

Installation and Maintenance Manual

Air Handler with DX-Kit

Air Handler

Standard PSC

Single Piece, Multi-Position

Compatibility

DX-Kit and Air Handler Combined Model	DX-Kit	Air Handler Model
(H, Y) MAHP18B21S	EXV-018E	AP18BX21
(H, Y) MAHP24B21S	EXV-024E	AP24BX21
(H, Y) MAHP30B21S	EXV-030E	AP30BX21
(H, Y) MAHP36B21S	EXV-036E	AP36BX21
(H, Y) MAHP36C21S	EXV-036E	AP36CX21
(H, Y) MAHP48C21S	EXV-048E	AP48CX21
(H, Y) MAHP48D21S	EXV-048E	AP48DX21
(H, Y) MAHP60C21S	EXV-060E	AP60CX21
(H, Y) MAHP60D21S	EXV-060E	AP60DX21

IMPORTANT:

READ AND UNDERSTAND THIS MANUAL BEFORE USING THIS DX-KIT. KEEP THIS MANUAL FOR FUTURE REFERENCE.



PMGB0406B

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Air Handler

1. Introduction

This manual is for this Air Handler and the DX Kit.

Read this "Installation and Maintenance Manual" carefully before installing this product. Read through the applicable product documentation for other units in the system as well.

Provide this manual and the warranty to all installers and users. Ask end users to maintain copies for future reference.

- For details on wiring between the indoor unit and the outdoor unit, refer to the installation documentation for **the outdoor unit**.
- For details on the optional controller, refer to the installation documentation for that product.

For installation of this Air Handler and DX-Kit, start with the air handler unit as described in the first sections of this document. Then, proceed to install the DX-Kit as described in the later part of this document.



The single piece air handler series provides the flexibility for installation in any position. You may use this unit for upflow, downflow, horizontal right, or horizontal left applications. Locate these units in a closet, utility room, attic, crawl space, or basement. Use these versatile models for cooling or heat pump operation with or without electric heat.

Top or side power and control wiring, color-coded leads for control wiring, easy to install drain connections, and electric heaters all combine to make installation easy and minimize installation cost. Electric heat kits are available as field installed accessories. Single phase kits are available from 2.5 kW to 25 kW. 208-230 volt 3-phase kits are available from 10kW to 25kW.


2. Safety




This is a safety alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.


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. <i>Refer back to these safety instructions as needed</i>
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- 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 quenching 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.

 WARNING	FIRE OR ELECTRICAL HAZARD. Failure to follow the safety warnings exactly could result in serious injury, death or property damage. A fire or electrical hazard may result causing property damage, personal injury or loss of life..
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 WARNING	<p>The air handler area must not be used as a broom closet or for any other storage purposes, as a fire hazard may be created. Never store items such as the following on, near or in contact with the furnace.</p> <ul style="list-style-type: none"> • Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners or other cleaning tools. • Soap powders, bleaches, waxes or other Cleaning compounds; plastic items or containers; gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids or other volatile fluid. • Paint thinners and other painting compounds. • Paper bags, boxes or other paper products <p>Never operate the air handler with the blower door removed. To do so could result in serious personal injury and/or equipment damage.</p>
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 WARNING	Improper installation, adjustment, alteration, or maintenance may create a condition where the operation of the product could cause personal injury or property damage. Refer to this manual for assistance, or for additional information, consult a qualified contractor, installer, or service agency
--	--

 CAUTION

This product must be installed in strict compliance with the installation instructions and any applicable local, state, and national codes including, but not limited to building, electrical, and mechanical codes.

Safety Requirements

1. Failure to carefully read and follow all instructions in this manual can result in air handler malfunction, death, personal injury and/or property damage.
2. This air handler should be installed in accordance with all national and local building/safety codes and requirements, local plumbing or wastewater codes, and other applicable codes.
3. This air handler should be installed only in a location and position specified in the "Unit Installation" section of this Instruction Manual.
4. The air handler is not to be used for temporary heating of buildings or structures under construction.
5. Always install the air handler to operate within the air handler's intended maximum outlet air temperature.
6. The unit rating plate displays the air handler model number. The unit dimensions for the supply air plenum are provided in Figure 3 and Table 1 of this Instruction Manual. The plenum must be installed according to the instructions.
7. Clearance from combustible material is provided under "Clearances" in the "Unit Installation" section.

CAUTION

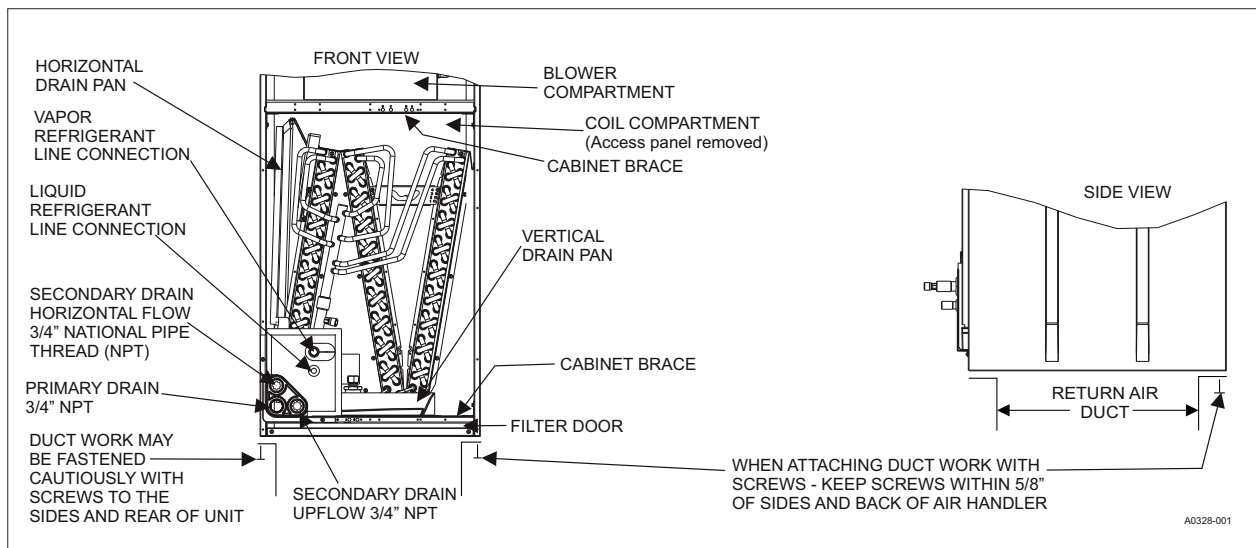
DO NOT lift air handler by the cabinet braces. The cabinet braces are held in place by the coil channels. The cabinet braces could become disengaged from the cabinet causing the air handler to fall, potentially causing injury or damaging property. See Figure 1 for location of cabinet braces. Lift the air handler by tightly gripping the casing.

8. It is necessary to maintain clearances for servicing. Allow access to electric heaters and blower.
9. Verify the unit rating plate and power supply to ensure that the electrical characteristics match.
10. You must install air handler so the electrical components are protected from water.
11. Installing and servicing heating/cooling equipment can be hazardous due to the electrical components. Only trained and licensed personnel should install, repair, or service heating/cooling equipment. Unlicensed service personnel can perform basic maintenance functions such as cleaning and replacing the air filters. When working on heating/cooling equipment, the precautions in the manuals and on the labels attached to the unit and other safety precautions must be observed as applicable.

CAUTION

These air handlers should be transported and handled in an upright, upflow position. Failure to do so may result in unit damage and personal injury. Configuration conversions should be done at site of installation.

12. These instructions cover minimum requirements and conform to existing national standards and safety codes. In some instances these instructions exceed certain local codes and ordinances, especially those that have not kept up with changing residential and non-HUD modular home construction practices. These instructions are required as a minimum for a safe installation.



Inspection

As soon as you receive the Air Handler, check to be sure it is still under pressure per Figure 2. Inspect the coil for possible damage during transit. If damage is evident, note the extent of the damage on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing. Consult the Local Distributor for more information. Check the drain pan for cracks or breakage. Before installation, check the unit for screws or bolts that may have loosened in transit. There are no internal shipping or spacer brackets that need to be removed. Verify that all accessories are available as required. Complete the installation of these accessories or field conversion of the unit before setting the unit in place or connecting any wiring, duct work or piping.

When installing the air handler, it is important to note that the Schrader core on the suction line stub-out must be relocated to the equalizer connection port located on the coil. See the circled ports in the figure below.

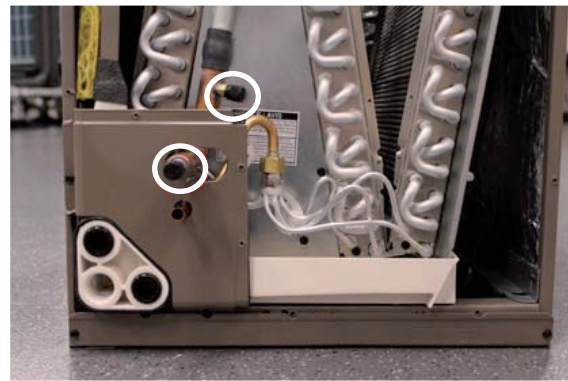
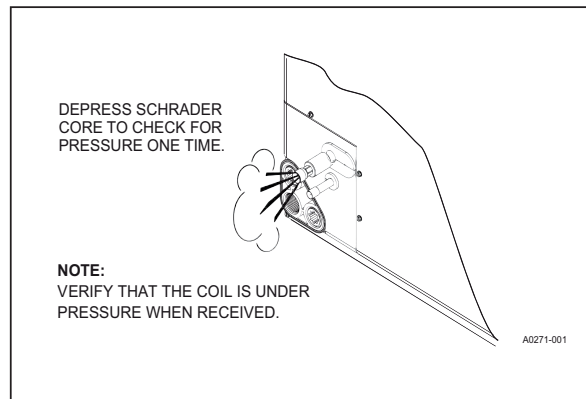


Figure 2. Pressure Check

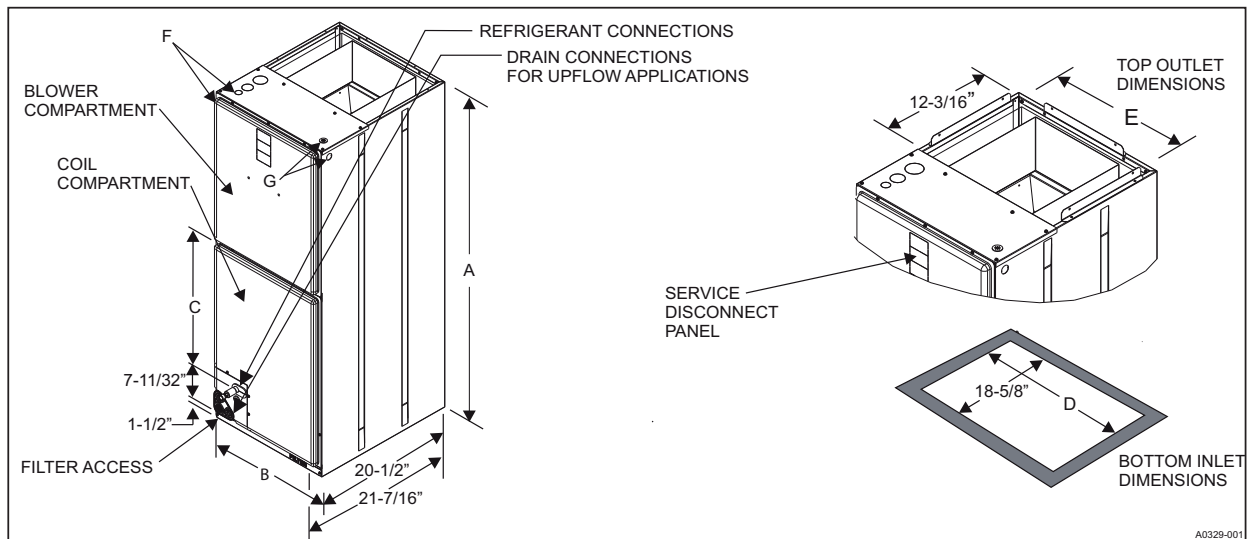


Figure 3. Dimensions and Duct Connection Dimensions

Table 1. Dimensions

Models	Dimensions ¹					Wiring Knockouts ²		Refrigerant Connections Line Size	
	A	B	C	D	E	F	G	Liquid	Vapor
	Height	Width				Power (Conduit)	Control (Conduit)		
18B	41	17-1/2	12-7/8	14-1/4	16-1/2	7/8 (1/2) 1-3/8 (1) 1-23/32 (1-1/4)	7/8 (1/2)	3/8	3/4
24B	41	17-1/2	12-7/8	14-1/4	16-1/2				
30B	47-1/2	17-1/2	19-1/2	14-1/4	16-1/2				
36B	47-1/2	17-1/2	19-1/2	14-1/4	16-1/2			7/8	
36C	51-1/2	21	22-5/8	17-3/4	20				
48C	51-1/2	21	22-5/8	17-3/4	20				
48D	55-1/2	24-1/2	26-5/8	21-1/4	23-1/2				
60C	55-3/4	21	26-7/8	17-3/4	20				
60D	55-1/2	24-1/2	26-5/8	21-1/4	23-1/2				

1. All dimensions are in inches.
2. Knockout size (conduit size in parentheses).

3. Unit Installation

NOTICE

Avoid handling aluminum coil components after handling the copper line set or other tubing without first cleaning hands.

Unit Sizing

Base the size of the unit on an acceptable heat loss or gain calculation for the structure. Use the ACCA Manual J or other approved methods. Reference Figure 3 and Table 1.

1. Only connect the air handler to a duct system that has an external static pressure within the allowable range.
2. Airflow must be within the minimum and maximum limits approved for electric heat, indoor coils and outdoor units. Refer to the Dx-Kit section for details.
3. Install the air handler so that supply ducts carry air circulated by the air handler to areas outside the space containing the air handler. The return air must also be handled by duct(s) sealed to the air handler casing and terminating in the space to be cooled/ heated.
4. Refer to the unit rating plate for the air handler model number, and then see the dimensions page of this instruction for supply air plenum dimensions. You must install the plenum according to the instructions.
5. The installer must check available supply power and verify that it is within the normal operating voltage range for the unit. The acceptable voltage range for these units is as follows:

Air Handler Voltage	Normal Operating* Voltage Range
208V/230V-1-60	188V-253V

*Rated in accordance with ARI Standard 110, utilization range "A."

Clearances

You must take clearances into consideration, and provide for them as follows:

1. Refrigerant piping and connections - minimum 12" recommended for clearances to braze and service the joint.
2. Maintenance and servicing access - minimum 36" from front of unit recommended for blower motor/ coil replacement.
3. Condensate drain lines routed to clear filter and panel access.
4. Filter removal - minimum 36" recommended.
5. The duct work connected to this unit is designed for zero clearance to combustible materials.
6. A combustible floor-base accessory is available for downflow applications of this unit, as required by local code.
7. Refer to the Dx-Kit section 18 for clearance of the DX-Kit.

Location

Location is usually predetermined. Check with owner's or dealer's installation plans. If location is not decided, consider the following in choosing a suitable location:

1. Select a location with adequate structural support, space for service access, and clearance for air return and supply duct connections.
2. Using hanging brackets to wall mount this single piece air handler unit is not recommended.
3. Normal operating sound levels may be objectionable if the air handler is placed directly over some rooms such as bedrooms, study, etc.
4. Select a location that will permit installation of condensate line to an open drain or outdoors allowing condensate to drain away from structure.

NOTICE

The primary and secondary drain line must be trapped to allow proper drainage of condensate water. The secondary drain line should be piped to a location that will give the occupant a visual warning that the primary drain is clogged. If the secondary drain line is not used, it must be capped.

5. When an indoor coil is installed in an attic or above a finished ceiling, an auxiliary drain pan should be provided under the air handler as is specified by most local building codes.
6. Proper electrical supply must be available.
7. If unit is located in an area of high humidity (i.e. an unconditioned garage or attic), nuisance sweating of casing may occur. On these installations, unit duct connections and other openings should be properly sealed, and a wrap of 2" fiberglass insulation with vinyl vapor barrier should be used.

Air Handler Configuration

These air handler units are supplied ready to be installed in an upflow or horizontal left position. Refer to Figure 4. If the unit requires either downflow or horizontal right airflow configurations, the unit must have the coil assembly repositioned. Refer to the Downflow or Horizontal Right Conversion procedures.

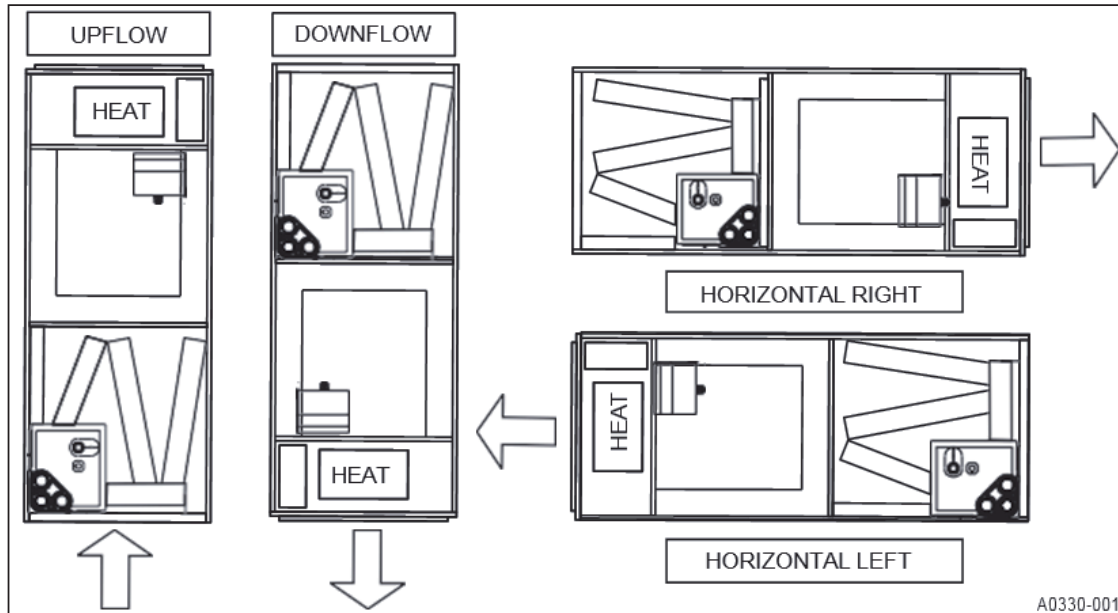


Figure 4. Typical Installation

Downflow or Horizontal Right Conversion

NOTICE

Convert air handler to correct orientation prior to installation. You must make the conversion before brazing the refrigerant connections to the coil.

1. Remove the coil access panel.
2. Slide coil/drain pan assembly out of air handler.

NOTICE

The center support bar for the coil/drain pan has a position identifier embossed into the cabinet structure between the two forward fingers of the support bar. There are four position identifiers: A, B, C, or D. The lettered hole location can differ from unit to unit due to the cabinet width of the air handler. After removal and re-installation, install the center support bar in the same lettered position that it was originally.

3. Note the lettered position of the center support bar for the coil/drain pan. Remove the center support bar by sliding the forward end of the support bar to the right or left until the lower finger clears the structure.

NOTICE

The position identifier for the coil slide rail is embossed into the back corner vertical angle of the cabinet structure. There are four position identifiers: 1, 2, 3, or 4. The numbered attachment location can differ from unit to unit due to the cabinet height of the air handler. After removal and reinstallation, install the coil slide rail in the same numbered position that it was originally.

4. Note the numbered position of the coil slide rail located at the upper right hand side of the indoor coil compartment. Remove slide rail from air handler cabinet by removing front screw and lowering bracket down to disengage hook on back of slide rail.
5. Turn air handler cabinet upside down (downflow position).
6. Install coil slide rail by hooking the aft end into holes at the numbered position the slide rail was originally in right rear corner post, and secure rail into right front edge of cabinet with screw in the pre- drilled hole.

NOTICE

The position identifier for the coil slide rail is embossed into the back corner vertical angle of the cabinet structure. There are four position identifiers: 1, 2, 3, or 4. The numbered attachment location can differ from unit to unit due to the cabinet height of the air handler. After removal and reinstallation, install the coil slide rail in the same numbered position that it was originally.

NOTICE

When installing a coil blow off wing, make sure that each notch in the coil blow off wing (see Figure 5) slides around the anchor screw with the bottom of the notch fully set against the screw. Ensure that coil blow off wing is installed with the flange bending away from the coil data plate.

7. Install center support bar for the coil/drain pan onto the lettered position that it was originally mounted.
8. For horizontal right applications, install front and back coil blow off wings (blow off wings shipped as loose parts with the unit). Locate 4 screws securing coil data plates to coil drain pan. Loosen the screws. Slide each coil blow off wing between the drain pan and the coil data plate. Tighten screws to securely anchor coil blow off wings. Refer to Figure 5.
9. Slide the coil back into the cabinet. Be sure to engage the side coil slide into the slide rail on the air handler cabinet.
10. Install coil access panel. Conversion is now complete..

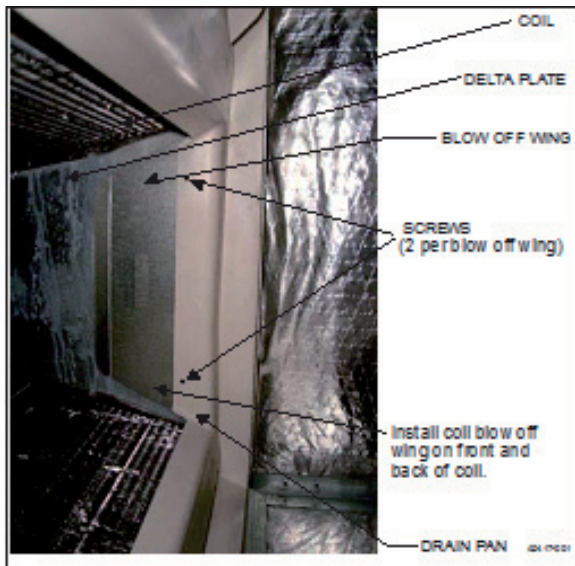


Figure 5. Coil Blow Off Wing Installation

4. Duct Work and Connections

For air supply and return, use upflow, horizontal, or downflow, as applicable to the installation.

The vast majority of problems encountered with heating and cooling systems are linked to improperly designed or installed duct systems. The success of an installation highly depends upon the proper design and installation of the duct system.

When installing a central air or return grill in or near the living space, design the duct work so the grille is not in direct line with the opening in the unit. Ensure a quieter system by using one or two elbows and acoustical duct liner. Where the return air duct is short or where sound may be a problem, use acoustical duct liner inside the duct. Use flexible duct connectors to minimize the transmission of vibration/noise into the conditioned space.

WARNING

Do not bring in return air from a location which could introduce hazardous substances into the airflow. Use 1/2" screws to connect duct work to cabinet. If pilot holes are drilled, drill only through field duct and unit flange.

Insulation of duct work is a must where it runs through an unheated space during the heating season or through an uncooled space during the cooling season. The use of a vapor barrier is recommended to prevent absorption of moisture from the surrounding air into the insulation.

