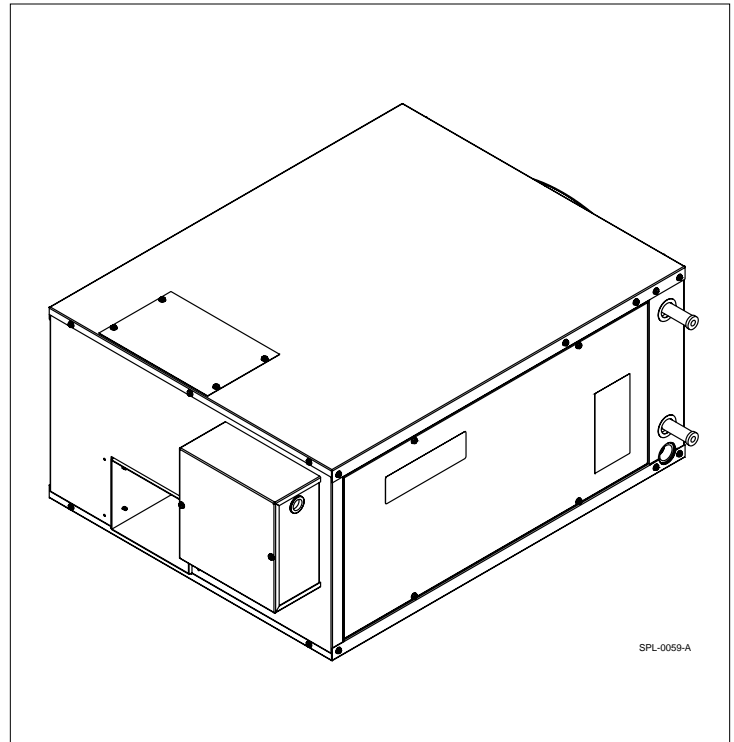




MODEL WCSP-D SYSTEM INSTALLATION, OPERATION & MAINTENANCE MANUAL

Central Hydronic Coil Series
2 to 5 Tons
Fan Coil Unit/Air Supply
Components



SPL-0059-A

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Section 1: INTRODUCTION

The following terms are used throughout this manual to bring attention to the presence of potential hazards or to important information concerning the product:

▲ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death, serious injury or substantial property damage.

▲ WARNING Indicates an imminently hazardous situation which, if not avoided, could result in death, serious injury or substantial property damage.

▲ CAUTION Indicates an imminently hazardous situation which, if not avoided, may result in minor injury or property damage.

NOTICE: Used to notify of special instructions on installation, operation or maintenance which are important to equipment but not related to personal injury hazards.

SPACEPAK SYSTEM DESIGN

The SpacePak WCSP-D unit is a hydronic fan coil unit which utilizes chilled or heated water from a chiller or boiler to provide the conditioned air through the specially designed prefabricated preinsulated flexible duct system. The system and its basic components operate the same as in any conventional air-to-air cooling system.

The SpacePak system is covered by the following U.S. Patents: 3,507,354; 3,575,234; 3,596,936; 3,605,797; 3,685,329; 4,045,977; 4,698,982; 926,673 and Canadian Patents: 891,292; 923,935; 923,936.

CODE COMPLIANCE

Fan coil unit installation must conform to the requirements of the local authority having jurisdiction or, in the absence of such requirements, to the National Board of Fire Underwriters regulations. Fan coil unit meets ETL listing requirements.

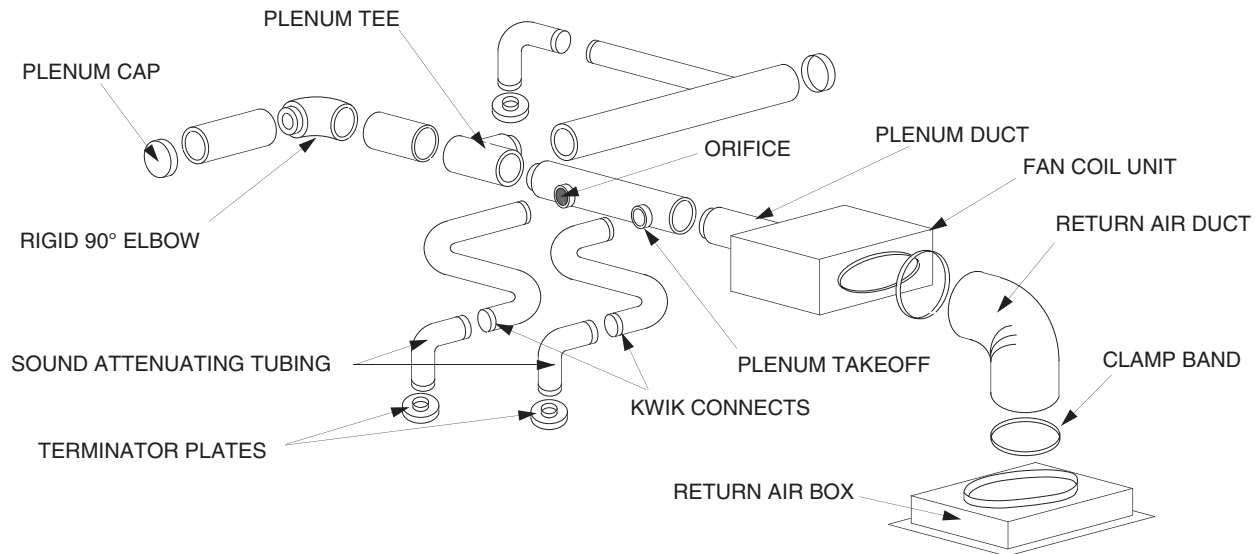
All electrical wiring must be in accordance with the National Electrical Code ANSI/NFPA No. 70-latest edition and any additional state or local code requirements. If an external electrical source is utilized, the fan coil unit, when installed, must be electrically grounded.

NOTICE: It is a requirement of the International Mechanical Code (307.2.3) to install a secondary drain or an auxiliary drain pan where damage to any building components will occur as a result of overflow from the equipment drain pan or stoppage in the condensate drain piping from a cooling or an evaporator coil.

AIR DISTRIBUTION SYSTEM COMPONENT REQUIREMENTS

Air distribution components installation must conform to the requirements of local authority having jurisdiction or, in the absence of such requirements, to the National Fire Protection Association 90A or 90B.

Do not begin the installation of the system without a system layout and material take-off. If a layout plan is not already available and room terminator requirements determined, then refer to the SpacePak Application Manual, SP9, to complete this information. A description of air distribution system components is shown in Figure 1.1.



RETURN AIR BOX (SPC-1D, AC-RBF-3, SPC-3D):

Each includes filter grill with metal frame, permanent filter, and 2 clamp bands. SPD-1D is for WCSP-2430D. AC-RBF-3 is for WCSP-3642D and SPC-3D is for WCSP-4860D.

RETURN AIR DUCT (SPC-4,5, & 6): Flexible, 10 feet long with round shape. SPC-4 (15" dia.) for WCSP-2430D. SPC-5 (19" dia.) for WCSP-3642D and SPC-6 (24" dia.) is for WCSP-4860D.

PLENUM DUCT & COMPONENTS: May be round or square, fiberboard or sheet metal duct types as specified by the installing contractor. Above layout is shown as an illustrative reference only.

SUPPLY TUBING (SPC-25-100): Flexible, insulated, 2" I.D. and 3 1/4" O.D. Each section is 100 feet long.

R8 SUPPLY TUBING (AC-ST8-50): Flexible, R8 insulated, 2" I.D. and 6 1/4" O.D. Each section is 50 feet long.

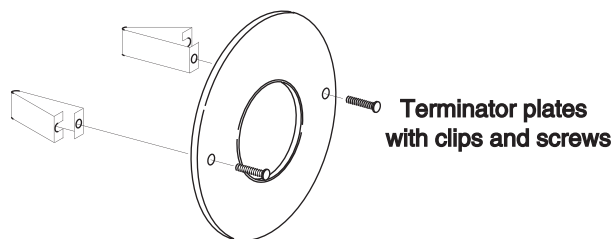
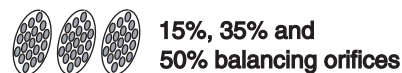
INSTALLATION KITS: Each contains a specified amount of sound attenuating tubes, kwik-connects, plenum take-offs, terminator plates, winter supply air shut-offs and balancing orifices to complete installation of room outlets.

ADDITIONAL COMPONENTS (not shown)

WINTER SUPPLY SHUT OFF (SPC-42-10): To keep moisture from collecting in ductwork during winter months.

KWIK CONNECT WALL ELBOW (AC-KCWE): to allow for wall terminations in 2" X 4" stud spaces.

INSTALLATION KIT COMPONENTS



PLIERS (SPC-72): To assure full setting of all clips (fasteners) in plenum take-off.

SECONDARY DRAIN PAN: specifically sized for SpacePak horizontal fan coil units. Constructed of durable polyethylene. Fan coil unit sets directly on top and can be installed with threaded rod.

FIGURE 1.1: AIR DISTRIBUTION SYSTEM COMPONENTS

Plenum Duct

The plenum duct can be run in practically any location accessible for the attachment of the supply tubing (see suggested layouts in Figure 1.2). The plenum is normally located in the attic or basement, and it is usually more economical to run the plenum where it will appreciably shorten the lengths of two or more supply runs.

In some two-story split level homes, it may be advantageous to go from one level to another with the plenum duct. Whenever necessary, either between floors or along the ceiling, the small size of the plenum makes it easy to box in.

The fan coil unit is designed to operate with a total external static pressure of 1.5 inches of water column (minimum 1.0 - maximum 1.5). Excessive static pressure is an indication of too few outlets and may cause the coil to freeze and some or all outlets to be noisy.

