



# MODEL ESP-J SYSTEM INSTALLATION, OPERATION & MAINTENANCE MANUAL

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



## SECTION 1: INTRODUCTION

SpacePak System Design.....	2
Code Compliance.....	2
Air Distribution Requirements.....	2
Model Number Description.....	2
Air Distribution Components.....	3-5
High Altitude Guidelines.....	5
Shipment of Unit.....	5

## SECTION 2: SYSTEM INSTALLATION

Step 1: Locating The Unit.....	6
Step 2: Cutting Return Air Opening.....	8
Step 3: Attaching Supply Air Plenum Adaptor.....	8
Step 4: Setting The Unit.....	9
Step 5: Connecting Refrigerant Lines.....	9
Step 6: Installing The Condensate Trap & Line.....	10
Step 7: Wiring The Unit.....	10
Step 8: Installing Air Distribution Components.....	10-19
Step 9: Retrofit to B & C Series Units.....	20
Layouts.....	20,21

## SECTION 3: START UP & OPERATION

Sequence Of Operation.....	22
Prior To Start-Up.....	22
System Start-Up & Adjustments.....	22
Fan Speed Settings.....	22
Operating Setpoints.....	23-25
Charging Cooling Only Systems.....	26
Factors Affecting the Balance of the System.....	26

## SECTION 4: MAINTENANCE

Before Each Cooling Season.....	27
If System Fails To Operate.....	27
Troubleshooting Guide.....	28-31
Checking ESP-J Blower Motor.....	32
Check ESP-J Low Voltage Transformer.....	32
Check External Static Pressure.....	32
Service/Troubleshooting Form.....	33
Parts List.....	34
<b>WARRANTY INFORMATION</b> .....	35



Intertek



IN UNITED STATES: 260 NORTH ELM ST. WESTFIELD, MA 01085 (413) 564-5530/FAX (413) 564-5815  
IN CANADA: 7555 TRANMERE DRIVE, MISSISSAUGA, ONTARIO, L5S 1L4 (905) 670-5888/FAX (905) 670-5782



# 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

SpacePak is a hi-velocity central air conditioning system which utilizes a conventional outdoor condensing unit matched with the indoor Model ESP-J fan coil unit to provide conditioned air through the specially-designed, pre-fabricated, pre-insulated 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. Follow local code requirements.

## 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 performing a load calculation to determine heat gain, 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.

## ESP-J - MODEL NUMBER DESCRIPTION

1	2	3	4	5	6	7	8	9	10
UT			CA				SE	CT	RT

### 1,2,3 - Unit Type [UT]

ESP - Evaporator DX Fan Coil Unit

### 4,5,6,7 - Capacity [CA]

2430 - 24,000 to 30,000 BTU/Hr. (2-2 $\frac{1}{2}$  tons)

3642 - 36,000 to 42,000 BTU/Hr. (3-3 $\frac{1}{2}$  tons)

4860 - 48,000 to 60,000 BTU/Hr. (4-5 tons)

### 8 - Series [SE]

J - "J" series

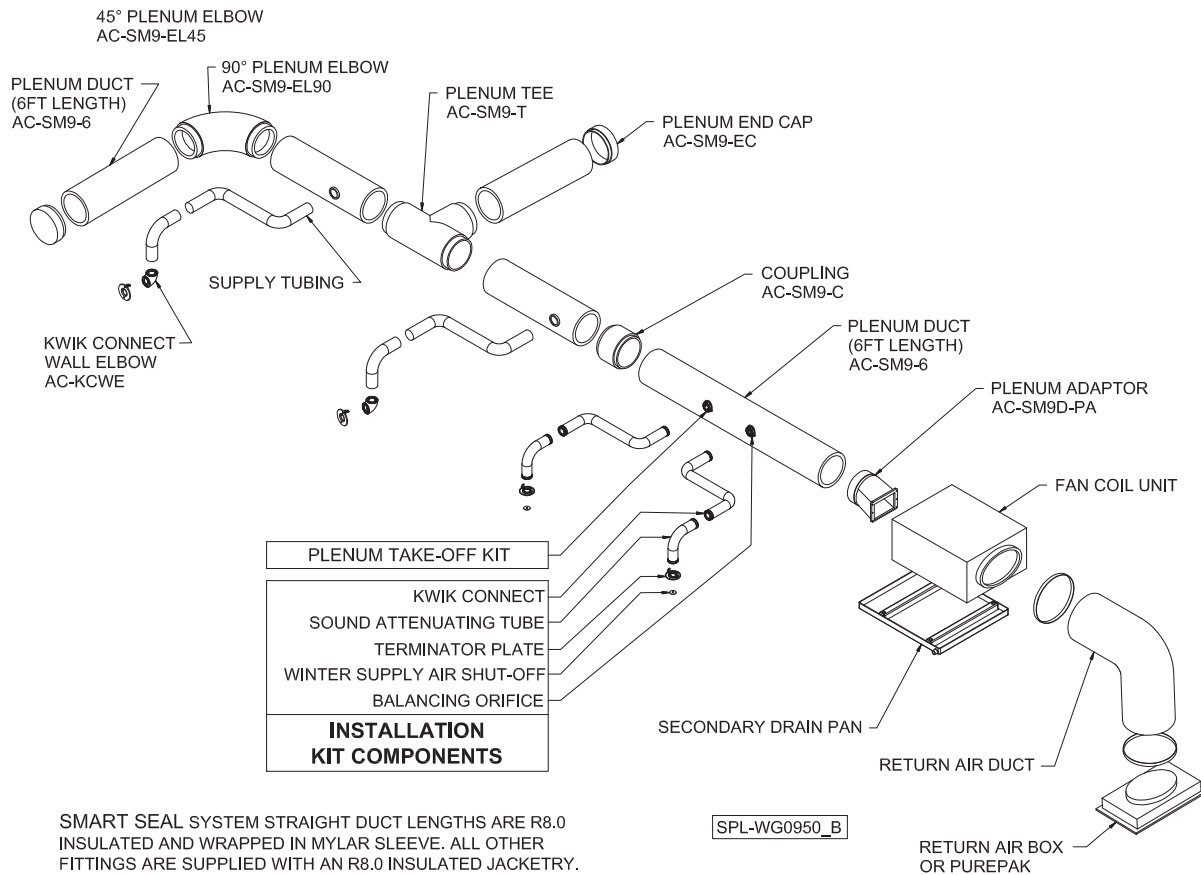
### 9 - Cabinet Type [CT]

