8.2 Electrical Wiring Capacity

##### 8.2.1 Field Minimum Wire Sizes for Power Supply

- This equipment can be installed with a Ground Fault Circuit Interrupter (GFCI), which is a recognized measure for added protection to a properly grounded unit. Install appropriate sized breakers/fuses/overcurrent protection switches and wiring in accordance to local, state and NEC codes and requirements. The equipment installer is responsible for understanding and abiding by applicable codes and requirements.
- Do not operate the system until all check points have been cleared.
  - (A) Confirm that the electrical resistance is more than 1 megohm, by measuring the resistance between ground and the terminal of the electrical parts. If it is less than 1 megohm, do not operate the system until the electrical leakage is found and repaired.
  - (B) Confirm 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.
- 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 to temperatures higher than 194°F (90°C).



### 8.2.2 Details of Electrical Wiring Connection

The electrical wiring capacity of the outdoor unit should be referred to the "Installation and Maintenance Manual" for outdoor unit. Setting a DIP switch may be required depending on the arrangement with the outdoor unit.

Select wiring capacity according to the table 8.1. Install a GFCI and main switch as shown in each of the system diagrams below.

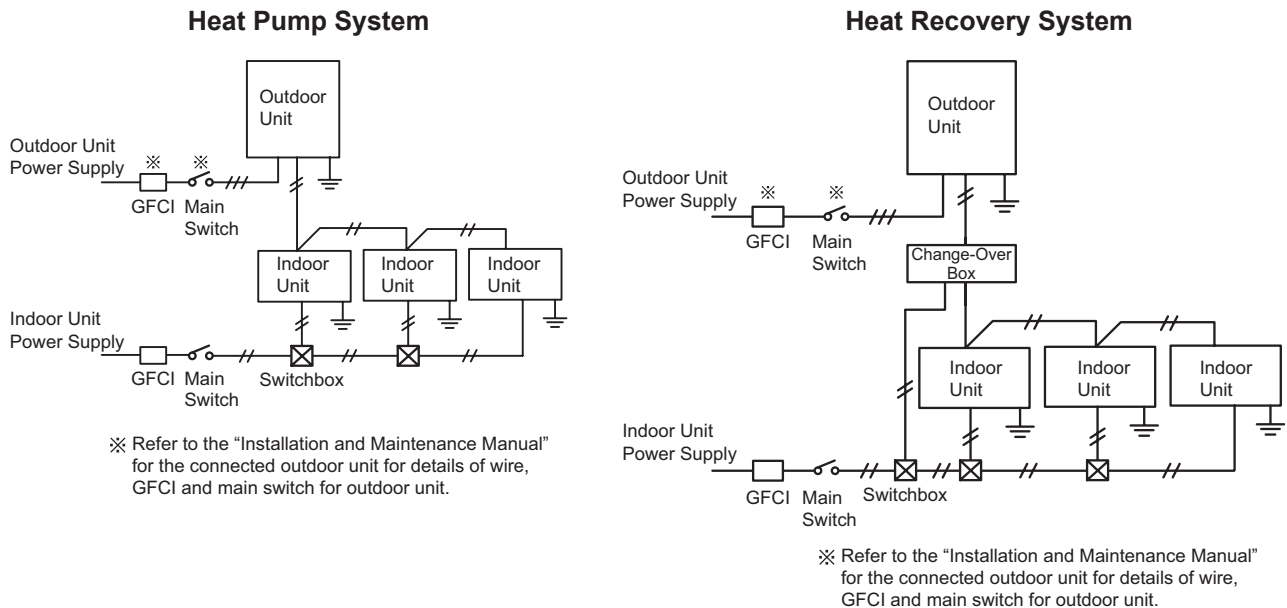


Table 8.1 Recommended Wiring Capacity and Sizes

Follow local electrical codes when selecting a GFCI device.

Model	Power Supply	Minimum Wire Thickness [AWG (mm <sup>2</sup> )]			GFCI		Main Switch		MCA (Minimum Circuit Ampacity)
		Power Supply Wiring Size (Main)	Ground Wiring Size	Communication Cable Size	Nominal Current [A]	Nominal Sensitive Current [mA]	Nominal Current [A]	Fuse [A]	
(H,Y,C)IC1006B21S	1~, 208/230V 60Hz	18 (0.82)	18 (0.82)	18 (0.82)	15	30	15	15	0.2
(H,Y,C)IC1008B21S									0.3
(H,Y,C)IC1012B21S									0.4
(H,Y,C)IC1015B21S									0.5

#### NOTES:

- 1) Follow local codes and regulations when selecting field wires.
- 2) Select the GFCI with activation speed of 0.1 sec. or less.
- 3) Total operating current is less than 12A.

## NOTICE

- Confirm for the recommended size GFCI shown in the table 8.1.
- Between indoor and outdoor units, use dual-conductor, AWG18 (0.82mm<sup>2</sup>) stranded copper cable for communication cable. Do not use any cable with more than two conductors. Twisted pair or shielded cable can be used in environments with excessive electrical noise to reduce the possibility of communication errors between system components. Total cable length must not exceed 3281 ft (1000m).
- Select the wiring size, GFCI (Ground Fault Circuit Interrupter) in accordance with the regulations for each region, the "Installation and Maintenance Manual", and the dedicated electrical circuit that must be used.
- Outside of the indoor unit, installation of the power supply wiring, communication cable, and wired controller cable should be spaced as far apart as possible.