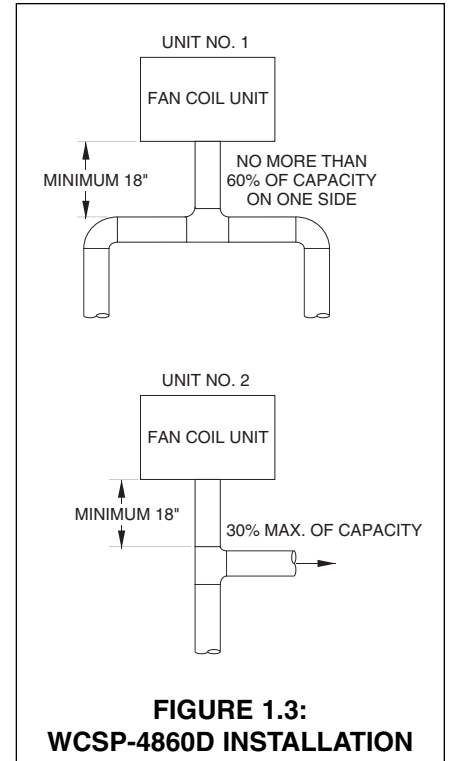
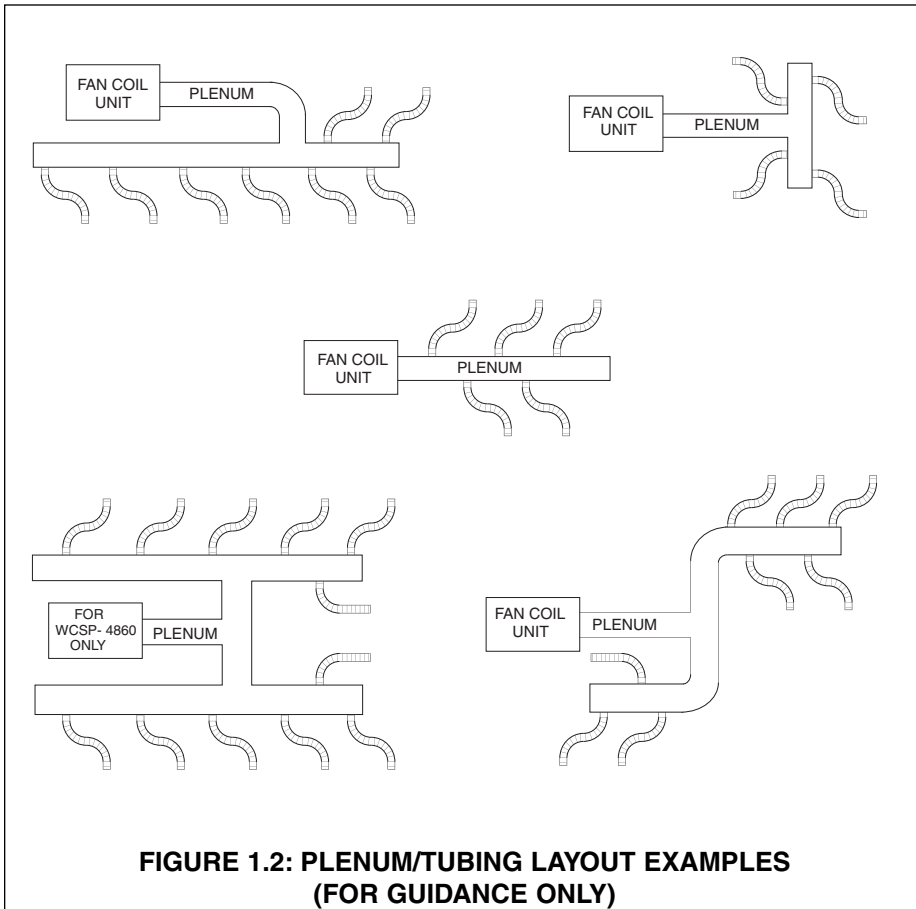
For systems with a tee installed as on Unit No. 1 (Figure 1.3), the best results are obtained if not more than 60% of the total number of system outlets are attached to any one branch of the tee. For systems with a tee installed as on Unit No. 2 (Figure 1.3), not more than 30% of the total number of system outlets should be attached to the perpendicular branch of the tee.

The larger system capacities (WCSP-4860D) are effected more by higher system static pressure than the smaller systems. The four and five ton systems are ideally designed as indicated by the diagram in the lower left corner of figure 1.2. If this layout cannot be followed, it is important to create some pressure drop in the plenum run using elbows and tees. Installation of the plenum tee closer than the minimum indicated in Fig. 1.3 will reduce performance of the system. No supply runs should be installed between unit outlet and this tee. Static readings on system should be taken before tee.

Supply Tubing

In the case of two-story or split-level applications, supply tubing may run from one story to another. It is small enough to go in stud spaces, but this is often difficult in older homes because of hidden obstructions in stud spaces. It is more common to run the supply tubing from the attic down through second story closets to the first story terminators.

Supply tubing runs in the corners of the second story rooms can be boxed in and are hardly noticeable since overall diameter is only 3/4".



Room Terminators

Terminators should be located only in the ceiling or floor for vertical discharge. Horizontal discharge is acceptable, but is sometimes more difficult to install. Two excellent spots for horizontal discharge are in the soffit area above kitchen cabinets (see Figure 1.4) and in the top portion of closets (see Figure 1.5).

Terminators should always be out of normal traffic patterns to prevent discharge air from blowing directly on occupants. And they should not be located directly above shelves or large pieces of furniture. Outside wall or corner locations are recommended if the room has more than one outside wall. Locating terminators away from interior doors prevents short cycling of air to the return air box.

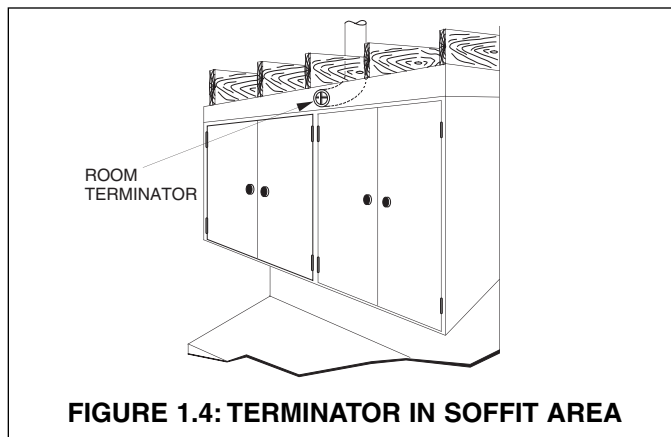


FIGURE 1.4: TERMINATOR IN SOFFIT AREA

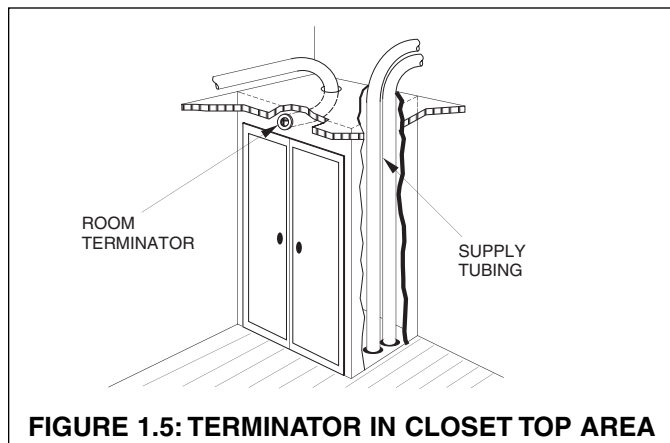


FIGURE 1.5: TERMINATOR IN CLOSET TOP AREA

WARRANTY INFORMATION

Refer to the Limited Warranty published on the back page of this manual.

SHIPMENT OF UNIT

Each fan coil unit is shipped in a single carton. Packed with the unit, there are vibration isolation pads, a condensate trap assembly, a length of 6" wide foil faced fiberglass insulation and a factory installed primary float switch.

SECTION 2: SYSTEM INSTALLATION

NOTICE: Before proceeding with the installation, we recommend reading through this section of the manual for an overall understanding of the air conditioning fan coil unit and air distribution system component installation procedures.

STEP 1: LOCATING THE UNIT

The fan coil unit may be installed in an unconditioned space (as long as it is protected from the weather) such as an attic, garage or crawlspace...or a conditioned space such as a basement, closet or utility room (see dimensions in Figure 2.2).

The fan coil unit is shipped set-up for horizontal supply air discharge. This can be easily field converted to vertical discharge, as detailed on pg. 9 and Figures 2.9A and 2.9B pg. 10.

When selecting a location, consider the locations (as shown in Figures 2.4, 2.5 and 2.6) of the return air box; routing of the plenum duct, supply tubing, refrigerant lines, condensate drain line; and all recommended clearances (see Figures 2.2).

NOTICE: It is a requirement of the International Mechanical Code (307.2.3) to install a secondary drain or an auxiliary drain pan where damage to any building components will occur as a result of overflow from the equipment drain pan or stoppage in the condensate drain piping from a cooling or an evaporator coil.

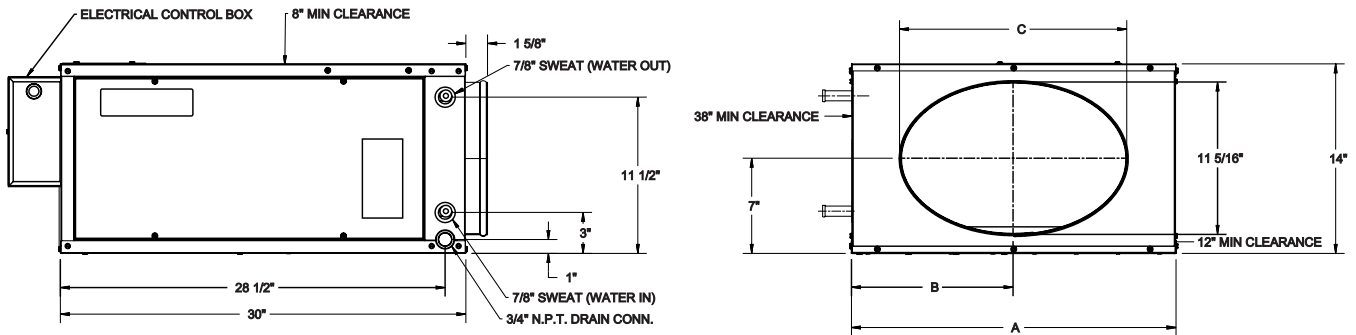
Follow local code requirements.

Model	System capacity (Nom. Tons)	Electrical Characteristics	Connections			
			Bottom Water In	Top Water Out	Cond. Drain (NPT)	Return Inlet (Dia.)
WCSP-2430D	2 - 2-1/2	1-60-208/230	7/8"	7/8"	3/4"	15"
WCSP-3642D	3 - 3-1/2	1-60-208/230	7/8"	7/8"	3/4"	19"
WCSP-4860D	4 & 5	1-60-208/230	7/8"	7/8"	3/4"	24"

Model	System capacity (Nom. Tons)	Blower					Coil		Ship. Wt. (lbs)
		Std. CFM @ 1.5" W.C.	Wheel Dia. and Width	Motor HP	Motor Type	F.L. Amps	No. of Rows Deep	Flow Rate per Ton (GPM)	
WCSP-2430D	2 - 2-1/2	550	9" x 5"	1/3	PSC	1.8	6	2.4	112
WCSP-3642D	3 - 3-1/2	850	9" x 5"	1/2	PSC	2.8	6	2.4	134
WCSP-4860D	4 & 5	1150	9" x 6-3/8"	1	PSC	3.6	6	2.4	171

FIGURE 2.1: MODEL WCSP-D SPECIFICATIONS

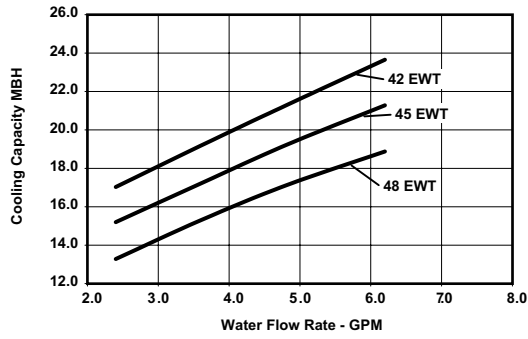
MODEL	"A"	"B"	"C"
WCSP-2430D	24 1/8"	12"	16 7/8"
WCSP-3642D	33 1/8"	16 1/2"	24 1/4"
WCSP-4860D	43 1/8"	21 1/2"	34 1/8"



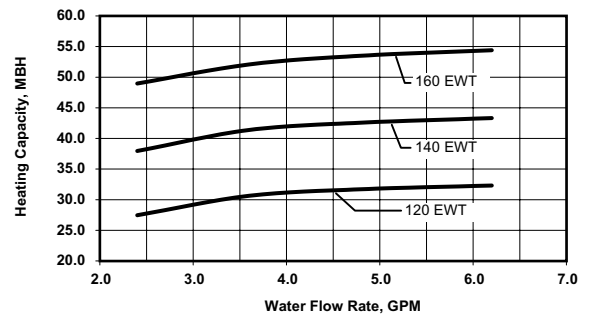
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FIGURE 2.2: UNIT DIMENSIONS AND CLEARANCES