H - Horizontal

### 10 - Refrigerant Type [RT]

4 - R410A

**FIGURE 1.1: AIR DISTRIBUTION SYSTEM COMPONENTS**



SMART SEAL SYSTEM STRAIGHT DUCT LENGTHS ARE R8.0 INSULATED AND WRAPPED IN MYLAR SLEEVE. ALL OTHER FITTINGS ARE SUPPLIED WITH AN R8.0 INSULATED JACKETRY. DUCT COMPONENTS SHOWN WITHOUT FACTORY SUPPLIED R8.0 INSULATED JACKETRY.

**RETURN AIR BOX (BM-9149, AC-RBF-3, BM-9169):** Each includes filter grill with metal frame, permanent filter, and 2 clamp bands. BM-9149 is for ESP-2430J. AC-RBF-3 is for ESP-3642J and BM-9169 is for ESP-4860J.

**RETURN AIR DUCT (BM-6808-10, BM-6809-10, BM-6839-10):** Flexible, 10 feet long with round shape. BM-6808-10 (15" dia.) for ESP-2430J. BM-6809-10 (19" dia.) for ESP-3642J and BM-6839-10 (24" dia.) is for ESP-4860J.

**PLENUM ADAPTOR:** 9" round OR 10" X 10" square metal component to attach plenum duct to fan coil unit.

**PLENUM DUCT & COMPONENTS:** May be 9" round sheet metal or 10" X 10" (O.D.) square, fiberboard duct types as specified by the installing contractor. Above layout is shown as an illustrative Smart Seal assembly reference only.

**R6 SUPPLY TUBING (AC-ST6-100):** Flexible, R6 insulated, 2" I.D. and 3-1/4" O.D. Each section is 100 feet long.

**R8 SUPPLY TUBING (AC-ST8-75):** Flexible, R8 insulated, 2" I.D. and 5-3/8" O.D. Each section is 75 feet long.

**INSTALLATION KITS:** Contains a specified amount of sound attenuating tubes, kwik-connects, terminator

plates (incl. spring clips & screws), winter supply air shut-offs and a balancing orifice set to complete installation of room outlets. Supplied in (2) [AC-IKLT-2] and (5) [AC-IKLT-5] outlet boxed quantities.

**PLENUM TAKE-OFF KIT:** Contains a specific amount of plenum take-offs, gaskets and fasteners to complete installation of room outlets. Take-offs available for round sheet metal or square fiberboard duct as specified by installing contractor. Supplied in (2) [AC-TKMR-2] and (5) [AC-TKMR-5] outlet boxed quantities for round sheet metal and (2) [AC-TKFS-2] and (5) [AC-TKFS-5] outlet boxed quantities for square fiberboard.