Properly size the supply air duct by use of a transition to match unit opening. Suspend all ducts using flexible hangers and never fastened directly to the structure.

Fabricate and install duct work in accordance with local and/or national codes. This includes the standards of the National Fire Protection Association for Installation of Air-Conditioning and Ventilating Systems, NFPA No. 90B. Design duct systems in accordance with the Air Conditioning Contractors of America (ACCA) – Manual D.

CAUTION

This unit is not designed for non-ducted (freeblow) applications. Do not operate without duct work attached to unit. Never operate equipment without filters.

Horizontal Suspension

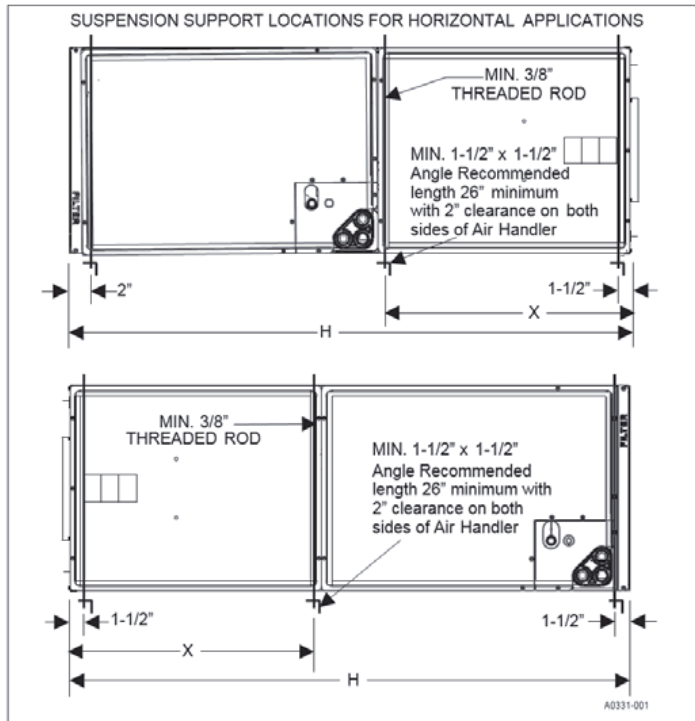
These air handlers may be suspended in horizontal applications. Use angle steel support brackets with minimum 3/8" threaded rods, supporting the unit from the bottom. Attach the threaded rods at the locations shown in the Figure 6, leaving enough clearance between door and rod so that doors easily remove for service.

CAUTION

DO NOT lift air handler by the cabinet brace. The cabinet brace is held in place by the coil channel. The cabinet brace could become disengaged from the cabinet causing the air handler to fall, potentially causing injury or damaging property. See Figure 1 for location of cabinet braces.

NOTICE

When assembling the support structure, be sure to size and provide clearance for removal of the access door.



Dimension in Inches		
Air Handler Cabinet Size	X	H
17-1/2 Width-Short H	21	41
17-1/2 Width-Short H	21	47-1/2
21 Width –Short H	21-1/2	51-1/2
21 Width –Short H	21-1/2	55-3/4
24-1/2 Width	21-1/2	55-1/2

Figure 6. Horizontal Suspension

Duct Flanges

Three duct flanges are provided to assist in positioning and attaching duct work to the air handler. These flanges are included in the unit parts bag. With the screws from the parts bag, install one of the duct flanges. Duct flanges have holes on both legs with one leg longer than the other. You can use the longer leg to mate against the air handler so that different thicknesses of duct board are made flush with the outer surface of the air handler. Repeat the procedure for the other two flanges. Refer to Figure 7. If you do not use the flanges, you may discard them.

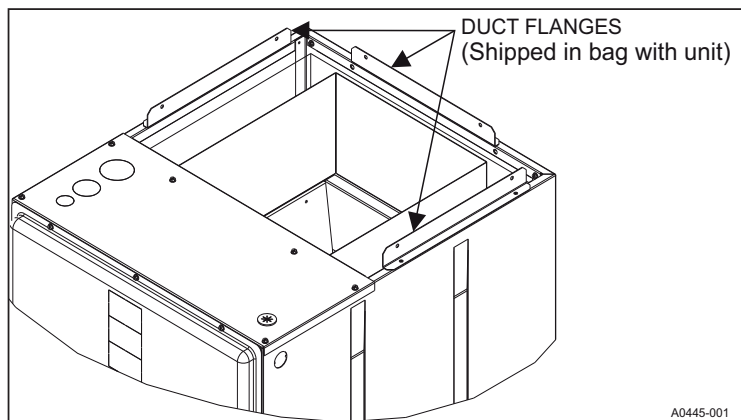


Figure 7 Duct Attachment

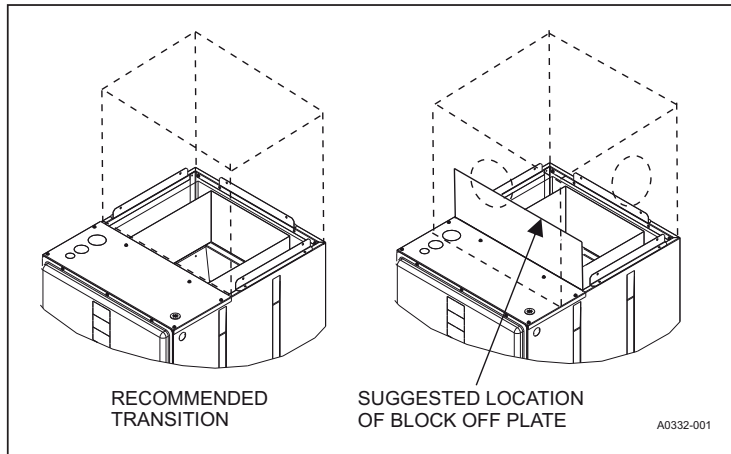


Figure 8 Duct Work Transition

Unit Connections

There are several ways to handle the supply and return air duct connections. The location and sizing of the connections depends on the situation and the method best suited to the installation. Upflow, horizontal or downflow applications may be used.

Properly size the supply air duct by use of a transition to match unit opening. Refer to Table 1 for air handler unit inlet and outlet dimensions.

⚠ CAUTION

Use 1/2" screws to connect duct work to unit. Longer screws will pierce the drain pan and cause leakage. If you drill pilot holes, drill only through field duct and unit bottom duct flange.

Duct work that is not designed to match the supply air opening can cause turbulence inside the plenum. This turbulence can change the air flow patterns across the electric heater limit switches. If the factory suggested transition cannot be fabricated, it is recommended that you attach a block off plate to the supply opening (approximately 8" high and running the full width of the plenum). Refer to Figure 8. The use of this block off plate enables better air circulation across the limit switches.

Air Filters

Return air filters are required and must be field supplied. Filtration can be accomplished external to the unit or the integral filter rack may be used. A 1" filter access rack is built into the unit. Remove the filter access cover. Install proper size filter. Use a Standard 1" size permanent or throw away filter, or permanent washable filters are available using model numbers: 1PF0601, 602 or 603. See Unit Data, section 11) for filter size.

⚠ CAUTION

Never operate equipment without filters.

5. Electronic Expansion Valve

When this air handler is used on a VRF (Variable Refrigerant Flow) system, an EEV (Electronic Expansion Valve) is used. The EEV is included with the DX Kit that is shipped with the air handler.

6. Refrigerant Line Connection

⚠ CAUTION

Coil is under inert gas pressure. Relieve pressure from coil by depressing Schrader core at the end of the suction-manifold stub out.

⚠ CAUTION

Always supply dry nitrogen through the tubing while it is being brazed. Unless an inert atmosphere is provided, the temperature required is high enough to cause oxidation of the copper. Continue the flow of dry nitrogen until the joint has cooled. Always use a pressure regulator and safety valve to insure that only low pressure dry nitrogen is introduced into the tubing. Only a small flow is necessary to displace air and prevent oxidation.

NOTICE

Before handling aluminum coil components, clean your hands after handling the copper lines set or other tubing.

Instructions for Liquid Refrigerant Line of the Air Handler

Step 1. Remove bottom front cover. The heat exchanger is exposed.



Step 2. See accessory piping that is shipped with the unit. This piping is used for the unit's Liquid Refrigerant Line.



Step 3. Remove the brass nut on the distributor body.



Step 4. Remove Piston, Teflon Ring, and Brass Nut.



Step 5. Attach the brass nut to the accessory piping.



Step 6. Attach the Teflon ring to seal the two connections together. Do not re-install the piston.



Step 7. Attach the accessory piping to the distributor body. Tighten the nut with a torque of 16-20 ft-lbs. Then, manually raise the distributor body to align with the liquid line connection hole.



7. Condensate Drain Connections

Trap all drain lines a minimum of three inches, pitch them away from unit drain pan, and ensure they are not smaller than the coil drain connection.

CAUTION

DO NOT use Teflon™ tape, pipe thread compound, or other sealants. The use of a sealant may cause damage and premature failure of the drain pan. Threaded drain connection should be hand-tightened, no more than 1 turn. Avoid Double Trapping of a single drain line.

Route the drain line so that it does not interfere with accessibility to the coil, air handling system or filter and will not be exposed to freezing temperatures. See Figures 12 & 13 for drain connection locations.

CAUTION

When the unit is installed in an attic or above a finished ceiling, an auxiliary drain pan should be provided under the coil as specified by most local building codes. When this exterior secondary drain pan is used that drain should be piped to a location that will give the occupant a visual warning that the primary drain is clogged.

If the coil is provided with a secondary drain pipe it to a location that will give the occupant a visual warning that the primary drain is clogged. If a secondary drain is not used it must be plugged.

Instruct the owner that the evaporator coil drain pan should be inspected and cleaned regularly to prevent odors and assure proper drainage. If a secondary drain is not used it must be plugged. See Figures 12 & 13.

Install coils level or pitched slightly toward the drain end. Suggested pitch should not exceed 1/4 inch per foot of coil.

The drain pan connections are designed to ASTM Standard D 2466 Schedule 40. Use 3/4" PVC or steel threaded pipe. Since the drains are not subject to any pressure it is not necessary to use Schedule 40 pipe for drain lines.

8. Electric Heater Installation

If the air handler requires electric heat, install the electric heat kit according to the installation instructions included with the kit. After installing the kit, mark the air handler nameplate to designate the heater kit that was installed. If no heater is installed, mark the name plate appropriately to indicate that no heat kit is installed.

Use only 6HK Revision C or later heater kits, as listed in this manual. Use data from Tables 4 through 8 for information on required minimum motor speed tap to be used for heating operation, maximum over-current protection device required as listed for combination of air handler and heater kit.

For Upflow, Downflow and Horizontal left-hand applications, install the kits without modification.

Field modification is required for Horizontal right-hand airflow applications only. Follow instructions with heater for modification.

NOTICE

In some horizontal applications, the service disconnects on the electric heat kits must be rotated 180° so the up position of the disconnect is in the ON position. This service disconnect orientation change is required by UL1995, Article 26.19 (in reference to all circuit breakers).

Refer to the Cautions section 23 for Heater Kit wiring information.

9. Line Power Connections

Power may be brought into the unit through the supply air end of the unit (top left when unit is in the upflow vertical position) or the left side panel. Use the hole appropriate to the unit's orientation in each installation to bring conduit from the disconnect. Terminate the power lead conduit at the electrical control box. Refer to Tables 6 through 9 to determine proper wire sizing. Refer to local codes to determine the correct wire size. To minimize air leakage, seal the wiring entry point at the outside of the unit.

You must make all electrical connections to air handlers with copper conductors. Direct connection of aluminum wiring to air handlers is not approved.

If aluminum conductors are present, you must follow all applicable local and national codes when converting from aluminum to copper conductors prior to connection to the air handler.

The chosen conductor and connections all must meet or exceed the amperage rating of the overcurrent protector (service disconnect or fuse) in the circuit.

Existing aluminum wire within the structure must be sized correctly for the application. Refer to your local codes to determine the correct wire size. Use Caution when sizing aluminum rather than copper conductors, as aluminum conductors are rated for less current than copper conductors of the same size.

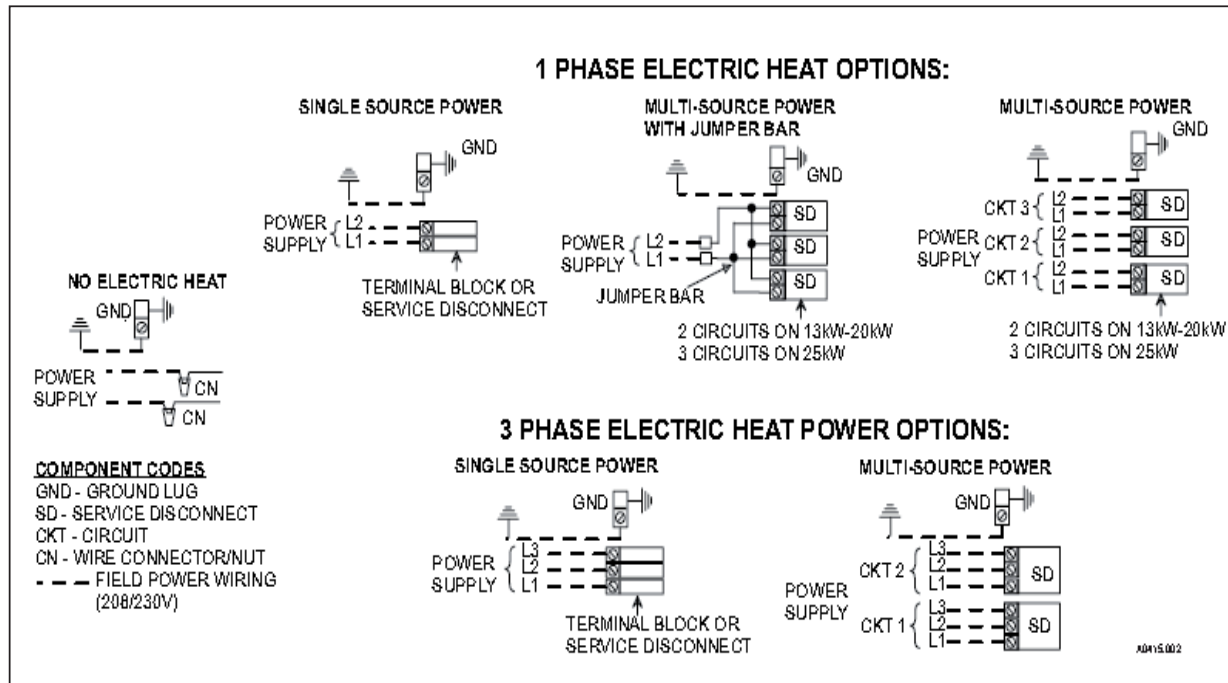


Figure 9. Line Power Connections

10. Blower Speed Connections

Adjust blower motor speed to provide airflow within the minimum and maximum limits approved for indoor coil, electric heat and outdoor unit. Speed tap adjustments are made by the optional controller. Airflow data is shown in Unit Data, (Section 11), Table 11.

Connect motor wires from the control box of the DX-Kit to motor speed tap receptacle according to the DX-Kit wiring label.

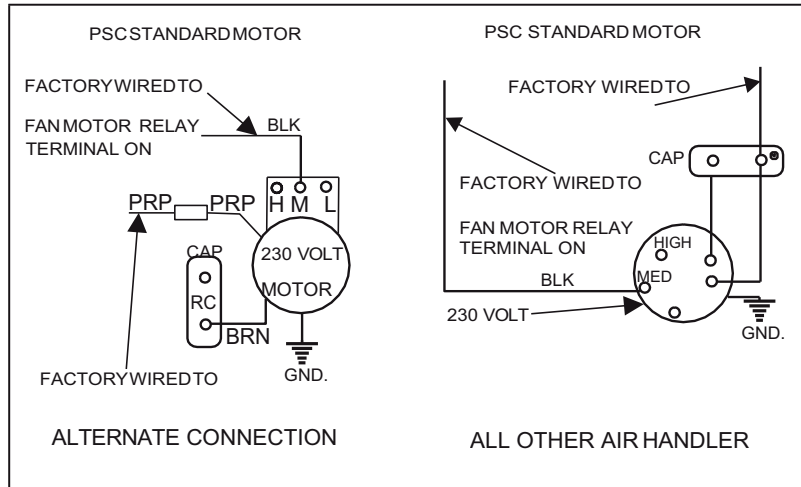


Figure 10. Factory Wired Blower Connections

11. Unit Data

Table 2. Physical and Electrical Data - Cooling Only

Models		18B	24B	30B	36B	36C
Blower - Diameter x Width		10 x 8	10 x 8	10 x 8	10 x 8	10 x 10
Motor	HP	1/8 HP	1/4 HP	1/3 HP	1/2 HP	1/2 HP
	Nominal RPM	867	850	950	1085	1050
Voltage		208/230	208/230	208/230	208/230	208/230
Full Load Amps @230V		1.0	1.4	2.3	2.6	2.2
Filter *	Type	DISPOSABLE OR PERMANENT				
	Size	16 x 20 x 1	16 x 20 x 1	16 x 20 x 1	16 x 20 x 1	20 x 20 x 1
	Permanent Type Kit	1PF0601	1PF0601	1PF0601	1PF0601	1PF0602
Shipping/Operating Weight (lbs.)		91/85	93/87	119/113	119/113	120/114
<hr/>						
Models		48C	48D	60C	60D	
Blower - Diameter x Width		10 x 10	10 x 10	10 x 10	10 x 10	
Motor	HP	1/2 HP	1/2 HP	1 HP	1 HP	
	Nominal RPM	1040	1040	1007	1007	
Voltage		208/230	208/230	208/230	208/230	
Full Load Amps @230V		2.9	2.9	4.1	4.1	
Filter *	Type	DISPOSABLE OR PERMANENT				
	Size	20 x 20 x 1	22 x 20 x 1	20 x 20 x 1	22 x 20 x 1	
	Permanent Type Kit	1PF0602	1PF0603	1PF0602	1PF0603	
Shipping/Operating Weight (lbs.)		158/150	163/153	156/146	180/170	

*Field Supplied

Table 3. Electrical Data - Cooling Only

Models	Motor FLA ¹	Minimum Circuit Ampacity	MOP ²
18B	1.1	1.4	15
24B	1.4	1.8	15
30B	2.3	2.9	15
36B	2.6	3.3	15
36C	2.2	2.8	15
48C/48D	2.9	3.6	15
60C/60D	4.1	5.1	15

1. FLA = Full Load Amps.
2. MOP = Maximum Overcurrent Protection device; must be HACR type service disconnect or time delay fuse. Refer to local codes to determine the correct wire size.

Table 4. Electrical Heat - Minimum Fan Speed

Heater Kit Models ^{1, 2, 3}	Nom. kW@240V	Air Handler Models								
		18B	24B	30B	36B	36C	48C	48D	60C	60D
6HK(0,1)6500206	2.4kW	Med	Low	Low	Low	Low	Low	Low	Low	Low
6HK(0,1)6500506	4.8kW	Med	Low	Low	Low	Low	Low	Low	Low	Low
6HK(0,1)6500806	7.7kW	-	-	Med	Low	Low	Low	Low	Low	Low
6HK(0,1)6501006 6HK36501025	9.6kW	-	-	Med	Low	Low	Low	Low	Low	Low
6HK(1,2)6501306	12.5kW	-	-	Med	Low	Med	Low	Low	Low	Low
6HK(1,2)6501506 6HK36501525	14.4kW	-	-	Med	Low	Med	Low	Low	Low	Low
6HK(1,2)6501806 6HK36501825	17.3kW	-	-	-	Low	Med	Low	Low	Low	Low
6HK(1,2)6502006 6HK46502025	19.2kW	-	-	-	Low	-	Med	Med	-	Med
6HK(1,2)6502506 6HK46502525	24kW	-	-	-	-	-	-	Med	-	Med

1. (0,1) - 0 = no service disconnect OR 1 = with service disconnect.
2. (1,2) - 1 = with service disconnect, no breaker jumper bar OR 2 = with service disconnect & breaker jumper bar.
3. 6HK3 = 3-Phase with terminal block connectors only, 6HK4 = 3-Phase with service disconnect.

Table 5. KW & MBH Conversions - For Total Power Input Requirement

For a power distribution voltage that is different than the provided nominal voltage, multiply the kW and MBH data from the table by the conversion factor in the following table.

DISTRIBUTION POWER	NOMINAL VOLTAGE	CONVERSION FACTOR
208V	240V	0.75
220V	240V	0.84
230V	240V	0.92

Table 6. Electric Heat Performance Data: 208/230-1-60 & 208/230-3-60

Heater Models ^{1,2,3}		Nominal kW@240V	Total Heat ⁴				kW Staging			
			kW		MBH		W1 Only		W1 + W2	
			208V	230V	208V	230V	208V	230V	208V	230V
1PH	6HK(0,1)6500206	2.4	1.8	2.2	6.2	7.5	1.8	2.2	1.8	2.2
	6HK(0,1)6500506	4.8	3.6	4.4	12.3	15	3.6	4.4	3.6	4.4
	6HK(0,1)6500806	7.7	5.8	7.1	19.7	24.1	5.8	7.1	5.8	7.1
	6HK(0,1)6501006	9.6	7.2	8.8	24.6	30.1	7.2	8.8	7.2	8.8
	6HK(1,2)6501306	12.5	9.4	11.5	32	39.2	3.1	3.8	9.4	11.5
	6HK(1,2)6501506	14.4	10.8	13.2	36.9	45.1	3.6	4.4	10.8	13.2
	6HK(1,2)6501806	17.3	13	15.9	44.3	54.2	6.5	7.9	13	15.9
	6HK(1,2)6502006	19.2	14.4	17.6	49.2	60.2	7.2	8.8	14.4	17.6
6HK(1,2)6502506	24	18	22	61.5	75.2	7.2	8.8	18	22	
3PH	6HK36501025	9.6	7.2	8.8	24.6	30.1	7.2	8.8	7.2	8.8
	6HK36501525	14.4	10.8	13.2	36.9	45.1	10.8	13.2	10.8	13.2
	6HK36501825	17.3	13	15.9	44.3	54.2	13	15.9	13	15.9
	6HK46502025	19.2	14.4	17.6	49.2	60.2	7.2	8.8	14.4	17.6
	6HK46502525	24	18	22	61.5	75.2	9	11	18	22

1. (0,1) - 0 = no service disconnect OR 1 = with service disconnect.
2. (1,2) - 1 = with service disconnect, no breaker jumper bar OR 2 = with service disconnect & breaker jumper bar.
3. 6HK3 = 3-Phase with terminal block connectors only, 6HK4 = 3-Phase with service disconnect.
4. For different power distributions, see conversions, Table 5.

