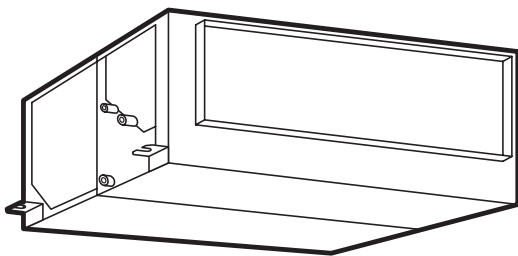


ENGINEERING MANUAL

INVERTER-DRIVEN MULTI-SPLIT SYSTEM HEAT PUMP AIR CONDITIONERS

Engineering Manual



< Indoor Units >

- DOAS (Dedicated Outdoor Air System) Type
(H,Y)DOA096B21S

IMPORTANT NOTICE AND SAFETY SUMMARY



1. Introduction

This Engineering Manual concentrates on heat pump air conditioning units. Read this manual carefully before performing installations or operations.


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

(Transportation/Installation Work) > (Refrigerant Piping Work) > (Electrical Wiring Work) > (Ref. Charge Work) > (Test Run) > (User)

2. Important 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 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.
- 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 which 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 will 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. (approximately 3m) away from such devices.
- When a wireless controller is used, locate at a distance of at least 3.3 ft. (approximately 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 condensate pipe. If you do, you may have drain 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.
- If the wired controller is installed in a location where electromagnetic radiation is generated, make sure that the wired controller is shielded and cables are sleeved inside conduit tubing.
- If there is a source of electrical interference near the power source, install noise suppression equipment (filter).
- During the test run, check the unit's operation temperature. If the unit is used in an environment where the temperature exceeds the operation boundary, it may cause severe damage. Check the operational temperature boundary in the manual. If there is no specified temperature, use the unit within the operational temperature boundary of 32 to 104°F (0 to 40°C).
- Read installation and appropriate user manuals for connection with PC or peripheral devices. If a warning window appears on the PC, the product stops, does not work properly or works intermittently, immediately stop using the equipment.

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.
- If the remote sensors are not used with this controller, then do not install this controller...
 - in a room where there is no thermostat.
 - where the unit is exposed to direct sunshine or direct light.
 - where the unit will be in close proximity to a heat source.
 - where hot/cold air from the outdoors, or a draft from elsewhere (such as air vents, diffusers or grilles) can affect air circulation.
 - in areas with poor air circulation and ventilation.
- 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 fire, oil, steam, or powder can directly enter the unit, such as in close proximity or directly 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 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 condensate piping becomes clogged, moisture can back up and can 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.
- During transportation, do not allow the backrest of the forklift make contact with the unit, otherwise, it may cause damage to the heat exchanger and also may cause injury when stopped or started suddenly.
- Remove gas inside the closing pipe when the brazing work is performed. If the brazing filler metal is melted with remaining gas inside, the pipes will be blown off and it may cause injury.
- Be sure to use nitrogen gas for an airtight test. If other gases such as oxygen gas, acetylene gas or fluorocarbon gas are accidentally used, it may cause explosion or gas intoxication.

After installation work for the system has been completed, explain the "Safety Precautions," the proper use and maintenance of the 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

WARNING

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.
- Check the design pressure for this product is 601 psi (4.15MPa). The pressure of the refrigerant R410A is 1.4 times higher than that of the refrigerant R22. Therefore, the refrigerant piping for R410A shall be thicker than that for R22. Make sure to use the specified refrigerant piping. If not, the refrigerant piping may rupture due to an excessive refrigerant pressure. Besides, pay attention to the piping thickness when using copper refrigerant piping. The thickness of copper refrigerant piping differs depending on its material.
- The refrigerant R410A is adopted. The refrigerant oil tends to be affected by foreign matters such as moisture, oxide film, (or fat). Perform the installation work with care to prevent moisture, dust, or different refrigerant from entering the refrigerant cycle. Foreign matter can be introduced into the cycle from such parts as expansion valve and the operation may be unavailable.
- To avoid the possibility of different refrigerant or refrigerant oil being introduced into the cycle, the sizes of the charging connections have been changed from R407C type and R22 type. It is necessary to prepare the appropriate tools before performing installation work.
- Use refrigerant pipes and joints which are approved for use with R410A.
- A compressor/unit comprises a pressurized system. Never loosen threaded joints while the system is under pressure and never open pressurized system parts.
- 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 will become 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.
- When maintaining, relocating, and disposing of the unit, dismantle the refrigerant piping after the compressor stops.
- When pipes are removed out from under the piping cover, after the insulation work is completed, cover the gap between the piping cover and pipes by a packing (field-supplied). If the gap is not covered, the unit may be damaged if snow, rain water or small animals enter the unit.
- Do not apply an excessive force to the spindle valve at the end of opening. Otherwise, the spindle valve flies out due to refrigerant pressure. At the test run, fully open the gas and liquid valves, otherwise, these devices will be damaged. (It is closed before shipment.)
- If the arrangement for outdoor units is incorrect, it may cause flowback of the refrigerant and result in failure of the outdoor unit.
- The refrigerant system may be damaged if the slope of the piping connection kit exceeds $\pm 15^\circ$.

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.
 - Perform all electrical work in strict accordance with this installation and maintenance manual and all the relevant regulatory standards.
 - 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.
 - Insulate a wired controller against moisture and temperature extremes.
 - Use specified cables between units.
 - The new air conditioner may not function normally in the following instances:
 - If electrical power for the new air conditioner is supplied from the same transformer as the external equipment* referred to below.
 - If the power source cables for this external equipment* and the new air conditioner unit are located in close proximity to each other.

external equipment*: (Example): A lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor and large-sized switch.
- Regarding the cases mentioned above, surge voltage may be inducted into the power supply cables for the packaged air conditioner due to a rapid change in power consumption of the device and an activation of a switch.
- Check field regulations and standards before performing electrical work in order to protect the power supply for the new air conditioner unit.
- Communication cabling shall be a minimum of AWG18 (0.82mm²), 2-Conductor, Stranded Copper. Shielded cable must be considered for applications and routing in areas of high EMI and other sources of potentially excessive electrical noise to reduce the potential for communication errors. When shielded cabling is applied, proper bonding and termination of the cable shield is required as per Johnson Controls guidelines. Plenum and riser ratings for communication cables must be considered per application and local code requirements.
 - The polarity of the input terminals is important, so be sure to match the polarity when using contacts that have polarity.
 - Use an exclusive power supply for the air conditioner at the unit's rated voltage.
 - Highly dangerous electrical voltages may be 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 installing the controller or remote devices, ensure that the indoor and outdoor unit operation has been stopped. Further, be sure to wait at least five minutes before turning off the main power switch to the indoor or outdoor units. Otherwise, water leakage or electrical breakdown may result.
 - Do not open the service cover or access panel to the indoor or outdoor units without turning OFF the main power supply. Before connecting or servicing the controller or cables to indoor or outdoor units, open and tag all disconnect switches. Never assume electrical power is disconnected. Check with a meter and equipment.
 - This equipment can be installed with a Ground Fault Circuit Breaker (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 with local, state and NEC codes and requirements. The equipment installer is responsible for understanding and abiding by applicable codes and requirements.

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1. General Information (Features)

VRF Air Conditioners

Johnson Controls proudly introduces new Variable Refrigerant Flow (VRF) air conditioners, a highly-efficient and reliable air-conditioning system. Recently, increased numbers of buildings are requiring "Intelligent" facilities that include communication networks, office automation, and a comfortable environment. In particular, a comfortable environment is becoming more of a year-around requirement in office buildings. The VRF multi-split system air conditioner meets these requirements. The proven combination of the scroll compressor and inverter provides the best air conditioning for small and medium office buildings.

■ VRF System

Johnson Controls has developed the VRF system with its customers in mind.

This system, which is unique in the world, allows the interconnection of indoor units for all our VRF air conditioners.

This system provides the consumer with greater flexibility for installation, which means that the air-conditioning systems will integrate better within complex facility structures.

■ Comfortable Air Conditioning Environment

Fresh air intake is realized while suppressing the air conditioning load by cooling or heating outdoor air.

■ Two Control Mode

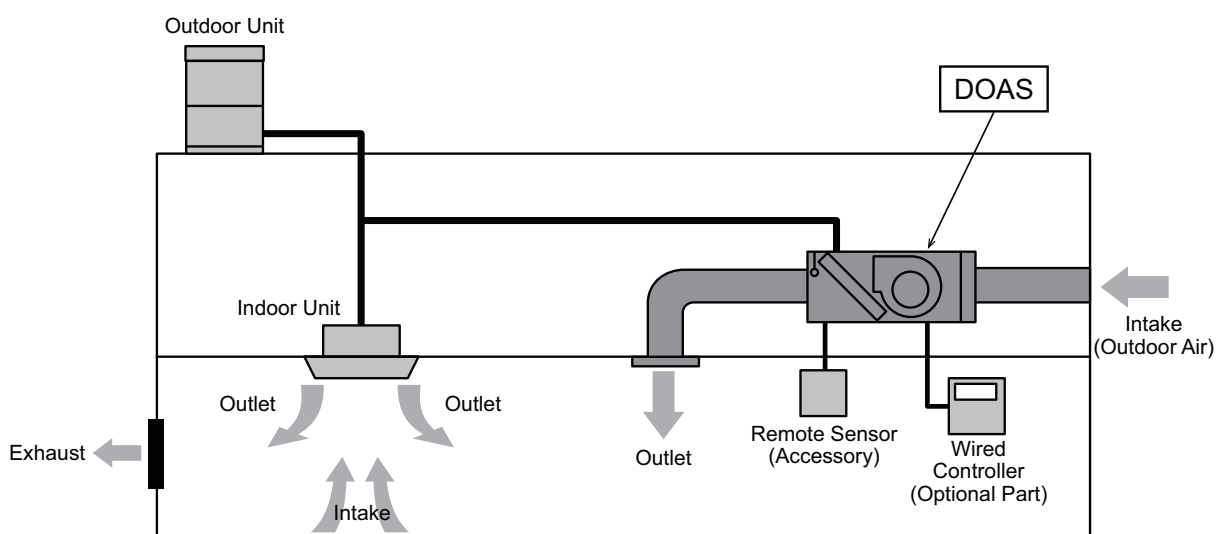
Depend on the installation environment and the purpose of use, the DOAS control system can be chosen from two options.

< Indoor Temperature Control >

In this mode, the control system bring the room atmosphere temperature closer to the set point temperature of the wired controller, using a temperature sensor (remote sensor or thermistor in the wired controller) mounted in the room.

[Advantage]

When using an indoor temperature sensor, the system will be able to control the temperature in collaboration with other indoor units.



Temperature Set Point Range of Wired Controller: Cooling . 66°F (19°C) ~ 86°F (30°C)
Heating . 62°F (17°C) ~ 86°F (30°C)

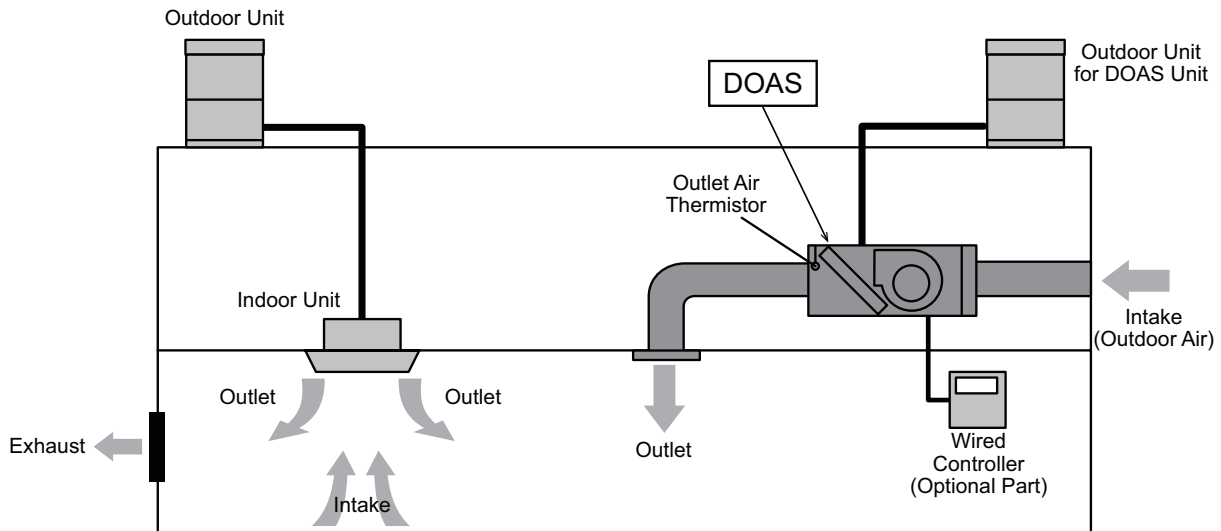
FEATURES

< Outlet Air Temperature Control >

In this mode, the control system bring the outlet temperature closer to the setting temperature of the wired controller, using an outlet air thermistor in the unit.

[Advantage]

When it is set introduce outdoor air, the system enable intake of fresh air without impacting the room temperature.



Temperature Set Point Range of Wired Controller: Cooling . 56°F (13°C) ~ 77°F (25°C)
Heating . 66°F (19°C) ~ 86°F (30°C)

■ Constant Air Volume Mode

Constant air volume mode is available for the unit in order to keep the air velocity constant during defrosting or hot start operation.

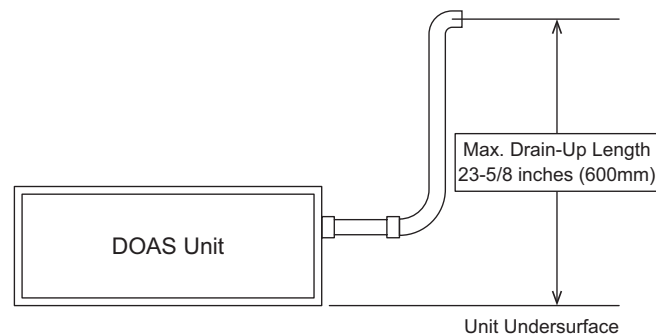
Even when combined with a ventilation fan, air supply and exhaust are balanced by this constant air volume mode. (Settings are available using the optional function setting in the wired controller.)

NOTE:

During the defrosting operation and start of the heating operation, airflow temperature will be decreased. Carefully consider the installation location and direction of the air outlet.