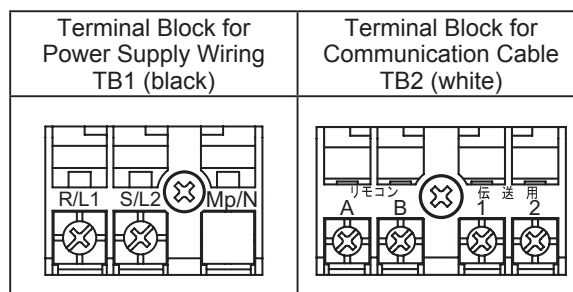


### 8.3 Position of Electrical Wiring Connection

- The electrical wiring connection for the indoor unit is shown in Section 8.2.2. For details relating to the intermediate connections between the indoor unit and the decorative panel, refer to installation of the decorative panel.
- The connection at the terminal block for the indoor unit is shown in the figure below. Check the arrangement for the outdoor unit before performing any wiring. Tighten screws in the terminal block as indicated in the torque specification table shown below.

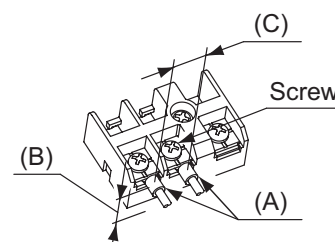
Tightening Torque for Terminals

Screw Size		Tightening Torque
TB1	M4	0.7 - 1.0 ft·lbs (1.0 - 1.3 N·m)
TB2	M3.5	0.9 ft·lbs (1.2 N·m)



## NOTICE

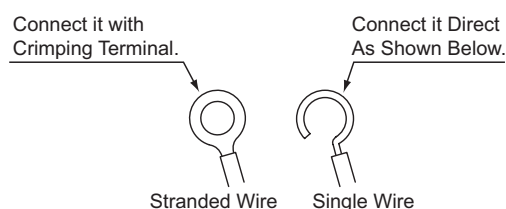
- Do not connect the main power supply wiring to the communication line (Terminals A, B, 1, and 2 of TB2). If connected, the printed circuit board (PCB) is destroyed.
- Pay attention to following when wires are connected at the terminal block:
  - (A) Attach a piece of insulation tape or a sleeve at each terminal.
  - (B) Maintain the recommended distance between the electrical box and the terminals to prevent a short circuit.
  - (C) Maintain the recommended distance between terminals.



- (1) Connect the cable for the optional controller or the optional extension cable to the terminals inside the electrical box through the connecting hole of the cabinet.
- (2) Connect the power supply and the ground wiring to the terminals in the electrical box.
- (3) Connect the cables between the indoor unit and the outdoor unit to the terminals inside the electrical box.
- (4) Connect cables to their corresponding terminal number and the similarly marked band.
- (5) Connect the communication cable between those indoor units connected to the same outdoor unit.
- (6) Do not connect the main power supply wiring to the communication line (Terminals A, B, 1 and 2 of TB2). If connected, the printed circuit board (PCB) is destroyed.
- (7) Tightly clamp the power supply wiring and communication cables using the cable band inside the electrical box.

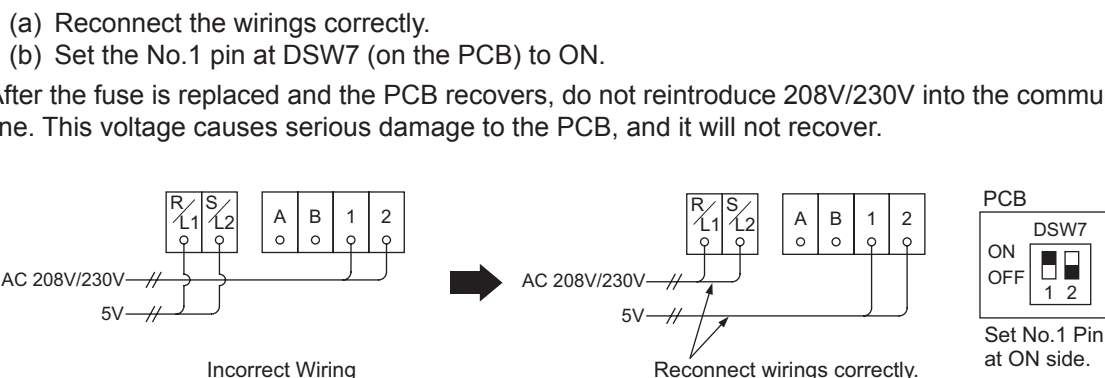
#### NOTE:

When the standard wire is used for the field-wiring connection, use the M4 crimping terminal. When the single wire is used, fashion it into the shape as shown at right and connect it in order to tighten the washer uniformly. Tighten the screws at the terminal block according to the torque specification as shown in the table above.



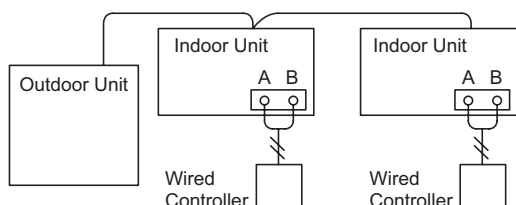


- (8) All electrical work should be performed in strict accordance with electrical schematics in the "Installation and Maintenance Manual".
- (9) If Power Supply Voltage (208V/230V) is introduced into the Communication Line:  
If 208V/230V are applied to the communication line at (Terminals 1 and 2 of TB2) by mistake, the fuse on the PCB for the communication line will blow. In this case, perform the recovery work as shown in the diagrams below.