**KWIK CONNECT 90° WALL ELBOW (AC-KCWE):** To allow for wall terminations in 2" X 4" stud spaces.

**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.

**PLIERS (SPC-72):** To assure full setting of all clips (fasteners) in plenum take-off (not shown).

**PLENUM HOLE CUTTER (SPC-71-10):** To cut 2" hole in fiber board for plenum take-off installation (not shown).

## 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.

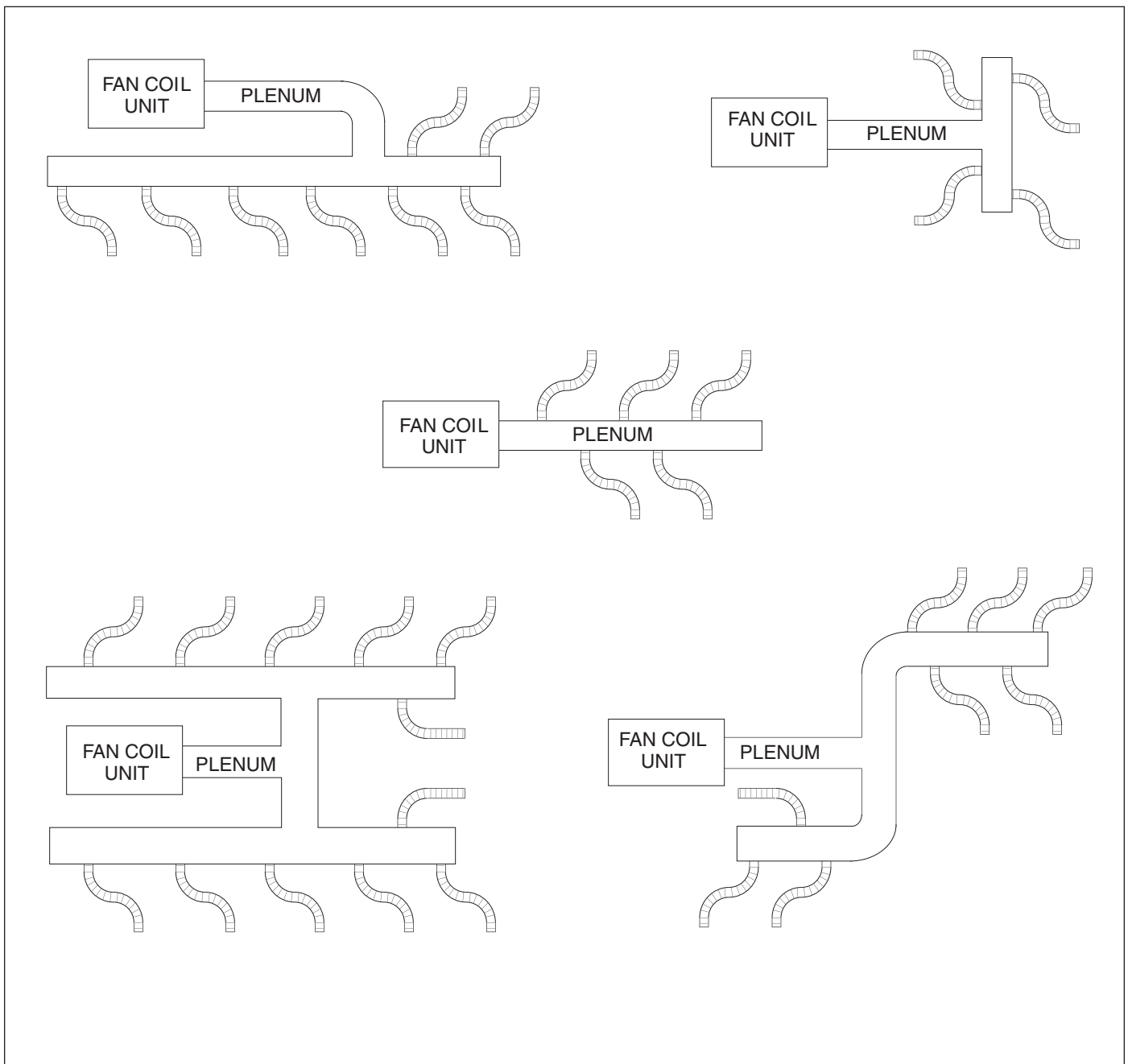
In some two-story split level homes, it may be advantageous to go from one level to another with the plenum duct. Whenever necessary, either between floors or along the ceiling, the small size of the plenum makes it easy to box in.

The fan coil unit is designed to operate with a total external static pressure of 1.8 inches of water column (minimum 1.2 - maximum 1.8). Excessive static pressure increases the air flow in individual runs and may cause some or all terminators to be noisy.