Note that, when the air outlet temperature is 19.4°F (-7°C) or less, heating operation is stopped.

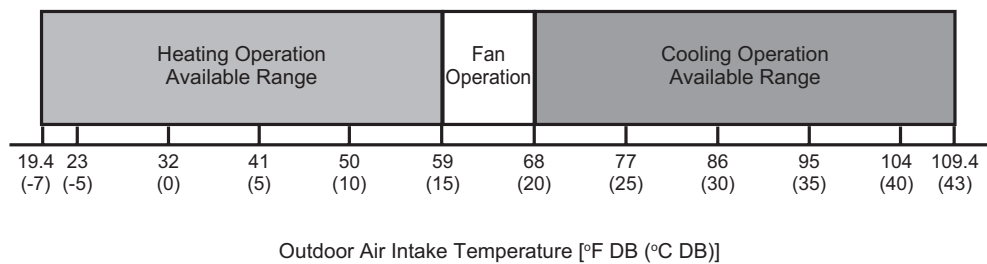
■ Flexible Layout when Using a Drain Pump



■ High External Static Pressure

Flexible duct installation due to the high external static pressure capability.

■ Operation Range



NOTES:

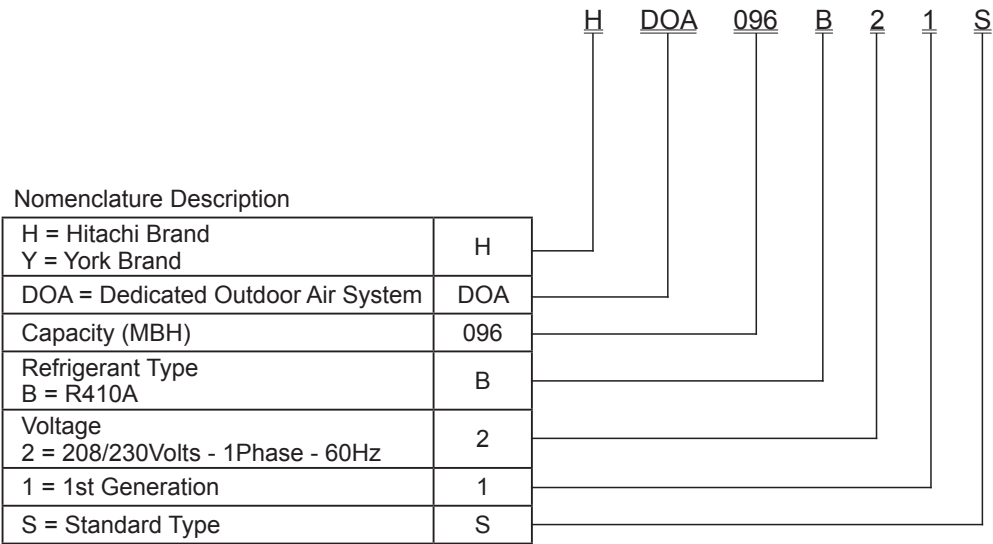
- 1. The above figure shows the sensed temperature of inlet air thermistor for the DOAS unit.
- 2. When the outdoor air intake temperature is 32°F DB (0°C DB) or less, the heating operation is started for freeze protection of the heat exchanger.
However, when the condition is such that the heating operation is not available, the operation is stopped.
- 3. When the outdoor air intake temperature is 19.4°F DB (-7°C DB) or less, the heating operation is stopped for protection of the heat exchanger from freezing and/or a cold draft.
In addition, even when it is within the operation range, the operation might be stopped for unit protection.
- 4. During the heating operation, when the outdoor air intake temperature is 59°F DB (15°C DB) or more, the operation is changed to fan operation.
- 5. When starting the heating operation or defrosting operation, the fan function is stopped by setting the optional function setting in the wired controller. Constant air volume mode is available in order to keep the air speed constant. (If it is in abnormal condition, the fan function will stop.) Refer to the Service Manual for details.
- 6. During cooling operation, when the outdoor air intake temperature is 68°F DB (20°C DB) or less, the operation is changed to fan operation.
When the outdoor air intake temperature is 109.4°F DB (43°C DB) or more, the fan operation can continue, though the alarm might be stopped by increasing pressure due to being out of operation range.
In addition, when the outdoor air intake temperature is high (approx. 104°F DB (40°C DB) or more) or low (approx. 73.4°F DB (23°C DB) or less) the cooling operation and the fan operation might be alternated for unit protection.

2. DOAS (Dedicated Outdoor Air System) Type

2.1 Unit Nomenclature

Model Descriptions

Example



2.2 Line-up

Type		Capacity		Model
		RT	MBH	
Indoor Unit	DOAS	8.0	96	(H,Y)DOA096B21S

2.3 General Data

Indoor Unit Type		DOAS
Model		(H,Y)DOA096B21S
Indoor Unit Power Supply		AC 1Phase, 208/230V, 60Hz
Outlet Air Temperature Control *1		
Nominal Cooling Capacity	Btu/h (kW)	96,000 (28.2)
Nominal Heating Capacity	Btu/h (kW)	60,000 (17.6)
Indoor Temperature Control *2		
Nominal Cooling Capacity	Btu/h (kW)	96,000 (28.2)
Nominal Heating Capacity	Btu/h (kW)	83,600 (24.5)
Sound Pressure Level *3 (Overall A Scale) (208/230V)		
	dB	50/51
Outer Dimensions		
Height	in. (mm)	19-1/8 (486)
Width	in. (mm)	50 (1270)
Depth	in. (mm)	44-1/8 (1120)
Net Weight	lbs (kg)	247 (112)
Refrigerant		R410A
Indoor Fan		
Airflow Rate	cfm (m ³ /min)	1236 (35.0)
External Pressure (208/230V)		
High Pressure	in.W.G (Pa)	1.06/1.24 (265/310)
Standard	in.W.G (Pa)	-
Motor Nominal Output	W	402 (201 x 2 pcs)
Min Circuit Amps	A	4.3
Maximum Fuse Amps	A	15
Connections		
Refrigerant Piping		Brazed
Liquid Line	in. (mm)	3/8 (9.52)
Gas Line	in. (mm)	7/8 (22.20)
Condensate Drain		VP25
OD	in. (mm)	1-1/4 (32)
ID	in. (mm)	1 (25)

NOTES:

*1. Outlet Air Temperature Control

A control system to bring the outlet temperature closer to the set point temperature of the wired controller, using an outlet air thermistor of the unit.

Nominal capacity (outlet air temperature control) is based on combination with VRF system and following conditions:

Cooling Operation Conditions

Outdoor Temperature: 91°F DB (33.0°C DB)
82°F WB (28.0°C WB)

Discharge Set Temperature: 61°F DB (16.0°C DB)

Piping Length: 24.6 ft. (7.5m) Piping Lift: 0 ft. (0m)

Heating Operation Conditions

Outdoor Temperature: 32°F DB (0°C DB)
27°F WB (-2.9°C WB)

Discharge Set Temperature: 72°F DB (22.0°C DB)

*2. Indoor Temperature Control

A control system to bring the room atmosphere temperature closer to the set point temperature of the wired controller, using a temperature sensor (remote sensor or thermistor in wired controller) mounted to any place in the room.

Nominal capacity (indoor temperature control) is based on combination with VRF system and following conditions:

Cooling Operation Conditions

Outdoor Temperature: 91°F DB (33.0°C DB)
82°F WB (28.0°C WB)

Indoor Temperature: 81°F DB (27.0°C DB)

Piping Length: 24.6 ft. (7.5m) Piping Lift: 0 ft. (0m)

Heating Operation Conditions

Outdoor Temperature: 32°F DB (0°C DB)
27°F WB (-2.9°C WB)

Indoor Temperature: 68°F DB (20.0°C DB)

*3. The sound pressure level is based on the following conditions.

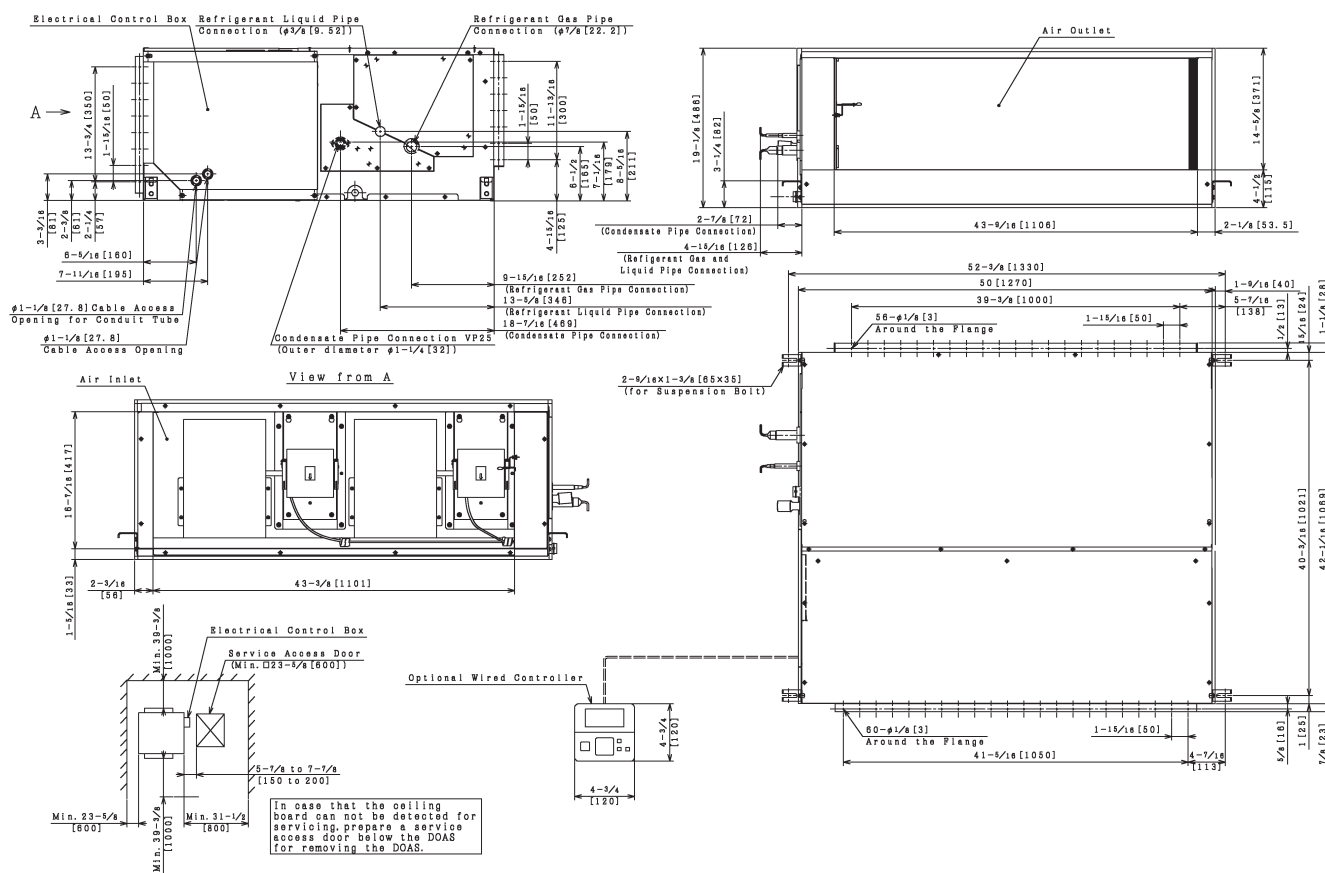
4.9 ft. (1.5m) beneath the units.

The above data is measured in an anechoic chamber so that reflected sound should be taken into consideration in the field.

2.4 Dimensional Data

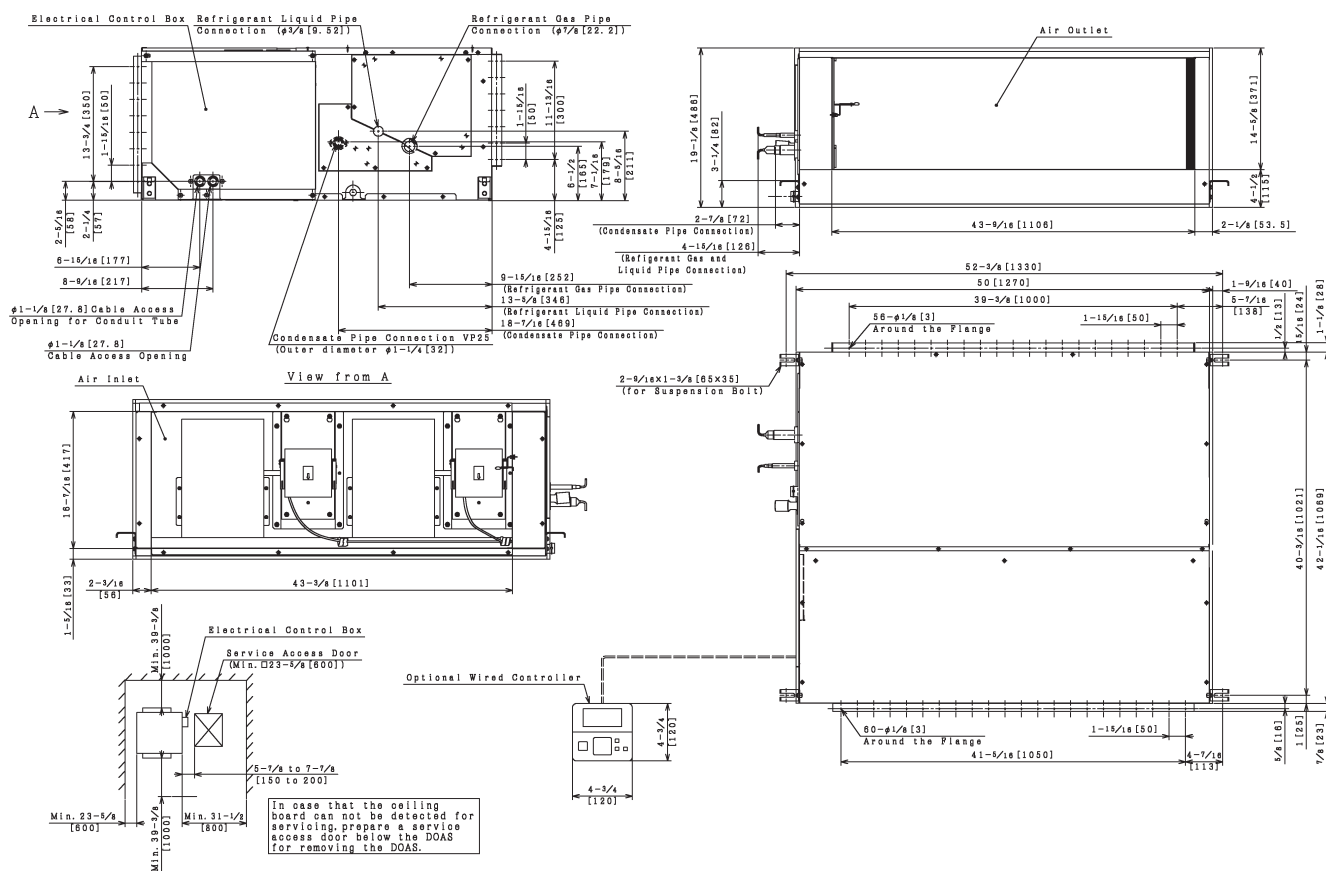
Model: (H,Y)DOA096B21S (Produced in 2017 or earlier)