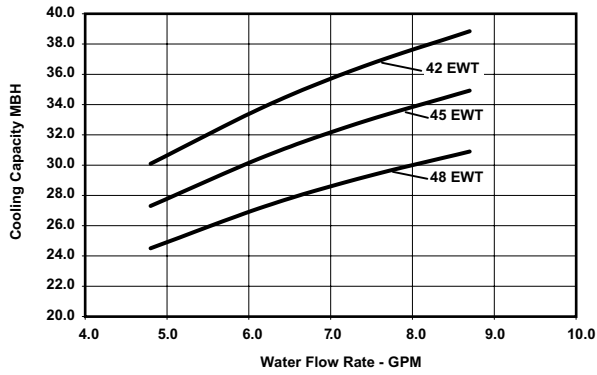
WCSP-2430D @ 550 cfm Cooling Capacity



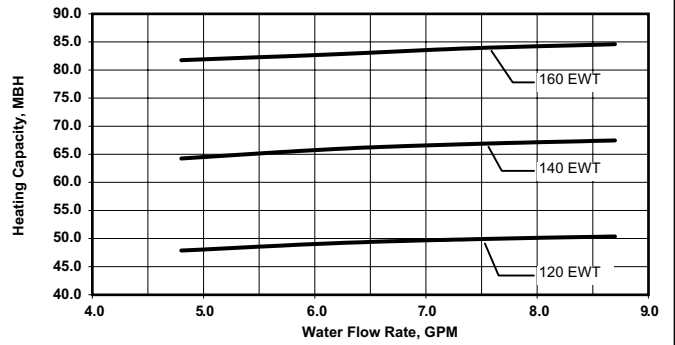
WCSP-2430D @ 550 cfm Heating Capacity



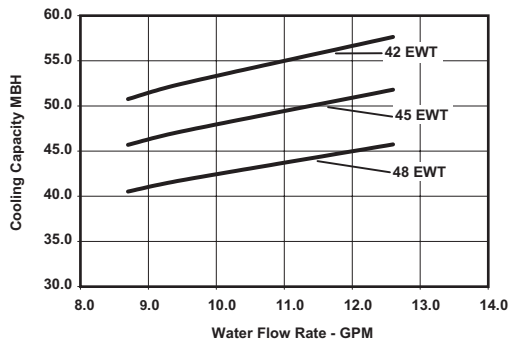
WCSP-3642D @ 850 cfm Cooling Capacity



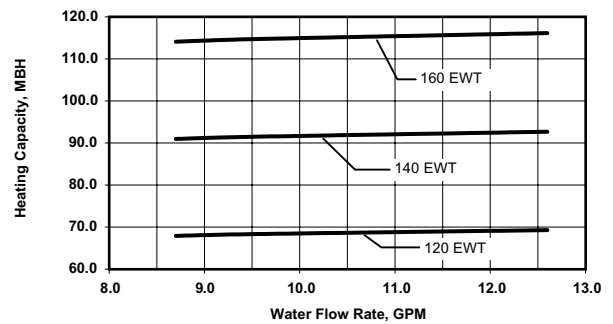
WCSP-3642D @ 850 cfm Heating Capacity



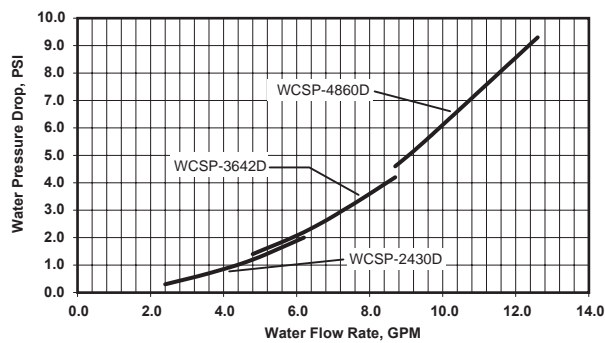
WCSP-4860D @ 1150 cfm Cooling Capacity



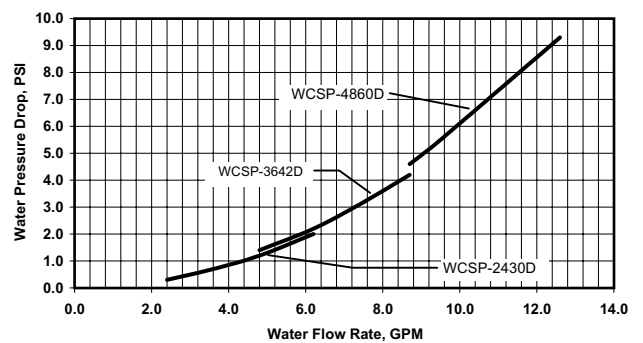
WCSP-4860D @ 1150 cfm Heating Capacity

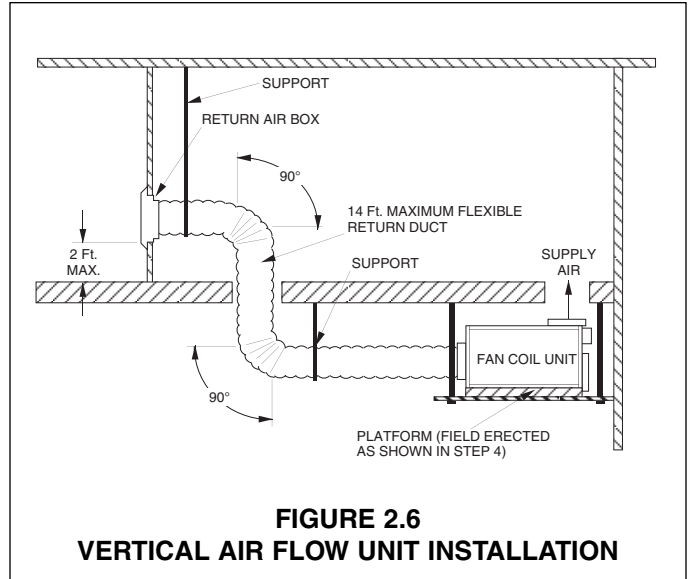
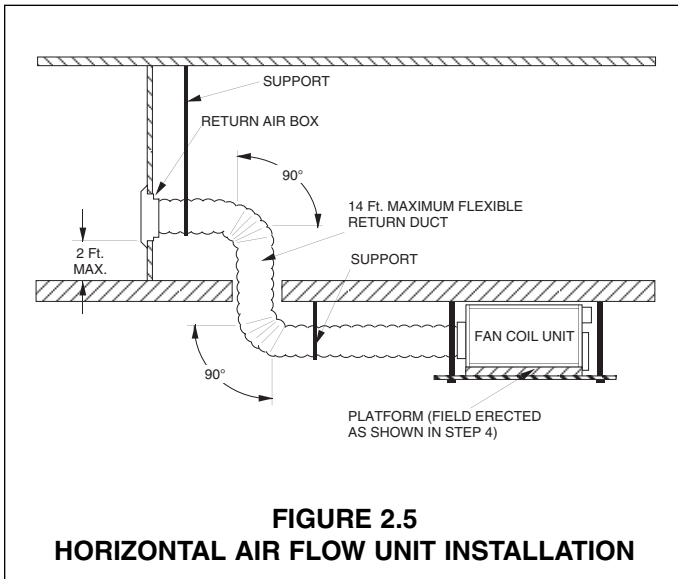
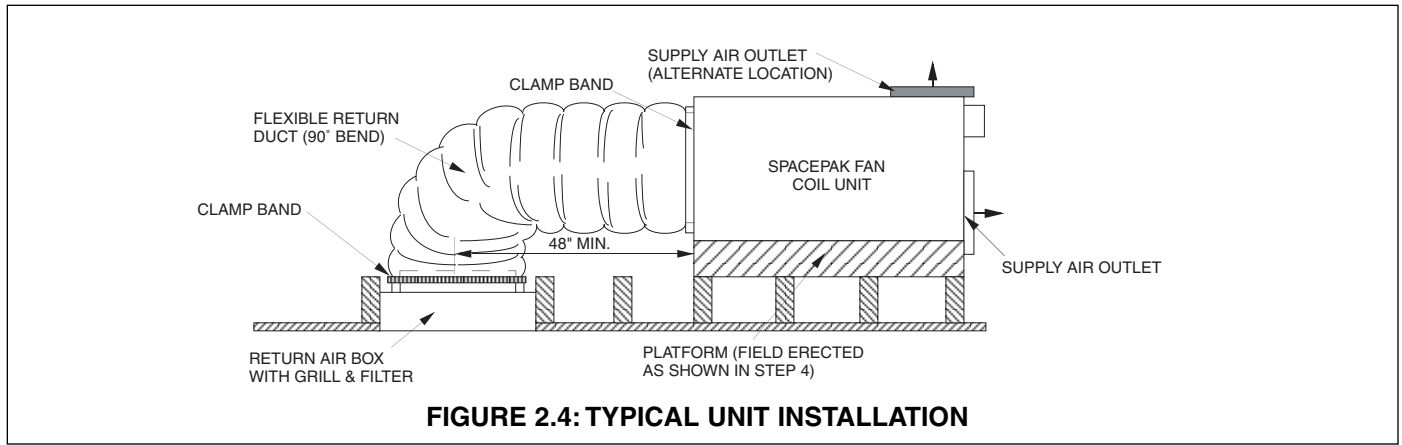


Hydronic Coil Pressure Drop Characteristics



Hydronic Coil Pressure Drop Characteristics





STEP 2: CUTTING RETURN AIR OPENING

Select exact location for return air box. Avoid installing box in dining room, living room, kitchen, etc., unless return air duct can be installed with at least two 90° bends (accomplished by splicing two return air ducts together.)

For attic installations to raise fan coil unit up through opening, cut return air opening 14½" wide by 27" long for the WCSP-2430D, 14½" wide by 31½" long for the WCSP-3642D* and 14½" wide by 36½" long for the WCSP-4860D. These openings will accommodate the return air box with sufficient frame lip to cover the opening (see Figure 2.7).

NOTICE: The electrical box must be removed from the WCSP-3642 unit to fit through hole cut out.

Refer to the "Installation Tip" supplied with the return air box.

If ceiling joists are on 16" centers, the 14½" width of the return air box should fit between successive joists. Where joists run in the opposite direction, or to properly center the return, it may be necessary to cut joists and install headers.

For all wall return applications, cut the return air opening to accommodate the return air box (measure box itself). Remember, location of opening must allow for a 90° bend in the return air duct.

Check the opening for proper fit of the return air box. Do not install the return air box until the installation of the entire SpacePak system is completed, if you want to fit materials up through this hole.