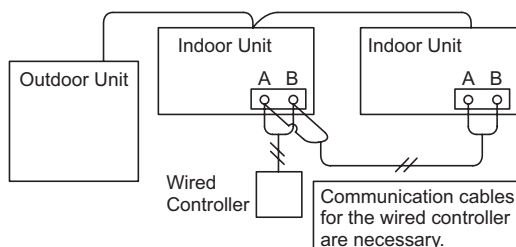


#### (10) Wired Controller Connection

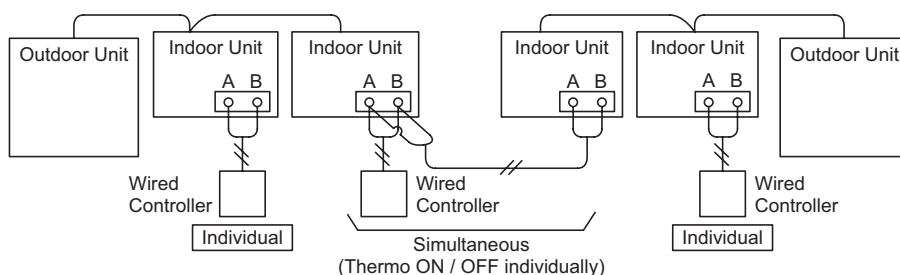
- (a) Wired Controllers to each unit for an individual operation setting



- (b) Single Wired Controller for an individual operation setting



- (c) Wired Controller Connections between different refrigerant cycles





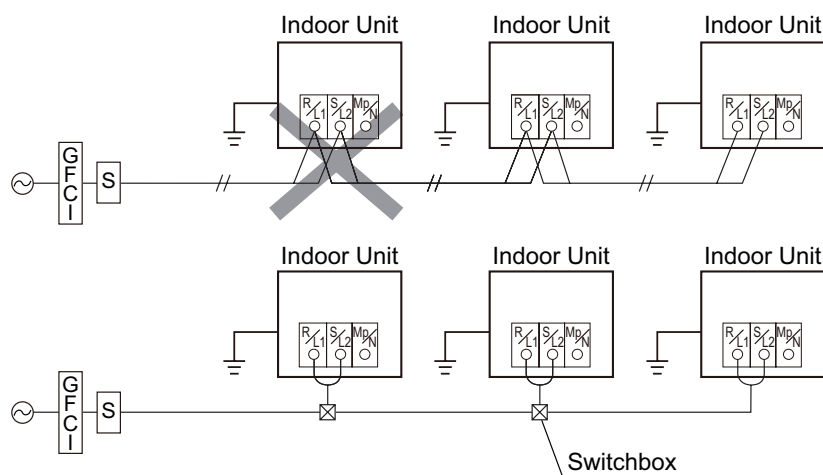
# NOTICE

- The DIP switch settings for the outdoor unit should be performed in accordance with the "Installation and Maintenance Manual" for the outdoor unit.
- Be aware that communication cable for the wired controller is required in these instances:
  - a) The following functions are set to the sub unit which is not installed with the wired controller.
    - \* Remote ON/OFF function settings, (No.1, 2, and 3), (External Input / Output Function)
    - \* Power supply ON/OFF functions, (No.1 and 2), (Function Selection)
    - \* Prohibiting the wired controller after manual stoppage (External Input / Output Function)
    - \* Group setting by the centralized controller
  - b) The combination of twin, triple, or quad is controlled by single wired controller.
  - c) The address for the indoor unit is changed from the wired controller.

## 8.4 Wired Controller Cable

### Caution for Electrical Wiring

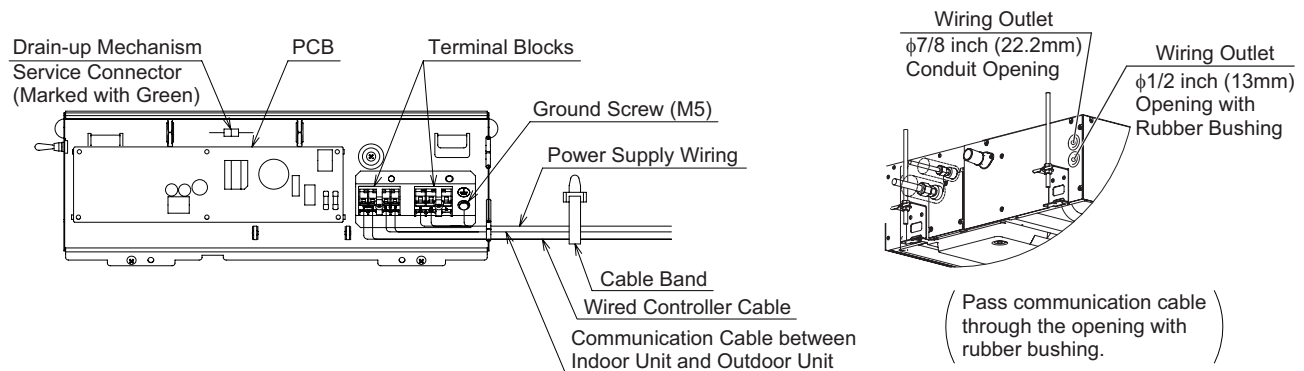
Do not connect the power supply wiring and the communication cable into one terminal.  
The manual switchbox is required when communication cable is required.