Table 7. Electrical Data For Single Source Power Supply: 208/230-1-60

Air Handler Models	Heater Models ^{1,2}	Heater Amps @240V	Field Wiring			
			Min. Circuit Ampacity		MOP ³	
			208V	230V	208V	230V
18B	6HK(0,1)6500206	10	12.2	13.3	15	15
	6HK(0,1)6500506	20	23.0	25.3	25	30
24B	6HK(0,1)6500206	10	12.6	13.7	15	15
	6HK(0,1)6500506	20	23.4	25.7	25	30
30B	6HK(0,1)6500206	10	13.7	14.8	15	15
	6HK(0,1)6500506	20	24.5	26.8	25	30
	6HK(0,1)6500806	32	37.7	41.5	40	45
	6HK(0,1)6501006	40	46.1	50.7	50	60
	6HK(1,2)6501306	52	59.4	65.4	60	70
	6HK(1,2)6501506	60	67.8	74.6	70	80
36B	6HK(0,1)6500206	10	14.1	15.2	15	20
	6HK(0,1)6500506	20	24.9	27.2	25	30
	6HK(0,1)6500806	32	38.1	41.8	40	45
	6HK(0,1)6501006	40	46.5	51.1	50	60
	6HK(1,2)6501306	52	59.7	65.8	60	70
	6HK(1,2)6501506	60	68.2	75.0	70	80
	6HK(1,2)6501806	72	81.4	89.7	90	90
	6HK(1,2)6502006	80	89.8	98.9	90	100
36C	6HK(0,1)6500206	10	13.6	14.7	15	15
	6HK(0,1)6500506	20	24.4	26.7	25	30
	6HK(0,1)6500806	32	37.6	41.3	40	45
	6HK(0,1)6501006	40	46.0	50.6	50	60
	6HK(1,2)6501306	52	59.2	65.3	60	70
	6HK(1,2)6501506	60	67.7	74.5	70	80
	6HK(1,2)6501806	72	80.9	89.2	90	90

Air Handler Models	Heater Models ^{1,2}	Heater Amps @240V	Field Wiring			
			Min. Circuit Ampacity		MOP ³	
			208V	230V	208V	230V
48C	6HK(0,1)6500206	10	14.4	15.6	15	20
	6HK(0,1)6500506	20	25.3	27.5	30	30
	6HK(0,1)6500806	32	38.5	42.2	40	45
	6HK(0,1)6501006	40	46.9	51.5	50	60
	6HK(1,2)6501306	52	60.1	66.1	70	70
	6HK(1,2)6501506	60	68.5	75.4	70	80
	6HK(1,2)6501806	72	81.8	90.0	90	90
	6HK(1,2)6502006	80	90.2	99.3	90	100
48D	6HK(0,1)6500206	10	14.4	15.6	15	20
	6HK(0,1)6500506	20	25.3	27.5	30	30
	6HK(0,1)6500806	32	38.5	42.2	40	45
	6HK(0,1)6501006	40	46.9	51.5	50	60
	6HK(1,2)6501306	52	60.1	66.1	70	70
	6HK(1,2)6501506	60	68.5	75.4	70	80
	6HK(1,2)6501806	72	81.8	90.0	90	90
	6HK(1,2)6502006	80	90.2	99.3	100	100
	6HK(1,2)6502506	100	111.8	123.2	125	125
60C	6HK(0,1)6500206	10	15.9	17.1	20	20
	6HK(0,1)6500506	20	26.8	29.0	30	30
	6HK(0,1)6500806	32	40.0	43.7	40	45
	6HK(0,1)6501006	40	48.4	53.0	50	60
	6HK(1,2)6501306	52	61.6	67.6	70	70
	6HK(1,2)6501506	60	70.0	76.9	70	80
	6HK(1,2)6501806	72	83.3	91.5	90	100
	6HK(1,2)6502006	80	91.7	100.8	100	110
60D	6HK(0,1)6500206	10	15.9	17.1	20	20
	6HK(0,1)6500506	20	26.8	29.0	30	30
	6HK(0,1)6500806	32	40.0	43.7	40	45
	6HK(0,1)6501006	40	48.4	53.0	50	60
	6HK(1,2)6501306	52	61.6	67.6	70	70
	6HK(1,2)6501506	60	70.0	76.9	70	80
	6HK(1,2)6501806	72	83.3	91.5	90	100
	6HK(1,2)6502006	80	91.7	100.8	100	110
	6HK(1,2)6502506	100	113.3	124.7	125	125

1. (0,1) - maybe 0 (no service disconnect) or 1 (with service disconnect).
2. (1,2) maybe 1 (with service disconnect, no breaker jumper bar) or 2 (with service disconnect & breaker jumper bar).
3. MOP = Maximum Overcurrent Protection device; must be HACR type service disconnect or time delay fuse. Refer to your local codes to determine the correct wire size.

Table 8. Electrical Data For Multi-source Power Supply: 208/230-1-60

Air Handler Models	Heater Models	Total Heater Amp@ 240V	Min. Circuit Ampacity						MOP*					
			208V			230V			208V			230V		
			Circuit						Circuit					
			1st*	2nd	3rd	1st*	2nd	3rd	1st*	2nd	3rd	1st*	2nd	3rd
30B	6HK16501306	52	21.7	37.6	-	23.6	41.5	-	25	40	-	25	45	-
	6HK16501506	60	24.5	43.3	-	26.8	47.9	-	25	45	-	30	50	-
36B	6HK16501306	52	22.0	37.6	-	24.0	41.5	-	25	40	-	25	45	-
	6HK16501506	60	24.9	43.3	-	27.2	47.9	-	25	45	-	30	50	-
	6HK16501806	72	42.3	39.0	-	46.4	43.1	-	45	40	-	50	45	-
	6HK16502006	80	46.6	43.3	-	51.2	47.9	-	50	45	-	60	50	-
36C	6HK16501306	52	21.5	37.6	-	23.5	41.5	-	25	40	-	25	45	-
	6HK16501506	60	24.4	43.3	-	26.7	47.9	-	25	45	-	30	50	-
	6HK16501806	72	41.8	39.0	-	45.9	43.1	-	45	40	-	50	45	-
48C	6HK16501306	52	22.4	37.6	-	24.4	41.5	-	25	40	-	25	45	-
	6HK16501506	60	25.3	43.3	-	27.6	47.9	-	30	45	-	30	50	-
	6HK16501806	72	42.6	39.0	-	46.8	43.1	-	45	40	-	50	45	-
	6HK16502006	80	47.0	43.3	-	51.5	47.9	-	50	45	-	60	50	-
48D	6HK16501306	52	22.4	37.6	-	24.4	41.5	-	25	40	-	25	45	-
	6HK16501506	60	25.3	43.3	-	27.6	47.9	-	30	45	-	30	50	-
	6HK16501806	72	42.6	39.0	-	46.8	43.1	-	45	40	-	50	45	-
	6HK16502006	80	47.0	43.3	-	51.5	47.9	-	50	45	-	60	50	-
	6HK16502506	100	47.0	43.3	21.7	51.5	59.9	24.0	50	45	25	60	60	25
60C	6HK16501306	52	23.9	37.6	-	25.9	41.5	-	25	40	-	30	45	-
	6HK16501506	60	26.8	43.3	-	29.1	47.9	-	30	45	-	30	50	-
	6HK16501806	72	44.1	39.0	-	48.3	43.1	-	45	40	-	50	45	-
60D	6HK16501306	52	23.9	37.6	-	25.9	41.5	-	25	40	-	30	45	-
	6HK16501506	60	26.8	43.3	-	29.1	47.9	-	30	45	-	30	50	-
	6HK16501806	72	44.1	39.0	-	48.3	43.1	-	45	40	-	50	45	-
	6HK16502006	80	48.5	43.3	-	53.0	47.9	-	50	45	-	60	50	-
	6HK16502506	100	48.5	43.3	21.7	53.0	59.9	24.0	50	45	25	60	60	25

*MOP = Maximum Overcurrent Protection device; must be HACR type circuit breaker or time delay fuse. The 1st circuit includes blower motor amps. Refer to your local codes to determine the correct wire size.

Table 9. Electrical Data for Single Source Power Supply: 208/230-1-60

Air Handler Models	Heater Models ¹	Heater Amps @240V	Field Wiring			
			Min. Circuit Ampacity		MOP ²	
			208V	230V	208V	230V
30B	6HK36501025	23.1	27.9	30.5	30	35
	6HK36501525	34.6	40.4	44.3	45	45
36B	6HK36501025	23.1	28.3	30.9	30	35
	6HK36501525	34.6	40.8	44.7	45	45
	6HK36501825	41.6	48.4	53.2	50	55
	6HK46502025*	46.2	53.3	58.5	55	60
36C	6HK36501025	23.1	27.8	30.4	30	35
	6HK36501525	34.6	40.3	44.2	45	45
	6HK36501825	41.6	47.9	52.7	50	55
48C	6HK36501025	23.1	28.6	31.3	30	35
	6HK36501525	34.6	41.1	45.1	45	50
	6HK36501825	41.6	48.8	53.6	50	55
	6HK46502025*	46.2	53.6	58.9	55	60
48D	6HK36501025	23.1	28.6	31.3	30	35
	6HK36501525	34.6	41.1	45.1	45	50
	6HK36501825	41.6	48.8	53.6	50	55
	6HK46502025*	46.2	53.6	58.9	55	60
	6HK46502525*	57.7	66.2	72.7	70	80
60C	6HK36501025	23.1	30.1	32.8	35	35
	6HK36501525	34.6	42.6	46.6	45	50
	6HK36501825	41.6	50.3	55.1	55	60
60D	6HK36501025	23.1	30.1	32.8	35	35
	6HK36501525	34.6	42.6	46.6	45	50
	6HK36501825	41.6	50.3	55.1	55	60
	6HK46502025*	46.2	55.1	60.4	60	70
	6HK46502525*	57.7	67.7	74.2	70	80

1. Asterisk (*) denotes the 20kW and 25kW heater models (6HK46502025 and 6HK46502525) come with service disconnects standard. Single source power MCA and MOP requirements are given here only for reference if used with field installed single point power modification (S1-32436041000).
2. MOP = Maximum Overcurrent Protection device; must be HACR type circuit breaker or time delay fuse. The 1st circuit includes blower motor amps. Refer to your local codes to determine the correct wire size.

Table 10. Electrical Data For Multi-source Power Supply: 208/230-3-60

Air Handler Models	Heater Models ¹	Total Heater Amp@ 240V	Min. Circuit Ampacity				MOP ²			
			208V		230V		208V		230V	
			Circuit				Circuit			
			1st ²	2nd	1st ²	2nd	1st ²	2nd	1st ²	2nd
36B	6HK46502025	46.2	28.3	25.0	30.9	27.6	30	25	35	30
48C	6HK46502025	46.2	28.6	25.0	31.3	27.6	30	25	35	30
48D	6HK46502025	46.2	28.6	25.0	31.3	27.6	30	25	35	30
	6HK46502525	57.7	34.9	31.3	38.2	34.6	35	35	40	35
60D	6HK46502025	46.2	30.1	25.0	32.8	27.6	35	25	35	30
	6HK46502525	57.7	36.4	31.3	39.7	34.6	40	35	40	35

1. The 20kW and 25kW heater models (6HK46502025 and 6HK46502525) come with service disconnects standard.
2. MOP = Maximum Overcurrent Protection device; must be HACR type circuit breaker or time delay fuse. The 1st circuit includes blower motor amps. Refer to your local codes to determine the correct wire size.

Table 11. Air Flow Data (CFM¹)

Models	Wired Controller Indication (Blower Speed)	External Static Pressure (in. wc.)						
		0.10	0.20	0.30	0.40	0.50	0.60	0.70
208 Volts								
18B ²	High (High)	723	702	666	576	N/A	N/A	N/A
	Low (Medium)	566	543	480	382	N/A	N/A	N/A
24B	High (High)	990	973	953	924	885	797	713
	Low (Medium)	736	723	703	644	606	540	457
30B	High (High)	1228	1192	1134	1078	1023	951	843
	Low (Medium)	1023	998	958	915	859	741	677
36B	High (High)	1522	1475	1416	1349	1276	1188	1108
	Low (Medium)	1251	1217	1180	1135	1085	1042	968
36C	High (High)	1539	1489	1450	1400	1283	1201	1110
	Low (Medium)	1159	1147	1096	1042	994	943	877
48C	High (High)	1686	1643	1583	1507	1441	1357	1062
	Low (Medium)	1482	1439	1392	1340	1280	1090	971
48D	High (High)	1988	1931	1853	1775	1695	1606	1391
	Low (Medium)	1672	1636	1587	1522	1439	1302	1139
60C ²	High (High)	1851	1813	1757	1680	N/A	N/A	N/A
	Low (Medium)	1718	1687	1631	1562	N/A	N/A	N/A
60D ²	High (High)	1932	1871	1784	1701	N/A	N/A	N/A
	Low (Medium)	1795	1734	1660	1590	N/A	N/A	N/A
230 Volts								
18B ²	High (High)	806	780	745	687	N/A	N/A	N/A
	Low (Medium)	640	614	563	500	N/A	N/A	N/A
24B	High (High)	1142	1114	1078	1051	988	931	778
	Low (Medium)	854	840	826	800	738	688	605
30B	High (High)	1316	1270	1213	1151	1081	1008	917
	Low (Medium)	1139	1104	1059	1005	952	880	769
36B	High (High)	1601	1552	1485	1414	1337	1258	1178
	Low (Medium)	1385	1352	1302	1252	1193	1106	1057
36C	High (High)	1671	1636	1581	1513	1439	1330	1210
	Low (Medium)	1326	1310	1280	1238	1162	1081	994
48C	High (High)	1775	1727	1668	1596	1513	1431	1190
	Low (Medium)	1591	1551	1500	1447	1380	1312	1059
48D	High (High)	2150	2069	1988	1894	1812	1690	1481
	Low (Medium)	1878	1812	1752	1677	1604	1497	1258
60C ²	High (High)	1931	1889	1808	1739	N/A	N/A	N/A
	Low (Medium)	1845	1798	1731	1659	N/A	N/A	N/A
60D ²	High (High)	2040	1969	1885	1779	N/A	N/A	N/A
	Low (Medium)	1917	1861	1779	1694	N/A	N/A	N/A

1. Air handler units have been tested to UL 1995 / CSA 22.2 standards up to 0.30" wc external static pressure. Dry coil conditions only, tested without filters. For optimal performance, external static pressures of 0.2" to 0.5" are recommended. Applications above 0.5" are not recommended.
2. Model 18B, 60C, and 60D air handlers must be used within external static pressure of 0.4".

12. Maintenance

Filters must be cleaned or replaced when they become dirty. Inspect at least once per month. The frequency of cleaning depends upon the hours of operation and the local atmospheric conditions. Clean filters keep unit efficiency high.

Coil Cleaning

If the coil needs to be cleaned, use water to clean.

Lubrication

The bearings of the blower motor are permanently lubricated.

Condensate Drains

During the cooling season check the condensate drain lines to be sure that condensate is flowing from the primary drain but not from the secondary drain. If condensate ever flows from the secondary drain the unit should be promptly shut off and the condensate pan and drains cleaned to insure a free flowing primary drain.

13. Air System Adjustment

To check the Cubic Feet per Minute (CFM), measure the external duct static using a manometer and static pressure tips.

To prepare coil for static pressure measurements, run the fan only to assure a dry coil.

NOTICE

Refer to Table 11 for coil Air Flow Data (CFM)

Drill 2 holes, one 12" away from the air handler in the supply air duct and on 12" away from the air handler in the return air duct (before any elbows in the duct work). Insert the pressure tips, and energize the blower motor. See Table 11 to determine the air flow, and make the necessary adjustments to keep the CFM within the airflow limitations of the coil.

External Duct Static

Measure the supply air static pressure. Record this positive number. Measure the return air static pressure. Record this negative number. Treat the negative number as a positive, and add the two numbers together to determine the total external system static pressure. If a filter rack is installed on the return air end of the air handler or indoor coil section, make sure to measure the return air duct static between the filter and the indoor coil.

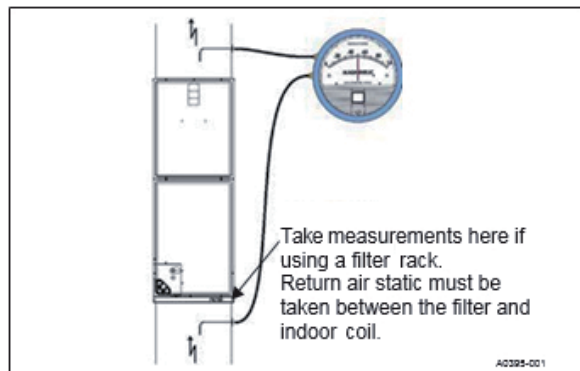


Figure 11. Duct Static Measurements

14. Installation Verification

Prior to and during the accomplishment of the installation procedures, verify all tasks are accomplished as indicated in these instructions.

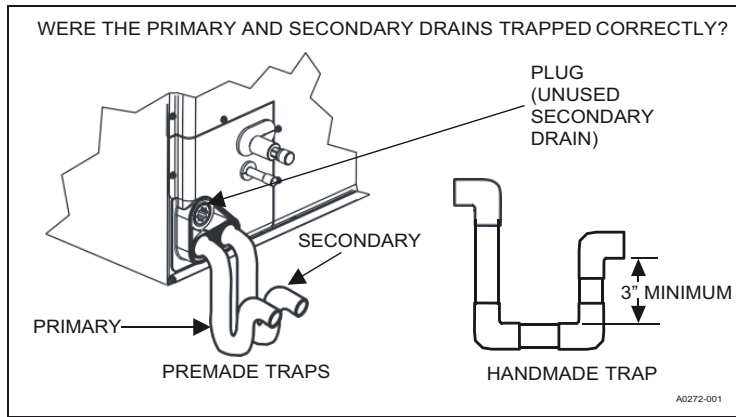


Figure 12. Drain Traps

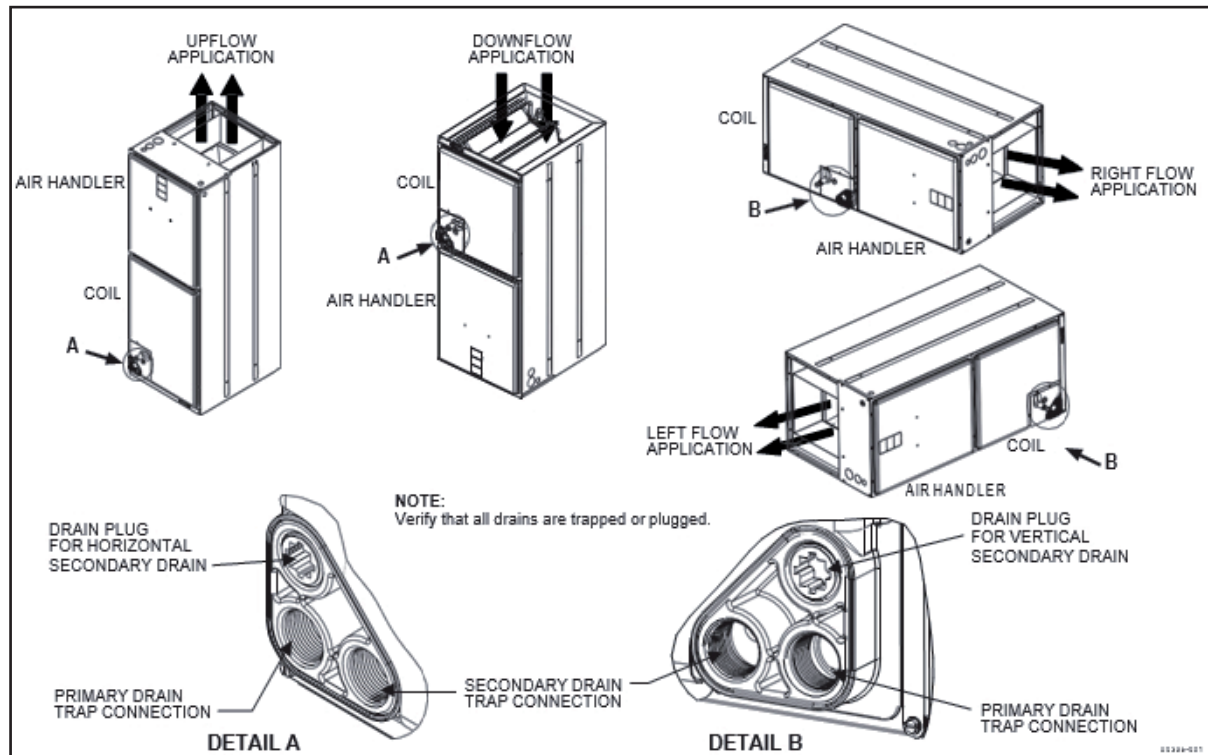


Figure 13. Location of Coil Trapped and Plugged Drain Connections

DX-Kit

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 product is designed for standard air conditioning applications only. Do not use this product 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 product will be 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 product which you operate as well for other models.
- This product has been designed for a specific temperature range. For optimum performance and long life, operate this product 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 product 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.

15. Introduction

This is the installation section for the DX-Kit.



Provide this "Installation and Maintenance Manual" 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 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 station, refer to the "Installation and Maintenance Manual" for the central station.

16. 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. <i>Refer back to these safety instructions as needed.</i>
--	--

- 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 quenching 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 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 drain pan and could run inside of the control 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 control 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 this product 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 drain water flowing back which may cause leaks.
- Be sure the drain 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 air baffle.
 - A snowy area: Install the outdoor unit on a raised platform that is higher than drifting snow. Provide snow vents.
- 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 drain 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 drain pipe is installed incorrectly, water leakage and damage to the ceiling, floor, furniture, or other possessions may result. If the drain 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 this product.

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. Refrigerant gases can cause asphyxiation (0.026 lbs/ft³ (0.42 kg/m³) based on ISO 5149 for R410A). Consult with your distributor for countermeasures (ventilation system and so on). 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 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.
- 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



WARNING

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 (0.82mm²), 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 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 clamp 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 control 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. Check to ensure 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.
- 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.

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 device*.
- When the power supply wiring for the device* and the packaged air conditioner are located close to each other:

Device*: (Example): Lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor, and large-sized switch.
It consumes large quantities of electrical power.

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.