Unit: inch (mm)



Model: (H,Y)DOA096B21S (Produced in 2018 or later)

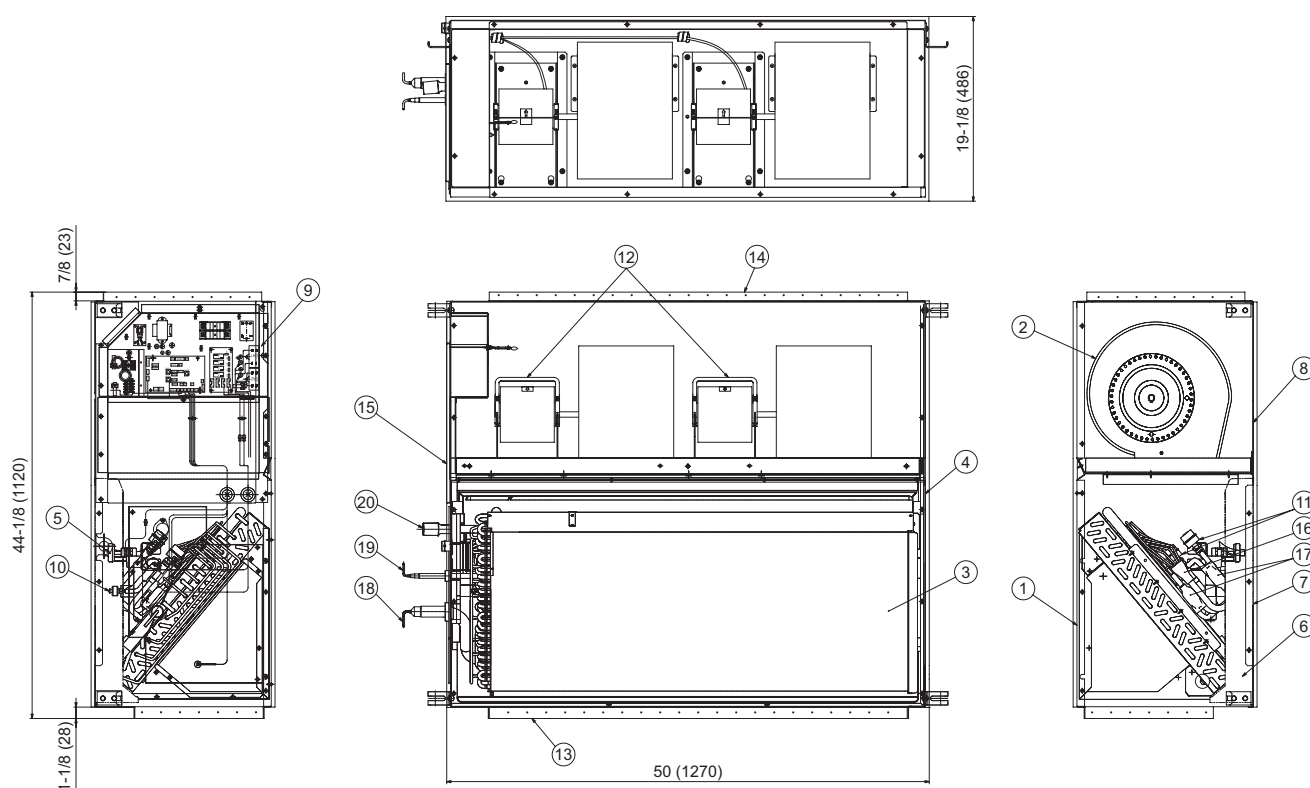
Unit: inch (mm)



2.5 Structure

Model: (H,Y)DOA096B21S

Unit: inch (mm)



No.	Name	Remarks
1	Top Enclosure	
2	Fan	
3	Heat Exchanger	
4	Right Side Enclosure	
5	Drain Pump	
6	Drain Pan	
7	Bottom Enclosure (Front)	
8	Bottom Enclosure (Back)	
9	Electrical Control Box	
10	Float Switch	
11	Micro-Computer Control Expansion Valve	
12	Fan Motor	AC
13	Air Outlet	
14	Air Inlet	
15	Left Side Enclosure	
16	Distributor	
17	Strainer	
18	Refrigerant Gas Pipe Connection	With $\phi 1/8$ [22.2] Flare Nut
19	Refrigerant Liquid Pipe Connection	With $\phi 3/8$ [9.52] Flare Nut
20	Drain Pipe Connection	

2.6 Component Data

Indoor Heat Exchanger and Fan

Model		(H,Y)DOA096B21S
Heat Exchanger Type		Multi-Pass Cross Finned Tube
Tube	Material	Copper Tube
	Outer Diameter	1/4 (7.0)
	Rows	4
	Number of Tube/Coil	108
Fin	Material	Aluminum
	Pitch	1/16 (1.6)
Maximum Operating Pressure		601 (4.15)
Total Face Area		6.48 (0.61)
Number of Coil/Unit		1
Indoor Fan		Multi-Blade Centrifugal Fan
Number/Unit		2
Outer Diameter		8-15/16 (227)
Nominal Airflow (Hi)		1236 (35.0)
Indoor Fan Motor		Drip-Proof Type Enclosure
Starting Method		PSC (Permanent Split Capacitor)
Nominal Output		201
Quantity		2
Insulation Class (*)		F

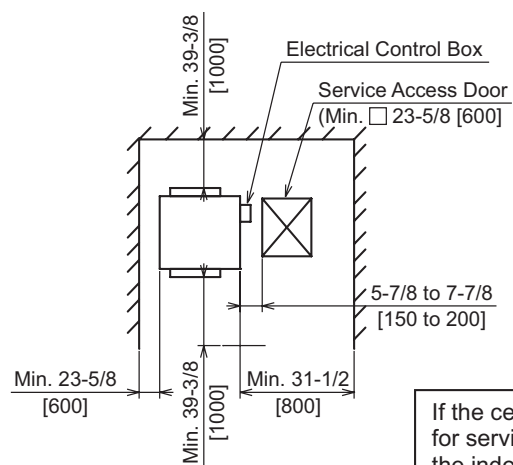
NOTE:

(*) The insulation class means the heat resistant grade of the insulation material based on the IEC standard.
Refer to the IEC 60085 for more information.

2.7 Operation Space

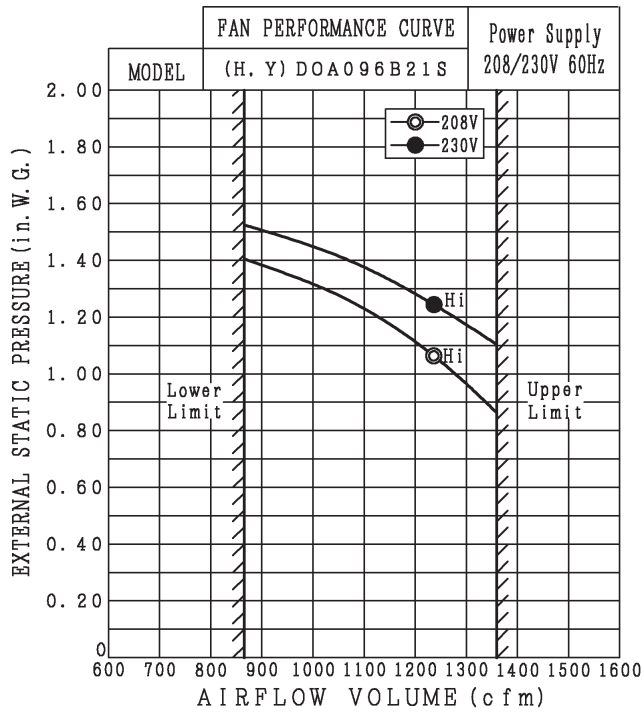
Model: (H,Y)DOA096B21S

Unit: inch [mm]



If the ceiling board can not be detected for servicing, prepare a service access door below the indoor unit for removing the indoor unit.

2.8 Fan Performance



2.9 Electrical Data

Model	Unit Main Power			Applicable Voltage		Power Supply		Indoor Fan Motor	Unit
	VOL	PH	HZ	Maximum	Minimum	MCA	MFA	OPT	FLA
(H,Y)DOA096B21S	208/230	1	60	253	188	4.3	15	0.402 (Motor 2 pcs)	3.4

VOL: Rated Unit Power Supply Voltage (V)

PH: Phase

HZ: Frequency (Hz)

MCA: Maximum Circuit Ampacity (A)

MFA: Maximum Fuse Ampacity (A)

OPT: Rated Motor Output (kW)

FLA: Full Load Ampacity (A)

NOTE:

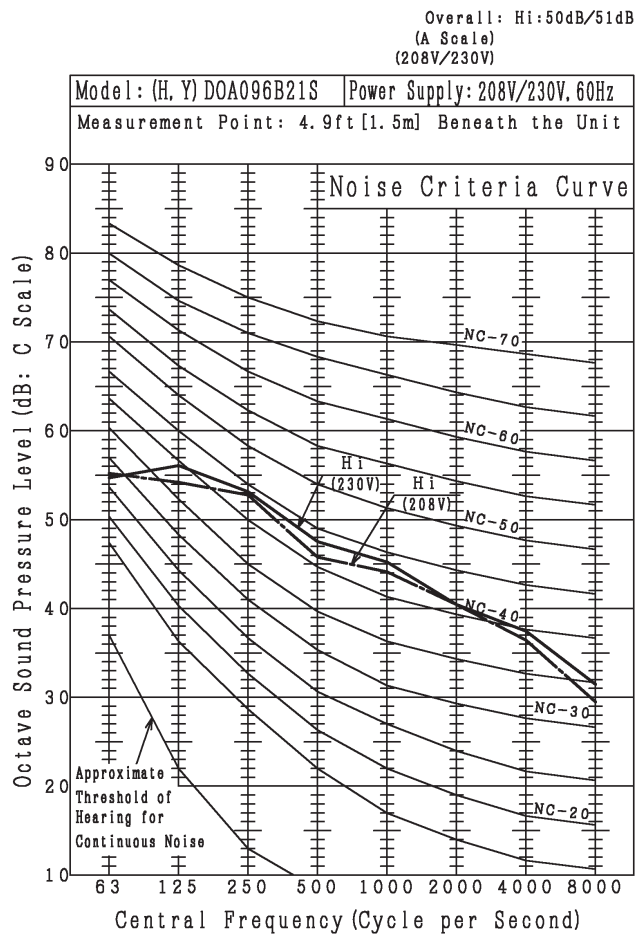
Power supply voltage should be satisfied with the following.

Supply Voltage: Rated Voltage within $\pm 10\%$

Starting Voltage: Rated Voltage within -15%

Operating Voltage: Rated Voltage within $\pm 10\%$

2.10 Sound Data

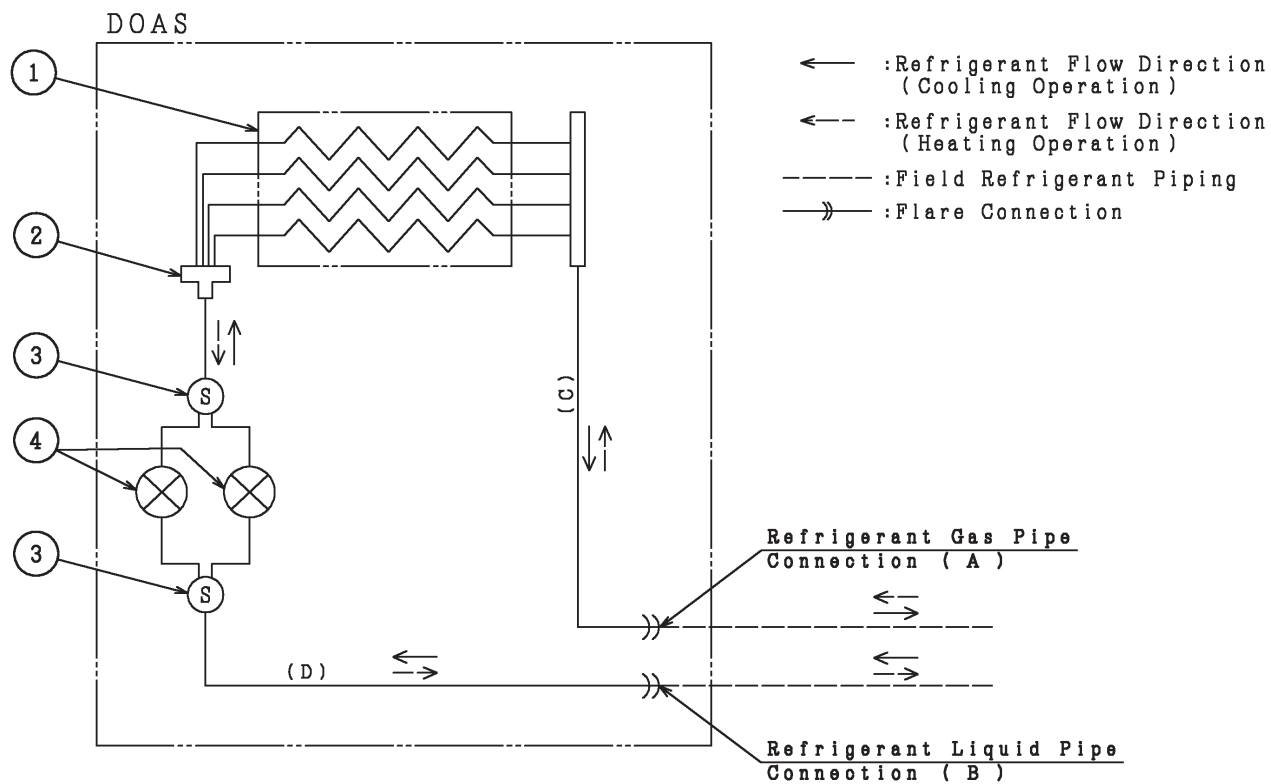
NOTES:

1. The sound pressure level is based on the following:
Measurement Point: 4.9 ft. (1.5m) beneath the unit.
2. The above data is measured in an anechoic chamber therefore reflected sound should be taken into consideration in the field.