## 8.5 Wiring Connections

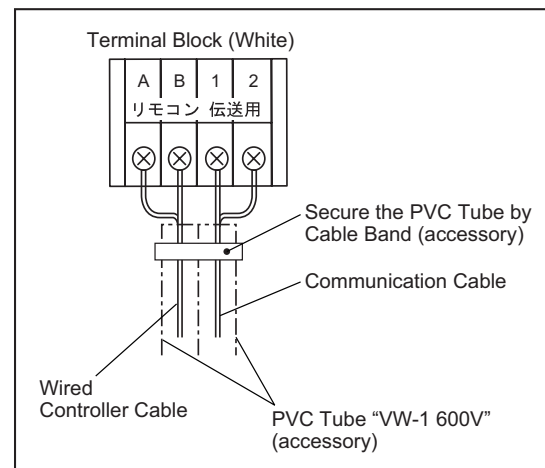
The wiring connections for the indoor unit are shown in the figures below.



- Remove the electrical box cover.
- Connect the communication cable, the power supply wiring and the wired controller cable to each terminal block. Connect the ground wiring to the ground screw.
- Attach the electrical box cover. Pay attention not to pinch wires when attaching the electrical box.

### NOTE

- Insert the communication cable and wired controller cable into the PVC tube "VW-1 600V" (Accessory) to separate from the power supply wiring for the indoor unit.
- Secure the both ends of the PVC tube by cable band (Accessory).
- If shielded cable is used, terminate at the ground terminal.



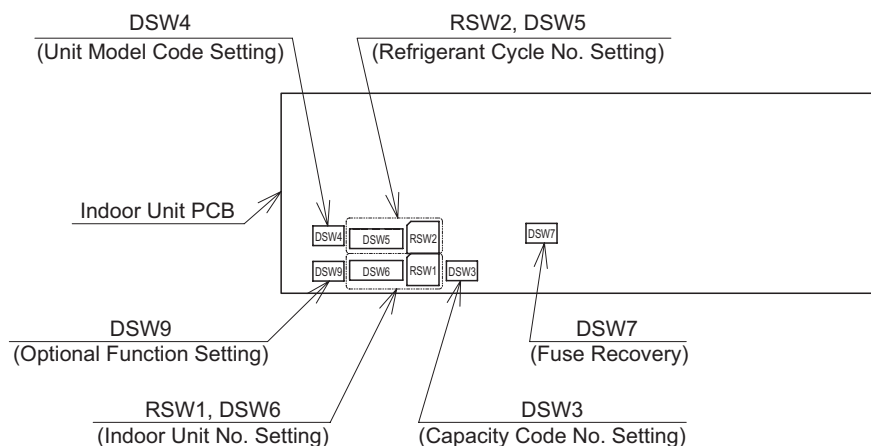
## ! WARNING

Install and secure all electrical wiring correctly through the opening, to the terminal blocks using the cable bands provided. Wiring should be spaced appropriately and firmly fastened to guaranty against electrical short, sparks, and flame.



## 8.6 DIP Switch Settings

- (1) Turn OFF the power supply to both indoor and outdoor units before adjusting DIP switch settings. Otherwise, the settings are invalidated and do not take effect.
- (2) Positions of DIP Switches on the PCB are shown in the figure below.



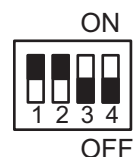
- (3) **Unit No. Setting (RSW1 and DSW6)**  
Setting is not required.  
Indoor unit numbers are set by the auto-address function. If an indoor unit number setting is required, set the unit number of all indoor units respectively and sequentially by following setting position. It is recommended that you assign a number to each indoor unit from "1". A maximum of 64 indoor units per refrigerant cycle can be connected to an H-LINK II System. Though the available numbers range from zero to 63, the applicable number for the 64th indoor unit in theory supplants the number "zero".  
For the centralized control, this setting is required.

Unit No. Setting	
<b>DSW6 (Tens Digit)</b> 	<b>RSW1 (Units Digit)</b> Setting Position Set by inserting slotted screwdriver into the groove.
Before shipment, DSW6 and RSW1 are set at "0". For the units supporting H-LINK II, the unit No. can be set for Max. 64 indoor units (No.0~63).	
<b>Ex.) Set at No.16 Unit</b> <b>DSW6</b>  Set No.1 Pin at ON side <b>RSW1</b>  Set at "6"	

- (4) **Capacity Code Setting (DSW3)**  
No setting is required, due to setting before shipment. This switch is utilized for setting the capacity code that corresponds to the capacity of the indoor unit.

Indoor Unit Capacity (MBH)	06	08	12	15
Setting Position				

- (5) **Unit Model Code Setting (DSW4)**  
No setting is required. It is for setting the model code of the indoor unit.





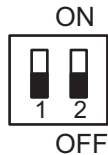
- (6) Refrigerant Cycle No. Setting (RSW2 and DSW5)  
This setting is required. The unit arrives with all settings in the OFF position.

#### Refrigerant Cycle No. Setting

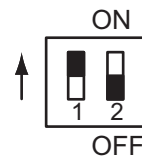
DSW5 (Tens Digit)	RSW2 (Units Digit)	Ex.) Set at No.5 Cycle
	<div>Setting Position</div> <div>Set by inserting slotted screwdriver into the groove.</div>	<div>DSW5</div> <div>Set All Pins OFF</div> <div>RSW2</div> <div>Set at "5"</div>
<p>Before shipment, DSW5 and RSW2 are set at "0".</p> <p>For the units supporting H-LINK II, the ref. cycle No. can be set for Max. 64 cycles. (No. 0-63)</p>		

- (7) Fuse Recovery (DSW7)

\* Factory Setting

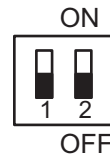


\* When introducing high voltage to terminals 1 and 2 of TB2, the (0.5A) fuse on the PCB is cut. In such a case, first, reconnect the wiring correctly to TB2, and then adjust the number 1 pin to ON.