17. Before Installation

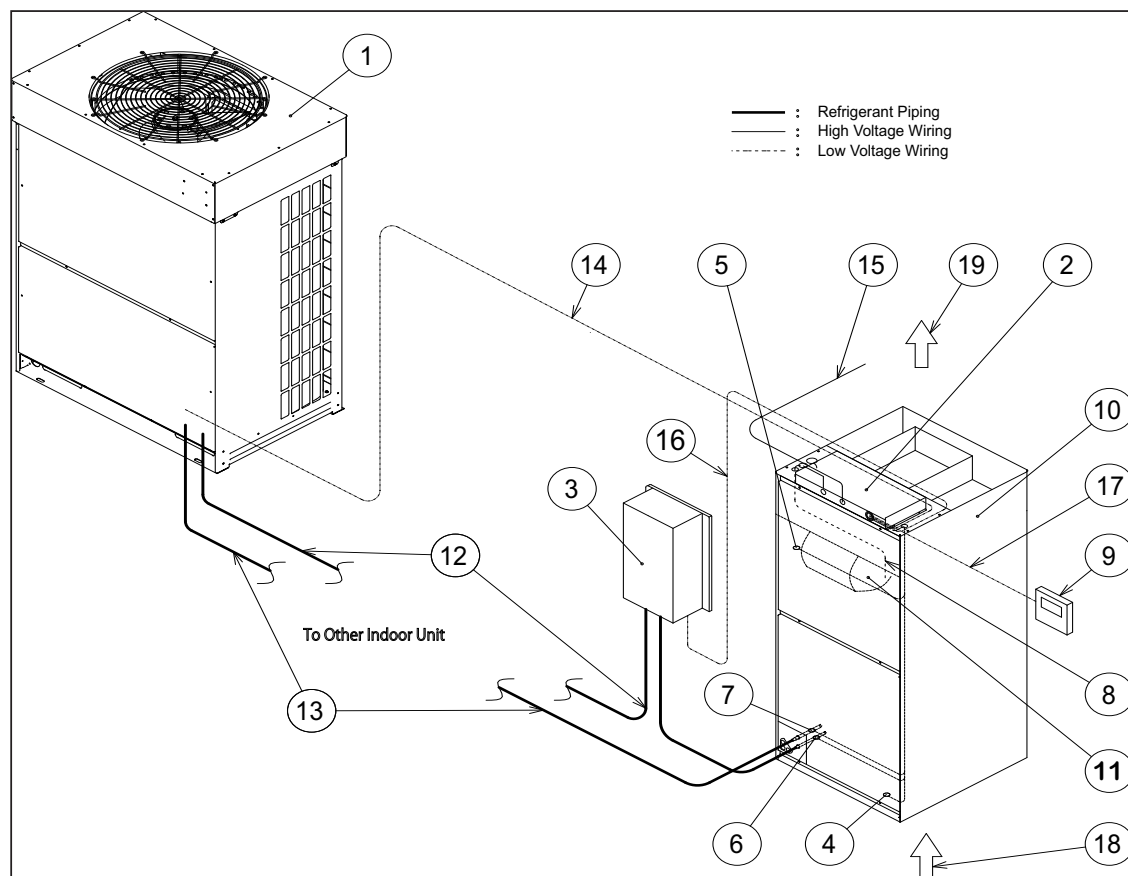
17.1 About DX-Kit

DX-Kit is an interface kit designed to control the air handlers using a fan motor control and expansion valve control depending on the air inlet or outlet temperatures.

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

The following figure shows an installation example of DX-Kit in the VRF system. The DX-Kit includes a control box, an expansion valve box, air inlet and outlet thermistors, liquid and gas pipe thermistors, and a fan motor control board.

The control box should be mounted on the air handler.



Item No.	Description	Item No.	Description
1	VRF Outdoor Unit	10	Air Handler
	DX-Kit	11	Fan Motor for Air Handler
2	Control Box	12	Liquid Pipe Line
3	Expansion Valve Box	13	Gas Pipe Line
4	Air Inlet Thermistor Probe	14	H-LINK Communication Cable
5	Air Outlet Thermistor Probe	15	Power Supply Wiring
6	Liquid Pipe Line Thermistor Probe	16	Expansion Valve Control Cable
7	Gas Pipe Line Thermistor Probe	17	Wired Controller Connection Cable
8	Fan Motor Wiring	18	Air Inlet of Air Handler
9	Wired Controller	19	Air Outlet of Air Handler

Figure 14. DX-Kit in the VRF system

17.2 Applicable Model

This DX-Kit is compatible with the following air handler models.

DX-Kit Model	Air Handler Model
EXV-018E	AP18BX21
EXV-024E	AP24BX21
EXV-030E	AP30BX21
EXV-036E	AP36BX21, AP36CX21
EXV-048E	AP48DX21, AP48CX21
EXV-060E	AP60DX21, AP60CX21

CAUTION

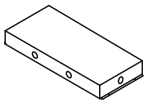
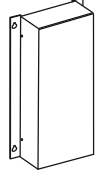



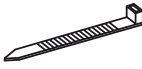


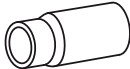



- **Ensure the installation distance between this DX-Kit and the air handler is the shortest possible.**
- **For the piping length, keep a maximum distance of 16.4ft (5 m) between the air handler and the expansion valve box. Be certain the elevation difference between the air handler and the expansion valve box DOES NOT exceed 6.6 ft (2 m).**
- **Be sure that the installation distance between the control box and the air handler is short enough so that thermistor sensing is not distorted.**
- **Never install the thermistor cable in the same ducting as the power or control wirings.**

17.3 Transportation and Handling Model

- Avoid unpackaging the DX-Kit until it arrives at the installation site.
- Install the DX-Kit as soon as possible after unpacking.
- Unpack and place the DX-Kit on the floor. Position the DX-Kit with the bottom surface facing downward on the soft packing insulation material. Any superficial damage to this item can compromise its moisture sealing qualities.
- Do not lay any objects on this product.

17.4 Factory-Supplied Accessories

Check to ensure that the following accessories are packed with this product.

Accessory	Qty.	Purpose
Control Box 	1	System Control Box
Expansion Valve Box 	1	Expansion Valve for Refrigerant Cycle Control
Thermistor 	4	Temperature Sensing: Air Inlet (Blue), Air Outlet (Red), Gas Pipe (Yellow), Liquid Pipe (Black)
Thermistor Extension 	4	To Extend Thermistor Length: Air Inlet (Blue), Air Outlet (Red), Gas Pipe (Yellow), Liquid Pipe (Black)
Thermistor Insulation 	1	For Refrigerant Liquid Piping Thermistor
	1	For Refrigerant Gas Piping Thermistor
Cable Clamp 	8	For Securing Pipe Insulation and Thermistor
Thermistor Holder for Piping 	1	For Attaching Liquid Piping Thermistor to Piping
	1	For Attaching Gas Piping Thermistor to Piping
Butyl Sheet 	1	For Refrigerant Liquid Piping Thermistor
	1	For Refrigerant Gas Piping Thermistor
Reducer 	1	For Changing Pipe Diameter of Gas Pipe Connection of Air Handler
Tapping Screw 1 	4	For Mounting Control Box on Air Handler
Cable Holder 	5	For Attaching Air Inlet, Air Outlet Thermistors, and Routing Cable
Tapping Screw 2 	8	For Attaching Cable Holder to Fan Casing

17.5 Field-Supplied Items

Item	Purpose
Expansion Valve Cable	For connection between TB2 terminal no. 1 to 5 in the control box and TB3 terminal no.1 to 5 in the expansion valve box. AWG20 recommended.
Wired Controller (CIW01)	To control the air handler.
Wired Controller Cable	For connection to wired controller.
H-Link Cable	For connection to outdoor unit.
Conduit	As required to follow local code.
Mounting Screws (Qty.4)	Use to mount Expansion Valve Box (not included with DX-kit)

NOTICE

The controller and branch piping are optional accessories that are not included with this product. If necessary, please contact your contractor.

17.6 Necessary Tools and Instrument List for Installation

No.	Tool	No.	Tool
1	Cordless Drill	12	Flare Kit
2	Handsaw	13	Torque Wrench
3	Phillips Screwdriver	14	Charging Cylinder
4	Vacuum Pump	15	Manifold Gauge
5	Refrigerant Gas Hose	16	Wire Cutter
6	Megohmmeter	17	Gas Leak Detector
7	Copper Pipe Bender	18	Level
8	Manual Water Pump	19	Crimper for Solderless Terminals
9	Pipe Cutter	20	Hoist (for Indoor Unit)
10	Brazing Kit	21	Ammeter
11	Hex Wrench	22	Voltage Meter

NOTE:

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

18. Installation Location

- (1) Allow proper clearance for operation and maintenance to install this product

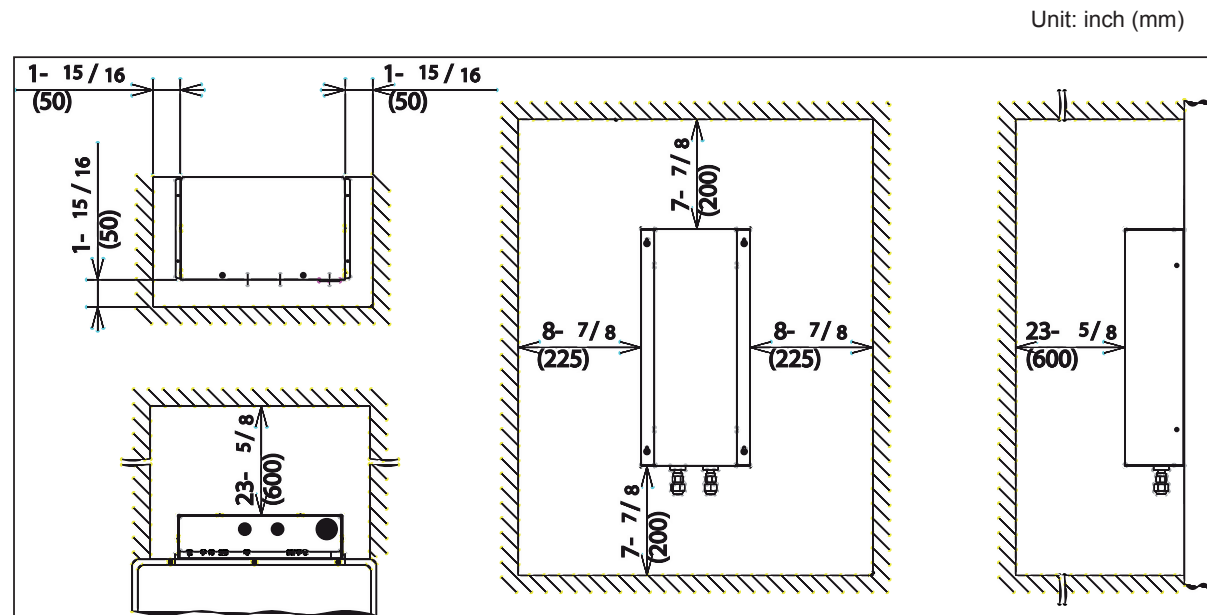


Figure 15. Installation Space

- (2) Select installation methods according to the dimension of the false ceiling.
- (3) For the piping length, keep a maximum distance of 16.4 ft (5 m) between the air handler and the expansion valve box. Be sure the elevation difference between the air handler and the expansion valve box DOES NOT exceed 6.6ft (2m).
- (4) Check to be sure that the ceiling slab is strong enough to support the weight of the expansion valve box. Otherwise noise and vibration may occur.
- (5) Ensure proper space around the control box and expansion valve box for operation and maintenance work. Prepare a service access door to remove the DX-Kit without getting rid of the ceiling plate.
- (6) Select a suitable and convenient location for the refrigerant piping connection.
- (7) Do not install the DX-Kit in a kitchen where vapor or mist flows. During the cooling operation, if water condensation forms on the expansion valve box, then use insulation.
- (8) Do not install the DX-Kit in a organic solvent (thinner or benzine) environment. Synthetic resin parts may dissolve.
- (9) Do not install the DX-Kit where generation, flowing or staying of flammable gas may occur.
- (10) Install the expansion valve box where the sound will not leak such as in the false ceiling of a hall way. Be sure you do not hear the sound of refrigerant running from the expansion valve box.
- (11) Use ceiling material that has sound proofing such as plaster board.
- (12) Do not leave combustible materials inside the space served by this product.
- (13) For installation of this product in a hospital or other facility where there are electromagnetic waves from medical equipment.
 - (a) Do not install this product where the electromagnetic wave radiates directly to the control box, communication cable or wired controller.
 - (b) Install this product and components as far away as practicable or at least 9.8ft (3m) from any electromagnetic wave radiator.
 - (c) Prepare a steel box and install the wired controller in it. Prepare a steel conduit tube and wire the controller cable in it. Then, connect the ground wiring with the box and the tube.
 - (d) Install a noise filter when the power supply emits harmful noises.

19. Installation Work

19.1 Preparation

- (1) Determine the final location and installation orientation of this product with respect to the space allowed for piping, wiring, and maintenance access. See also Section 19.2.

DO NOT mount the box with the pipe connections on top of the Air Handler.

- (2) Refer to the Installation dimensions shown in the following figure.

Unit: inch (mm)

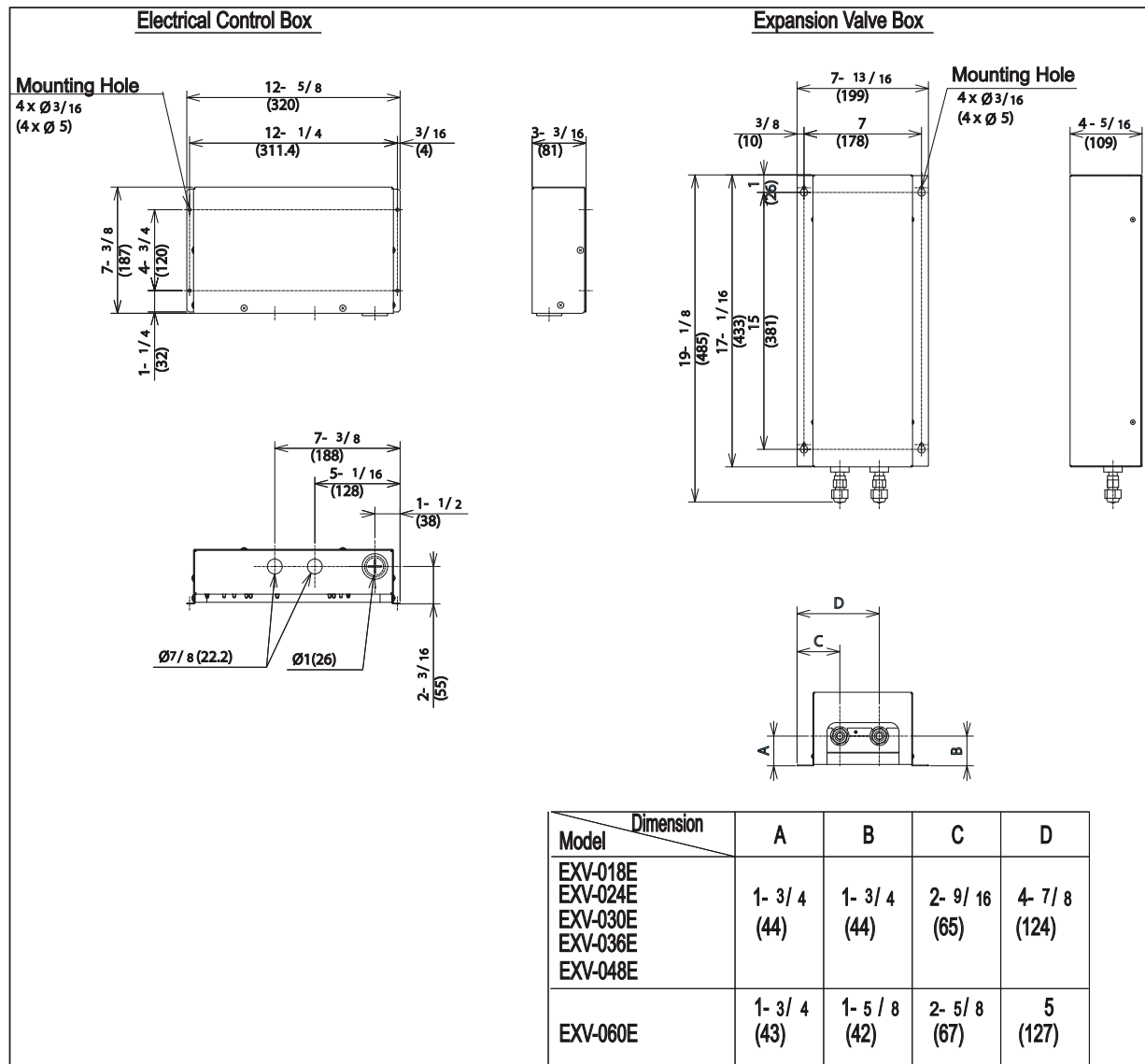


Figure 16. Installation Dimensions

19.2 Mounting Control Box

Mount the Control Box on top of the Air Handler.

! WARNING

- Be sure to mount the control box in the correct position indicated below or else it will come into contact with the wiring holes of the air handler. Incorrect positioning will damage the wiring and affect the conduit connection. A serious accident and malfunction may result.
- Make sure there are no shavings left inside the control box and air from drilling mounting holes for the control box on the air handler. Shavings inside the control box will cause a serious accident and corrosion to the heat exchanger.

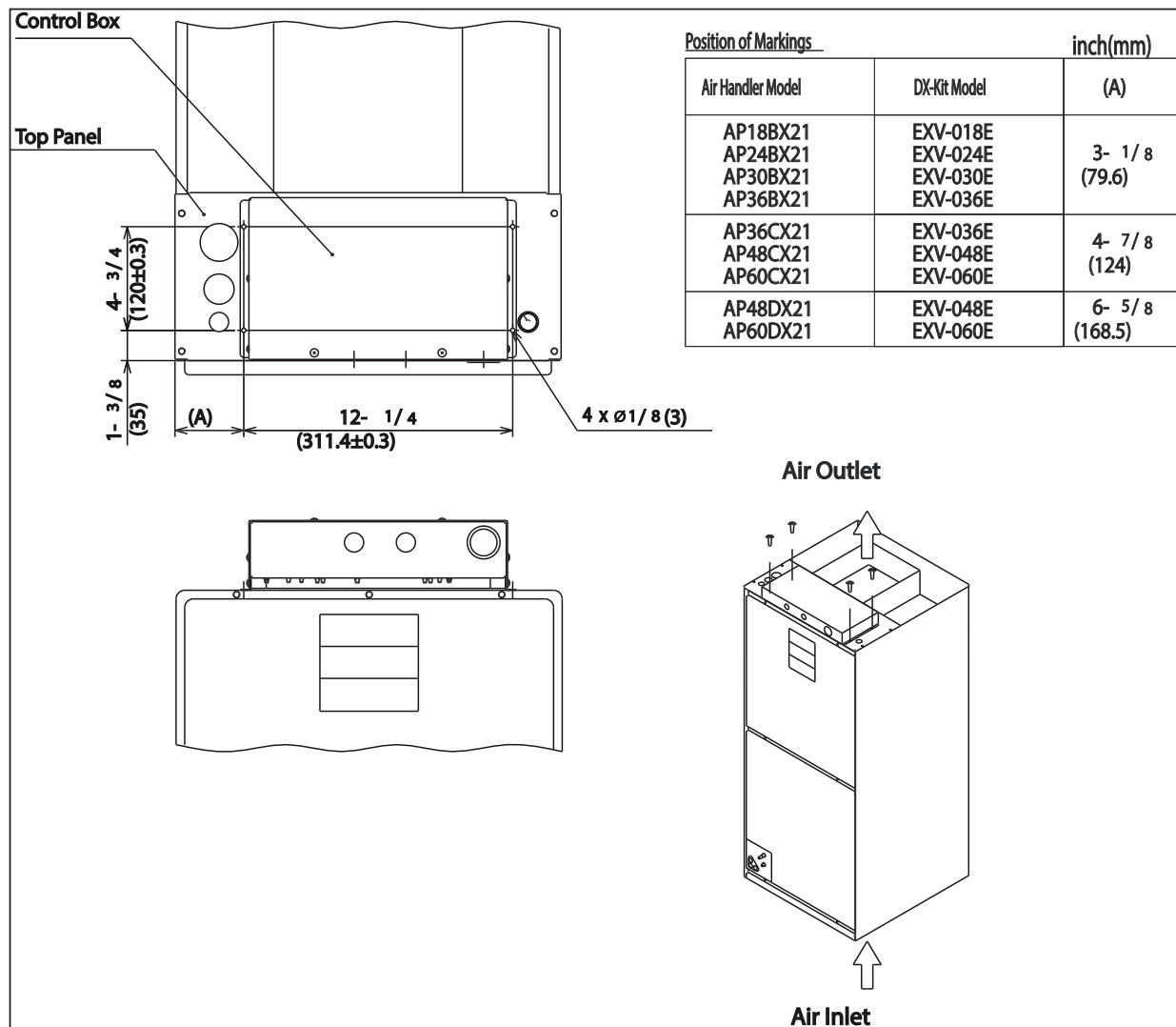


Figure 17. Mounting the Control Box

19.3 Mounting Expansion Valve Box

Mount the expansion valve box as shown in the following figure.

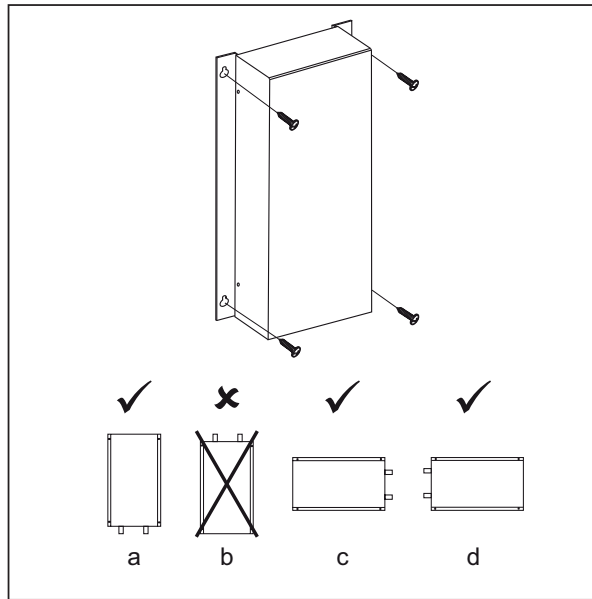


Figure 18. Mounting Valve Box

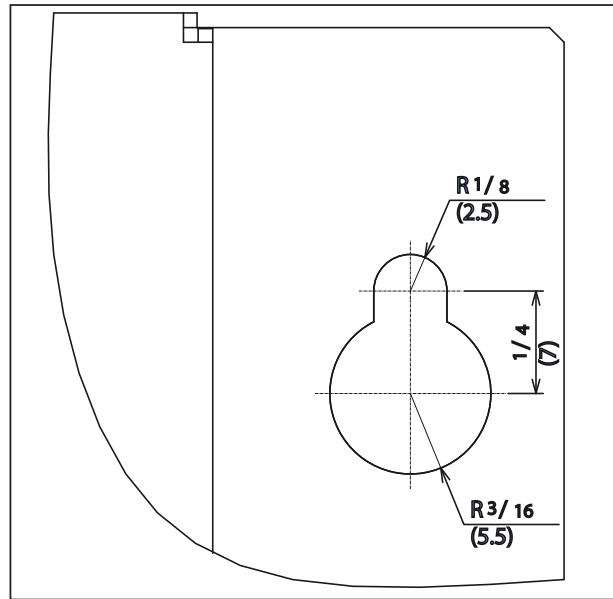


Figure 19. Details of Mounting Hole

NOTE

- In case of installation positions "c" and "d", make sure to insulate the copper pipes inlet on the expansion valve box cover to avoid any liquid filtration and accumulation.
- Installation position "b" is prohibited.

20. Refrigerant Piping Work

⚠ DANGER

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

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

20.1 Piping Materials

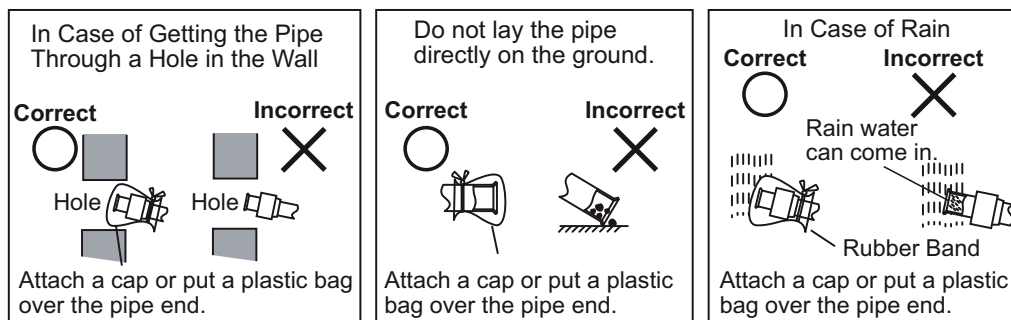
- (1) The tolerance of refrigerant piping length differs depending on the combination with the outdoor unit. Refer to "Installation and Maintenance Manual" of the outdoor unit for details.
- (2) Select the piping size from the following table.