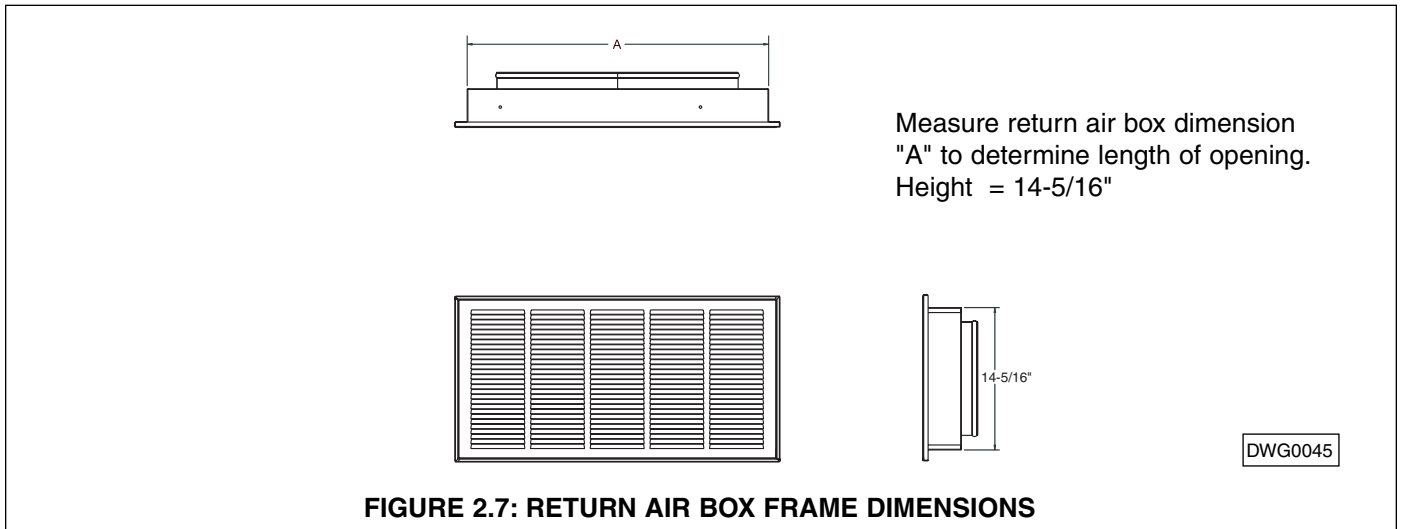


FIGURE 2.7: RETURN AIR BOX FRAME DIMENSIONS

STEP 3: ATTACHING SUPPLY AIR PLENUM ADAPTOR

NOTICE: If the unit is to be located in the attic and installed through the ceiling joists, attach the supply plenum adaptor in the attic.

A. HORIZONTAL DISCHARGE:

Refer to duct installation instructions supplied with fan coil unit.

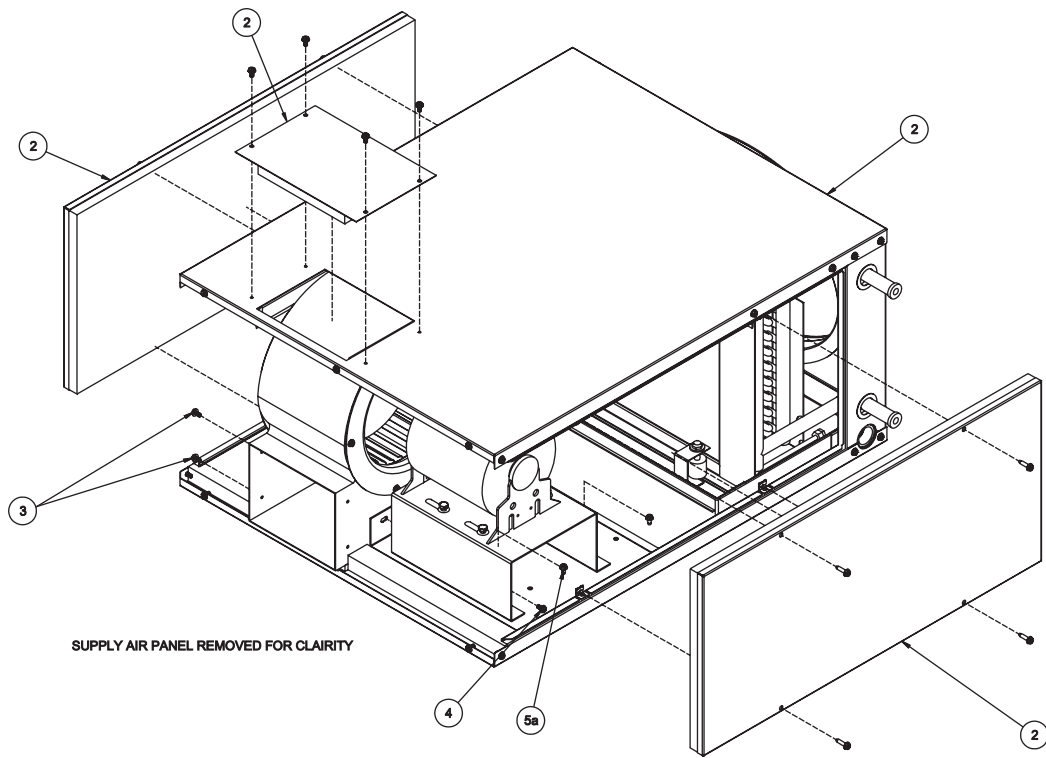
B. TO CONVERT TO VERTICAL DISCHARGE: Refer to Figure 2.9A & 2.9B

Tools required: $\frac{5}{16}$ " box wrench, $\frac{5}{16}$ " nut driver, drill and $\frac{1}{4}$ " drill bit.

Refer to Figure 2.9A for Steps 2 to 5a.

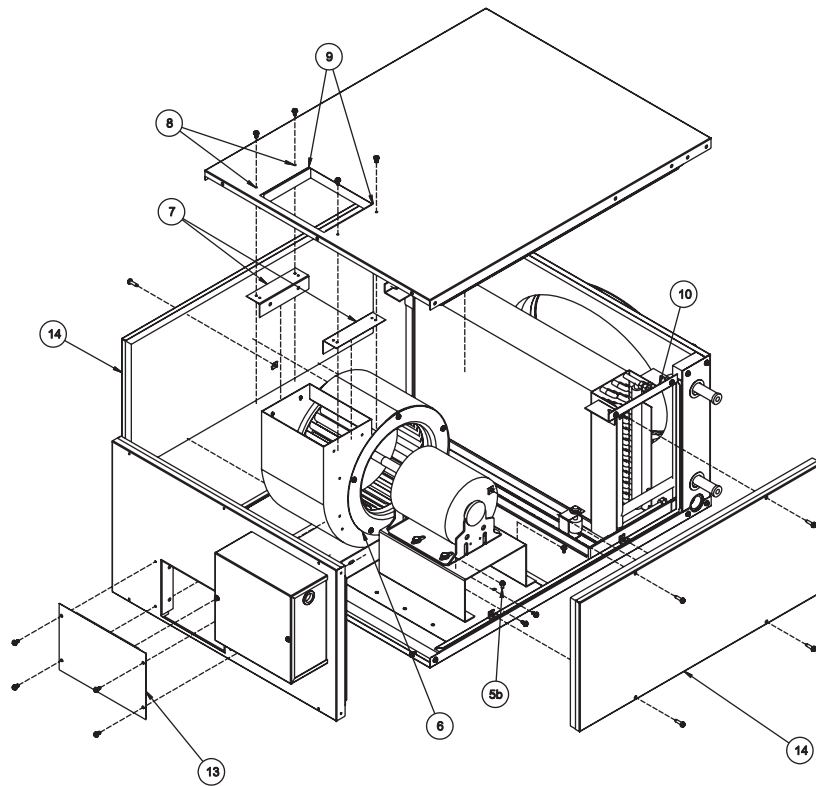
1. Place unit horizontally on a flat surface.
 2. Remove side access panels, the cover plate from the top panel and top of unit.
 3. Remove the two screws securing the front panel flange to the blower housing.
 4. Remove the two screws attaching the blower housing to the motor support channel flange.
 - 5a. Remove the six (6) screws attaching the motor mounting base to the motor support channel.
- Refer to Figure 2.9B for Steps 5b to 14.
- 5b. Shift the motor mounting base (and blower housing) back towards the coil to the second set of mounting lugs on the motor support channel. When in position, reattach the motor mounting base to the motor support channel with the six screws.
 6. Rotate the blower housing 90° to face upwards. Align the hole in the side blower housing with the upper slot in the motor support channel flange and join the two parts with one of the previously removed screws.

7. Attach the two flanges supplied, one to each side of the blower housing outlet. Align the holes in the flange with the holes in the housing and attach with screws supplied.
 8. Drill out the four (4) screw holes in the top panel that secured the removed cover plate to $\frac{1}{4}$ " inch diameter.
 9. Make a 2" long cut in the top panel insulation from each corner of the opening toward the sides of the unit to prepare for **Step 11**.
 10. Reposition the top panel on the unit **taking care** to straddle the evaporator coil with coil support brackets and to replace all screws.
 11. Fold back the top insulation flaps created in **Step 9** and position the flanges on the blower housing discharge against the top panel. Place the supply air plenum adaptor over the opening. Align the holes in the adaptor, gasket and top panel with the blower housing flange holes and secure with the screws provided. Reposition the top insulation flaps over the blower housing flanges. The insulation must be in place to prevent condensation forming on the top panel.
 12. Check that the blower wheel is centered in the inlet and discharge of the blower housing. To make any adjustments, loosen the 4 bolts securing the motor, shift the motor as required and refasten the 4 bolts.
 13. Place the coverplate removed from the top panel over opening in the front panel and screw in place.
- NOTICE: Check that all inside cabinet surfaces are covered with insulation, add insulation if required. An uninsulated panel will "sweat" and condensate will form on the cabinet.**
14. Replace the side access panels.



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FIGURE 2.9A



SPL-0062-A

FIGURE 2.9B

STEP 4: SETTING THE UNIT

Construct a platform for the fan coil unit, as shown in Figure 2.10. The platform can be constructed of 2x4 (minimum), 2x6, 2x8 and 2x10 lumber, as necessary to achieve sufficient height so that proper condensate drain line pitch of 1/4" per foot can be maintained. Figure 2.11 shows the approximate normal allowable run of condensate piping as a function of the framing lumber used for platform construction. The platform covering should be 1/2" plywood minimum.

Attach vibration isolation pads (supplied inside fan coil unit) to platform covering as shown in Fig. 2.10.

Secure the platform to the joist or floor, depending on location selected for the fan coil unit. Make sure platform is level.

For locations where the fan coil unit will be suspended, suspend platform from overhead by 1/4" threaded rods.

NOTICE: Leave room on sides for servicing.

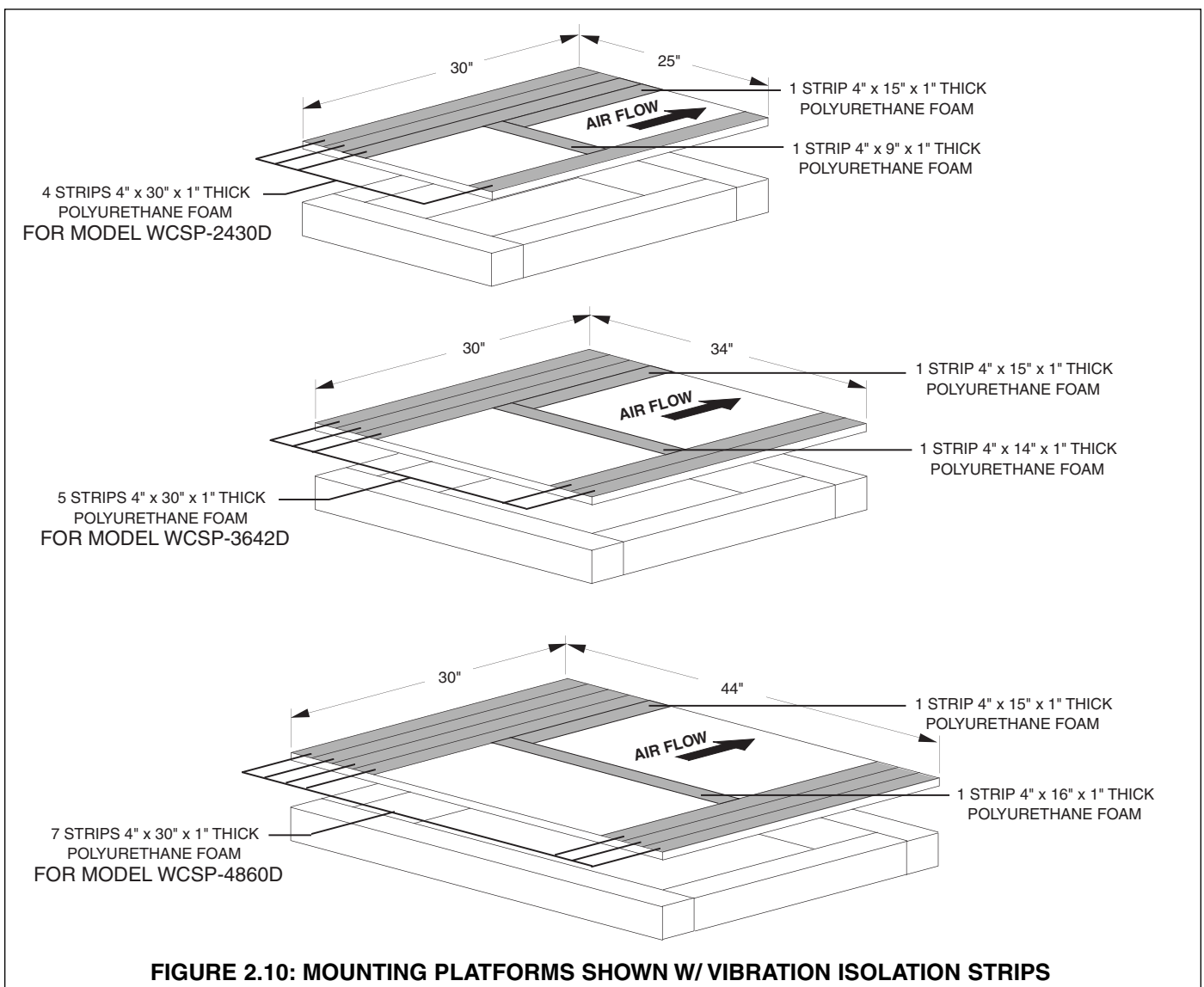
For installations with a return air box and return air duct, set fan coil unit on the platform with the elliptical opening facing in the direction of the return air opening. The supply air plenum adaptor should overhang the platform. **DO NOT** let the adaptor support the weight of the unit.