- (8) Optional Function Setting (DSW9)

No setting is required. Settings positions before shipment are all in the OFF position.



#### NOTES:

- The solid square "■" symbol signifies the "ON" and "OFF" positions for DIP switches. The diagrams show original settings before shipment.
- When the unit number and the refrigerant cycle are set, record the unit number and refrigerant cycle to facilitate maintenance and servicing activities afterward.

## NOTICE

All indoor and outdoor units must be shut down prior to attempting to make DIP Switch adjustments, otherwise, the settings do not take effect.



## 8.7 High Speed Setting

This function is used to set the airflow volume higher than normal airflow volume. This is used for high ceiling areas on site. Set High Speed setting 1 from the function selection menu, depending on the ceiling height as shown in the table below.

Ceiling Height		High Speed Setting
006 and 008 Type	012 and 015 Type	
Less than 8.9ft (2.7m)	Less than 10.2ft (3.1m)	Standard
8.9 - 9.8ft (2.7 - 3.0m)	10.2 - 11.5ft (3.1 - 3.5m)	High Speed 1

Follow the procedure for changing the setting in Section 8.10, "Function Selection by Wired Controller" of the manual.

## 8.8 Circulation Function at Heating Thermo-OFF\*

This function maintains the fan operation by the set airflow volume at the heating Thermo-OFF. It is for improvement of temperature distribution at sites with high ceilings.

\* NOTE:

Thermo-ON: The outdoor unit and some indoor units are running

Thermo-OFF: The outdoor unit and some indoor units stay on, but don't run.

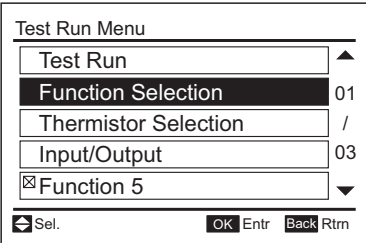
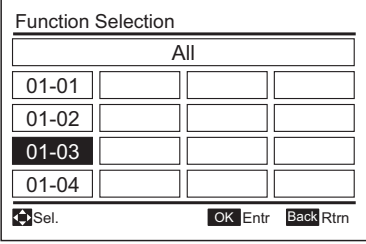
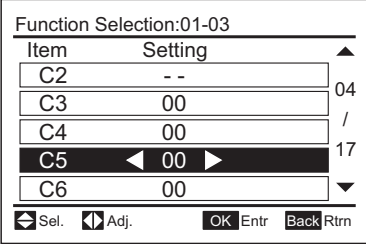
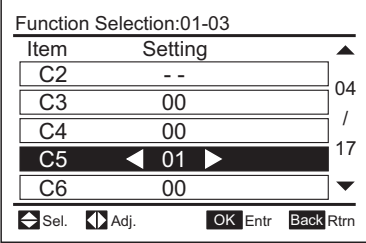
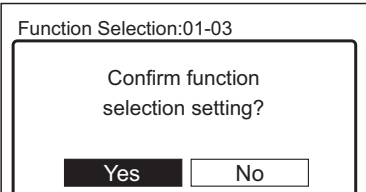

## 8.9 Control of Dew Condensation Prevention

This function limits the occurrence of condensation around louvers. Condensation can occur when the air conditioner has run in cooling mode over a prolonged period of time at 80.6°F DB (27°C DB) and a high rate of humidity (Relative Humidity: Approximately 80%). If there is any anticipation of upcoming operation under these conditions, set optional function K8 to "01" on the function selection menu to safeguard against condensation.



## 8.10 Function Selection by Wired Controller

Each function can be selected with the wired controller. Refer to "Installation and Maintenance Manual" for wired controller, and the "Service Manual" for indoor units for details.

<p>(1) Press and hold "Menu" and "Back/Help" simultaneously for at least 3 seconds during the normal mode (when unit is not operated). The Test Run menu is displayed.</p>	
<p>(2) Select "Function Selection" from the Test Run menu and press "OK".</p>	
<p>(3) Select the indoor unit by pressing "<math>\Delta \nabla \triangleleft \triangleright</math>" and press "OK". (This screen is NOT displayed when the number of indoor unit connected with the controller is 1 (one). In this case, (4) is displayed.) Press "All" to select all the indoor units connected to the wired controller.</p>	
<p>(4) Press "<math>\Delta \nabla</math>" and select the item required to change.</p>	
<p>(5) Press "<math>\triangleleft \triangleright</math>" and change the setting.</p>	
<p>(6) Press "OK" to display the confirmation screen.</p>	
<p>(7) Select "Yes" and press "OK". The Test Run menu is displayed after the setting is confirmed. If "No" is pressed, the screen returns to (4).</p>	
<p>(8) Press "Back/Help" on the Test Run menu to return to the normal mode.</p>	

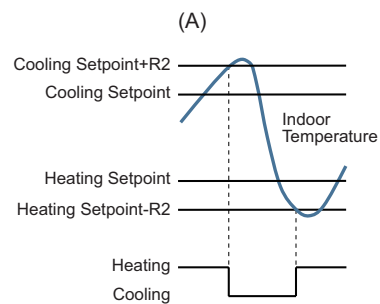
(Figure for Function Selection)

To set other units, press "Back/Help" at (4), (5) and the screen returns to (3).  
(If the number of indoor unit connected with the controller is 1 (one), the screen returns to (1).)