Table 12. Piping Size

DX-Kit Model	Liquid Piping (IN/OUT)	Applicable Air Handler Model	Gas Piping with Reducer*	inch (mm)
				Liquid Piping
EXV-018E	Φ3/8 (9.52)	AP18BX21	Φ3/4 (19.05) → Φ5/8 (15.88)	Φ3/8 (9.52)
EXV-024E		AP24BX21	Φ3/4 (19.05) → Φ5/8 (15.88)	
EXV-030E		AP30BX21	Φ3/4 (19.05) → Φ5/8 (15.88)	
EXV-036E		AP36BX21, AP36CX21	Φ3/4 (19.05) → Φ5/8 (15.88)	
EXV-048E		AP48DX21, AP48CX21	Φ7/8 (22.2) → Φ5/8 (15.88)	
EXV-060E		AP60DX21, AP60CX21	Φ7/8 (22.2) → Φ3/4 (19.05)	

*Change the gas connection piping diameter of the air handler by using the reducer to connect to VRF system.

- (3) Prepare field-supplied copper pipes.
- (4) Select clean copper pipes. Make sure there is no dust and moisture inside.
- (5) 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 it may prevent proper operation.
- (6) When cutting the pipes, use a pipe cutter to avoid grind swarf generation for the pipe cutting work. Blow the inside of pipes with nitrogen or dry air to remove any dust or foreign materials before connecting pipes. Do not use any tools which produce a lot of swarf such as a saw or a grinder.



20.2 Piping Connection Work

- (1) Example of piping connections is shown below. Make sure to attach the reducer (accessory) to the gas pipe connection of the air handler. Check the reducer size for the corresponding air handler in Table 12.

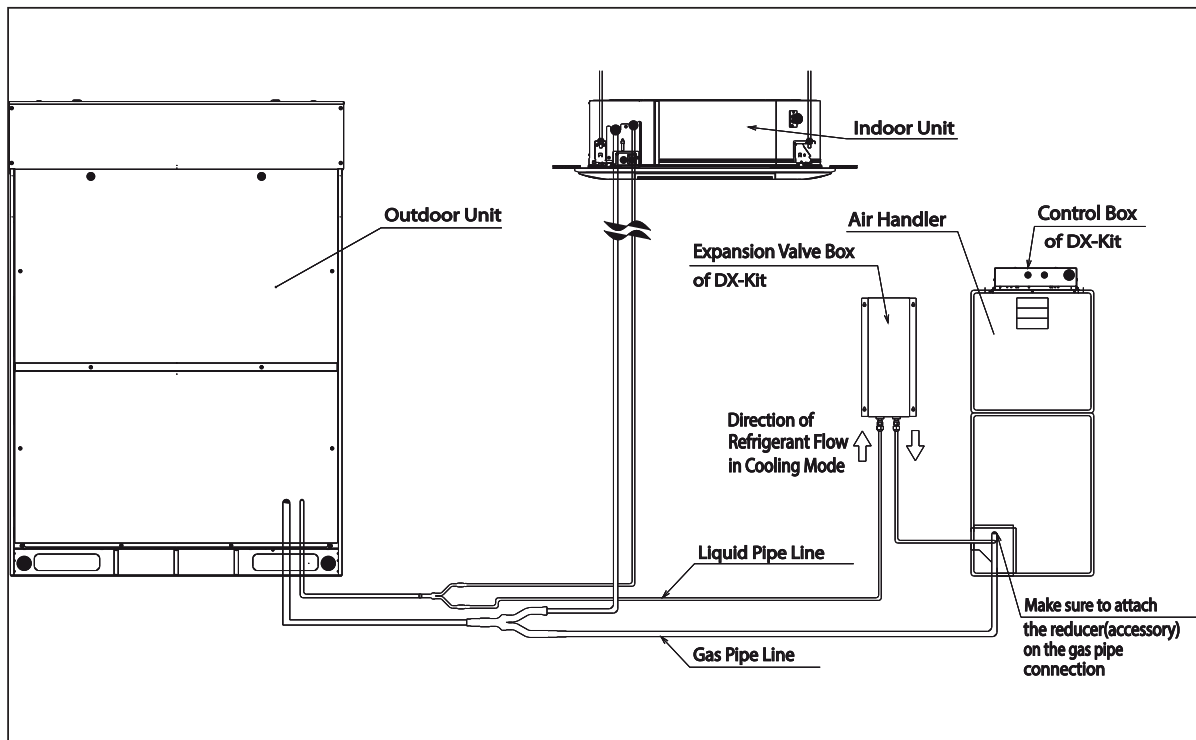


Figure 20. Piping Connections

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

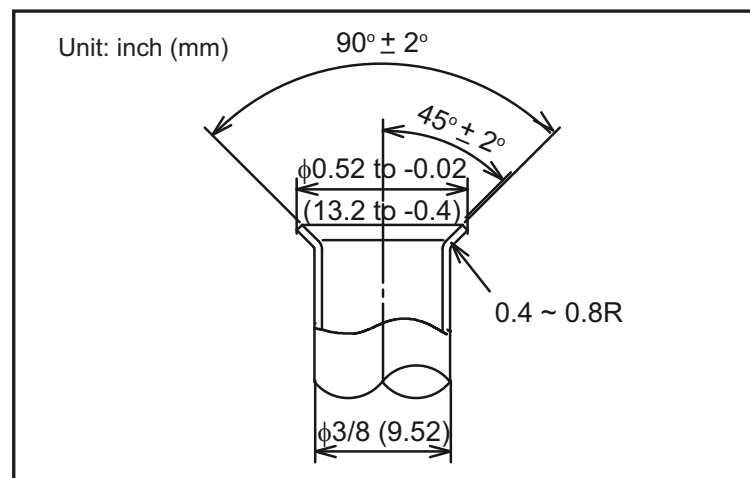


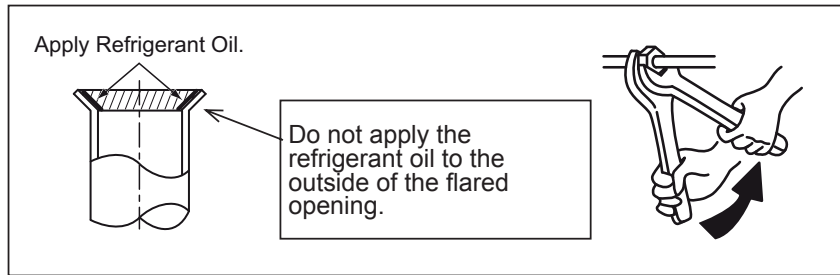
Figure 21. Flare Dimensions

- (3) Use the flare nut shipped with the unit.
- (4) Verify that there are no scratches, burrs stuck to internal surfaces, or surface deformations at the flared opening.
- (5) Before tightening the flare nut, apply the refrigerant oil (field-supplied) in a thin layer over the flared part. (Do not apply the oil on other areas.) Tighten the flare nut for the liquid pipe to the specified torque with two spanners. Then, tighten the flare nut for the gas piping in the same way. After tightening, check that no refrigerant leakage occurs.

NOTE:

Refrigerant oil is field-supplied.

[Ethereal Oil FVC50K, FVC68D (Idemitsu Kousan Co. Ltd.)]



Required Tightening Torque (JIS B 8607)

Pipe Size	Tightening Torque
3/8 inch (9.52 mm)	25.1-31.0 ft.lbs (34-42 N.m)

Figure 22. Applying Refrigerant Oil

- (6) Wherever buried piping exists on site, make sure there is adequate access to inspect piping sockets and elbows, and for interconnecting parts.
- (7) Piping must be reinforced to not be damaged by an external force.
- (8) Make sure that the piping can accommodate expansion and contraction.
- (9) Prevent the pipes from touching walls, ceiling, etc.
- (10) Test for air-tight integrity. This should be done in accordance with the "Installation and Maintenance Manual" for the outdoor unit.
- (11) If temperature and humidity inside the room exceed 80.6°F (27°C)/RH80%, condensation occurs on the surface of the insulation (field-supplied). Wrap additional insulation (approximately 3/16~3/8 inch (5~10mm) thickness) around the insulation (field-supplied) of the refrigerant pipe as a preventive measure.
- (12) Insulate each flare connection without gap with insulations (field-supplied) to prevent condensation. Insulate each refrigerant pipe as well.
- (13) Insulate piping between the expansion valve box and air handler with insulation (field supplied).

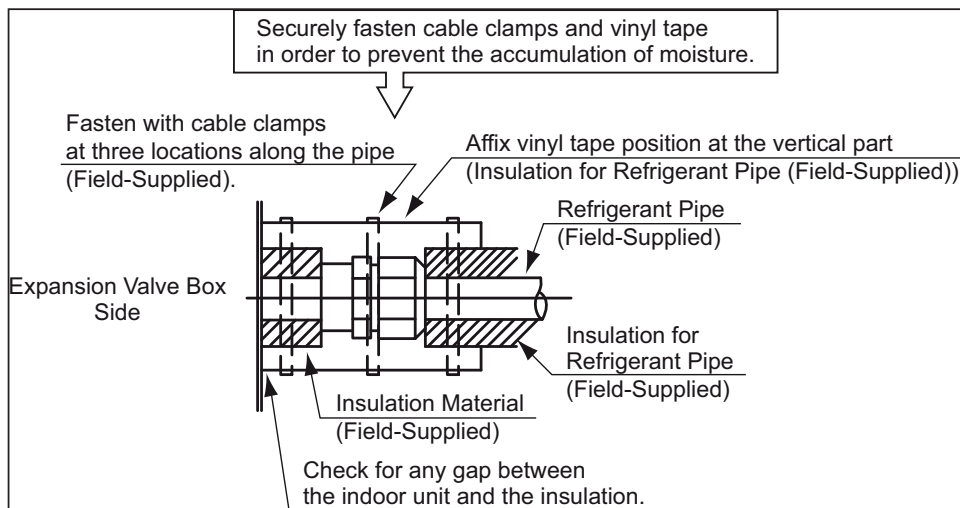


Figure 23. Insulating Piping

! WARNING

- Do not apply excessive force to the flare nut when tightening. 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 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 asphyxiation to people.

21. 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 this product and 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 this product without turning OFF the main power supply. It can result in an electrical shock.
- Turn OFF the main power switch of this product 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.
- Check the item below before turning ON the main switch. In case the power source for the indoor unit is 208V (nominal voltage), change the CN28 connector to CN27 of transformer (TF) in the control box as shown in the figure below.

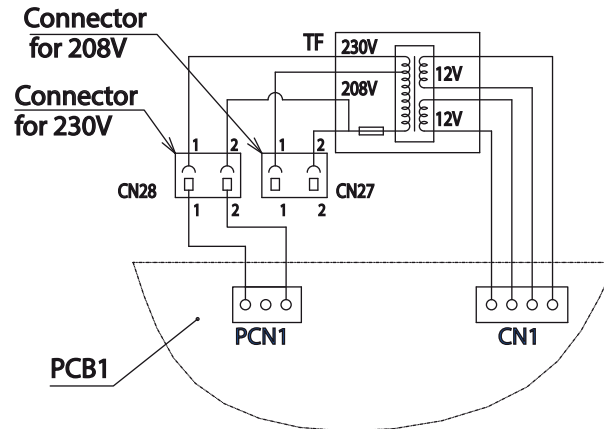


Figure 24. Electrical Wiring Diagram of Transformer (TF)

- Tighten screws according to the following torque.
M3.5: 0.9 ft·lbs (1.2 N·m)

CAUTION

- **Secure all cables together with cable clamps 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.**

21.1 General Check

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

21.2 Electrical Wiring Capacity

21.2.1 Field Minimum Wire Sizes for Power Supply

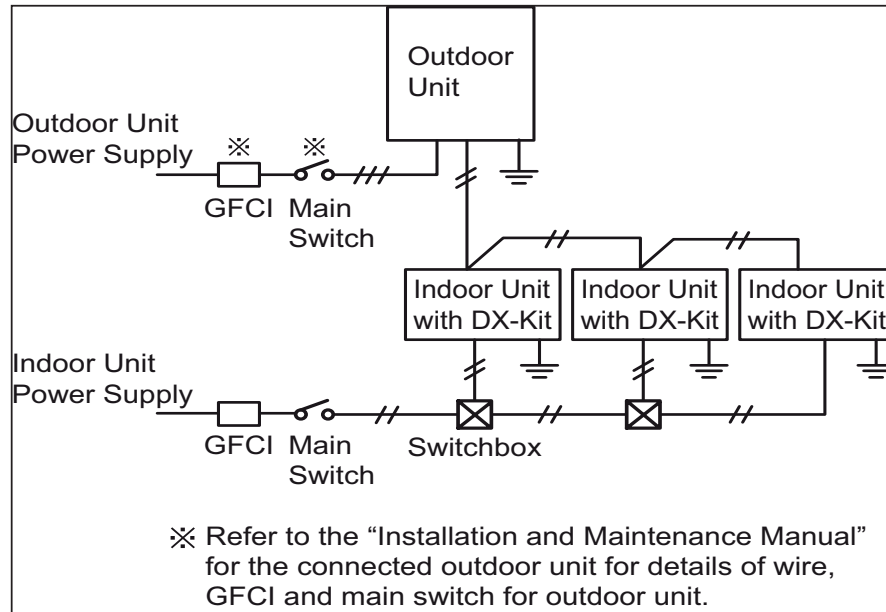
- This equipment can be installed with a Ground Fault Circuit Interrupter (GFCI), which is a recognized measure for added protection to a properly grounded unit. Install appropriate sized breakers / fuses / overcurrent protection switches and wiring in accordance to local, state and NEC codes and requirements. The equipment installer is responsible for understanding and abiding by applicable codes and requirements. Failure to use a GFCI can result in electrical shock or fire.
- Do not operate the system until all the check points have been cleared.
 - (A) Verify that electrical resistance is more than one megaohm by measuring the resistance between ground and the terminals of the various electrical components. If less than one megaohm, do not activate the system until the electrical current drain is found and repaired.
 - (B) Check to ensure that the stop valves for the outdoor unit are fully opened, and then start the system.
 - (C) Check to see that the main power has been switched ON for longer than 12 hours prior activating the system. Power to the crankcase heater needs this time interval to warm the compressor oil up to operating temperature.
- Do not touch any of the parts by hand at the discharge gas side, since the compressor chamber and the pipes at the discharge side are heated higher than 194°F (90°C).

21.2.2 Details of Electrical Wiring Connection

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

Select wiring capacity; then, install a GFCI (Ground Fault Circuit Interrupter) and main switch as shown in each of the system diagrams as shown below.

Heat Pump System



Heat Recovery System

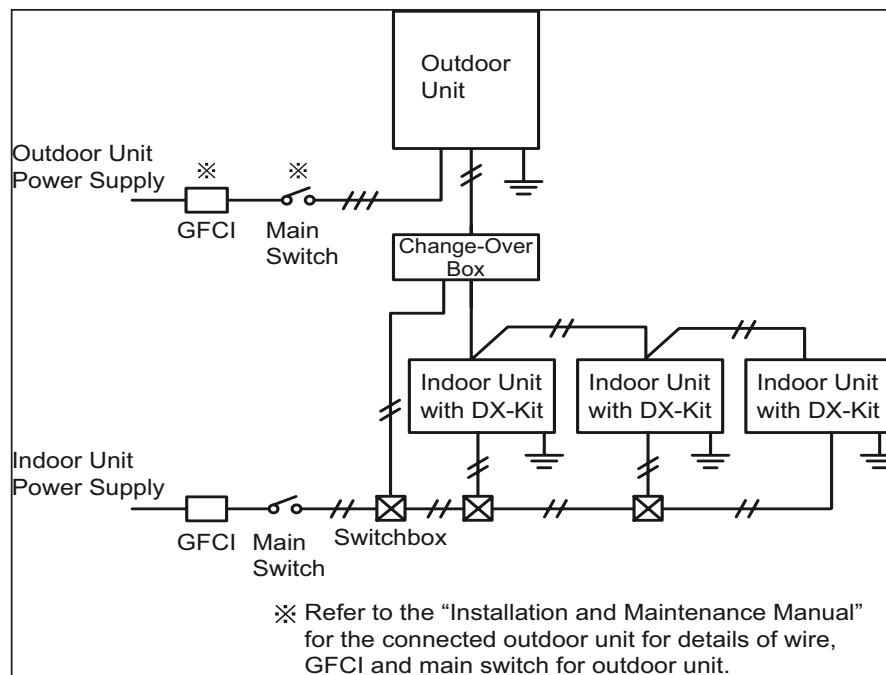


Figure 25. Electrical Wiring Connections: Heat Pump and Heat Recovery Systems

Refer to the air handler manual for the electrical characteristics to select the correct wiring size.

NOTES:

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

NOTICE

- Check for the recommended size GFCI in table 7.1 of the "Installation and Maintenance Manual" for the outdoor unit.
- Between indoor and outdoor units, use dual-conductor, AWG18 (0.82mm²) 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 should 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 this product, installation of the power supply wiring, communication cable, and wired controller cable should be spaced as far apart as possible.

21.3 Position of Electrical Wiring Connection

- The electrical wiring connection for the DX-Kit is shown in Section 21.2.2.
- The connection at the terminal block for the DX-Kit is shown in the figure below. Check the outdoor unit for the combination before the wiring work. The screws at the terminal block should be performed according to the tightening torque as shown in the table below.

Tightening Torque for Terminals

Screw Size	Tightening Torque
TB1, TB2, TB3	M3.5 0.9 ft·lbs (1.2 N·m)

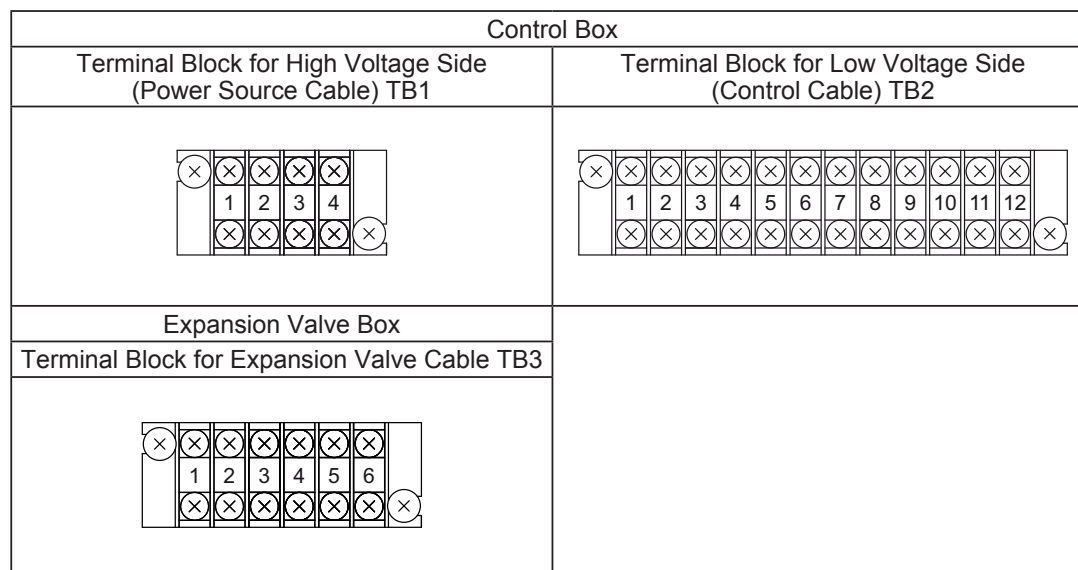
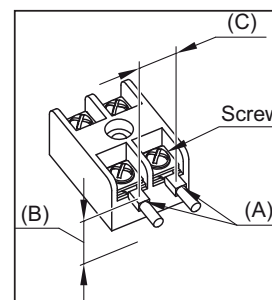


Figure 26. Positions of Electrical Wiring Connection

NOTICE

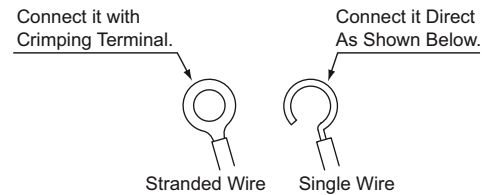
- Do not connect the main power supply wiring to the communication line (Terminals A, B, 1 and 2 of TB2). If these are connected, the printed circuit board (PCB) will be destroyed.
- Note the following for wire connections at TB1 and TB2:
 - (A) Attach a piece of insulation tape or sleeve at each terminal.
 - (B) Maintain a safe distance between the control box and the terminals to prevent a short circuit.
 - (C) Maintain a safe distance between the terminals.



- (1) Connect the cable for the optional controller or the optional extension cable to the terminals inside the control box through the connecting hole of the enclosure.
- (2) Connect the power supply and the ground wiring to the terminals in the control box.
- (3) Connect the cables between this product and the outdoor unit to the terminals inside the control 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) will be destroyed.
- (7) Tightly clamp the power supply wiring and communication cables using the cable clamp inside the control box.

NOTE:

When the standard wire is used for the field-wiring connection, the M4 crimping terminal should be used. 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. The screws at the terminal block should be tightened according to the torque specification as shown in the table on previous page.



- (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.
 - (a) Reconnect the wirings correctly.
 - (b) Set the No.1 pin at DSW7 (on the PCB) to ON.

Upon PCB recovery after the fuse has been replaced, if 208V / 230V is reintroduced into the communication line, the PCB will be seriously damaged and will not recover.