2.11 Control System

2.11.1 Refrigerant System

Model: (H,Y)DOA096B21S

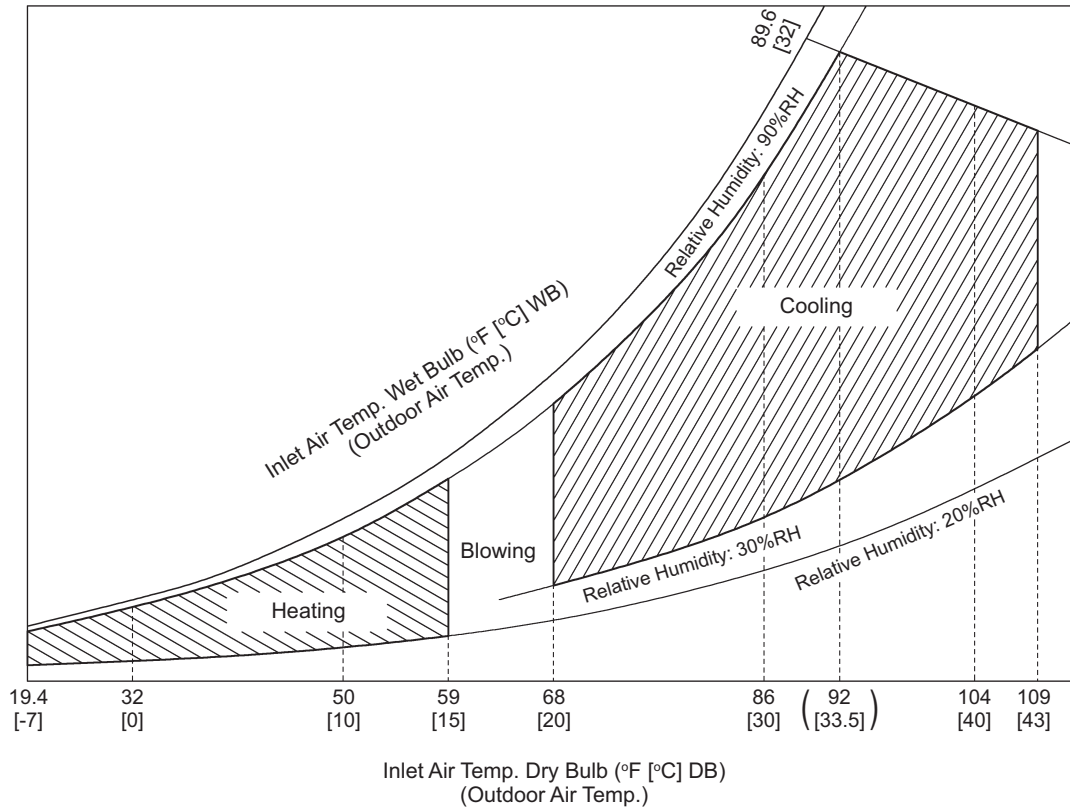


Mark	Part Name
①	Heat Exchanger
②	Distributor
③	Strainer
④	Electronic Expansion Valve

Unit: inch (mm)

Model	Distributor	(A) Gas Pipe Connection	(B) Liquid Pipe Connection	(C) OD×T	(D) OD×T
(H,Y)DOA096B21S	9 Pass	φ7/8 (22.2)	φ3/8 (9.52)	φ1×t0.063 (25.4×1.6)	φ1/2×t0.039 (12.7×1.0)

2.11.2 Operating Temperature Range

**NOTES:**

1. The above figure shows the sensed temperature of inlet air thermistor for the DOAS unit.
2. When the outdoor air intake temperature is 32°F DB (0°C DB) or less, the heating operation is started for freeze protection of the heat exchanger.
However, when the condition is such that the heating operation is not available, the operation is stopped.
3. When the outdoor air intake temperature is 19.4°F DB (-7°C DB) or less, the heating operation is stopped for protection of the heat exchanger from freezing and/or a cold draft.
In addition, even when it is within the operation range, the operation might be stopped for unit protection.
4. During the heating operation, when the outdoor air intake temperature is 59°F DB (15°C DB) or more, the operation is changed to fan operation.
5. When starting the heating operation or defrosting operation, the fan function is stopped though by setting the optional function setting in the wired controller. Constant air volume mode is available in order to keep the air speed constant. (If it is in an abnormal condition, the fan function will stop) Refer to the Service Manual for details.
6. During cooling operation, when the outdoor air intake temperature is 68°F DB (20°C DB) or less, the operation is changed to fan operation.
When the outdoor air intake temperature is 109.4°F DB (43°C DB) or more, the fan operation can continue, though the alarm might be stopped by increasing pressure due to being out of operation range.
In addition, when the outdoor air intake temperature is high (approx. 104°F DB (40°C DB) or more) or low (approx. 73.4°F DB (23°C DB) or less) the cooling operation and the fan operation might be alternated for unit protection.

2.11.3 Control Temperature

< Indoor Temperature Control >

	Cooling	Heating
Set Point Temperature Range for Wired Controller	66°F (19°C) ~ 86°F (30°C)	62°F (17°C) ~ 86°F (30°C)
Thermo-ON	[Inlet Temp.] ≥ [Setting Temp.] +2°F (+1°C) and [Inlet Temp.] ≥ 70°F (21°C)	[Inlet Temp.] ≤ [Setting Temp.] -2°F (-1°C) and 20°F (-7°C) ≤ [Inlet Temp.] ≤ 58°F (14°C)
Thermo-OFF	[Detected Indoor Temp.] ≤ [Setting Temp.] and [Inlet Temp.] ≤ [Setting Temp.] or [Inlet Temp.] ≤ 68°F (20°C)	[Detected Indoor Temp.] ≥ [Setting Temp.] and [Inlet Temp.] ≥ [Setting Temp.] or [Inlet Temp.] ≥ 59°F (15°C)

[Inlet Temp.]: Sensed Temperature of Inlet Air Thermistor

[Setting Temp.]: Set Point Temperature of Wired Controller

[Detected Indoor Temp.]: Sensed Temperature of Remote Sensor or Thermistor for Wired Controller

< Outlet Air Temperature Control >

	Cooling	Heating
Set Point Temperature Range for Wired Controller	56°F (13°C) ~ 77°F (25°C)	66°F (19°C) ~ 86°F (30°C)
Thermo-ON	[Inlet Temp.] ≥ [Setting Temp.] +2°F (+1°C) and [Inlet Temp.] ≥ 70°F (21°C)	[Inlet Temp.] ≤ [Setting Temp.] -2°F (-1°C) and 20°F (-7°C) ≤ [Inlet Temp.] ≤ 58°F (14°C)
Thermo-OFF	[Inlet Temp.] ≤ [Setting Temp.] -2°F (-1°C) or [Inlet Temp.] ≤ 68°F (20°C)	[Inlet Temp.] ≥ [Setting Temp.] +2°F (+1°C) or [Inlet Temp.] ≥ 59°F (15°C)

[Inlet Temp.]: Sensed Temperature of Inlet Air Thermistor

[Setting Temp.]: Set Point Temperature of Wired Controller

2.11.4 Standard Operation Sequence

(1) Control Flowchart

DOAS inlet air is outdoor air.

As long as DOAS outdoor air inlet temperature does not reach the setting temperature of the controller, thermo-OFF is not available and the operation is continued.

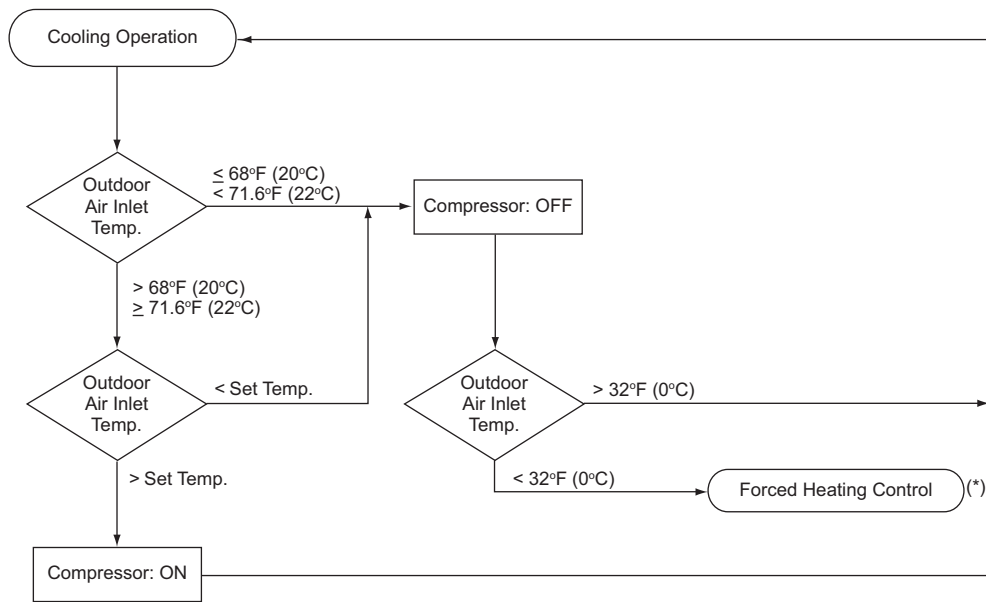
In addition, outdoor airflow directly into the indoor unit during thermo-OFF.

NOTE:

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

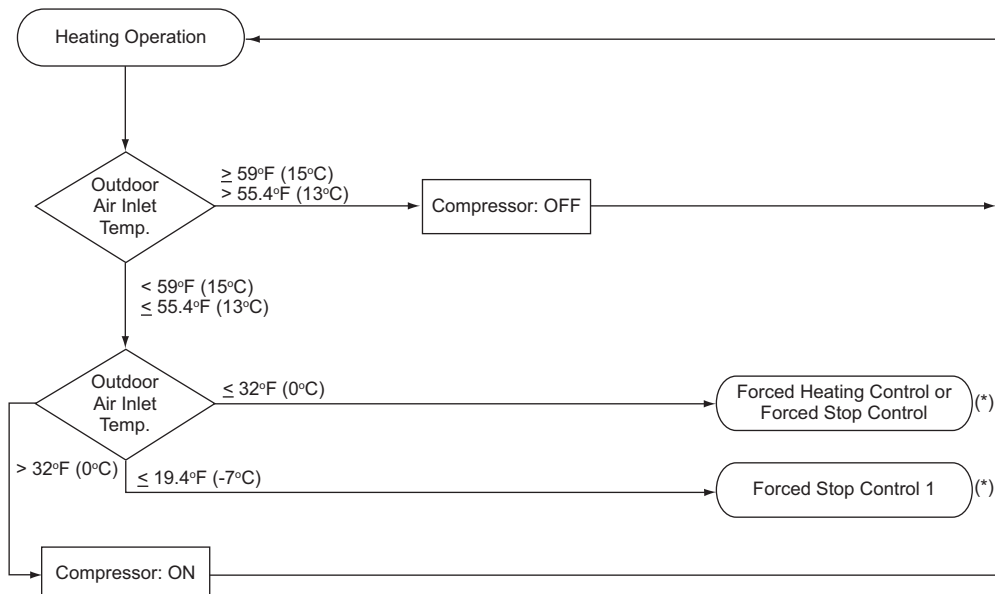
Thermo-OFF: The outdoor unit and some indoor units stay on, but do not run.

■ Cooling Operation



(*) Refer to (2) below "Freeze Protection Control" for details.