Optional Function			Function Selection Item	Unit	Setting Condition ( <u>Underlined</u> Part is Factory Setting)									
					00	01	02	03	04	05	06	07	08	09
High Speed Setting	Ceiling Height of 006 and 008 Type		C5	ft. (m)	<u>Less than 8.9 (2.7)</u>	8.9-9.8 (2.7-3.0)								
	Ceiling Height of 012 and 015 Type				<u>Less than 10.2 (3.1)</u>	10.2-11.5 (3.1-3.5)								
Circulation Function at Heating Thermo-OFF			b2	-	<u>Not Available</u>	Available								
Control of Dew Condensation Prevention			K8	-	<u>Not Available</u>	Available								
Automatic COOL/HEAT Operation			b8	-	<u>Not Available</u>	Available								
		Dual Setpoint	r1	-	<u>Not Available</u>	Available								
	(A)	Cooling/Heating Changeover Temperature	r2	°F (°C)	<u>2 (1.0)</u>	3 (1.5)	3* (2.0)	4 (2.5)	5 (3.0)	1 (0.5)				
Setback Temperature Adjustment (During card key removal, setpoint is set back)			r3	°F (°C)	<u>4 (2.5)</u>	5 (3.0)	6 (3.5)	7 (4.0)	8 (4.5)	9 (5.0)	10 (5.5)	1 (0.5)	2 (1.0)	3 (1.5) 3* (2.0)

\* Not displayed when fahrenheit (°F) is displayed.





## 8.11 Setback Operation

- (1) Press and hold "Menu" and "Back/Help" on the wired controller simultaneously for at least three seconds during the normal mode (unit stoppage).  
The Test Run menu is displayed.

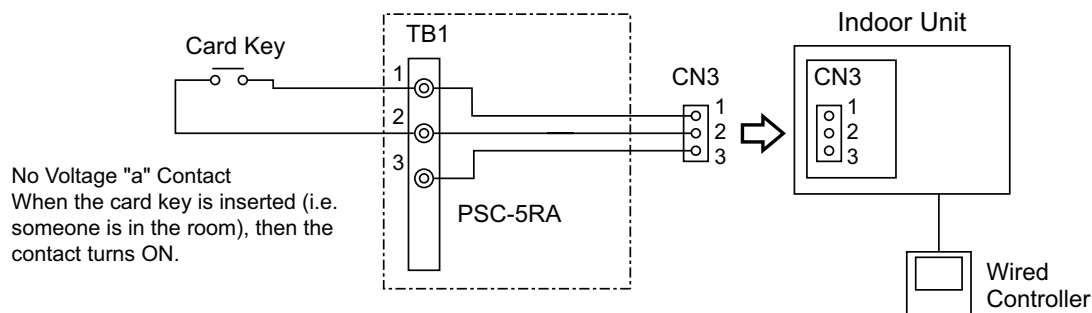
- (2) Select "Input/Output" from the Test Run menu and press "OK".

Test Run Menu	
<b>Test Run</b>	▲
Function Selection	01
Thermistor Selection	/
Input/Output	03
<input checked="" type="checkbox"/> Function 5	▼
◀ Sel.      OK Entr      Back Rtn	

- (3) Select either "Input 1" or "Input 2" and change the setting to "09".

Input/Output:01-03		
Item	Setting	Connector
<b>Input 1</b>	◀ 00 ▶	<b>CN3 1-2</b>
Input 2	00	CN3 2-3
Output1	00	CN7 1-2
Output2	00	CN7 1-3
Output3	00	CN8 1-2
◀ Sel.      ▶ Adj.      OK Entr      Back Rtn		

- (4) Build a circuit such as shown below.



- (5) Temperature adjustment for the setback function can be selected on the wired controller. Refer to Section 8.10, "Function Selection by Wired Controller" of this manual for details.



## 9. Test Run

### 9.1 Before Test Run

Verify that there are no problems with the installation, and do not perform Test Run until all the following conditions have been resolved.

Refer to the "Installation and Maintenance Manual" for the outdoor unit for details on Test Run operations from the outdoor unit.

Verify that refrigerant piping and the communication cable are connected to the same refrigerant cycle system. If not, it will cause an abnormal operation and damage to instrumentation.

- (1) Verify that electrical resistance is more than one megaohm, by measuring the resistance between ground and the terminal the terminus for electrical components. If the electrical resistance is less than one megaohm, do NOT operate the system until the electrical current outflow to ground is detected and repaired. Do not introduce any high voltage to the terminals of the communication cables (TB2 [A, B, 1 and 2]).
- (2) Verify that each wire is connected correctly at the correct phase for the power supply. If it is incorrectly connected, the unit will not operate and the wired controller displays the alarm code "05". In this case, verify the phase for the primary power supply according to the "Attention" label affixed to the back side of the service cover. Then, with the power supply turned OFF at the power supply, remake the necessary connections.
- (3) Check to ensure that the main power supply has been turned ON for more than 12 hours, to warm up the compressor oil by the crankcase heater.
- (4) Verify that all DIP Switch settings are correct. Refer to Section 8.6 "DIP Switch Settings".

### 9.2 Test Run

After all installation work is completed, Test Run should be performed.

- (1) Check to ensure that stop valves (gas and liquid) for the outdoor unit are fully opened.
- (2) Whenever indoor units are connected to the VRF system, perform the Test Run for the indoor units one by one sequentially and then check the refrigerant piping system and the electrical wiring system for conformity. (If these multiple indoor units are operated simultaneously, system conformity cannot be verified.)
- (3) Perform the **Test Run** in accordance with the following procedure. Ensure that the Test Run is carried out without any problem. The following procedure shows a case where a wired controller is utilized. If other controllers are activated instead, refer to the "Installation and Maintenance Manual" for those other controllers.