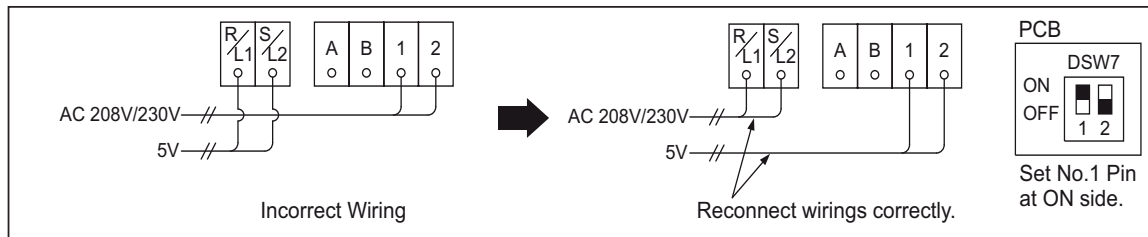
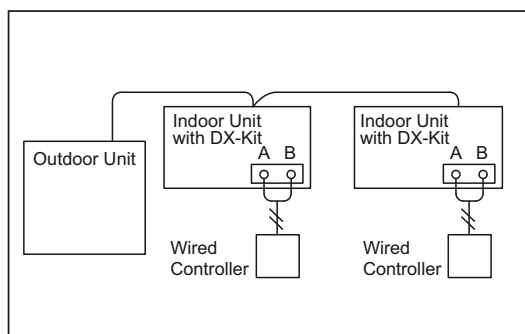


Figure 27. Reconnect Wiring

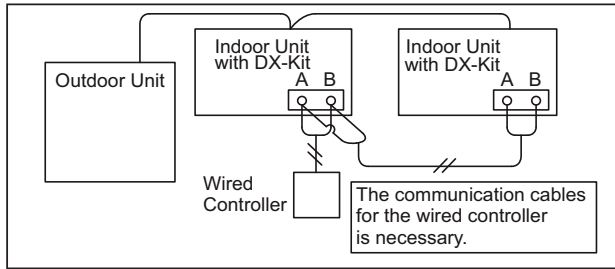
(10) Wired Controller Connection

- VRF Systems

(a) Wired Controllers to each Unit for Individual Operation Setting



(b) Single Wired Controller for Individual Operation Setting



(c) Wired Controller Connections between different Refrigerant Cycles

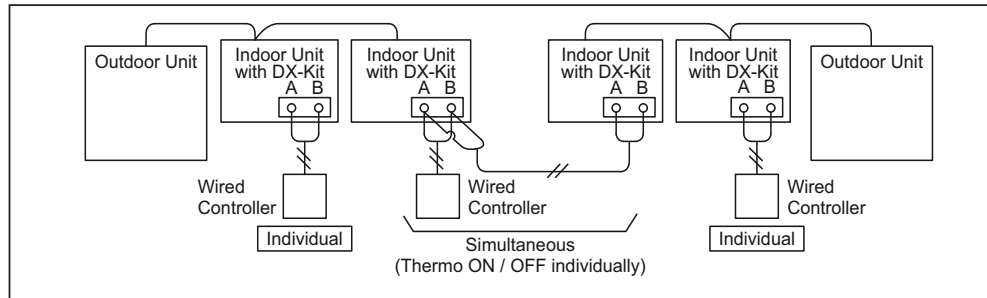


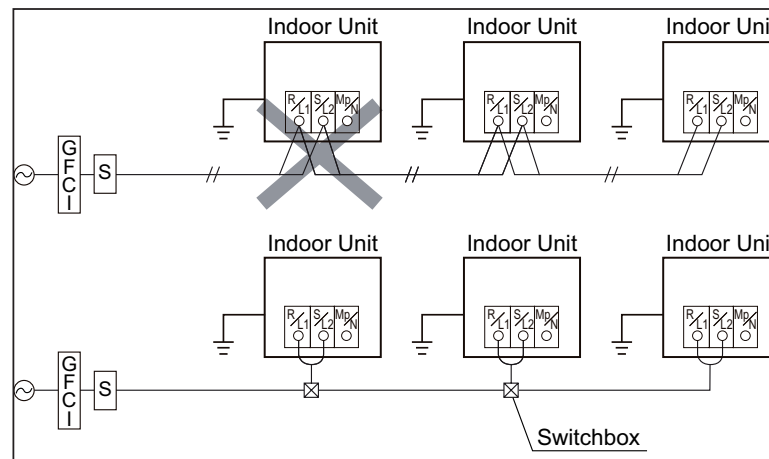
Figure 28. Wired Controller Connections

NOTICE

1. The DIP switch settings for the outdoor unit should be performed in accordance with the "Installation and Maintenance Manual" for the outdoor unit.
2. 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.

⚠ CAUTION

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



21.4 Wiring Connection

21.4.1 An overview of wiring connections from the DX-Kit control box is shown below.

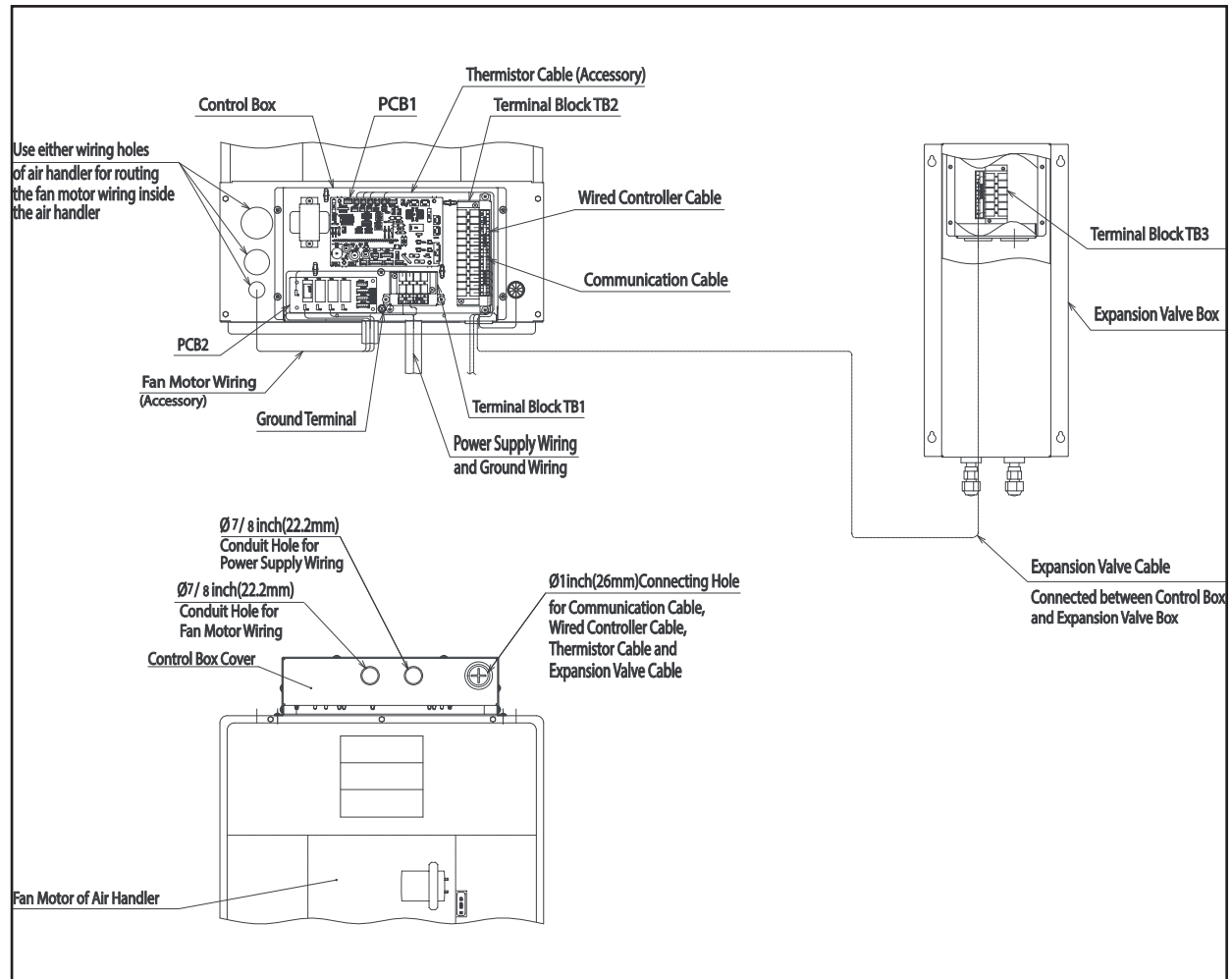


Figure 29. Wired Connections from the Control Box

Attach the cable holders (accessory) to the air handler at the positions shown below.

! WARNING

Route wires around sharp edges.

Cable holders must be attached to the air handler for mounting the air inlet and air outlet thermistors and securing excess wiring inside the air handler.

Position of the cable holders and the dimensions of the cable holder are shown below.

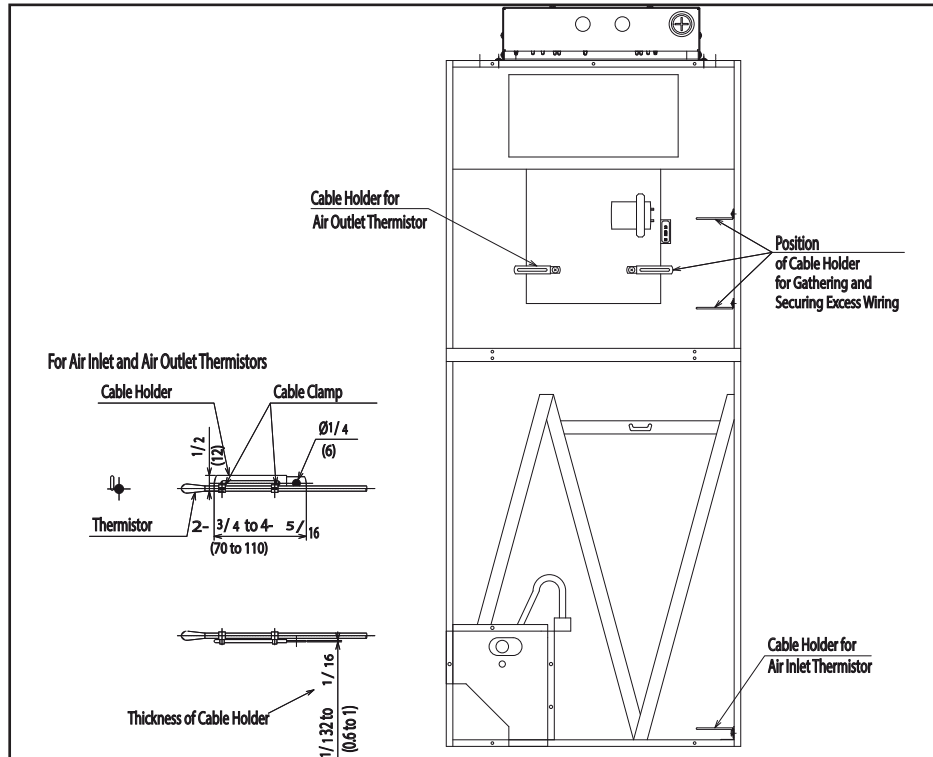


Figure 30. Attaching Cable Holders to Air Handler

- (1) Remove the upper front panel of the air handler to access the blower compartment.
- (2) Remove the lower front panel of the air handler to access the coil compartment.
- (3) Attach the cable holder for the air inlet thermistor at the air inlet side inside the air handler using the screw already attached to the unit.
- (4) Attach the cable holder of the air outlet thermistor on the fan casing inside the air handler using the #8 (M5) tapping screw, thread length must not exceed 3/8 inch (10mm).
- (5) Attach the cable holders for the securing wires using the screw already attached to the unit.

! WARNING

Secure the wiring neatly with the cable holders and cable clamps and make sure that the wiring will not be held down by the covers. Otherwise, the wiring may be damaged and serious accident and malfunction of the air handler may result.

21.4.2 Wiring Holes of Air Handler.

The location is shown below of the wire holes of the air handler that are used to route the wiring and cables from the DX-Kit control box.

! WARNING

Make sure there are no shavings left inside the control box and air handler from opening the knock-out hole on the air handler. Otherwise, it will cause serious accident and will cause corrosion to the heat exchanger.

Use the wiring holes of air handler indicated below for routing the wiring and cable from DX-Kit Control Box into air handler.

Open the knock-out hole by using a punch or screwdriver and lightly tap near the edges of the knockout piece to work it loose. It can then be removed.

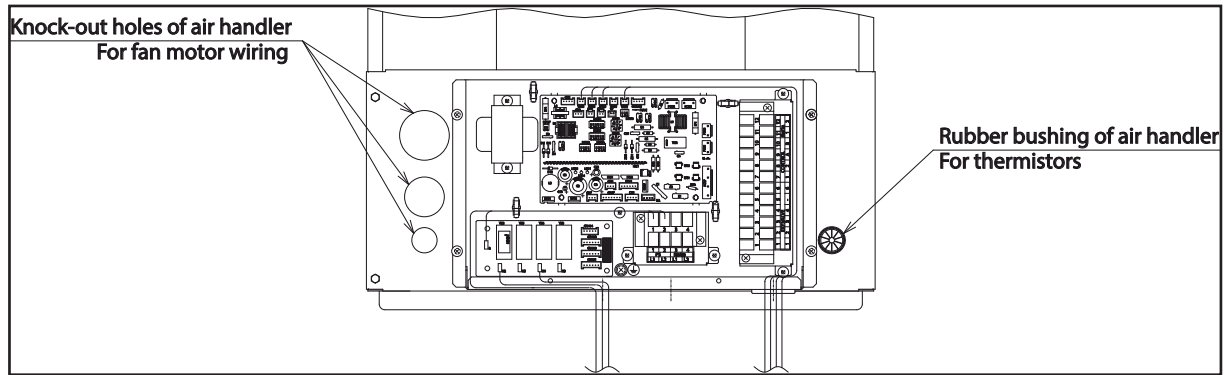


Figure 31. Wiring Holes of Air Handler

NOTES:

1. Pay attention to the connection of the wiring. Incorrect connection will seriously damage the PCB and unit.
2. Wiring should be spaced appropriately and firmly fastened to guarantee against electrical short circuit, sparks, and fire.
3. Do not touch the electrical components.
4. Do not apply an excessive force to the PCB. Otherwise, it may lead to PCB failure.
5. For reassembling, attach connectors to the correct position. Otherwise, the PCB may be damaged.
6. Securely attach the screw for the ground wiring.
7. If shielded cable is used, terminate at the ground terminal.

21.4.3 Thermistor Installation

Position of four thermistors (air inlet, air outlet, gas pipe and liquid pipe) inside the air handler are indicated below.

Mount the air inlet and air outlet thermistors on the cable holders using the cable clamps.

Route the three wirings for the blower inside the air handler by passing through the connecting hole on the left side of the air handler.

NOTES:

- Make sure that the thermistor cable are spaced appropriately and firmly fastened to ensure against contact to heat exchanger coil.
- Make sure the thermistors are installed in correct position. Otherwise, the air handler will not operate properly.

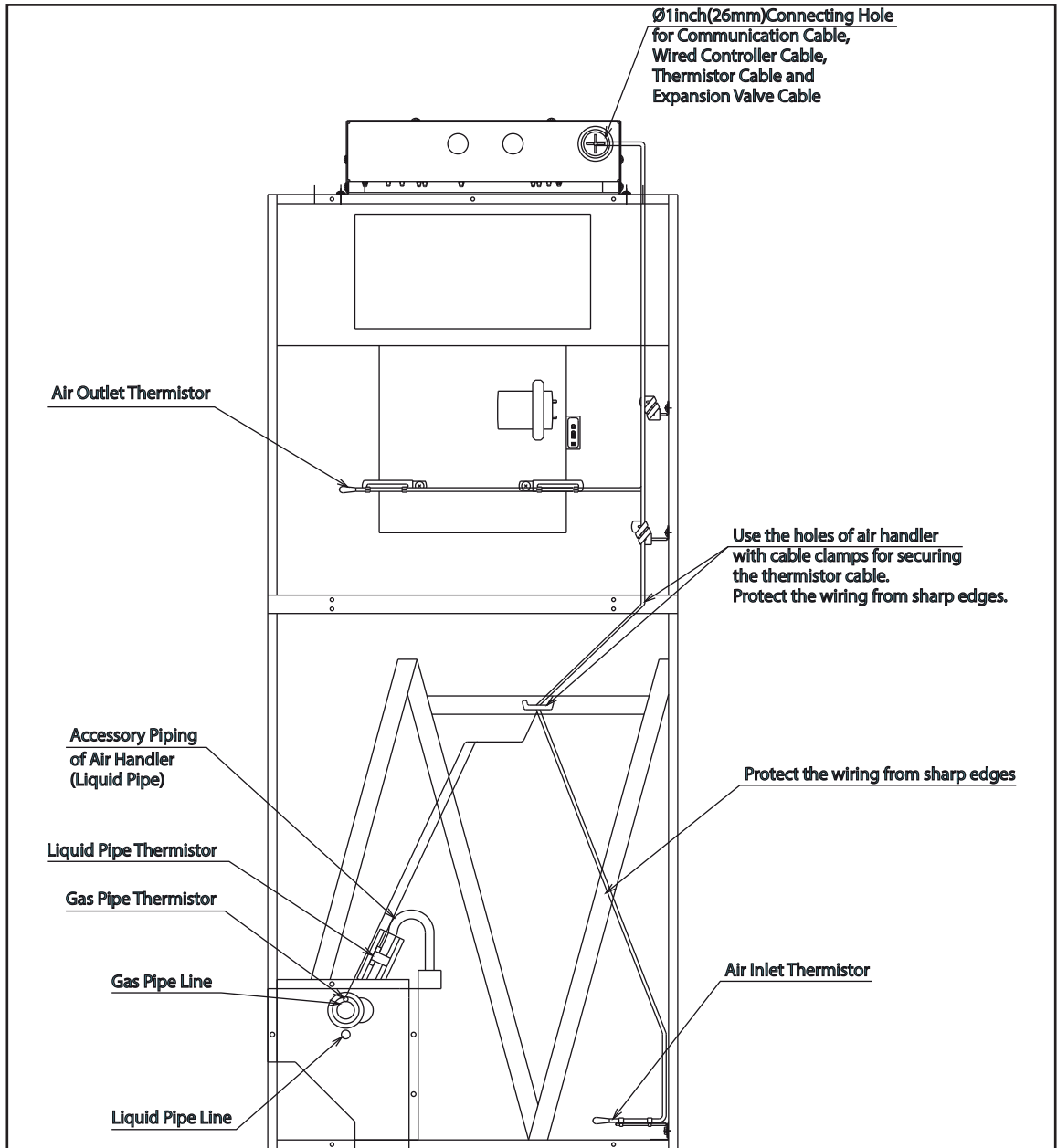


Figure 32. Thermistor Positions

21.4.3.1 Liquid and Gas Pipes Thermistors

Liquid and gas pipes thermistors are supplied with the control box. The purpose and identification of each one is as follows:

Item	PCB Connector/ Thermistor Connector Color	PCB Connector Number	Thermistor Length [inch (mm)]
Liquid Pipe Thermistor	Black	THM3	29-1/2 (750)
Gas Pipe Thermistor	Yellow	THM5	23-5/8 (600)

CAUTION

In all cases, mount the pipe thermistors after piping are brazed and sufficiently cooled. In case that the thermistors supplied with the DX-Kit are not long enough, please make sure that the length extension is properly done avoiding the sensing distortion and that the joint is properly insulated to avoid any electrical failure.

NOTE:

When fitting the pipe thermistors, remember that they must be secured correctly by the thermistor holder, ensuring the perfect contact between the pipe and thermistor. Cover it completely with insulation, butyl sheet and pipe insulation to protect it from the effect of the surrounding ambient temperature. Replace them if damaged during maintenance work.

- (1) Remove both upper and lower front panels of the air handler to access the blower and coil compartment.
- (2) Remove the control box cover with the six screws.
- (3) Pass the two connector side of thermistor cable through the connecting hole and connect the thermistor connectors to the corresponding connectors on the PCB.
- (4) Route the thermistor probe end inside the air handler by passing through the connecting hole on the right side of the top panel of the air handler.
- (5) Attach the thermistor probes to position indicated in the figure below inside the air handler. When attaching pipe thermistors use the thermistor holder. Then apply the pipe insulation with plastic bands to make sure that there is no clearance between the thermistors and pipe insulation.

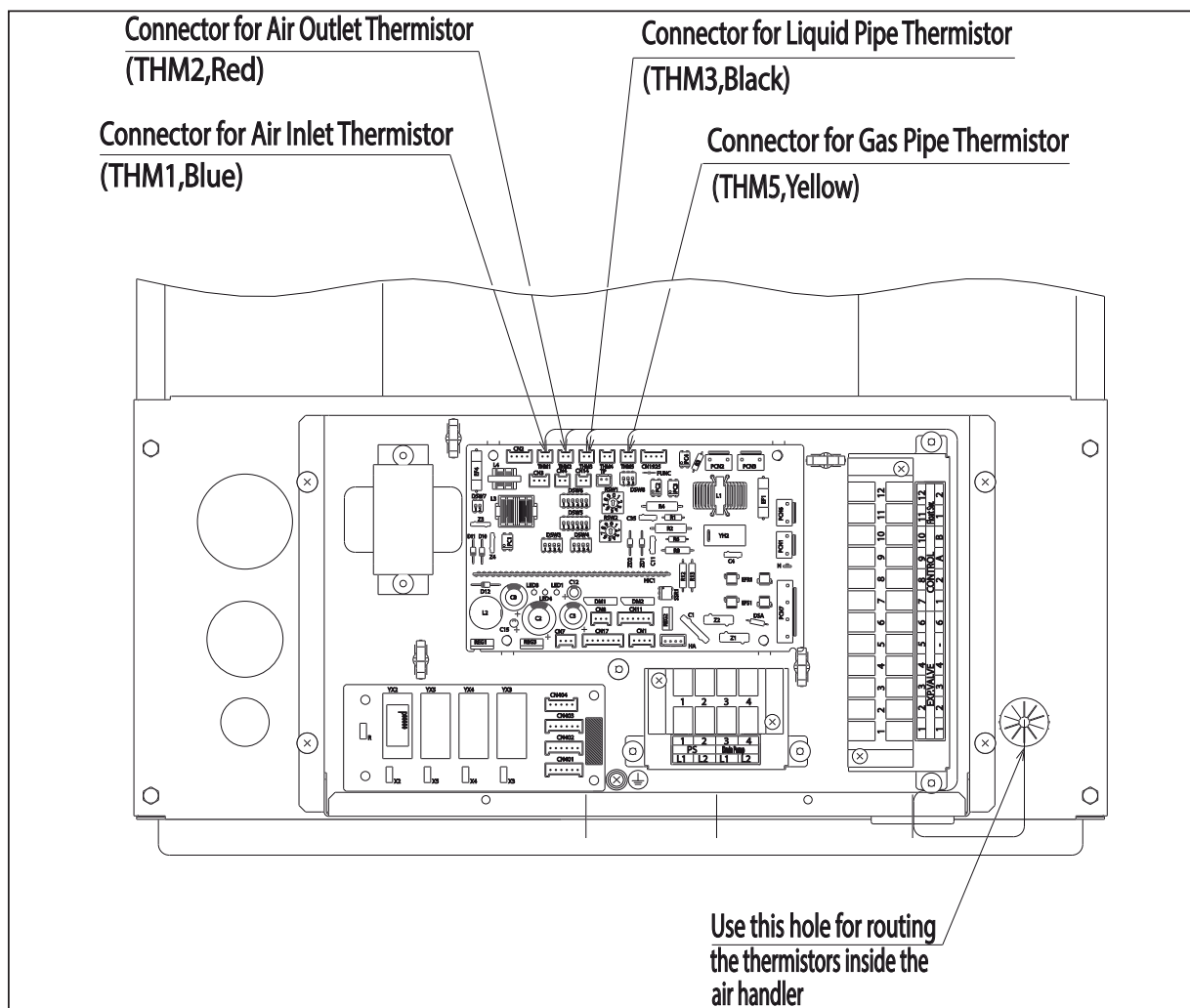


Figure 33. Thermistor Connectors

Enlarged View of P

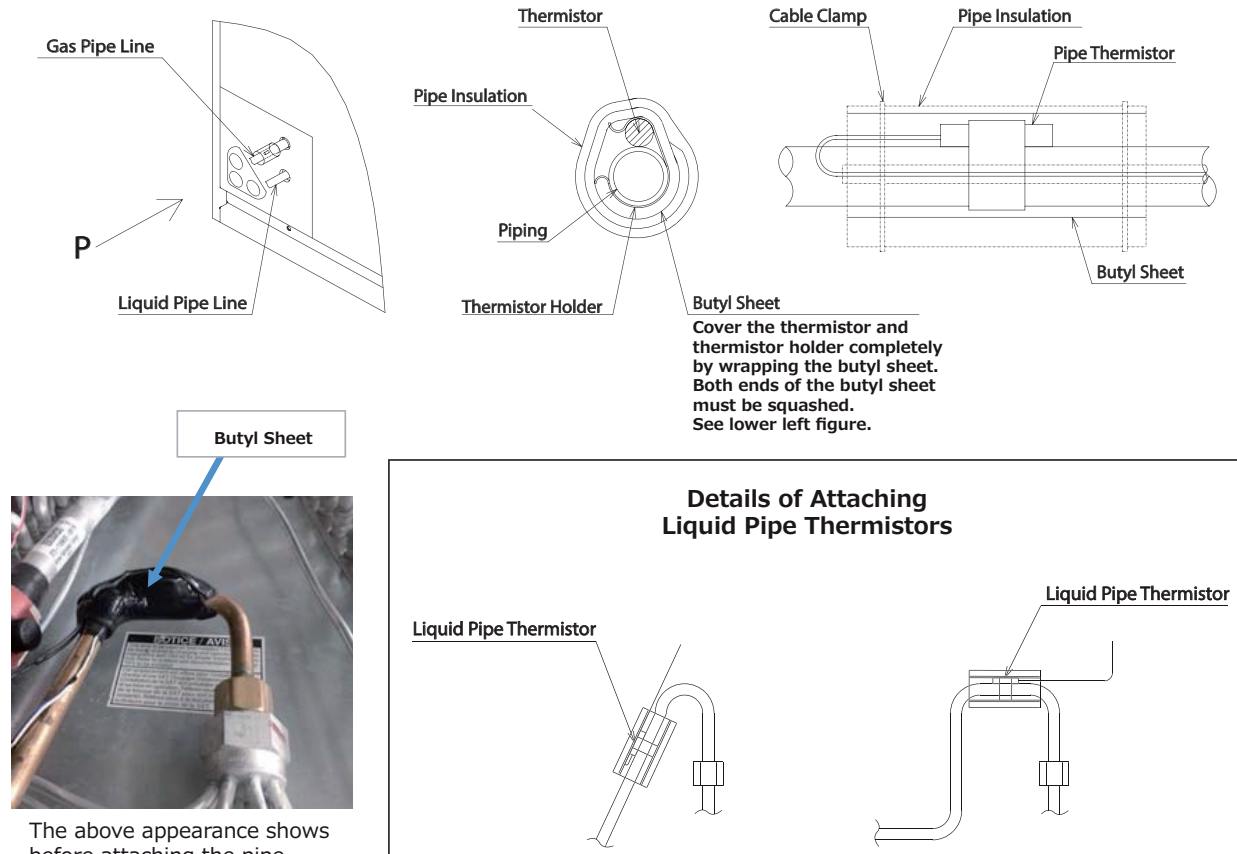


Figure 34. Thermistor Installation with Details

NOTES:

1. Pay attention to the attaching direction and position of the lead cable.
2. Make sure the cables are spaced appropriately and firmly fastened to ensure against contact to runner, electrical short circuit, sparks, and fire.
3. For optimal performance, be sure the liquid pipe thermistor is installed inside the unit and gas pipe thermistor in the closest straight part of the unit.

CAUTION

The thermistor must be installed properly in order to avoid water onto the thermistor.

21.4.3.2 Air Inlet and Outlet Thermistor

Air inlet and outlet thermistors are supplied with the control box. The purpose and identification of each one is as follows:

Item	PCB Connector/ Thermistor Connector Color	PCB Connector Number	Thermistor Length [inch (mm)]
Air Inlet Thermistor	Blue	THM1	47-1/4 (1200)
Air Outlet Thermistor	Red	THM2	47-1/4 (1200)

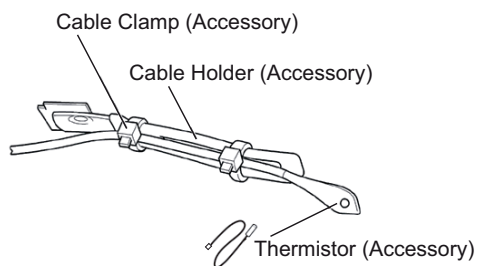
⚠ CAUTION

In case that the thermistors supplied with the DX Kit are not long enough, please make sure that the length extension is properly done avoiding the sensing distortion and that the joint is properly insulated to avoid any electrical failure.

NOTE:

When fitting the air inlet and outlet thermistor, remember that they must be secured correctly, in an adequate place to avoid external influences, like ambient conditions, and where the air temperature is significant.

- (1) Remove both upper and lower front panels of the air handler to access the blower and coil compartment.
- (2) Remove the control box cover with the four screws.
- (3) Pass the two connector side of thermistor cable through the connecting hole and connect the thermistor connectors to the corresponding connectors on the PCB.
- (4) Route the thermistor probe end inside the air handler by passing through the connecting hole on the right side of the top panel of the air handler.
- (5) Attach the thermistor probes to position indicated in the figure below.



For Air Inlet and Air Outlet Thermistors

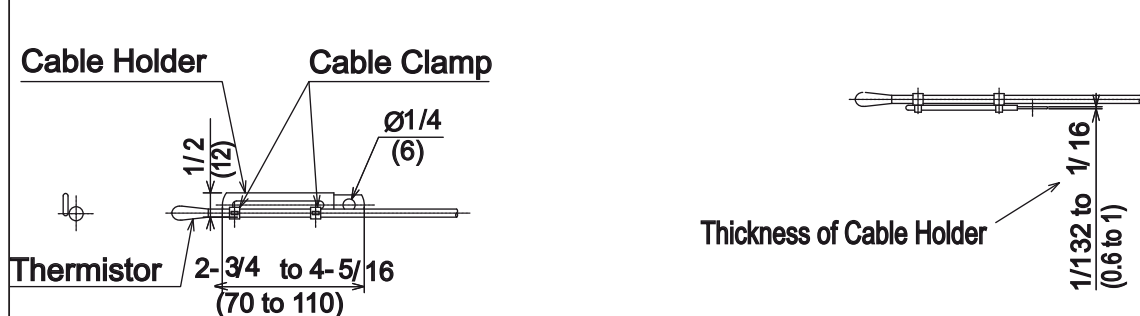
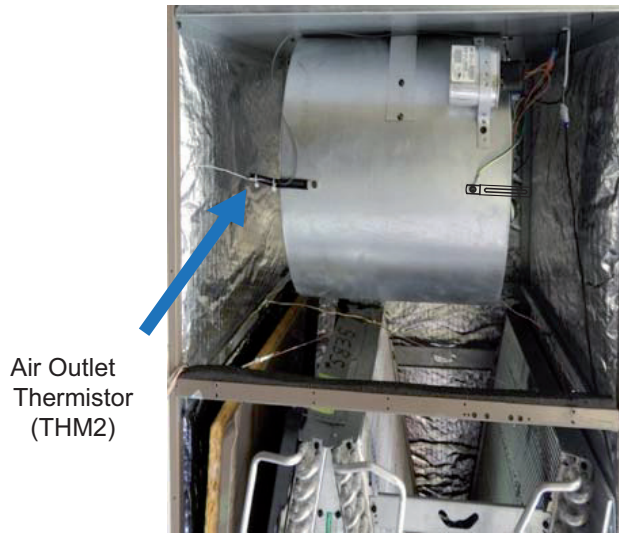


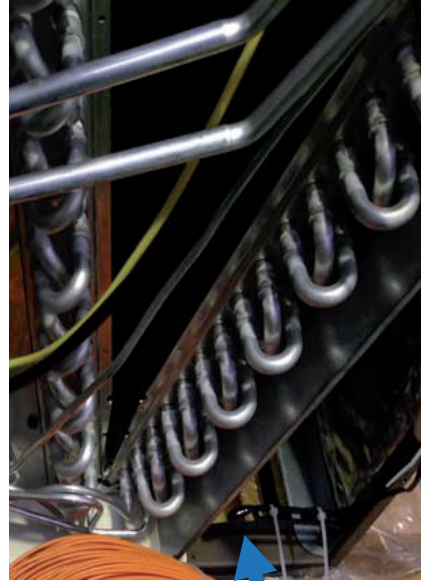
Figure 35. Air Inlet and Outlet Thermistors

NOTES:

1. Pay attention to the attaching direction and position of the lead wires.
2. Make sure that the wires are spaced appropriately and firmly fastened to ensure against contact to runner, electrical short circuit, sparks, and fire.



Air Outlet Thermistor (THM2)



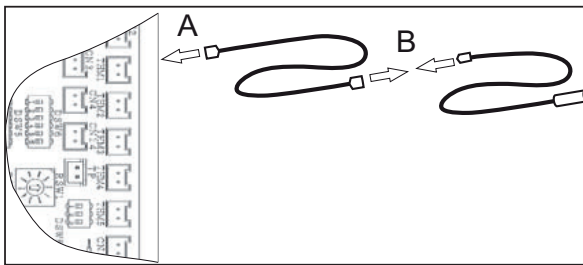
Air Inlet Thermistor (THM1)

Figure 36. Positions of Air Inlet and Outlet Thermistors

CAUTION

The thermistor must be installed properly in order to avoid water onto the thermistor.

21.4.4 Thermistor Extension Installation



A		B		Extension Length [inch (mm)]
PCB Connector Number	Thermistor Extension Connector Color	Thermistor Extension Connector Color	Thermistor Connector Color	
THM1	Blue	Blue	Blue	39-3/8 (1000)
THM2	Red	Red	Red	19-11/16 (500)
THM3	Black	Black	Black	59-1/16 (1500)
THM5	Yellow	Yellow	Yellow	59-1/16 (1500)

Figure 37. Thermistor Extension Installation

21.4.5 Connection to Fan Motor

Connect the fan motor wiring (high voltage) from the control box according to the wiring diagram shown below.

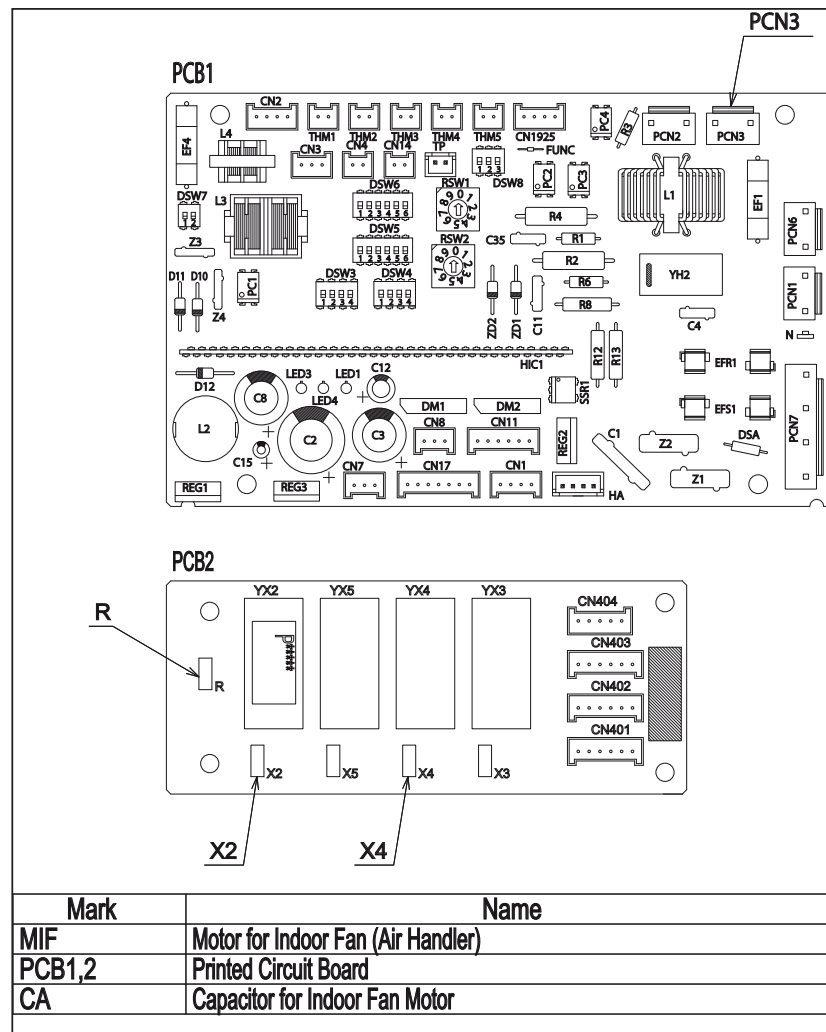
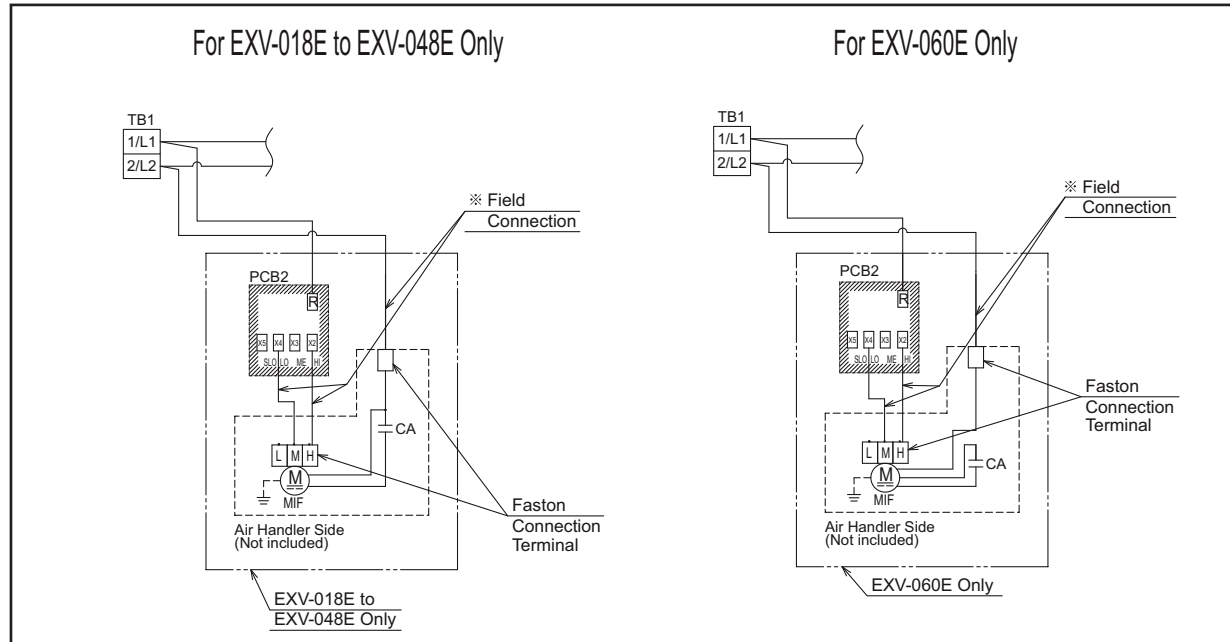


Figure 38. Connection to Fan Motor

There are three wiring from the control box for the fan motor.

- Wiring from "X2" terminal on PCB2 connects to "HI" terminal of fan motor.
- Wiring from "X4" terminal on PCB2 connects to "MED" terminal of fan motor.
- Wiring from TB1-#2 must be connected as shown above and depends on corresponding air handler model.
(Connection is different for air handler model AP60)

(1) Pass the fan motor wiring through the conduit hole for the fan motor wiring on the DX-Kit control box. (When connecting the fan motor wiring from outside the control box, run through the conduit tube.)

(2) Route the three wirings for the fan motor inside the air handler by passing through the connecting hole on the left side of the air handler.

(3) Use the cable holder to secure excess wiring.

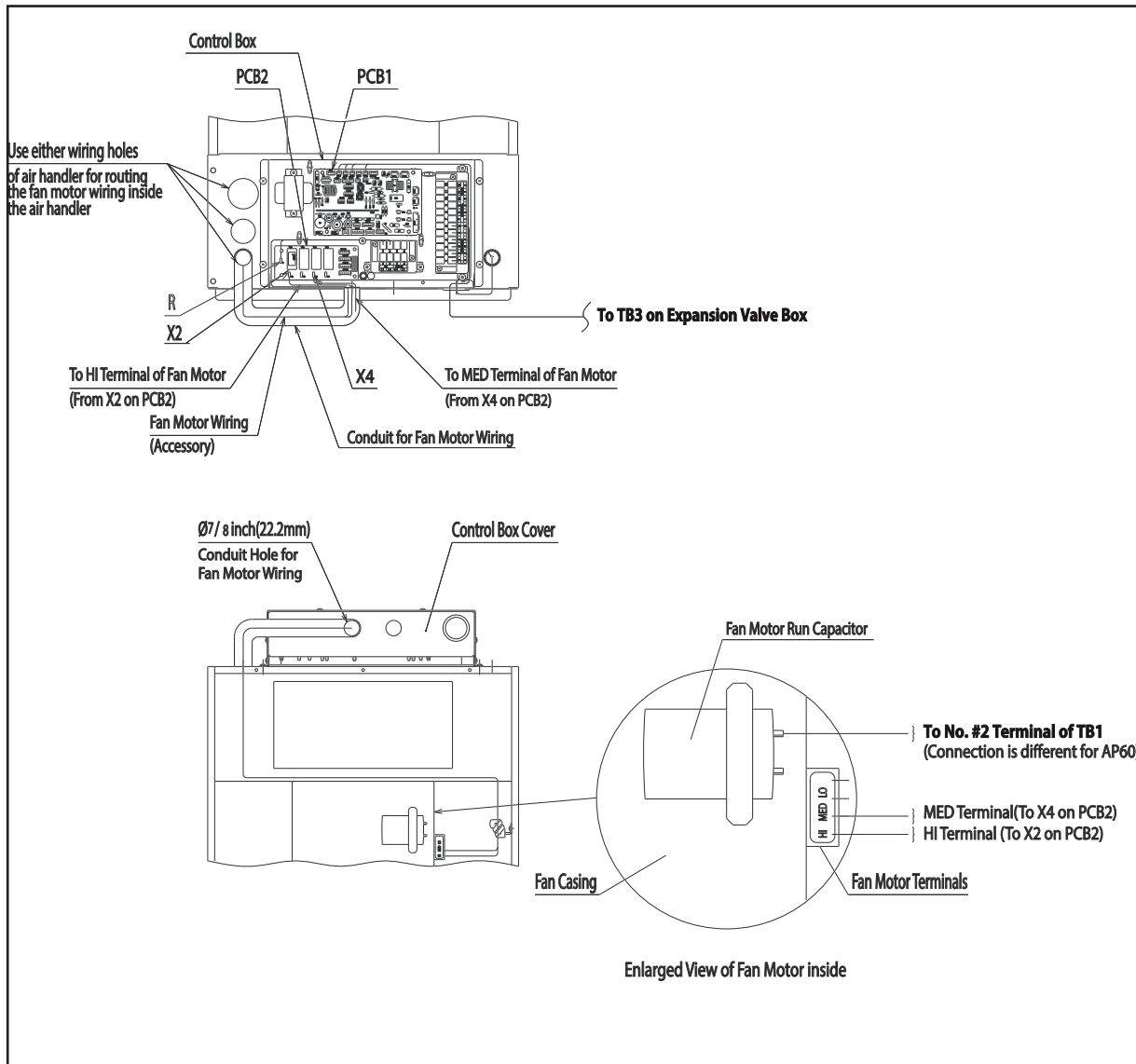


Figure 39. Connection to Fan Motor Inside Air Handler

! WARNING

- Make sure that the wiring does not touch sharp edges.
- Otherwise, the wiring may be damaged and serious accident and malfunction of the air handler may result.
- Do not connect the fan motor wiring from TB1-#2 to fan motor run capacitor for air handler model AP60. Otherwise, serious accident and malfunction of the air handler may result.

21.4.6 Connection to Expansion Valve Box

- (1) Remove the expansion valve box cover with the four screws. Then remove the terminal block cover with the four screws.
- (2) Connect the five cable for the expansion valve to the corresponding terminals 1, 2, 3, 4, 6 (EXP. VALVE) of terminal block (TB2) inside the control box.
- (3) Pass the expansion valve cable through the connecting hole for the expansion valve cable on the DX-Kit control box.
- (4) Connect the other end of cable to the corresponding terminals 1, 2, 3, 4, 6 (EXP. VALVE) of terminal block (TB3) inside the expansion valve box.
- (5) After the cable installation is complete, exercise caution when reinstalling the terminal block cover and expansion valve box cover.

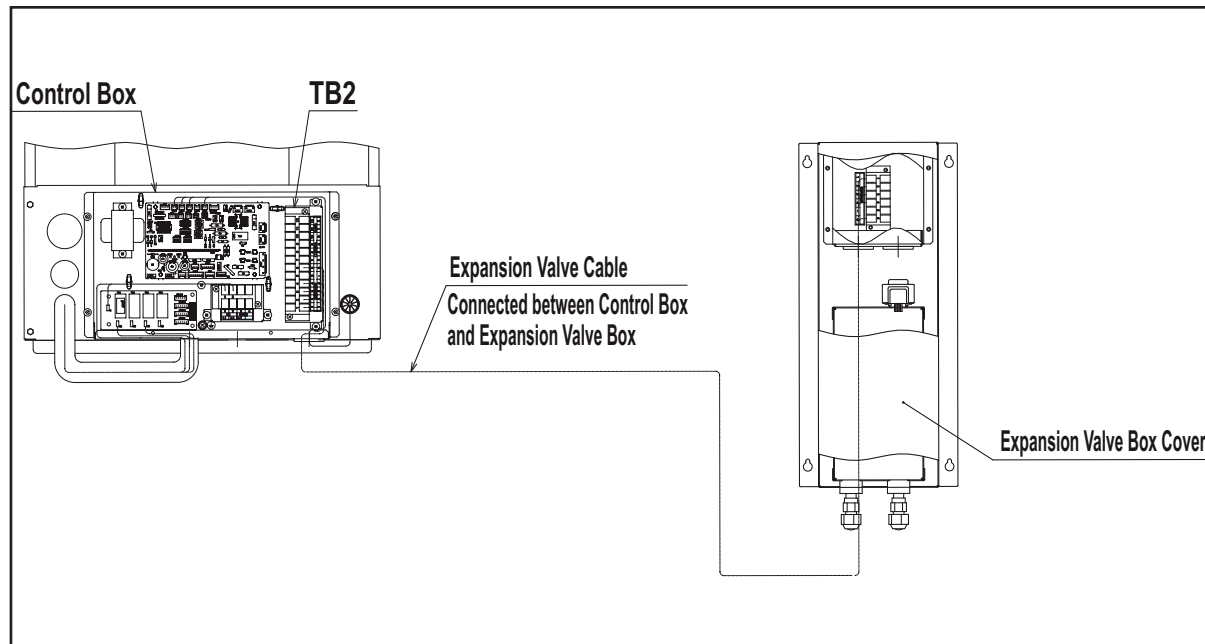


Figure 40. Connection to Expansion Valve Box

21.4.7 Connection for Power Supply Wiring and Communication and Wired Controller Cable

- (1) Pass the communication cable and the wired controller cable through the connecting hole for the communication cable on the DX-Kit control box.
Connect the communication cable to terminals 1, 2 (CONTROL) of TB2 inside the control box.
Connect the wired controller cable to terminals A, B (CONTROL) of TB2 inside the control box.
- (2) Pass the power supply wiring and the ground wiring through the conduit hole for power supply wiring.
Connect the power supply wiring to terminals L1, L2 (PS) of TB1 inside the control box.
Connect the ground wiring to the ground terminal inside the control box.
(When connecting the power supply wiring and the ground wiring from outside the unit, run through the conduit tube.)
- (3) After all wiring is complete, exercise caution when reinstalling the control box cover, upper and lower front panels of air handler.