■ Heating Operation

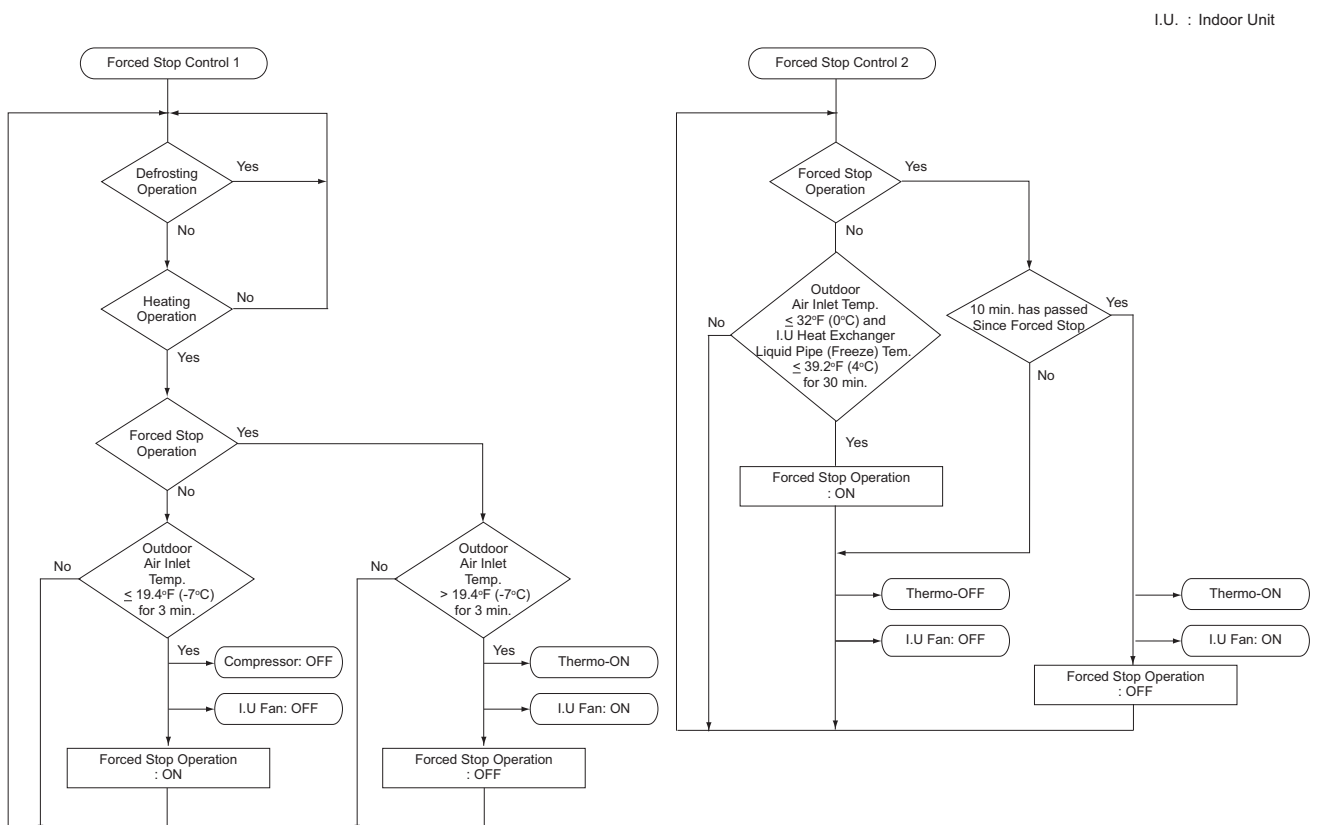
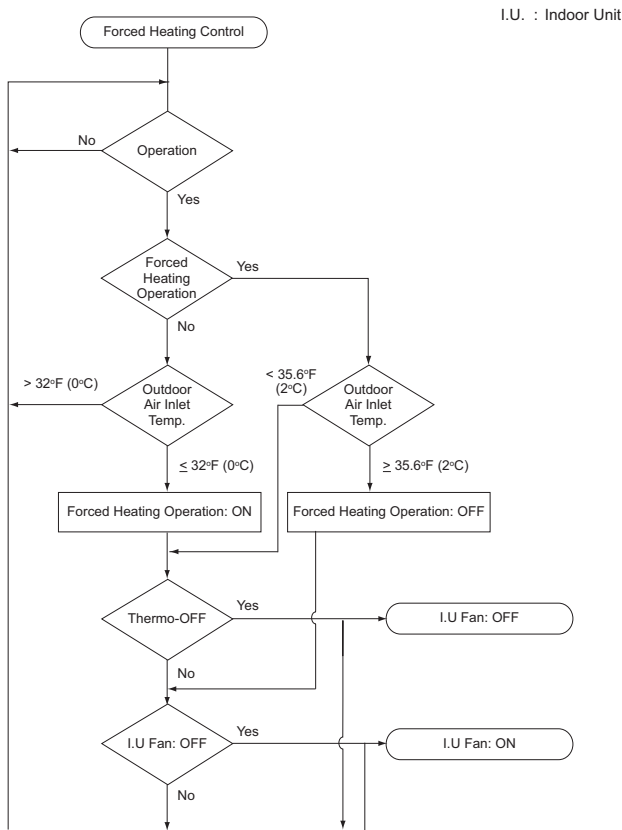


(*) Refer to (2) below "Freeze Protection Control" for details.

(2) Freeze Protection Control

DOAS operates the forced heating operation for freeze protection of the heat exchanger if the outdoor air inlet temperature is 32°F (0°C) or less during the cooling or airflow operation. However, the operation is stopped if the outdoor air inlet temperature is 19.4°F (-7°C) or less, or the temperature in the circuit is decreased.

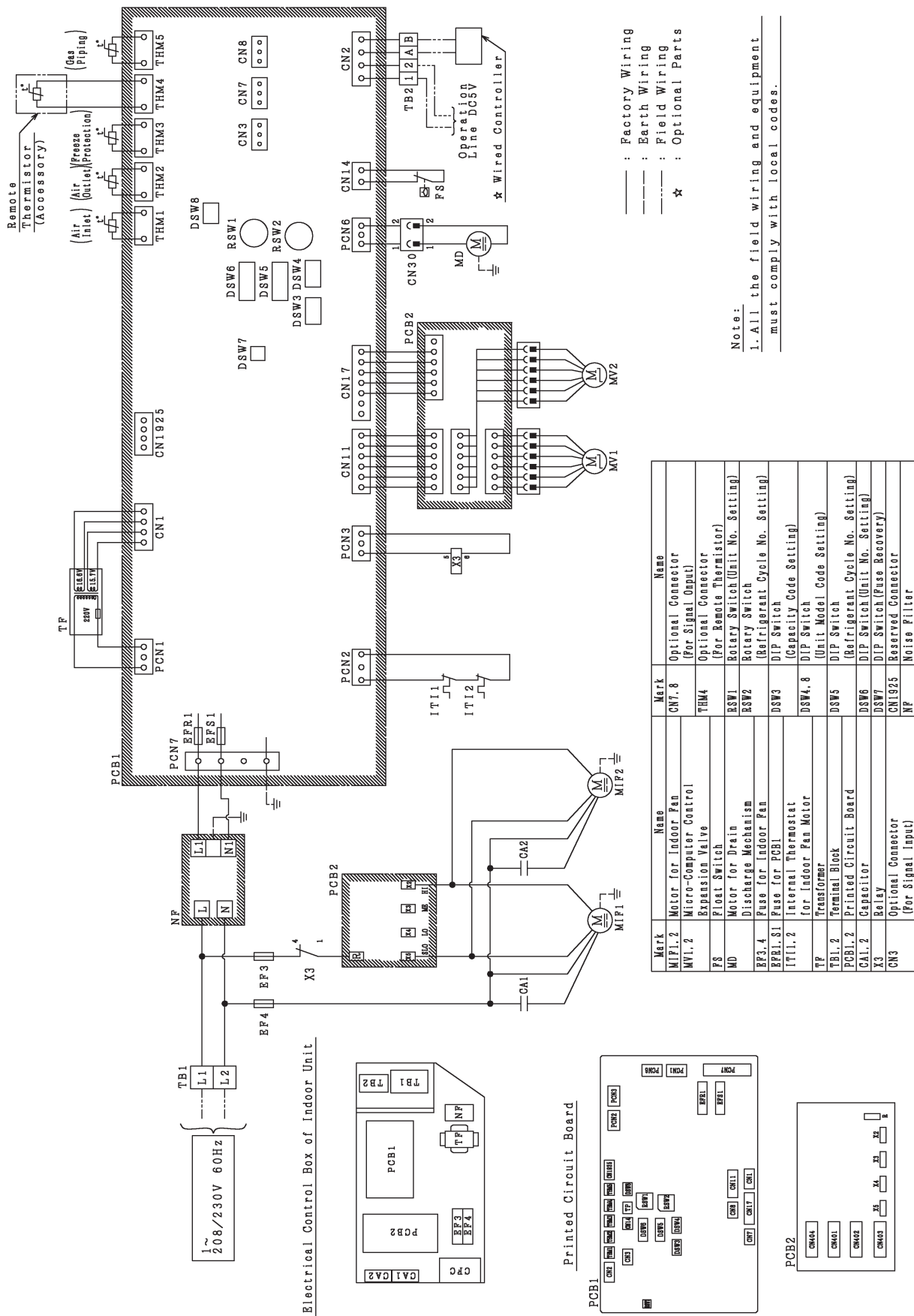
In addition, the operation is stopped when the condition is not available for the heating operation.
(The operation connected DOAS and other indoor units, etc.)



2.11.5 Safety and Control Device Setting

Model		(H,Y)DOA096B21S
For Evaporator Fan Motor Internal Thermostat		Automatic Reset, Non-Adjustable
Cut-Out	°F (°C)	302±9 (150±5)
Cut-In	°F (°C)	223±27 (106±15)
For Control Circuit Fuse Capacity	A	5

2.11.6 Wiring Diagram



3. Optional Parts

3.1 Line Up

Item No.	Optional Parts	Optional Parts Model Name
3.2	Seismic Suspension Bracket	SSB-IDH-01
3.3	Infrared (IR) Receiver Kit	CWDIRK01
3.4	3P Connector Cable	PCC-1A
3.5	Remote Sensor	THM-R2A
3.6	Relay and 3 Pin Connector Kit	PSC-5RA
3.7	Wired Controller	CIW01
3.8	Simplified Wired Controller	CIS01
3.9	Wireless Controller	CIR01
3.10	Mini Central Controller	CCM01
3.11	Large Central Controller	CCL01
3.12	Computerized Central Controller Software / Adapter	CCCS01 / CCCA01

Refer to the Engineering Manual of Control for details of item 3.7 to 3.12.

3.2 Seismic Suspension Bracket: SSB-IDH-01

Replace the original suspension bracket to this seismic suspension bracket to prevent destruction or damage to the ducted indoor unit during earthquake by improving its strength.

3.2.1 Applicable Unit

Model	SSB-IDH-01
Required Qty.	x 1
Applicable Indoor Unit	(H,Y)IDH072, 096B21S, (H,Y)DOA096B21S

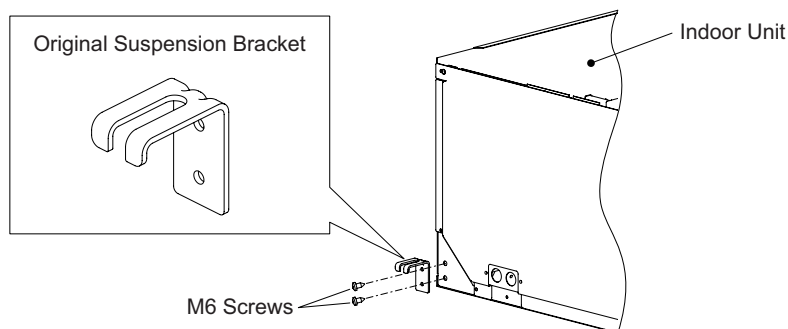
3.2.2 Installation Work

- (1) Reuse the screws attached to the unit bracket to attach the seismic suspension bracket.
- (2) The additional service space is required to install the seismic suspension bracket.

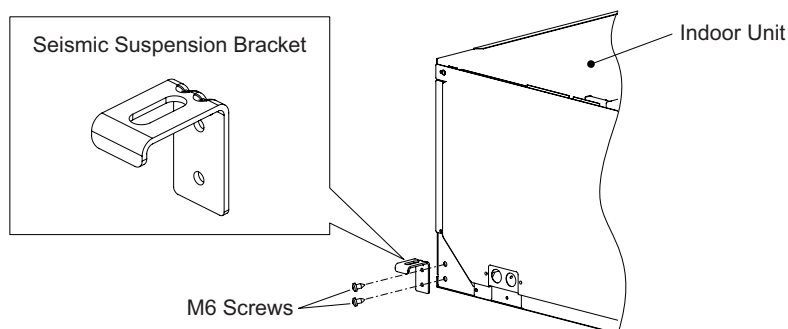
3.2.3 Seismic Suspension Bracket Installation Procedures

After confirming the ducted indoor unit model, install the seismic suspension bracket according to the following procedures. Install the seismic suspension bracket securely with the screws that are attached to the unit. If you don't tighten the screws well enough, the unit may fall over.

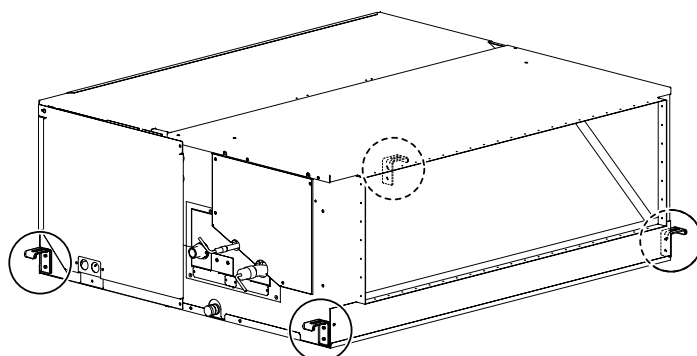
- (1) Remove two M6 screws securing the original suspension bracket and remove the original suspension bracket.



- (2) Attach the seismic suspension bracket to indoor unit and secure the seismic suspension bracket by reusing two of the screws removed from the unit.



- (3) Perform the same work at the other three bracket locations. (Total four places)



3.3 Infrared (IR) Receiver Kit: CWDIRK01

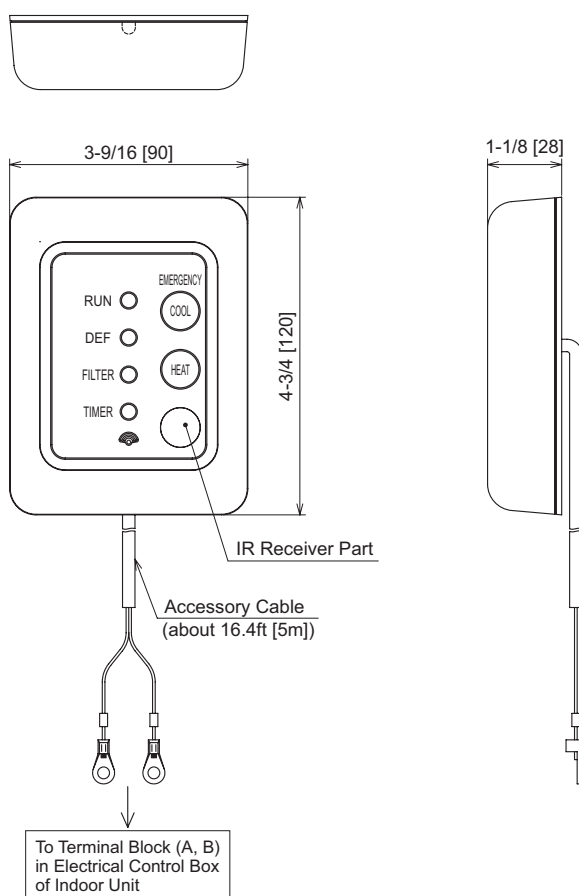
This IR receiver kit is installed with the wall mount to use with the wireless controller.