#### NOTE:

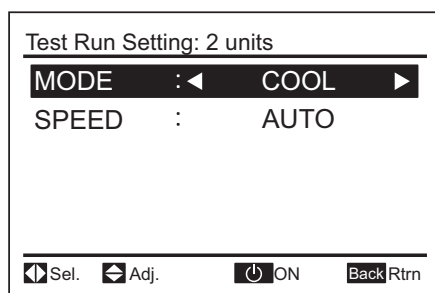
The outdoor unit may not be operated depending on the indoor and outdoor temperature conditions. Refer to the "Installation and Maintenance Manual" for outdoor units for details.

- (a) Press and hold "Menu" and "Back/Help" simultaneously for at least 3 seconds.

The **Test Run** menu will be displayed.

- The **Test Run** menu is displayed.

Test Run Screen



#### NOTE

When the "00 unit" is displayed, the auto-address function is working.

Cancel "**Test Run**" mode and reset.



- The total number of connected indoor units is indicated on the LCD (Liquid Crystal Display). In the case of a twin combination (set of two indoor units), the total number of the connected indoor units is displayed as “**2 units**”, and where there is a triple combination (set of three indoor units), the total number of the connected indoor units is displayed as “**3 units**”.
  - If the number indicated is not equal to the actual number of connected indoor units, the auto-address function is not performing correctly due to incorrect wiring or electrical interference. Turn OFF the power supply, and resolve the wiring issue after verifying the following items; (Do not repeat turning ON and OFF within a 10 second timespan.)
    - \* The power supply to the indoor unit is not turned ON or there is an incorrect wiring issue.
    - \* Incorrect connection of the interconnecting cable between indoor units or a poorly connected controller cable.
    - \* Incorrect setting of the rotary switch and DIP switch for the indoor unit printed circuit board (PCB). (The setting is overlapped.)
  - Press “ On/Off” to start the Test Run..
  - Press “ ” and set each item.
- (b) Press “ On/Off”.
- The RUN indicator turns ON and the operation starts. At this time, a two-hour OFF timer is set automatically.
- (c) Press “” or “”, select “LOUV.” and select “” (auto-swing) by pressing “” or “”. The auto swing operation starts. Check the operating sound at the louvers. If abnormal sound is not generated, press “” or “” again to stop the auto swing operation. If abnormal sound is generated from the louvers, remove the face panel and adjust the louver accordingly.

- (d) Verify that the motion sensor is operating correctly as in the following steps: (in cases of the decorative panel with the optional motion sensor kit).

1. Press and hold “Menu” and “Back/Help” simultaneously for at least three seconds during the Test Run mode.  
The check menu screen “A” is displayed.

“A”

Check Menu	
Check 1	▲
Check 2	01
Alarm History Display	/
Model Display	02
<input checked="" type="checkbox"/> Function 5	▼

Sel. Entr Rtm

2. Select “**Check 1**” at the check menu and press “**OK**”. (Screen “B” is displayed.)  
(This screen is NOT displayed when only one indoor unit is connected to the wired controller. In this case, screen “C” is displayed.)

“B”

Model Display:01-02		Model:F .08	
01-01			
01-02			
01-03			
01-04			
IDU	: *****	S/N:000000	
ODU	: *****	S/N:000000	

3. Select the indoor unit by pressing “ ” and press “OK”.  
The check data screen “C” is displayed.

“C”

Check 1:01-03	
Item	Value ▲
L3	00
L4	00
P1	00
P2	10
q1	50

Next Page Rtm

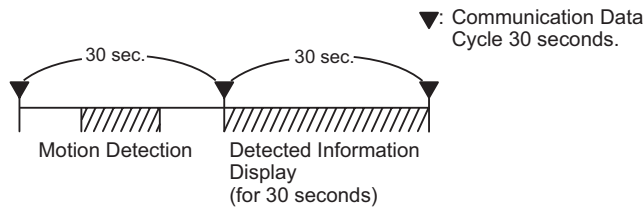
4. Press “ ” to change the screen until it displays the check screen “q1”.



## Check of the Motion Sensor

1. Perform the motion detection (waving a hand, etc) under the motion sensor of the selected indoor unit for approximately 10 to 15 seconds.
2. Check the value of "q1" after 30 seconds\* from starting the motion detection at Item 1. The detection information from the motion sensor against the motion detection is displayed a range of 0% to 100%.

\* The communication cable between the indoor unit and the wired controller is on a 30 second cycle.  
Timing for motion detection and the detected information display is shown below.



### NOTE:

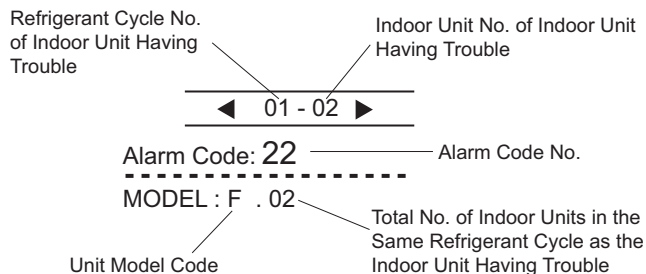
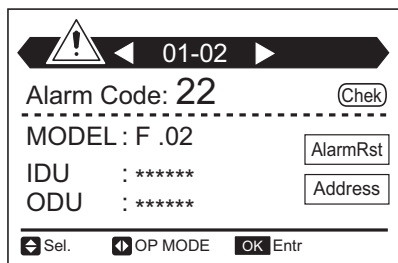
Refer to the "Operation Manual" for indoor unit settings for setup of the motion sensor. ("Motion Sensor Setting", "If Absent" and "Check Interval" can be set.)