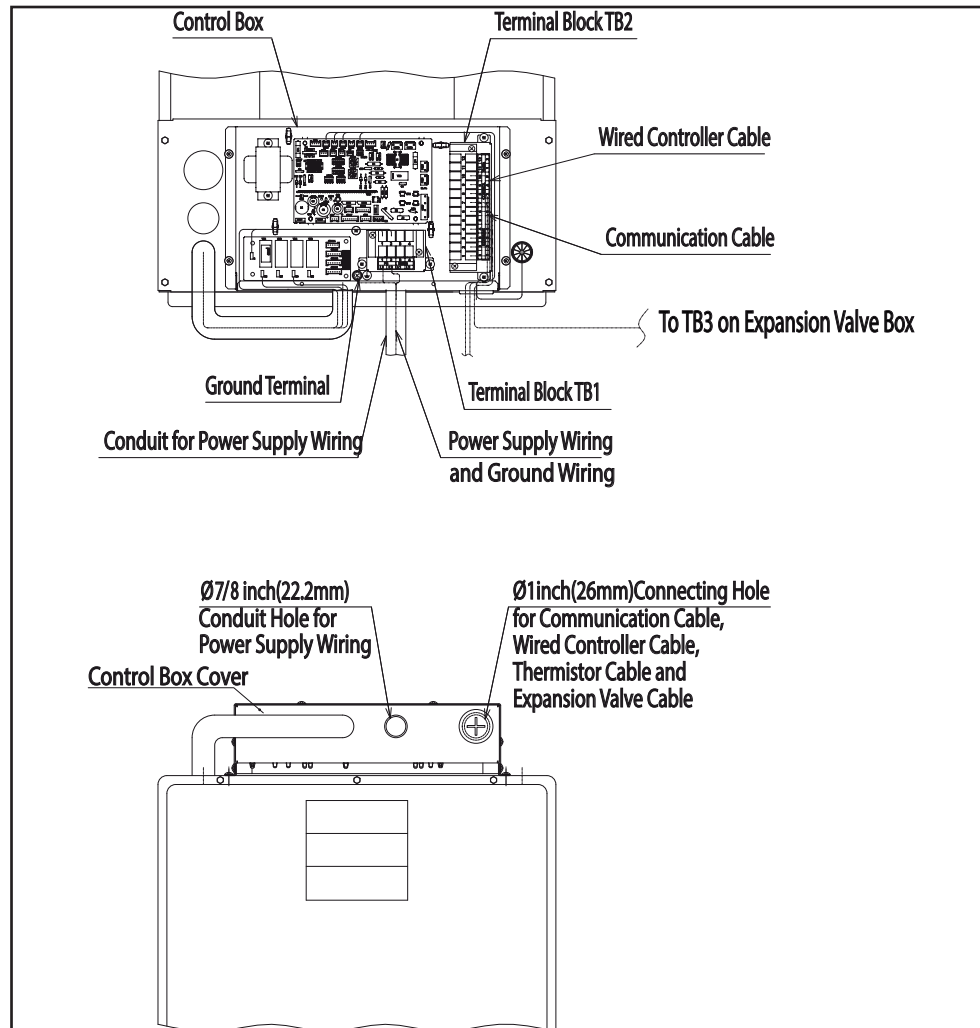


Figure 41. Connection for Power Supply

Terminal Block Connection and Remarks

Control Box Terminal Block

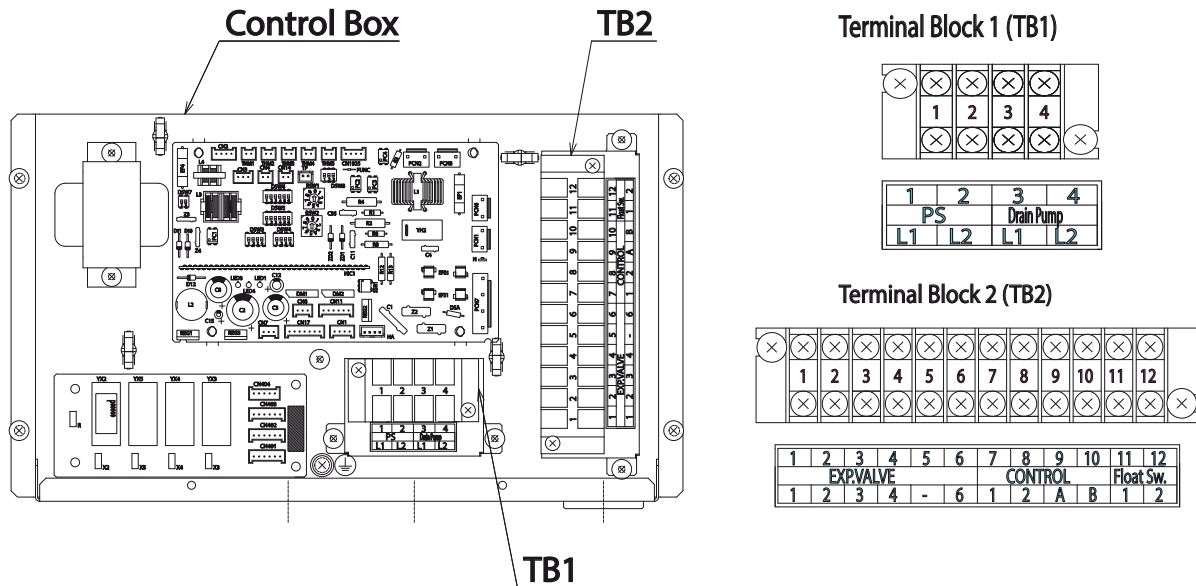


Figure 42. Terminal Box Connection

Terminal Block 1

Terminal No.	Label No.		Description
1	PS	L1	PS: Power Supply: Mains power supply connection (208/230V) wired to terminals L1 and L2.
2		L2	
3	Drain Pump	L1	Motor for Drain Discharge (Field-Supplied): Drain water pump with Float Switch can be connected to DX-kit.
4		L2	

Terminal Block 2

Terminal No.	Label No.		Description
1	EXP. VALVE	1	EXP. VALVE: Expansion Valve Connection: Link to expansion valve box. Number links from 1 to 4 and 6 must match in control box terminal block TB2 and expansion valve box terminal block TB3.
2		2	
3		3	
4		4	
5		-	
6		6	
7	CONTROL	1	CONTROL: H-LINK and Wired Controller Communication: H-LINK transmission between outdoor unit and indoor unit is 2 wired to terminals 1-2. Wired controller must be connected between terminals A and B (Non Polarity)
8		2	
9		A	
10		B	
11	Float Sw.	1	Float Sw. (Optional): Float Switch which is included with the drain water pump can be connected to DX-kit. Free contact between terminals 1 (11) and 2 (12)
12		2	

Expansion Valve Box Terminal Block

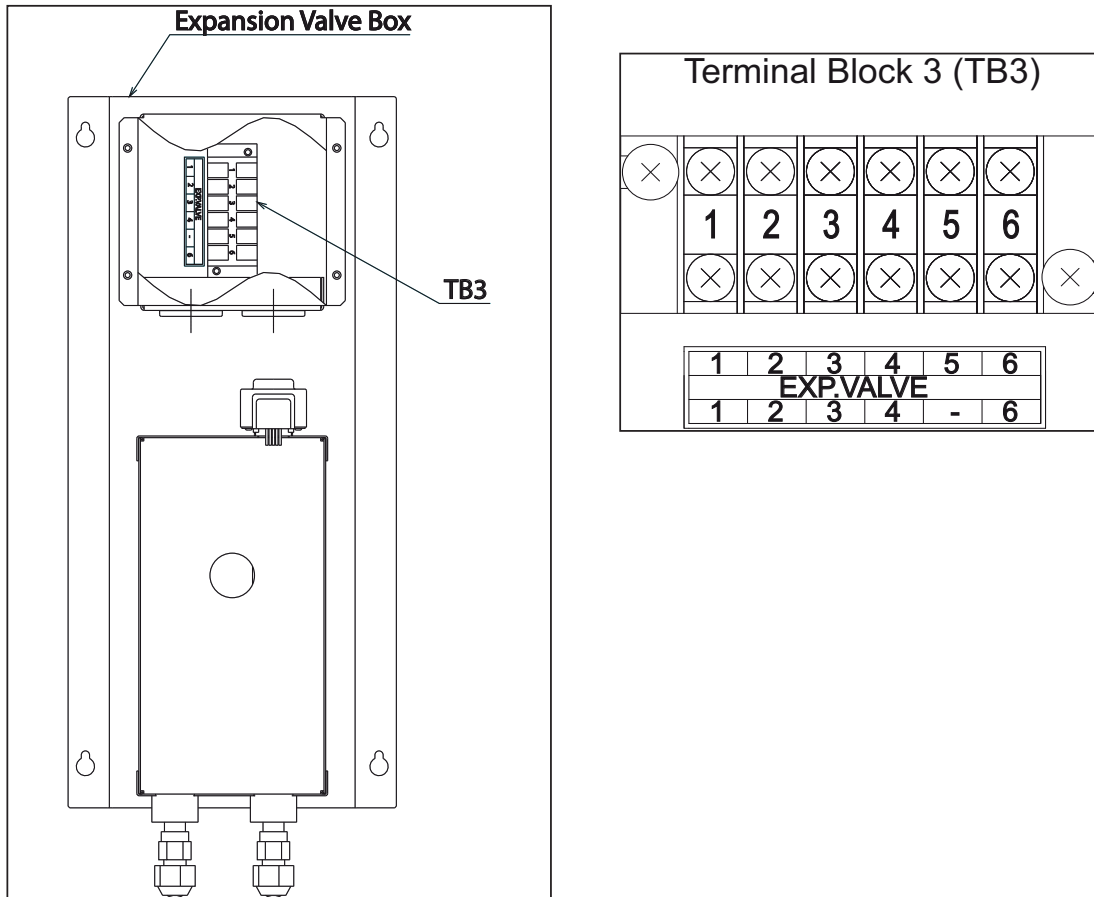


Figure 43. Expansion Valve Box Terminal Block

Terminal Block 3

Terminal No.	Label No.	Description
1	1	EXP. VALVE: Expansion Valve Connection: Link to control box. Number links from 1 to 4 and 6 must match in control box terminal block TB2 and expansion valve box terminal block TB3.
2	2	
3	3	
4	4	
5	-	
6	6	

21.5 DIP Switch Settings

- (1) Turn OFF the power supply to both DX-Kit and outdoor units before adjusting DIP switch settings. Otherwise, the setting will be invalidated and not take effect.
- (2) Position of DIP switches are shown below.

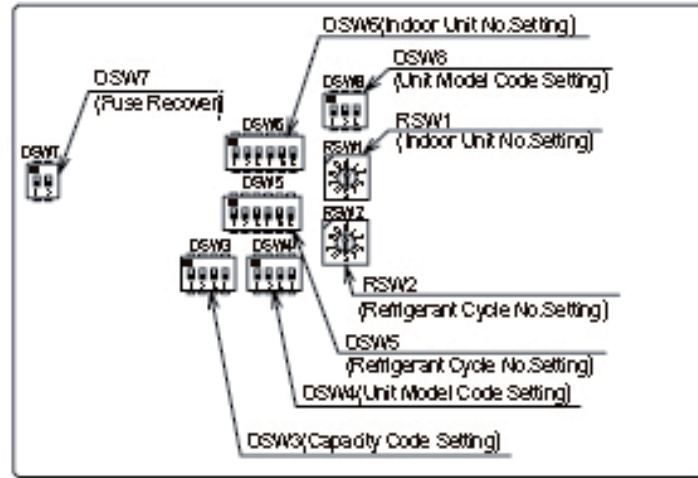


Figure 44. Position of DIP Switches

- (3) Unit No. Setting (RSW1 & 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.

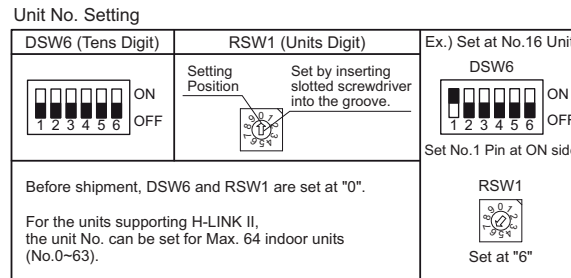


Figure 45. Unit Setting

- (4) Capacity Code Setting (DSW3)
No setting is required, due to setting before shipment. This switch is utilized for setting the capacity code which corresponds to the capacity of the DX-Kit.

DX-Kit Capacity (MBH)	18	24	30	36	48	60
Setting Position	ON OFF	ON OFF	ON OFF	ON OFF	ON OFF	ON OFF

Figure 46. Capacity Code Setting (DSW3)

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

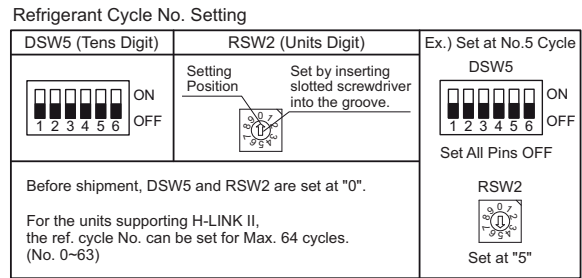


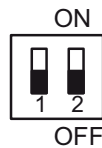
Figure 47. Refrigerant Cycle Setting

- (6) Unit Model Code Setting (DSW4)
No setting is required. This is for setting the model code of the Dx-Kit.

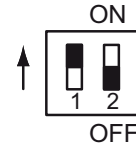


- (7) Fuse Recover (DSW7)

* Factory Setting



* In the case of applying high voltage to the terminal 1 and 2 of TB2, the 0.5A fuse on the PCB is cut. In such a case, first reconnect the wirings correctly to TB2, and then set the No.1 pin to ON.



- (8) Optional (DSW8)

No setting is required. This is for setting the model code of the DX-Kit.



NOTES:

- The "■" mark indicates setting for DIP switches. Figures show setting before shipment.
- When the unit number and the refrigerant cycle are set, record the unit number and refrigerant cycle to facilitate service and maintenance thereafter.

NOTICE

Turn OFF all power supply of the DX-Kit and the outdoor units before DIP switch settings. Otherwise, the setting will be invalidated and not take effect.

21.6 Function Selection by Wired Controller

Each function can be selected with the wired controller. Refer to the "Installation and Maintenance Manual" for the wired controller and the "Engineering Manual" for details.

< Circulator Function at Heating Thermo-OFF >

This function maintains fan operation by the set airflow volume at the heating Thermo-OFF. It improves temperature distribution when the unit is mounted on a high ceiling.

22. Test Run

22.1 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 connection for thermistors and expansion valve are correct. Otherwise, serious system failure will occur.
- (2) 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]).
- (3) 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 will display the alarm code "05". In this case, check 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.
- (4) 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.
- (5) Verify that all DIP Switch settings are correct. Refer to Section 21.5 "DIP Switches Setting".

22.2 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 is displayed.

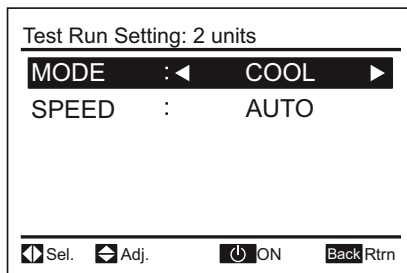


Figure 48. Test Run Menu

NOTE

When the "00 unit" is displayed, the auto-address function may be 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 will be set automatically.
- (c) Though temperature recordings by the thermistors are invalid during the Test Run phase, the protection devices are valid.
- (d) 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.
- (e) 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 “△” or “▽” to select “**TEST TIME**”. Then, set the test run time (30 to 600 minutes) by pressing “◀” or “▶”.

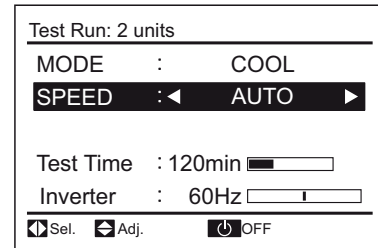
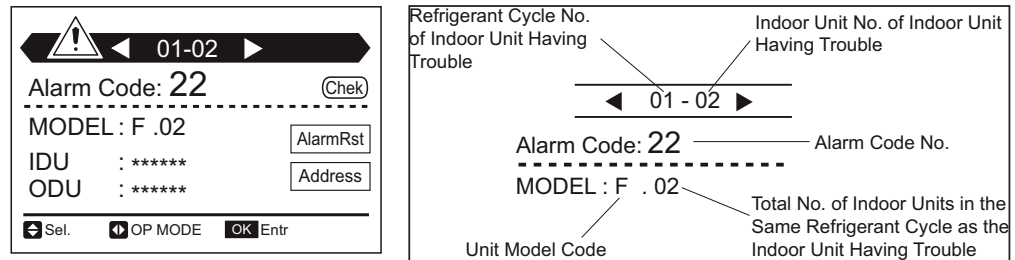


Figure 49. Test Run: 2 Units

- The RUN indicator on the wired controller for the indoor unit will flash 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 will be 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 22.3 “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

Figure 50. RUN Indicator

22.3 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 drain 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	
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 ≥ 64
b5		Incorrect setting of indoor unit number for H-LINK type	Interconnected indoor units are not supporting H-LINK II ≥ 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).
- The indication of the alarm code "EE" means serious abnormality to burn out 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.
Hand over this information to the building owner and request they 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 "Installation and Maintenance Manual":

1. Results of a test for air-tight integrity
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.

23. Cautions

23.1 Limitation of Air Handler

- When the outdoor temperature is low and external static pressure is low then airflow volume will not become the setting.
- An application using the AP18 and AP60 air handler must be within an external static pressure of 0.4".
Airflow volume at this external static pressure must be High: 674CFM Low: 490CFM for AP18 and High: 1743CFM Low: 1661CFM for AP60.

24. Startup Sheet

<input type="button" value="Print Form"/>	Residential Air Handler with Electric Heat Start-Up Sheet	<input type="button" value="Reset Form"/>
Proper start-up is critical to customer comfort and equipment longevity		
Start-Up Date	Company Name	Start-Up Technician
Owner Information		
Name	Address	Daytime Phone
City	State or Province	Zip or Postal Code
Equipment Data		
Unit Model #	Unit Serial #	
General Information (Check all that apply)		
<input type="radio"/> New Construction	<input type="radio"/> Up flow	<input type="radio"/> Horizontal Left
<input type="radio"/> Retrofit	<input type="radio"/> Down flow	<input type="radio"/> Horizontal Right
Unit Location and Connections (Check all that apply)		
<input type="checkbox"/> Unit is level	<input type="checkbox"/> Duct connections are complete:	<input type="checkbox"/> Supply <input type="checkbox"/> Return
<input type="checkbox"/> Condensate drain properly connected per the installation instructions	<input type="checkbox"/> Condensate trap has been primed with water	
Filters		
<input type="checkbox"/> Filters installed	Number of filters	Filter size
Electrical Connections & Inspection (Complete all that apply)		
<input type="radio"/> 208 volts AC	<input type="radio"/> 230 volt AC	
<input type="checkbox"/> Inspect wires and electrical connections	<input type="checkbox"/> Transformer wired properly for primary supply voltage	<input type="checkbox"/> Ground connected
Line Voltage Measured (Volts AC)	Low voltage value between "R" and "C" at control board (Volts AC)	
<input type="checkbox"/> Thermostat wiring is complete	<input type="checkbox"/> Thermostat cycle rate or heat anticipator adjusted to Installation Manual specifications	
Air Flow Setup		
Blower Type & Set-Up	<input type="radio"/> ECM	COOL <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
		ADJUST <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
		DELAY <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
		HEAT <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
	<input type="radio"/> X-13	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
<input type="radio"/> PSC	<input type="radio"/> Low <input type="radio"/> Medium Low <input type="radio"/> Medium <input type="radio"/> Medium High <input type="radio"/> High	
Supply static (inches of water column)	Supply air dry bulb temperature	Outside air dry bulb temperature
Return static (inches of water column)	Return air dry bulb temperature	Return air wet bulb temperature
Total external static pressure	Temperature drop	Supply air wet bulb temperature
Other Jumpers (Check all that apply)		
HUM STAT <input type="radio"/> YES <input type="radio"/> NO	AC/HP <input type="radio"/> AC <input type="radio"/> HP	CONT FAN <input type="radio"/> L <input type="radio"/> M <input type="radio"/> H
Continued on next Page		

Electric Heat (Complete all that apply)

Electric heat kit - Model number <input style="width:150px;" type="text"/>		Serial number <input style="width:150px;" type="text"/>		Rated KW <input style="width:50px;" type="text"/>	
Number of elements <input style="width:30px;" type="text"/>	Measured Amperage		Heater 1 <input style="width:50px;" type="text"/>	Heater 2 <input style="width:50px;" type="text"/>	Heater 3 <input style="width:50px;" type="text"/>
			Heater 4 <input style="width:50px;" type="text"/>	Heater 5 <input style="width:50px;" type="text"/>	Heater 6 <input style="width:50px;" type="text"/>
	Measured Voltage		Heater 1 <input style="width:50px;" type="text"/>	Heater 2 <input style="width:50px;" type="text"/>	Heater 3 <input style="width:50px;" type="text"/>
			Heater 4 <input style="width:50px;" type="text"/>	Heater 5 <input style="width:50px;" type="text"/>	Heater 6 <input style="width:50px;" type="text"/>
Heating return air dry bulb temperature <input style="width:80px;" type="text"/>		Heating supply air dry bulb temperature <input style="width:80px;" type="text"/>		Air temperature rise <input style="width:50px;" type="text"/>	

Clean Up Job Site

Job site has been cleaned, indoor and outdoor debris removed from job site

Tools have been removed from unit

All panels have been installed

Unit Operation and Cycle Test (Complete all that apply)

Operate the unit through continuous fan cycles from the thermostat, noting and correcting any problems

Operate the unit through cooling cycles from the thermostat, noting and correcting any problems

Operate the unit through mechanical heating cycles from the thermostat, noting and correcting any problems

Operate the unit through emergency heating cycles from the thermostat, noting and correcting any problems

Owner Education

Provide owner with the owner's manual

Explain operation of system to equipment owner

Explain thermostat use and programming (if applicable) to owner

Explain the importance of regular filter replacement and equipment maintenance

Comments and Additional Job Details

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