3.3.1 Specifications

Model	CWDIRK01
Outer Dimension < W × H × D >	3-9/16 × 4-3/4 × 1-1/8 inch (90 × 120 × 28 mm)

3.3.2 Dimensions

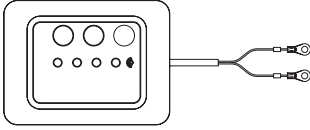




Unit: inch [mm]



3.3.3 Applicable Models

Model	CWDIRK01
Applicable Indoor Unit Model	General-Purpose (Ducted and Wall Mount Type)
Applicable Wireless Controller	CIR01

3.3.4 Accessories / Options

No.	Accessory	Qty	Remarks
①	IR Receiver Kit CWDIRK01 	1	With Connecting Cable
②	Cable Band 	1	For Clamping Cable
③	Securing Screw 	4	For Installing IR Receiver Kit
④	Securing Screw 	2	For Fixing Cable Clamp
⑤	Cable Clamp 	2	For Clamping Cable

3.3.5 Installation

⚠ WARNING

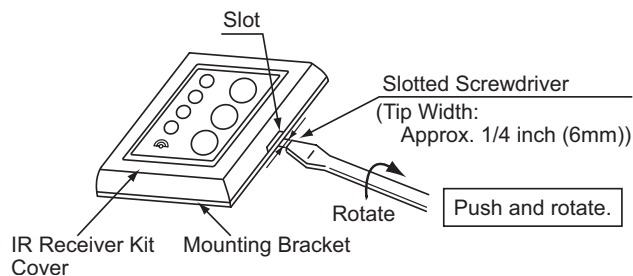
- Turn OFF the power supply completely before setting the DIP switch, installation work, and electrical wiring work for the IR receiver kit. If not, it may cause an electric shock.
- Perform securely the installation work referring to this manual. If the installation is not completed correctly, the IR receiver kit may fall and cause injury.
- Do not install the IR receiver kit where flammable gases may generate or enter. It may cause heat generation or a fire.
- Correctly perform the electrical wiring work. If electrical work is not completed correctly, heat generation at the connection, a fire or an electric shock may occur.
- Make sure that the electrical wires are securely fixed so that no external force affects the terminal connections of the wiring. Not doing so may cause heat generation or a fire.

NOTICE

- When the IR receiver kit is installed near ambient lighting, it may not receive a signal from the wireless controller. Therefore, pay particular attention to the installation position of the IR receiver kit.
- Do not run the connecting cable for the IR receiver kit and the power supply cable (208/230V) in parallel. It may cause a malfunction of the IR receiver kit.
- To ensure correct performance, read this manual together with the “Installation and Maintenance Manual” for the indoor unit and the wireless controller. Forward this information to the building owner and request that they maintain all the equipment manuals.
- CWDIRK01 is for a general-purpose IR receiver kit. It is applied for ducted, cassette, wall mount, ceiling-suspended, and floor type indoor units.

- 1 Perform the installation work for the IR receiver kit while the indoor unit is being installed.
- 2 Turn OFF the power supply for the indoor unit if the IR receiver kit is attached after the indoor unit is installed.
- 3 Install the IR receiver kit using the length of connecting cable (accessory).
The cable length is approximately 17 ft. (5m).

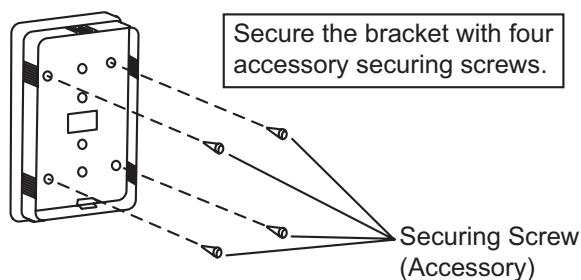
- 4 Open the cover of the IR receiver kit.
Push the slotted screwdriver with a tip width of approximately 1/4 inch (6mm) into the slot of the IR receiver kit cover and rotate it to open the cover as shown in the figure at the right.



- 5 Mount the IR receiver kit onto the wall or the ceiling surface as shown below.

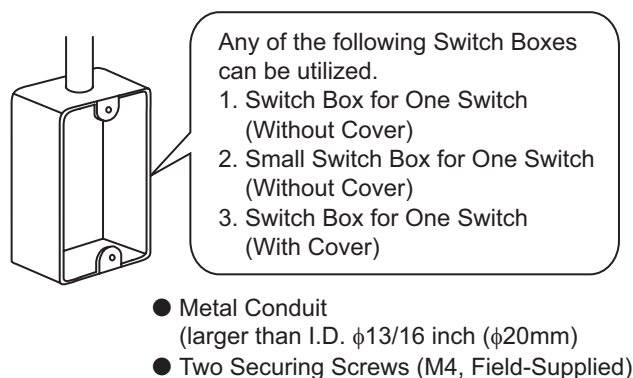
Situation A

- (1) Secure the bracket.

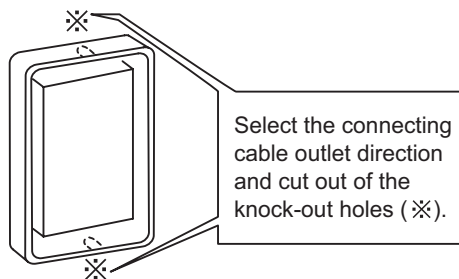


Situation B

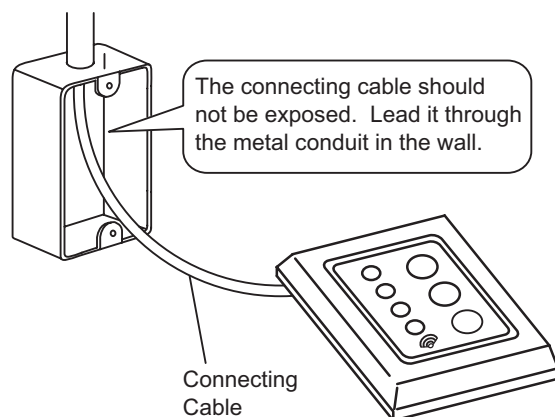
- (1) Prepare the field-supplied switch box (JIS Box). (JIS C8340)



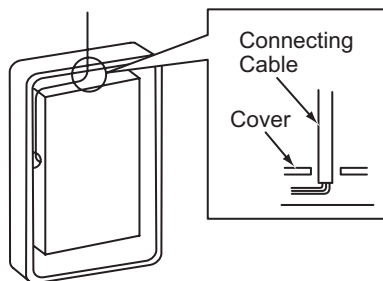
- (2) Select the connecting cable outlet direction and cut out one of the knock-out holes on the cover.



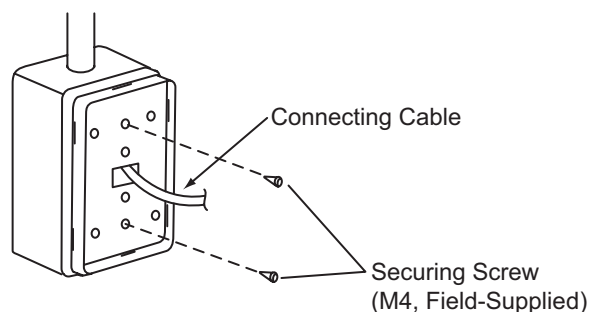
- (2) Run the connecting cable into the metal conduit.



- (3) Lead the connecting cable through the knock-out hole.

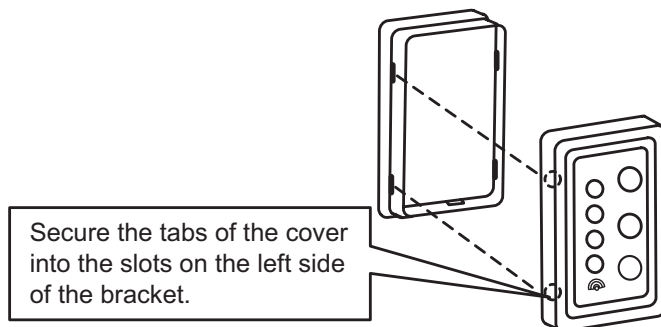


- (3) Secure the bracket.

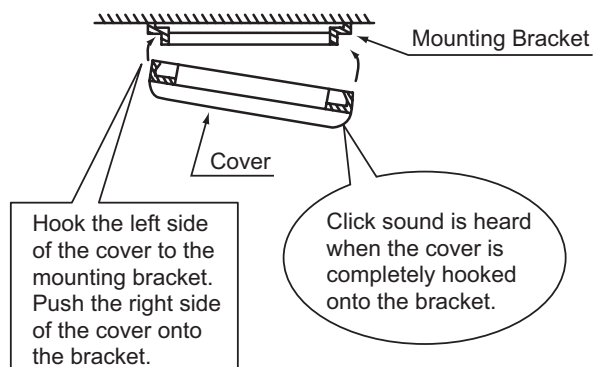


- (4) Attach the IR receiver kit.

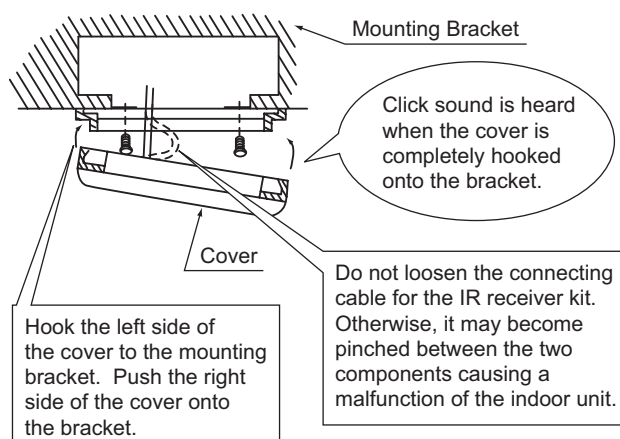
Do not pinch the cable between the bracket and the IR receiver kit cover when attaching the IR receiver kit. Attach the IR receiver kit cover following these directions.



Situation A



Situation B



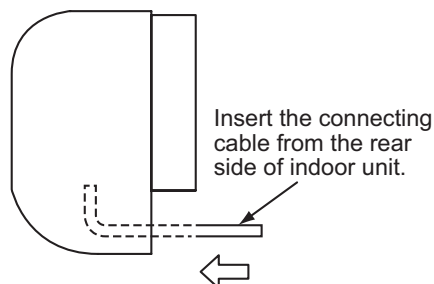
3.3.6 Electrical Wiring

The terminal block (TB2) for the controller cable is located as shown in the figure below. Connect the connecting cable for the IR receiver kit to terminals A and B at TB2. (There is no polarity between terminals A and B.) The details for wiring methods can be found in the “Installation and Maintenance Manual” for the indoor unit.

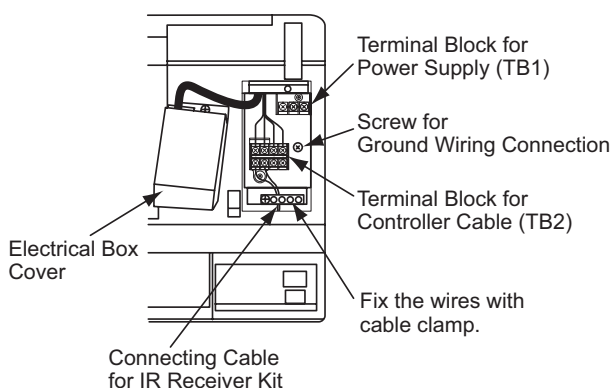
The following wiring method is an example for wall mount indoor units

NOTE:

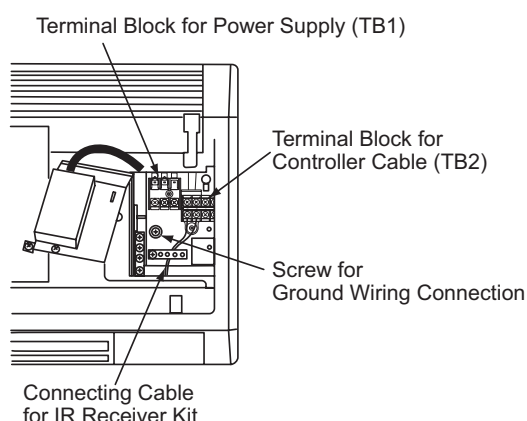
After running the connecting cable, clamp the extra length of the connecting cable using the accessory cable band and place it in the electrical box.



TIWM006 - 012B21S



TIWM015 - 030B21S

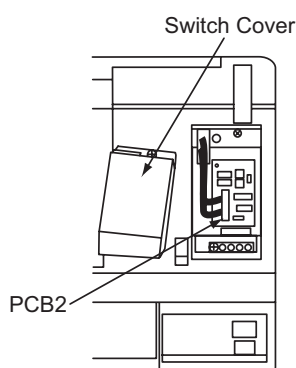


3.3.7 Setting DIP Switches on Indoor Unit Side

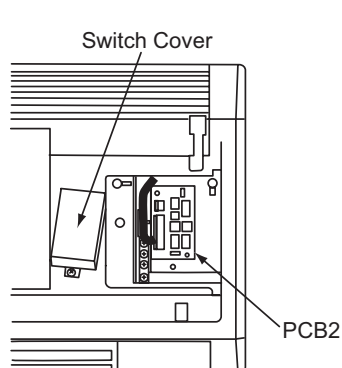
Instructions for setting DIP switches for other indoor units can be found in the Installation and Maintenance Manual for indoor units. The following DIP switch setting is an example for wall mount indoor units.

- 1 The factory setting of SW2 before shipment is “Wireless”. When using an IR receiver kit (CWDIRK01), set the SW2 to “Wired”. If not doing so, the operation is not available.
- 2 Turn OFF the power supply of the indoor and outdoor units completely before setting the DIP switch. If not turning off the power, the setting becomes invalid.
- 3 The positions of the DIP switches are shown below.
Open the switch cover. After the DIP switch is set, re-attach the switch cover. The details for setting DIP switches for an indoor unit can be found in the Installation and Maintenance Manual for indoor units.