3. Check that the value of "q1" is neither 0% nor 100%.  
If the value displayed is 0% or 100%, repeat the procedure from Item 1. If the same value reappears, it may be a malfunction of the motion sensor.
  4. Press "Back/Help" and return to the display.
- (e) Though temperature recordings by the thermistors are invalid during the Test Run phase, the protection devices are valid.
- (f) For VRF System  
According to the label; "Checking Method by 7-Segment Display" affixed to the inside of the front cover of the outdoor unit, check temperature, pressure, and operation frequency, and interconnected indoor unit numbers by 7-Segment displays.
- (g) To complete Test Run, press "On/Off" again or wait for the set Test Run time to pass.  
When changing the Test Run time, press "Δ" or "▽" to select "Test Time". Then, set the test run time (30 to 600 minutes) by pressing "◀" or "▶".

Test Run: 2 units	
MODE	: COOL
SPEED	: ◀ AUTO ▶
LOUV.	:
Test Time	: 120min
Inverter	: 60Hz
Sel.     Adj.     OFF	



- The RUN indicator on the wired controller for the indoor unit flashes orange (0.5 second ON/ 0.5 second OFF), indicative of a fault or error having been generated with activation of protection devices during the Test Run phase. Alarm code, unit model code, and the number of interconnected indoor units is displayed on the LCD as shown below. If the RUN indicator on the wired controller flashes for two seconds ON and two seconds OFF, the source of the problem could be a failure in the communication cable between the indoor unit and the wired controller (a loose or severed connection). In this case, verify Section 9.3 “Alarm Code” and perform the appropriate troubleshooting measures. Consult with an authorized service engineer, if the problem cannot be resolved at your end.



#### Unit Model Code

The relationship between the unit model code and the unit model is shown in the table below.

Indication	Unit Model
F	VRF System
E	Except Above Models



### 9.3 Alarm Code

Alarm (Troubleshooting) Code Table

Code No.	Category	Nature of Problem	Likely Cause
01	Indoor Unit	Activation of a protection device (Float switch)	Activation of the float switch; (High water level present in the condensate pan.) A problem exists in the piping.
02	Outdoor Unit	Activation of protection device; (Except for Alarm Code: 41, 42)	High Pressure Cut; (R410A: 601 psi (4.15MPa)), fan motor lockup during the outdoor unit cooling operation.
03	Communication	Communication failure between indoor and outdoor units	Incorrect wiring, loose terminals, disconnected wiring or a blown fuse.
04-09	Problem with the outdoor unit; (Refer to the "Installation and Maintenance Manual" for outdoor units.)		
11	Sensor on Indoor Unit	Inlet Air Thermistor failure	Loosely connected, disconnected, or a severed connection.
12		Outlet Air Thermistor failure	
13		Freeze Protection Thermistor failure	
14		Gas Piping Thermistor failure	
19	Fan Motor	Problem with Indoor Fan	Fan motor lockup, fan motor protection control device for indoor unit activated.
20-29	Problem with the outdoor unit; (Refer to the "Installation and Maintenance Manual" for outdoor units.)		
31	System	Incorrect capacity setting for indoor and outdoor units.	Incorrect capacity code setting for combination, excessive or insufficient total indoor unit capacity code.
32		Incorrect setting of other indoor unit number	Problem with a different Indoor Unit in the same refrigerant cycle; (Failure at the power supply, defective PCB).
35		Incorrect setting of indoor	Indoor unit number duplicated in same refrigerant group.
36		Incorrect indoor unit combination	Indoor unit is designed for other refrigerant; (R22 or R407C).
38-59	Problem with the outdoor unit; (Refer to the "Installation and Maintenance Manual" for the outdoor unit.)		
b0	System	Incorrect setting for unit capacity	Incorrect setting for unit capacity
b1		Incorrect setting of unit and refrigerant cycle number	Unit number or refrigerant cycle $\geq 64$
b5		Incorrect setting of indoor unit number for H-LINK type	Interconnected indoor units are not supporting H-LINK II $\geq 17$
EE	Compressor	Compressor protection alarm	This alarm code displays when the alarms such as damage to the compressor occur three times within a six hour period.

- When the RUN indicator flashes every four seconds, there is a communication failure between the indoor unit and the wired controller (loose connector, disconnected or incorrect wiring, or a severed connection).
- Display of the alarm code "EE" means serious abnormality and burn out of the compressor.

Refer to the "Installation and Maintenance Manual" for the indoor/outdoor unit connections.

## NOTICE

Do NOT operate the air conditioning just to run checks on electrical wiring until preparations for the Test Run phase is completed.

All the installation work of the air conditioning is completed.  
Handover this information to the building owner and request to maintain all the equipment manuals and warranty.

#### Refrigerant Leak Check

Conduct a periodic refrigerant leak check to maintain product performance and secure storage of refrigerant (Fluorocarbons). After completing installation, record the following results into this manual:

1. Results of a leak test all piping and connections
2. Total refrigerant charge volume dispensed (including a trim charge added following the installation)
3. Result of the refrigerant leak check

Then hand it over to users and ask them to retain for reference.

All periodic service and maintenance procedures must be conducted only by authorized and trained personnel.