Do not secure the unit to the platform, as the weight of the unit will hold it in position.

Connect refrigerant lines from outdoor condensing unit to the fan coil unit. The refrigerant lines and unit should be installed in accordance with the manufacturer's instructions.

LUMBER SIZE	2 X 4	2 X 6	2 X 8	2 X 10
MAXIMUM HORIZONTAL	8'	16'	24'	32'

FIGURE 2.11: CONDENSATE PIPING RUNS



STEP 5: INSTALLING THE CONDENSATE TRAP & LINE

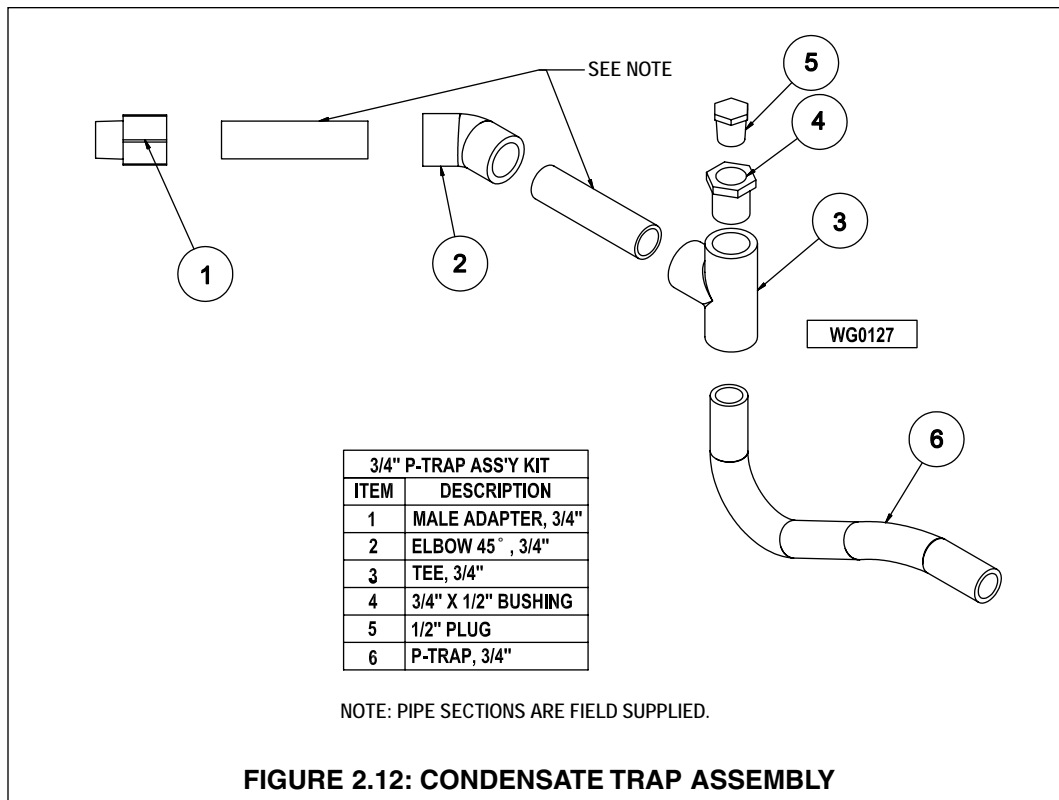
Refer to Fig. 2.2 & 2.3 for condensate drain location. Components for the PVC condensate trap are provided in a separate bag with fan coil unit (see Fig. 2.12) and should be cemented together with PVC pipe cement.

CAUTION Do not use substitute trap. Do not cut off or alter trap components.

Screw male adapter (see Fig. 2.12) into unit condensate line connection. Assemble and cement remaining components together. Then cement assembly to male adapter. The 45° elbow provides an offset from beneath the unit supply and return water piping to provide access to the clean-out plug.

Run a condensate line from the trap to a suitable drain that's in accordance with local codes. Make sure the line is pitched ¼" per foot.

NOTICE: Never connect condensate line to a closed drain system.



STEP 6: WIRING THE UNIT

WARNING Turn off electrical power supply before servicing. Contact with live electric components can cause shock or death.

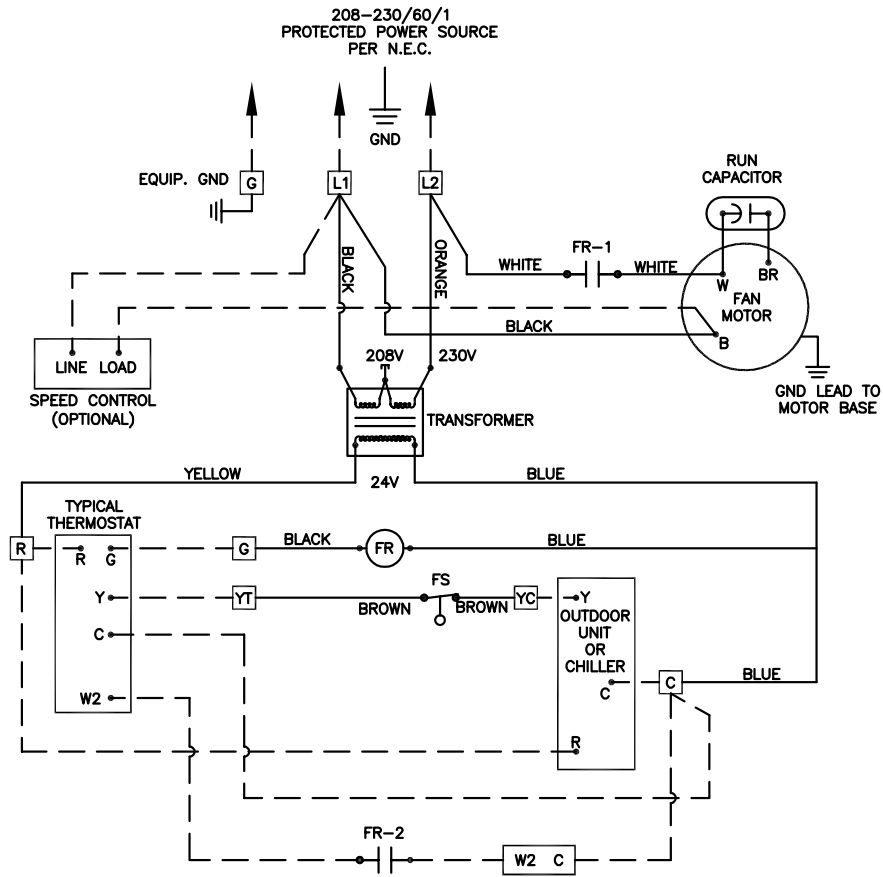
All electrical and control wiring must be installed in accordance with the codes listed in Section 1 of this manual. Wiring diagram is provided in Figure 2.13. A separate 208/230/60/1 power supply is recommended for the unit. Use standard 15-amp fuse and 14-gauge wire from power supply to unit.

Connect power supply to Terminals L1 (hot) and L2 (hot) on the high voltage terminal block. Connect a ground wire

to the equipment ground terminal located next to the high voltage terminal block.

The low voltage transformer in the unit has a 208 volt tap in the primary winding (color coded RED). If unit is to be operated with 208 volt electrical service, remove the 230 volt ORANGE lead from the L2 terminal and connect the 208 volt RED lead to the L2 terminal. Be sure to insulate the end of the unused ORANGE lead.

Locate the room thermostat on a wall near the return air box, approximately 60" from the floor. Connect the low-voltage thermostat wiring from the room thermostat to the low voltage control block in the unit.



- NOTES:**
1. FAN MOTOR FURNISHED WITH INHERENT THERMAL PROTECTION.
 2. TO BE WIRED IN ACCORDANCE WITH NATIONAL ELECTRIC CODE (NEC) AND LOCAL CODES.
 3. USE COPPER CONDUCTORS ONLY.

WIRING LEGEND

—	FACTORY NEC CL-I
—	FACTORY NEC CL-II
- - -	FIELD NEC CL-I
- - -	FIELD NEC CL-II
FR	FAN RELAY
FS	FLOAT SWITCH
⊖	COOL T'STAT TERMINALS

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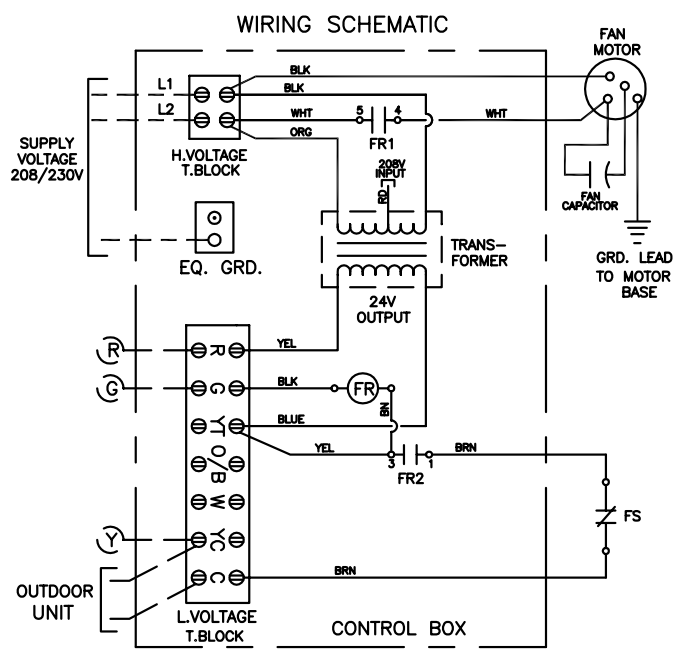