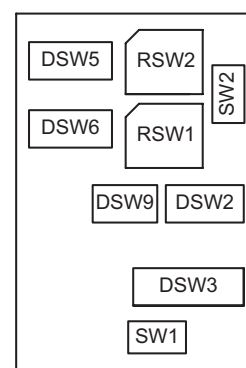
TIWM006 - 012B21S



TIWM015 - 030B21S



DIP Switch PCB (PCB2)



3.3.8 Setting DIP Switch on IR Receiver Kit Side

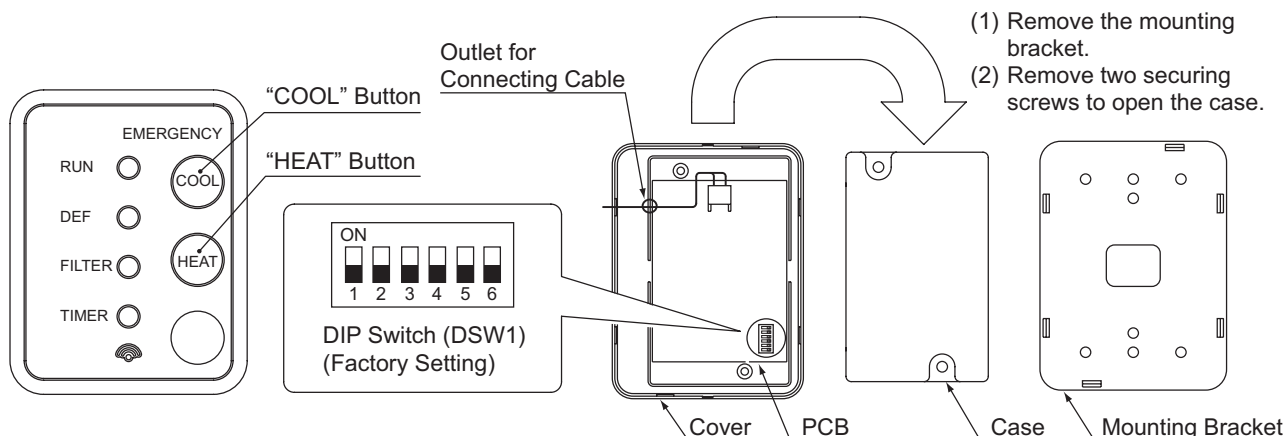
⚠ WARNING

Turn OFF the power supply completely before setting the DIP switch for an IR receiver kit. Not doing so may cause an electric shock.

- 1 The following switches are on the IR receiver kit.

NOTE:

When the case is closed, pay particular attention to the outlet position for connecting cable.



- 2 Emergency Operation Setting

“COOL” and “HEAT” switches are used for emergency operation when the batteries for the wireless controller are low.

- (1) Switch “COOL”: Press “COOL” so that the cooling operation is started.
Press “COOL” again so that the cooling operation is stopped.
- (2) Switch “HEAT”: Press “HEAT” so that the heating operation is started.
Press “HEAT” again so that the heating operation is stopped.

NOTE:

During an emergency operation, a yellow light “” flashes (0.5 second ON/0.5 second OFF).

The temperature setpoint and the fan speed for the cooling/heating operation are the same as before starting an emergency operation.

- 3 The DIP switch (DSW1) is for the optional function selection. If the optional function selection is required, set the DIP switch as follows.

Optional Function	DIP Switch Setting (DSW1)						Details
	1	2	3	4	5	6	
Main/Sub Setting	O	X	X	X	X	X	Change main (OFF setting)/ sub (ON setting) wireless controller for a two-wireless controller system.
Identifying of Indoor Unit	X	O	X	X	X	X	It functions as B Mode (identification of indoor unit) of the wireless controller when it is “ON”.
Invalidity of Emergency Operation	X	X	X	O	X	X	The switches for emergency operation are invalid.

O: ON

X: OFF

NOTICE

Review the following optional function settings when a function for the IR receiver kit is selected from the wireless controller or the centralized controller.

- The optional functions “Cooling Lower Limit for Setting Temperature” and “Heating Upper Limit for Setting Temperature” are not available with the wireless controller.
- The optional function setting “Fixing of Setting Temperature” is not available. When the operation mode is changed from the wireless controller, the indicated temperature on the wireless controller becomes the set temperature of the wired controller.

3.3.9 Identifying Indoor Units Installed in a Side-by-Side Operation

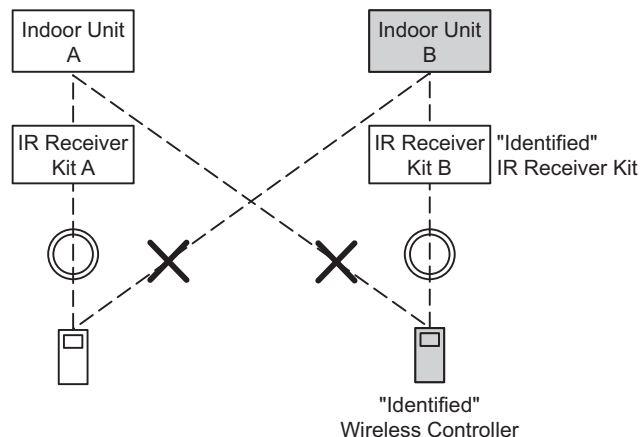
⚠ WARNING

Turn OFF the power supply completely before setting the DIP switch for the IR receiver kit. Not doing so can cause an electric shock.

When two indoor units are installed side by side, the commands from the wireless controller may be received by both indoor units. The function, "Identifying of Indoor Units Installed Side by Side" enables operation of the individual unit correctly without interfering with the other unit's operation. As shown in the figure at the right, the IR receiver kit of A and B are set side by side. In this instance, unit B is set as "Identifying Indoor Units Installed Side by Side".

NOTE:

This function setting is required at the receiver side. It should be set according to the Installation Manual for indoor units. Contact your distributor for details.



Setting of Identifying of Indoor Units Installed Side by Side

- 1 IR Receiver Kit Setting
Set the Number 2 pin of the IR receiver kit DIP switch (DSW1) at the "Identified" Unit B "ON" side.
- 2 Wireless Controller
Set the wireless controller according to the Installation and Maintenance Manual for the Wireless Controller.

Cancellation of Identifying of Indoor Units Installed Side by Side

- 1 IR Receiver Kit Setting
Set the Number 2 pin of the IR receiver kit DIP switch (DSW1) "OFF" side for cancellation.
- 2 Wireless Controller
Cancel the wireless controller setting according to the Installation and Maintenance Manual for the Wireless Controller.

3.3.10 Simultaneous Operation

⚠ WARNING

- Turn OFF the power supply completely before setting the DIP switch and electrical wiring work for the IR receiver kit. Not doing so can cause an electric shock.
- Accurately perform the electrical wiring work. If the electrical work is not completed correctly, heat generation at the connection, a fire, or an electric shock may occur.
- Make sure that the electrical wires are adequately clamped with a cable clamp and not in a manner that applies too much external force to the terminal connections of the wirings. If done correctly, the result could cause heat generation or a fire.

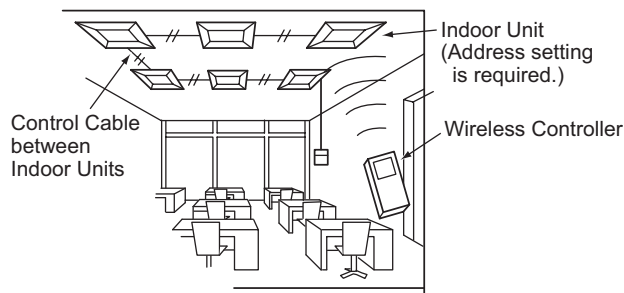
NOTICE

- Do not run the connecting cable for IR receiver kit and the power supply cable (208/230V) in parallel. It may cause a malfunction of the IR receiver kit.

Up to 16 indoor units can be simultaneously controlled using one wireless controller. When multiple indoor units are installed in a large room, all the indoor units can be controlled to start/stop with only one wireless controller.

NOTE:

Do not apply a simultaneous operation for the indoor units installed separately in different rooms. Some units may be left without turning OFF the power supply.

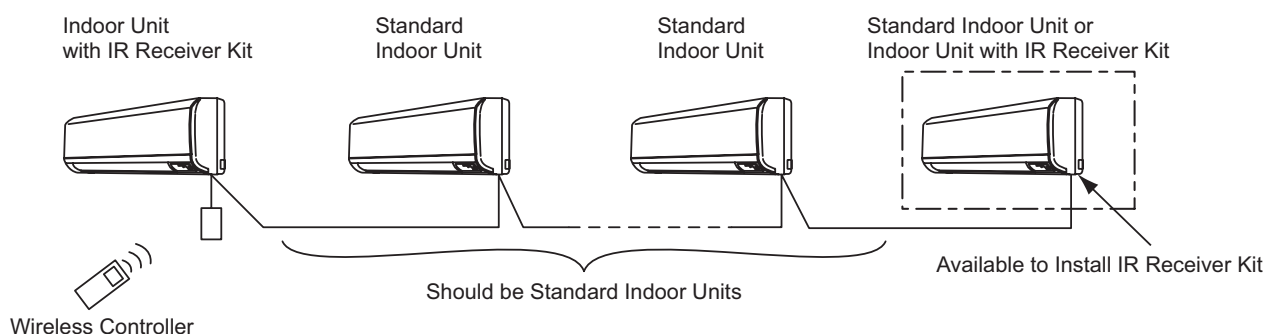


Control Example of Simultaneous Operation of Multiple Units

(Example of 4-way cassette type indoor units.)

Installation of IR Receiver Kit

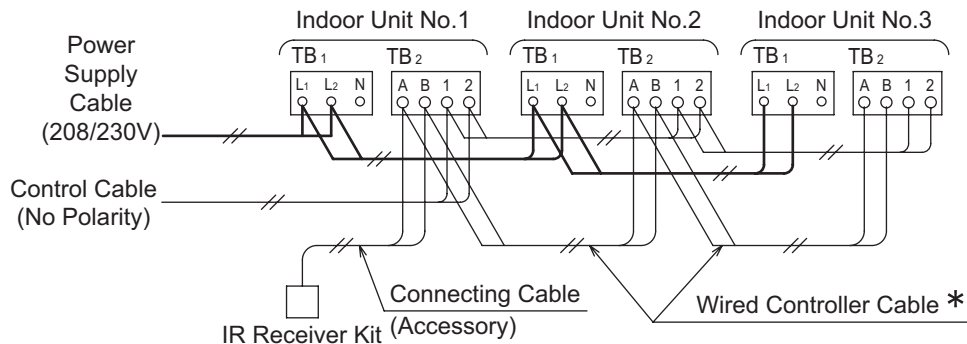
In an instance of simultaneous operation of multiple (up to 16) indoor units by the wireless controller, install the IR receiver kit only to the unit to be operated. Other units should be the standard units without the IR receiver kit. If multiple IR receiver kits are required to be installed, two IR receiver kits are the maximum.



Electrical Wiring Connecting and Setting

- 1 Connection between Indoor Units
Perform the connection work as shown below.

Power Supply Cable 208/230V



* For twin, triple or quad combinations, a communication cable for the wireless controller is not required.

Use the field-supplied communication cable (AWG18) for the wired controller cable. The total length should be within 1640ft (500m). If the total length is less than 98ft (30m), AWG22 cables can be used.

- 2 Do not run the connected wireless controller cable and the power supply cable (208/230V) in parallel in the indoor units.
Stabilize the cable with cable bands. Along with the wiring outside the indoor units, the control cables should not run with the power supply cable (208/230V). Keep a separation of more than 12 inches (30cm) or run the cable through a grounded metal conduit.

- 3 Unit Number Setting
The indoor unit numbers are set by the auto-address function. Therefore, an indoor unit number setting is not required. If the indoor unit number is fixed, set the unit number of all indoor units respectively and serially. It is recommended that the unit number settings begin with "1". The setting is set not to overlap the unit number.

Unit Number Setting

DSW6 (Tens Digit)	RSW1 (Units Digit)	Ex.: Set for No. 16 Unit
<div><div><div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>123456</div></div><div>ON OFF</div></div>	<div><div>Setting Position</div><div>Set by inserting slotted screwdriver into the groove.</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>0123456789</div></div></div>	<div><div>DSW6</div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>123456</div></div><div>ON OFF</div></div><div>RSW1</div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>0123456789</div></div><div>Set at "6".</div></div></div>
Factory setting for DSW6 and RSW1 were set to "0". Max. 63 units are available for setting.		Set No.1 pin ON.

3.3.11 Test Run by Wireless Controller (CIR01)

After all installations are completed, a test run should be performed.

- (1) Perform the test run according to the Installation Manual of the wireless controller.
- (2) The test run from the wireless controller switch takes two hours to complete.

NOTE:

For the wall mount indoor units, if the TIMER indicator (green) is flashing (0.5 second ON/0.5 second OFF) after two hours, an alarm may occur. Operate the indoor unit ,and check for abnormality.

3.3.12 Alarm Indication

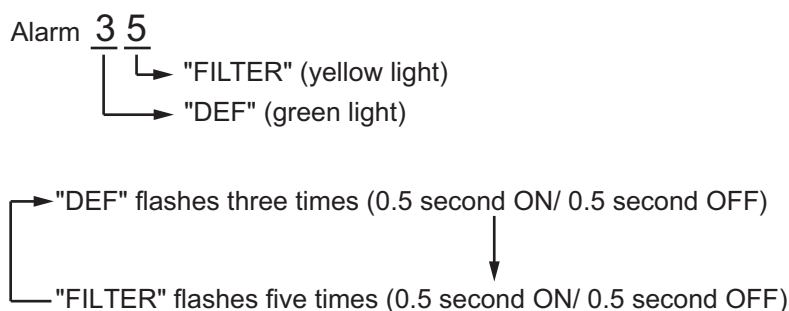
NOTICE

- If a malfunction occurs, such as safety device actuation, during the test run or the normal operation, "RUN" (red light) flashes (0.5 second ON / 0.5 second OFF).
- The alarm codes are indicated by the number of LED flashes of "DEF" (green light) and "FILTER" (yellow light).

The first LED light is green. The number of times this LED flashes (0.5 second ON and OFF) will tell you the "DEF" Alarm Code.

The second LED light is yellow. The number of times this LED flashes (0.5 second ON and OFF) will tell you the "FILTER" Alarm Code.

Example



These signals are repeated until the alarm is reset.

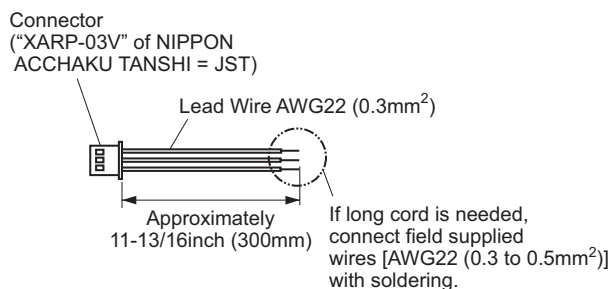
- "RUN" (red light) flashing (1 second ON/1 second OFF) indicates an abnormal transmission (connector loose, connector disconnection, broken wire, or incorrect wiring, or something similar) between the indoor unit and the IR receiver kit.
- When the IR receiver kit is connected to multiple indoor units, the alarm code is indicated for each indoor unit in order.