FIGURE 2.13: MODEL WCSP-D WIRING SCHEMATIC

STEP 7: INSTALLING AIR DISTRIBUTION COMPONENTS

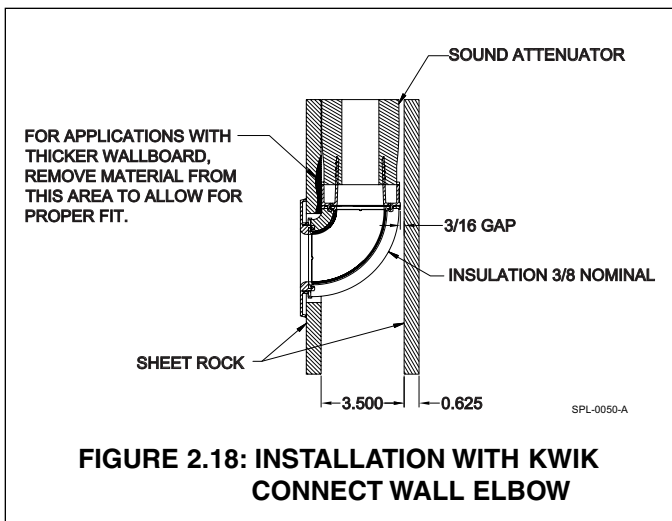
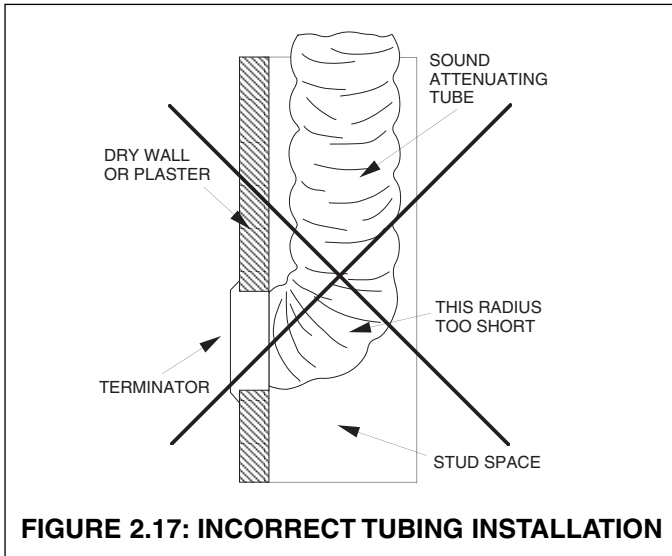
All plenum duct and supply tubing runs as well as room terminator locations must be in accordance with air distribution system requirements listed in Section 1 of this manual. Where taping of joints is required, UL181-approved tape is recommended.

Plenum Duct Installation

All tees, elbows and branch runs must be a minimum of 18" from the fan coil unit or any other tee, elbow or branch run. Keep all tees and elbows to a minimum to keep system pressure drop on larger layouts to a minimum.

NOTICE: Refer to duct installation instructions supplied with fan coil unit or follow manufacturers instructions supplied with other duct system types.

NOTICE: For the WCSP-4860D system, a plenum tee must be installed 18" minimum from the fan coil unit before continuing plenum duct run (see air distribution system requirements in Section 1 of this manual).



Room Terminator & Sound Attenuating Tubing Installation

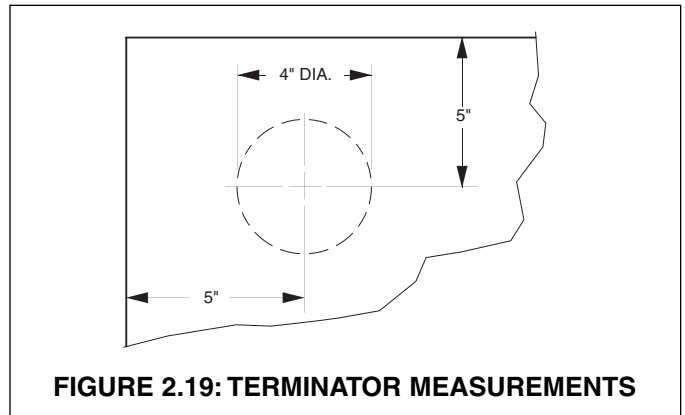
Room terminators and pre-assembled sound attenuating tubes are provided in the Installation Kits.

NOTICE: Do not install terminators in a wall in which a sharp bend in the sound attenuating tube is required (see Figure 2.17). The result would be unacceptable noise.

OPTION: Using a SpacePak Kwik Connect Wall Elbow (Model Number: AC-KCWE) addresses this condition (see Figure 2.18).

In marking location for room terminator (see Figure 2.19), the center of the terminator should be 5" from the wall or, when installed in the corner of a room 5" from both walls.

After marking location, drill a 1/8" diameter hole for outlet to be sure there is at least a 2" clearance all around the 1/8" hole to receive tubing and connector. Adjust direction of hole as needed, to gain this 2" clearance. After all clearances have been checked, take a 4" diameter rotary-type hole saw and cut a hole, using the 1/8" diameter hole as a pilot.



Assemble the room terminator to the sound attenuating tubing by simply fitting the two pieces together and twisting until tight (see Figure 2.20). If the terminator is to be used in a floor location, then field fabricate a small screen (1 1/2" square; 1/4 x 1/4 20-gauge galvanized wire screen) and place screen over opening on the back of the terminator prior to twisting on the kwik-connect (on the sound attenuating tube).

NOTICE: Do not shorten sound attenuating tube length. The result would be unacceptable noise.

Push the free end of the sound attenuating tube through the 4" hole until the two toggle springs on the room terminator snap into place.

Center the two spring clips on a line parallel to the direction of the tubing routing from the room terminator (see Figure 2.20). This is important since the weight of the tubing will have a tendency to cause a part of the terminator to pull away from the ceiling if the clips and tubing do not run parallel.

Then tighten the screws (attached to the terminator) until the terminator is snug against the ceiling or floor. **Do not overtighten.** For installations with floors or ceilings which are thicker than normal, longer toggle screws or special mounting plates may be required.

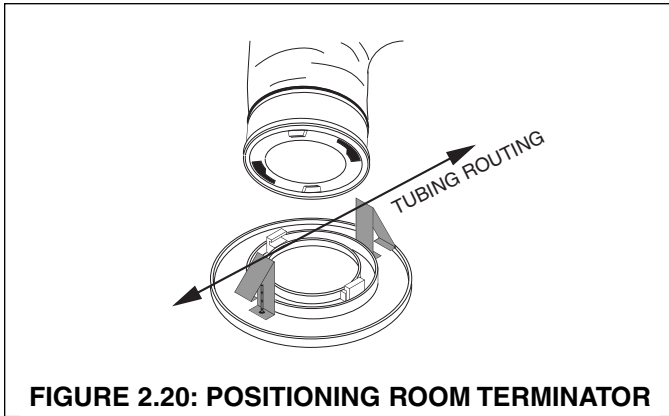


FIGURE 2.20: POSITIONING ROOM TERMINATOR

Supply Tubing Installation

Kwik-connects, plenum take-off gaskets, plenum take-offs and balancing orifices are provided in the Installation Kits.

Avoid sharp bends in the supply tubing (as well as the sound attenuating tube). The minimum radius bend is 4" (see Figure 2.21); however, wherever possible, hold to a larger radius.

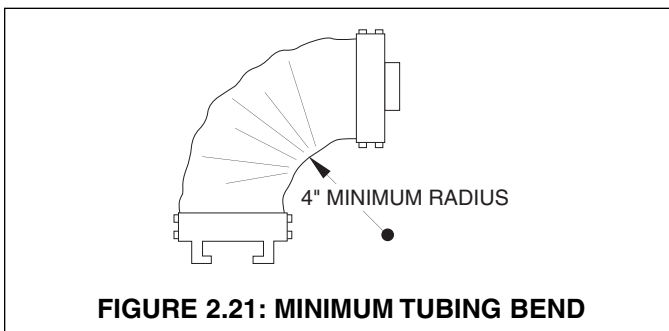


FIGURE 2.21: MINIMUM TUBING BEND

At the plenum, all supply tubing connections must be a minimum of 18" from any plenum tee, plenum elbow or the fan coil unit.

Individual supply tubing runs **must be a minimum of 6-feet**, even if the distance between the sound attenuating tubing and plenum is less than 6 feet.

Supply tubing comes in 100-foot sections and may be cut to length with a knife or fine tooth hacksaw.

For each supply tubing run, estimate and cut the length of tubing that will be needed between the plenum and sound attenuating tubing. At the open end of the supply tubing which will attach to the sound attenuating tubing, install a kwik-connect (see Figure 2.22). First, push back the cover and the insulation exposing the inner core. Second, twist a kwik-connect into the inner core. Third, pull down the insulation and cover, and tuck it into the deep groove on the back of the kwik-connect. Fourth, wrap the connection securely with tape.

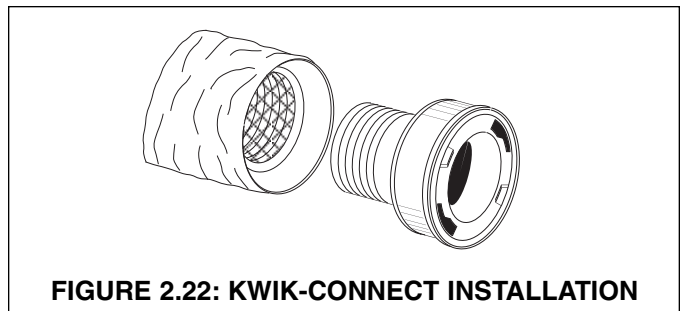


FIGURE 2.22: KWIK-CONNECT INSTALLATION

When finished, simply twist together (see Figure 2.23) the kwik-connect on the sound attenuating tube, and wrap the connection securely with tape.

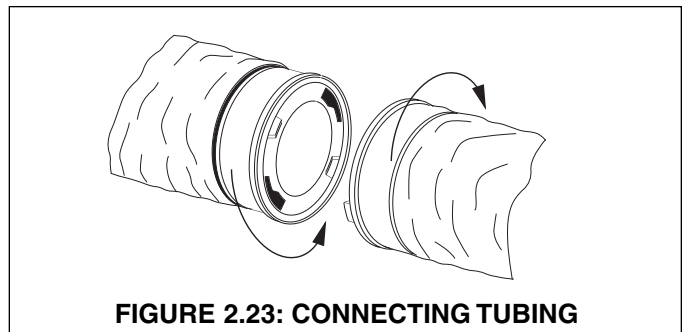


FIGURE 2.23: CONNECTING TUBING

After attaching the supply tubing to the sound attenuating tube, bring the open end of the tubing to the plenum.

Place the plenum take-off gasket on the back side of the plenum take-off and insert the assembly into the hole in the plenum (see Figure 2.25).

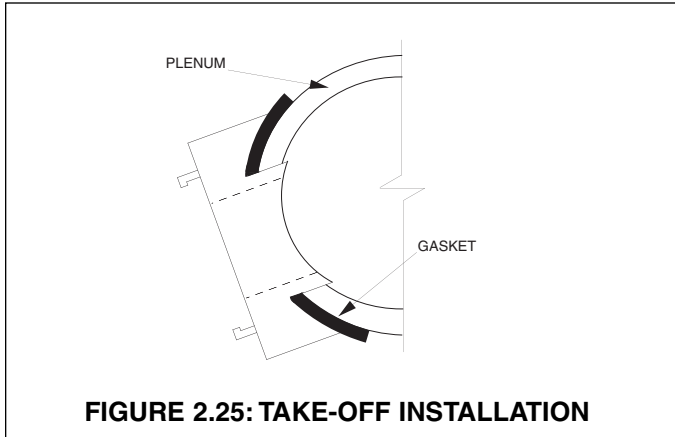


FIGURE 2.25: TAKE-OFF INSTALLATION

NOTICE: Gasket must be installed to seal plenum take-off to prevent air leakage.

Orient the plenum take-off to match the curvature of the plenum duct. Hand insert the four plenum take off fasteners one at a time and using the SpacePak pliers, snap the fasteners into place until they lock in place (see Figure 2.26).

NOTICE: All four fasteners must be installed to assure air tight fitting between plenum take-off and plenum.

In accordance with your calculations as to requirements for balancing orifices, mount the orifice in the outlet of the plenum take-off (see Figure 2.27), prior to attaching the supply tubing.

Next, install a kwik-connect in the open end of the supply tubing, using the same procedures as before, and twist together kwik-connects on supply tubing and plenum take-off. Wrap connection securely with tape.

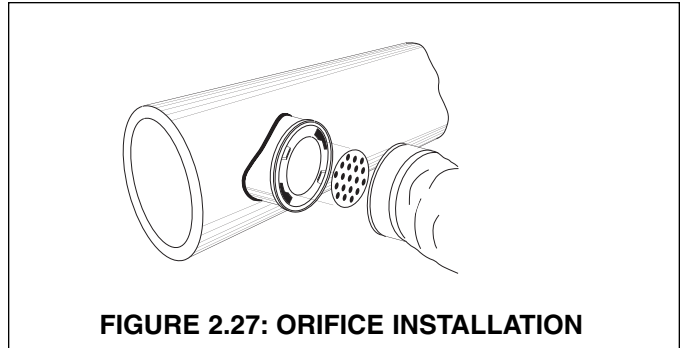


FIGURE 2.27: ORIFICE INSTALLATION

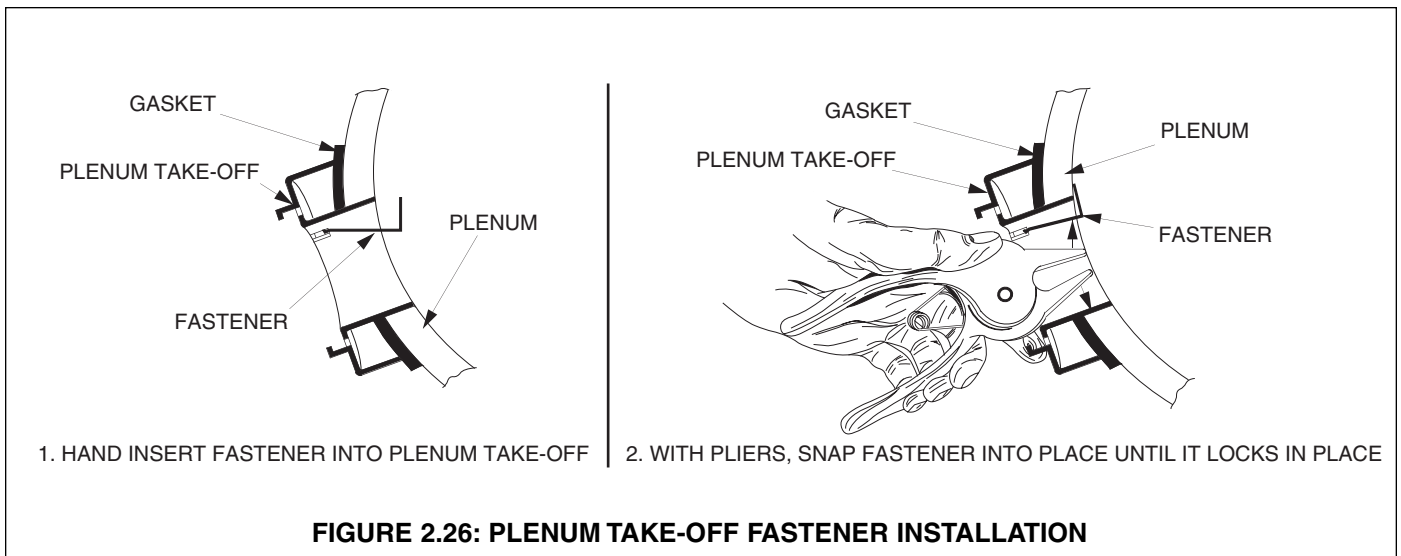


FIGURE 2.26: PLENUM TAKE-OFF FASTENER INSTALLATION

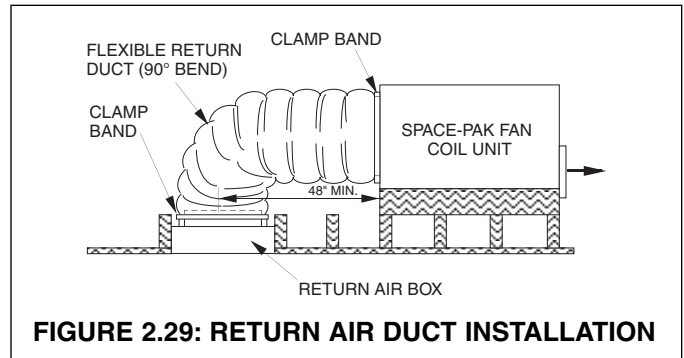
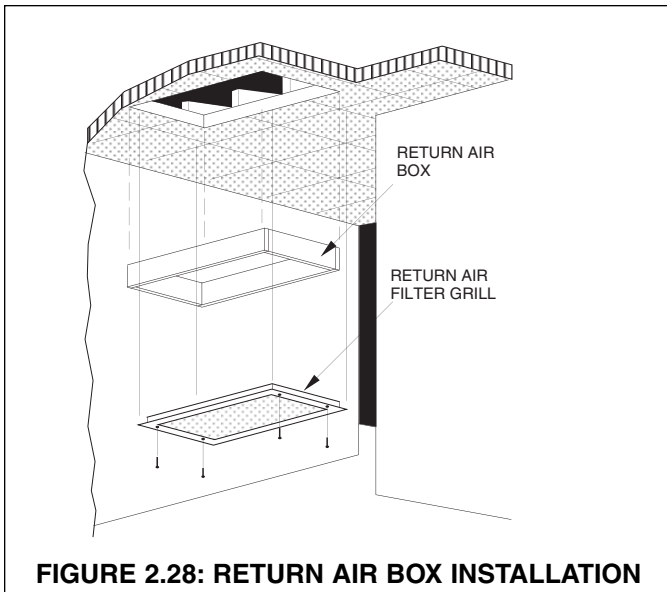
Return Air Box & Duct Installation

Remove the return air grill from the return air box and remove the air filter from the return air grill.

Insert the return box from below for ceiling installation (or from the front for wall installations) and fasten with four screws through holes provided on the long side of the box. (see Figure 2.28).

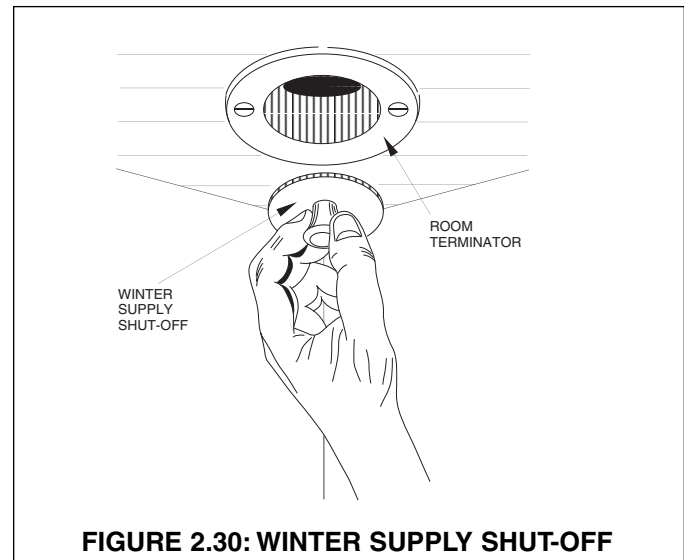
Then, insert return air grill into box (see Figure 2.28) and fasten with the four screws provided through the holes on both sides. Open return air grill (turn the $\frac{1}{4}$ turn latches) and insert filter. Close the return air grill. Slide a clamp band (provided with return air box) over one end of the return air duct. Place that end over the elliptical flange on the fan coil unit (see Figure 2.29). Move the clamp over the flange and tighten so the clamp holds the return air duct securely to the flange.

Follow the same procedures to attach the return air duct to the return air box (see Figure 2.29).



Winter Supply Shut-Off Installation

Simply snap winter supply shut-offs into the room terminator openings (see Figure 2.30). Wrap the return air filter in a plastic bag and reinstall it to block the return air opening. Winter supply shut-offs prevent moisture from collecting in ductwork during winter months. Be sure to remove the plastic bag and all winter supply shut-offs before operating the system.



SECTION 3: START-UP & OPERATION

SEQUENCE OF OPERATION

When power is turned on and thermostat fan switch is set to ON and the cooling indicator is set to OFF, the indoor fan motor is energized through the normally open contact FR1 of the FR fan relay in about 30 seconds. The outdoor unit is off.

When power is turned on and thermostat fan switch is set to ON or AUTO and the cooling indicator to COOL the indoor and outdoor units will start through the normally open contacts FR1 and FR2 of the FR fan relay.

The fan coil unit is equipped with a primary float switch, the outdoor unit will automatically shut down if the drain pan is full of water (condensate) and not draining. The fan coil unit will continue to operate. When the water level in the drain pan drops, the system will continue normal operation.

PRIOR TO START-UP

1. Check all electrical connections for tightness.
2. Check air filter has been installed in return air box or filter box.
3. Remove all winter supply shut-offs and store them in a safe place.

SYSTEM START-UP & ADJUSTMENTS

1. Place thermostat fan switch in ON position and cooling indicator in OFF position. In about 30 seconds, indoor unit blower will start.
2. Check blower operation for excess noise or vibration.
3. Check entire distribution system for leakage and apply additional tape where necessary.
4. Check that system static pressure is within acceptable limits (minimum 1.0" W.C. - maximum 1.5" W.C.). Static readings must be taken in the plenum a minimum of 18" (or after the tee on WCSP-4860D systems) from the fan coil unit, plenum tees or elbows but before any supply run.

- a. If greater than 1.5" W.C. add additional supply runs.
- b. If less than 1.0" W.C. check the return air filter is clean and return duct is not collapsed or kinked.

- c. Check supply air plenum for leaks.
- d. If more supply runs than recommended are used, check that balancing orifices are in place.
5. Check that blower motor amp draw compares with fan coil unit rating plate. Amp draw shown on plate is the FLA of motor (not the actual running amps) and will vary with the pressure and voltage.
6. Place the thermostat cooling indicator in COOL position, which will start the outdoor unit. Let the system run at least 30 minutes to stabilize operating conditions.
7. For outdoor unit start-up, follow manufacturer's instructions.
8. Check that temperature drop across evaporator coil in the indoor unit is between 20°F to 28°F.
9. Check the chiller or boiler for proper operation according to the manufacturer's instructions.

COMMON START-UP CONDITIONS

	CONDITION	VERIFICATION	SOLUTION
A.	Lack of cooling	1. Chilled water loop temperature	1. Adjust water temperature in chilled water loop
B.	Lack of heating	1. Hot water loop temperature	1. Adjust water temperature in hot water loop
C.	Blows cold air on initial start-up	1. Fan is controlled by a thermostat 2. Fan is controlled by an aquastat	1. Install aquastat 2. Adjust setting to allow water loop to reach proper temperature
D.	Condensate does not drain properly	1. Unit is not level 2. Unit is not trapped 3. Drain line is blocked	1. Make sure unit is level 2. Install trap supplied with unit 3. Clear blockage
E.	Unit sweats inside cabinet	1. Insulated panels not secured	1. Secure and seal all insulated panels to prevent air infiltration

FACTORS AFFECTING THE BALANCE OF THE SYSTEM

- A. Room Terminators (Outlets): Based on the equipment selected, determine the recommended number of fully open outlets from Figure 3.1.