Alarm Code Table

Further details for alarm codes can be found in the "Installation and Maintenance Manual" for the indoor unit.

3.4 3P Connector Cable: PCC-1A

This accessory connector is utilized to provide remote start/stop capability (binary input) to an indoor unit and provide operating status (binary output) of an indoor unit's functions. (System Parts: One set contains five 3P cords.)

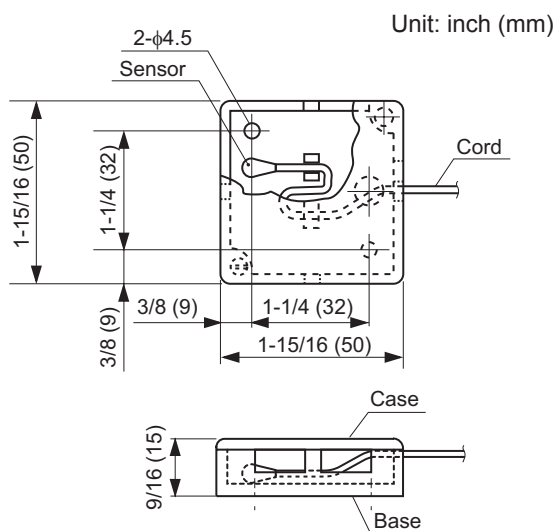


3P Connector Cable

Name	3P Connector Cable
Model	PCC-1A
Remarks	One set contains five 3P connector cables.

3.5 Remote Sensor: THM-R2A

When a remote temperature sensor is installed with an indoor unit, the indoor unit is configurable to use the temperature at the location of the remote sensor OR the average of the unit's return air temperature and the temperature at the location of the remote sensor to control that unit. (reference the specific controller Installation Manual for function configuration details)

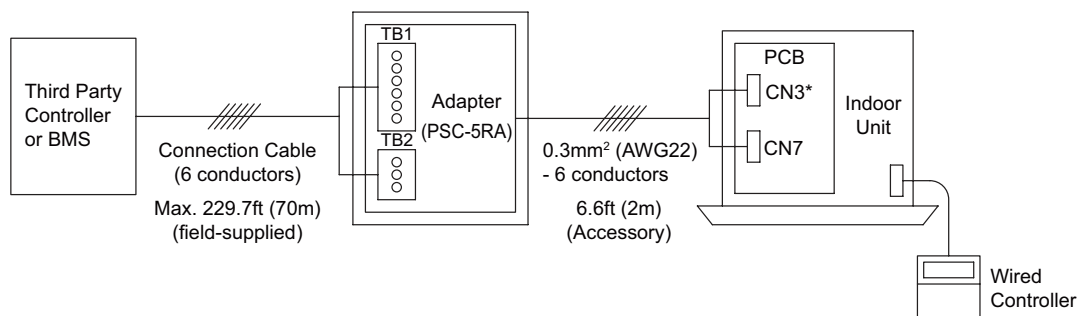
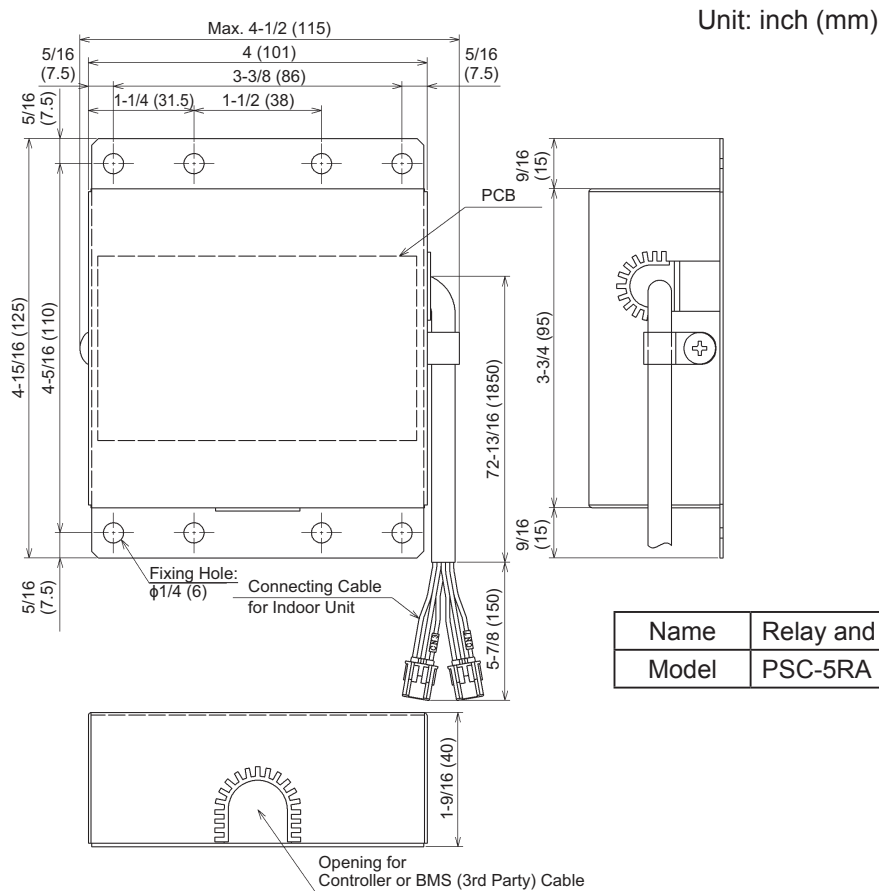


Specifications

Item		Specification
Model		THM-R2A
Case	Material	ABS Resin
	Color	Silky White
Base	Material	ABS Resin
	Color	Silky White
Sensor	Part Name	Thermistor
	Cord Length	approx. 26 ft (8m)

3.6 Relay and 3 Pin Connector Kit: PSC-5RA

This relay kit provides for basic input/output integration functionality (indoor unit ON/OFF, operating mode, alarm status) to third party controllers and Building Management Systems (BMS).



*: Refer to Service Manual for connector numbers.

Item	Signal	Description	Specifications
Third Party Controller or BMS	Input 1	Input level signal or pulse signal for voltage from the third party controller or BMS	Voltage: 12VDC, 10mA Voltage: 24VDC, 10mA Pulse Range: 500ms or more
	Input 2		
Third Party Controller or BMS	Output 1	Output signal from the wired controller	24VDC From 10mA to 1A
	Output 2		

Refer to the Indoor Unit Manual for Input/Output mode setting by the wired controller.

4. Selection Data

4.1 Selection Guide

(1) Key for Terms Used for DOAS Units

Nomenclature Description		H	DOA	096	B	2	1	S
H = Hitachi Brand Y = York Brand	H							
DOA = Dedicated Outdoor Air System	DOA							
Capacity (MBH)	096							
Refrigerant Type B = R410A	B							
Voltage 2 = 208/230Volts - 1Phase - 60Hz	2							
1 = 1st Generation	1							
S = Standard Type	S							

(2) Control Mode

Depend on the installation environment and the purpose of use, the DOAS control function can be chosen from two options.

< Indoor Temperature Control >

Control system that bring the room atmosphere temperature closer to the set point temperature in the wired controller, using a temperature sensor (remote sensor or thermistor in wired controller) mounted in the room.

[Advantage]

Because of using a indoor temperature sensor, the system enables to create the atmosphere temperature in collaboration with other indoor units.

[Setting Temperature Range of Wired Controller]

Cooling: 66°F (19°C) ~ 86°F (30°C), Heating: 62°F (17°C) ~ 86°F (30°C)

< Outlet Air Temperature Control >

A control system to bring the outlet temperature closer to the setting temperature of the wired controller, using a outlet air thermistor of the unit.

[Advantage]

When it is set introduce outdoor air, the system enable intake of fresh air without impacting the room temperature.

[Setting Temperature Range of Wired Controller]

Cooling: 56°F (13°C) ~ 77°F (25°C), Heating: 66°F (19°C) ~ 86°F (30°C)

Connected Indoor Unit		DOAS only	DOAS + Other Standard Indoor Unit
Control Mode	Indoor Temperature Control	○	○
	Outlet Air Temperature Control	○	×

○: Available, ×: Not Available

NOTES:

- Do not set "Indoor Temperature Control" and "Outlet Air Temperature Control" control modes enabled in the same refrigerant system.
- If multiple DOAS units are connected to the same refrigerant system, set the Outlet Air Temperature Control with the temperature on the wired controller same for all of the units.

SELECTION DATA

(3) Combination of Outdoor Unit and DOAS Unit

Indoor units can be connected to the outdoor unit (VRF system).

Refer to the table below for connection capacity ratio of each outdoor unit.

< Connection Capacity Ratio >

Outdoor Unit Model Name		DOAS Only		DOAS with other Indoor Units [Capacity of DOAS shall be calculated by multiplying with 1.5.]	
		Minimum	Maximum	Minimum	Maximum
VRF (Standard Type)	(H,Y)VAH(P,R)072B(3,4)1S	100%	145%	70%	150%
	(H,Y)VAH(P,R)096B(3,4)1S	100%	145%	65%	135%
	(H,Y)VAH(P,R)120B(3,4)1S	100%	145%	60%	130%
	(H,Y)VAH(P,R)144B(3,4)1S	100%	145%	75%	150%
	(H,Y)VAH(P,R)168B(3,4)1S	100%	145%	65%	140%
	(H,Y)VAH(P,R)192B(3,4)1S	100%	145%	65%	135%
	(H,Y)VAH(P,R)216B(3,4)1S	100%	145%	70%	150%
	(H,Y)VAH(P,R)240B(3,4)1S	100%	145%	70%	150%
	(H,Y)VAH(P,R)264B(3,4)1S	100%	145%	65%	140%
	(H,Y)VAH(P,R)288B(3,4)1S	100%	145%	65%	135%
	(H,Y)VAH(P,R)312B(3,4)1S	100%	145%	65%	130%
	(H,Y)VAH(P,R)336B(3,4)1S	100%	145%	65%	140%
	(H,Y)VAH(P,R)360B(3,4)1S	100%	145%	65%	135%
VRF (Less Module Type)	(H,Y)VAH(P,R)240B(3,4)1LM	100%	120%	60%	120%
	(H,Y)VAH(P,R)336B(3,4)1LM	100%	120%	60%	120%
	(H,Y)VAH(P,R)360B(3,4)1LM	100%	120%	60%	120%
Low Ambient VRF	(H,Y)VAHP072B(3,4)1CW	100%	145%	60%	130%
	(H,Y)VAHP096B(3,4)1CW	100%	145%	60%	110%
	(H,Y)VAHP144B(3,4)1CW	100%	145%	60%	130%
	(H,Y)VAHP168B(3,4)1CW	100%	145%	60%	110%
	(H,Y)VAHP192B(3,4)1CW	100%	145%	60%	110%
	(H,Y)VAHP288B(3,4)1CW	100%	145%	60%	110%

NOTES:

- DOAS cannot be connected to a Heat Recovery system.
- DOAS cannot be connected with Mini VRF.
- When connecting multiple DOAS and/or other standard indoor unit to the outdoor unit, be sure to operate all indoor units simultaneously.
In addition, it is recommended that only connect one DOAS to each outdoor unit.

(4) Indication of Selection

For selection of required outside airflow (and required number of DOAS units), refer to applicable local codes or latest issue of :

ANSI/ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality and/or,

ANSI/ASHRAE Standard 62.2, Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings.

The standard specifies minimum ventilation rates, and other measures, for new and existing buildings that provide indoor air quality that is acceptable to human occupants and that minimizes adverse health effects.

The standards list minimum required outside air (in CFM/person) depending on type of activity in the building/room.

4.2 Capacity Table

4.2.1 Cooling Capacity

Outdoor Air Temp. (°F WB)	62	66	70	74	78	82	86	90
Outdoor Air Temp. (°F DB)	TC (MBH)	TC (MBH)	TC (MBH)	TC (MBH)	TC (MBH)	TC (MBH)	TC (MBH)	TC (MBH)
68	32.3	34.7	-	-	-	-	-	-
71	32.3	34.6	-	-	-	-	-	-
75	32.3	34.4	36.4	-	-	-	-	-
79	32.3	34.2	37.1	49.6	-	-	-	-
83	-	34.1	37.8	49.6	72.4	-	-	-
87	-	33.9	38.6	49.6	71.7	97.2	-	-
91	-	-	39.3	49.6	71.0	96.0	122.0	-
95	-	-	-	49.6	70.3	95.1	122.0	151.0
99	-	-	-	51.7	70.3	94.3	120.4	149.7
103	-	-	-	-	70.3	93.5	119.5	148.5
107	-	-	-	-	-	93.1	118.3	147.3
109	-	-	-	-	-	91.0	117.9	146.8

TC: Total Capacity

NOTES:

- The above capacities are based on the following conditions:
 Air Discharge Temperature Setting: 64°F DB (18.0°C DB) for Cooling Operation
 Equivalent Piping Length: 24.6ft. (7.5m)
 Level Difference: 0ft. (0m)
- A value enclosed in means rated capacity.

4.2.2 Heating Capacity

Outdoor Air Temp. (°F WB)	17	19	23	27	31	35	39	43	51	55
Outdoor Air Temp. (°F DB)	TC (MBH)	TC (MBH)	TC (MBH)	TC (MBH)	TC (MBH)	TC (MBH)	TC (MBH)	TC (MBH)	TC (MBH)	TC (MBH)
20	80.0	-	-	-	-	-	-	-	-	-
22	76.4	76.4	-	-	-	-	-	-	-	-
27	-	-	67.3	-	-	-	-	-	-	-
32	-	-	-	60.0	60.0	-	-	-	-	-
37	-	-	-	-	51.8	50.9	-	-	-	-
42	-	-	-	-	43.6	43.5	43.6	-	-	-
47	-	-	-	-	-	36.4	36.5	36.4	-	-
52	-	-	-	-	-	-	29.1	29.0	-	-
57	-	-	-	-	-	-	-	21.5	21.1	20.7

TC: Total Capacity

NOTES:

- The above capacities are based on the following conditions:
 Air Discharge Temperature Setting: 72°F DB (22.0°C DB) for Heating (Factory Setting)
 Equivalent Piping Length: 24.6ft. (7.5m)
 Level Difference: 0ft. (0m)
- A value enclosed in means rated capacity.