FIGURE 3.1

NOMINAL TONNAGE	MINIMUM RECOMMENDED NUMBER OF FULLY OPEN OUTLETS *	
	MODEL	RECOMMENDED
2	WCSP-2430D	12
2 1/2	WCSP-2430D	14
3	WCSP-3642D	17
3 1/2	WCSP-3642D	19
4	WCSP-4860D	26
5	WCSP-4860D	26

* The minimum or recommended number of outlets means fully open outlets. Any outlet having an orifice would be only a percentage of an outlet.

- B. Orifice Combinations: Should orifices be required to balance the system (installed at plenum take-off), refer to the combinations listed in Figure 3.2.

FIGURE 3.2

DESIRED NUMBER OF TERMINALS *	TERMINAL - ORIFICE COMBINATION
.5	(1) .5
.65	(1) .35
.85	(1) .15
1.00	(1)
1.15	(1) .5 + (1) .35
1.30	(2) .35
1.50	(1) .35 + (1) .15 or (1) + (1) .5 or (3) .5
1.65	(1) + (1) .35 or (2) .5 + (1) .35
1.70	(2) .15
1.80	(2) .35 + (1) .5
1.85	(1) + (1) .15
1.95	(3) .35
2.00	(2)

* For a room with more than two (2) terminals, combinations of the above may be used to achieve the desired fractional number.

- C. Supply Tubing Length: An outlet with a supply tubing length of 15 feet is considered one, fully opened outlet. For other lengths refer to Figure 3.3 for adjustment factors.

FIGURE 3.3

2" SUPPLY TUBING LENGTH ADJUSTMENT FACTOR CHART								
RUN	6'	8'	10'	12'	15'	20'	25'	30'
FACTOR	.85	.88	.90	.94	1.0	1.1	1.25	1.50

SECTION 4: MAINTENANCE

The SpacePak system has been designed to provide years of trouble-free performance in normal installations. Examination by the homeowner at the beginning of each cooling season, and in mid-season should assure continued, good performance. In addition, the system should be examined by a qualified service professional at least once every year.

BEFORE EACH COOLING SEASON

1. Check and clean air filter. The air filter is permanent type. Remove and clean thoroughly with soap solution and water.

▲ WARNING Turn off electrical power supply before servicing. Contact with live electric components can cause shock or death.

2. Check fan coil unit. Turn off unit power disconnect switch and remove service access panels.

- a. Inspect coil and blower wheel for build-up of dust and dirt. Clean with solvent and/ or water as necessary.

- b. Replace service access panels and turn on unit power disconnect switch.

3. Check that unit condensate drain is clear and free running, and plug is in cleanout.

4. For chiller or boiler unit, follow manufacturer's maintenance instructions.

5. Follow "System Start-Up & Adjustments" procedures in Section 3 of this manual.

IF SYSTEM FAILS TO OPERATE

1. Check that thermostat switch is set for proper mode of operation and is set below room temperature.

2. Check that chiller or boiler unit is operating.

3. Check for tripped circuit breaker or blown fuse at the main fuse box. Reset breaker or replace blown fuse with same size and type.



Service / Troubleshooting FORM "1A"

Customer / Dealer Data:

Name: _____

Address: _____

Tel (day) _____ (eve) _____

Installing Dealer / Contractor:

Name: _____

Tel: _____

Equipment Data:

SPACEPAK Model # ESP / WCSP - _____

SPACEPAK Serial # _____

SPACEPAK Date of Installation: _____

Cond Unit Mfr: _____

Cond Unit Mod #: _____

Rated Capacity: _____ BTUH; SEER: _____

Air-side Data:

Total # of outlets: _____; Supply tube length: _____ Ft (avg)
(Please sketch duct layout on reverse side of this sheet, noting all fittings and distances, including return duct size / length)

Air Filter: Size (LxHxD) _____

Type (pleated, etc): _____

Is the filter clean? _____ (Y/N)

Static Pressure (Ps) in supply plenum: _____ "WG
(Measure at approximately 3 ft downstream of blower discharge)

Ps in return duct (downstream of filter, upstream of coil) _____ "WG

SpacePak Motor: Amps (measured): _____ Amps

Voltage (measured): _____ Volts

Air Temperatures:

@ Return (indoor ambient): _____ °FDB; _____ °FWB

@ Condensing unit (outdoor ambient): _____ °F

@ AHU (read 3 ft from fan discharge) _____ °F

@ last supply outlet _____ °F

Refrigeration-side Data:

Line sizes: Liquid _____ Suction _____

Total equivalent length of lines: _____ Ft; Vertical Rise: _____ Ft.

@ Condensing Unit:

Liquid: _____ psi; Temp: _____ °F; Subcool: _____ °F

Suction: _____ psi; Temp: _____ °F; Superheat: _____ °F

@ SpacePak:

Liquid: _____ psi; Temp: _____ °F; Subcool: _____ °F

Suction: _____ psi; Temp: _____ °F; Superheat: _____ °F

Approximate time running before taking readings: _____ Hrs.

Did you adjust the TXV? _____ (Y/N); (If yes, explain):

Refrigerant Charge (if weighed-in): _____ lbs

R410a / R22 (circle one)

Installed options: (circle one)

sight glass filter/drier zone controls

Other: _____

Water Data: (where applicable)

Line sizes: _____"; Length: _____ FT

Water temperatures:

Supply: _____ °F; Return _____ °F

Glycol?: _____ (Y/N); % Solution: _____

NOTES: _____

REF. NO.	NAME OF PART	PART NO.	WCSP-2430D	WCSP-3642D	WCSP-4860D
2	Drain Pan Assembly	BM-7354	1		
	Drain Pan Assembly	BM-7355		1	
	Drain Pan Assembly	BM-7356			1
3	Coil Assembly	70-8021	1		
	Coil Assembly	70-8022		1	
	Coil Assembly	70-8023			1
5	Transformer	27-3293	1	1	1
6	Motor	27-3236	1		
	Motor	27-3237		1	
	Motor	27-3238			1
7	Blower Wheel	27-8032	1	1	
	Blower Wheel	27-8033			1
9	Terminal Block (low volt)	27-3051	1	1	1
10	Terminal Block (high volt)	27-3056	1	1	1
11	Access Panel	BM-7361	1	1	1
12	Fan Relay	27-3322	1	1	1
13	Primary Float Switch	BM-6917	1	1	1

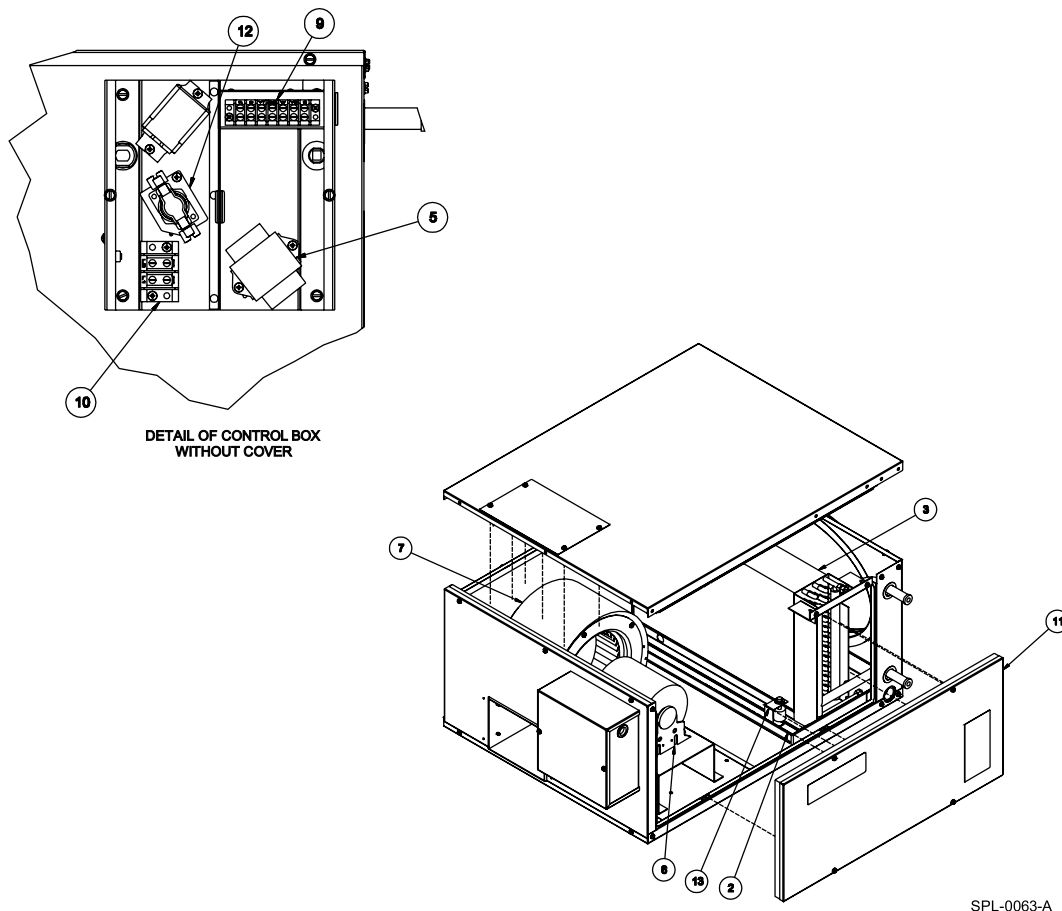


FIGURE 4.1: MODEL WCSP-D GENERAL ASSEMBLY

NOTES:

LIMITED WARRANTY

Central Air Conditioning Products

The "Manufacturer" warrants to the original owner at the original installation site that the Central Air Conditioning Products (the "Product") will be free from defects in material or workmanship for a period not to exceed one (1) year from the startup or eighteen (18) months from date of shipment from the factory, whichever occurs first. If upon examination by the Manufacturer the Product is shown to have a defect in material or workmanship during the warranty period, the Manufacturer will repair or replace, at its option, that part of the Product which is shown to be defective.

This limited warranty does not apply:

- a) if the Product has been subjected to misuse or neglect, has been accidentally or intentionally damaged, has not been installed, maintained or operated in accordance with the furnished written instructions, or has been altered or modified in any way.
- b) to any expenses, including labor or material, incurred during removal or reinstallation of the defective Product or parts thereof.
- c) to any workmanship of the installer of the Product.

This limited warranty is conditional upon:

- a) shipment, to the Manufacturer, of that part of the Product thought to be defective. Goods can only be returned with prior written approval from the Manufacturer. All returns must be freight prepaid.
- b) determination, in the reasonable opinion of the Manufacturer, that there exists a defect in material or workmanship.

Repair or replacement of any part under this Limited Warranty shall not extend the duration of the warranty with respect to such repaired or replaced part beyond the stated warranty period.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ALL SUCH OTHER WARRANTIES, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS LIMITED WARRANTY. IN NO EVENT SHALL THE MANUFACTURER BE LIABLE IN ANY WAY FOR ANY CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OF ANY NATURE WHATSOEVER, OR FOR ANY AMOUNTS IN EXCESS OF THE SELLING PRICE OF THE PRODUCT OR ANY PARTS THEREOF FOUND TO BE DEFECTIVE. THIS LIMITED WARRANTY GIVES THE ORIGINAL OWNER OF THE PRODUCT SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY BY EACH JURISDICTION.