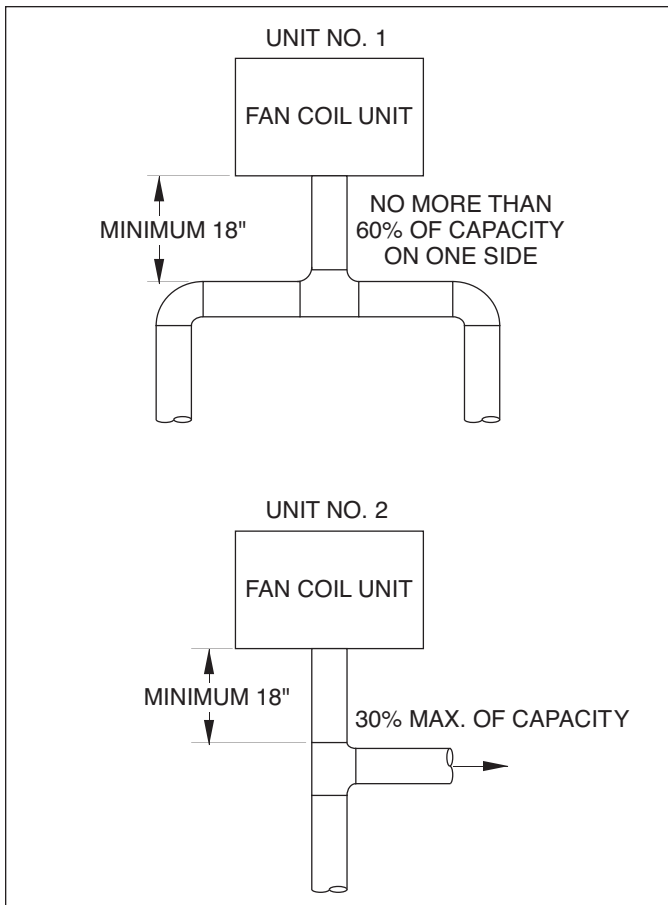
For systems designed with a bullhead tee installed as on Unit No. 1 (Figure 1.3), the best results are obtained if not more than 60% of the total number of system outlets are attached to any one branch of the tee. For systems with a branch tee installed as on Unit No. 2 (Figure 1.3), not more than 30%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

**NOTE: For installations replacing B or C series units refer to retrofit instructions on page 20.**

**FIGURE 1.2: PLENUM/TUBING LAYOUT EXAMPLES (FOR GUIDANCE ONLY)**



**FIGURE 1.3: ESP-3642/4860J INSTALLATIONS**



The larger system capacities (ESP-3642/4860J) are affected more by higher system static pressure than the smaller systems. Installation of the plenum tee closer than the minimum indicated in Figure 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

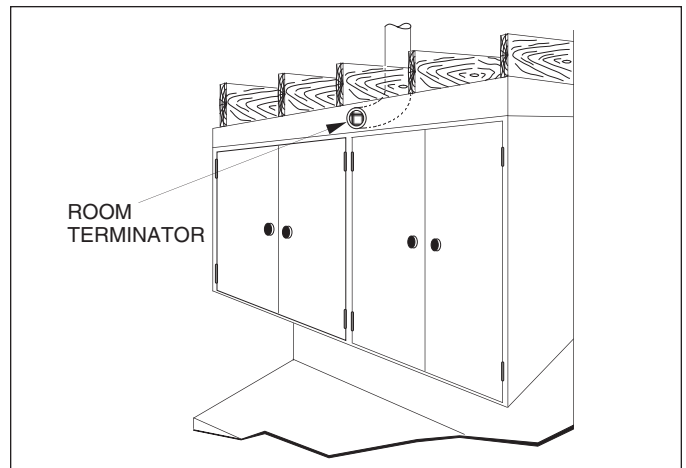
In the case of two-story or split-level applications, supply tubing may run from one story to another. It is small enough to go in stud spaces, but this is often difficult in older homes because of hidden obstructions in stud spaces. It is more common to run the supply tubing from the attic down through 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 3-1/4".

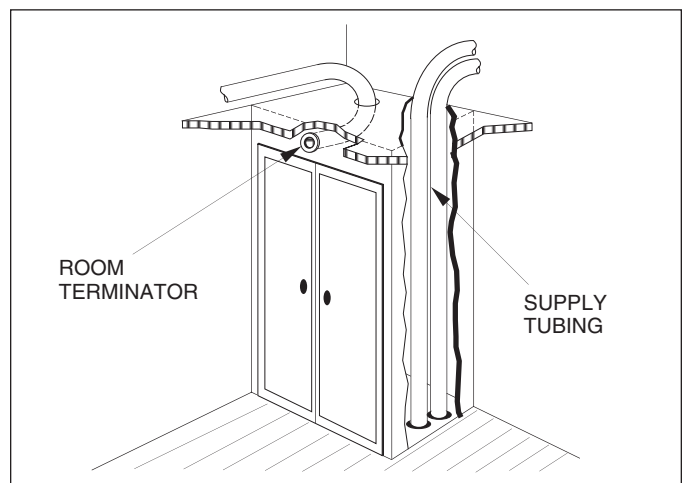
## Room Terminators

Terminators should be located primarily in the ceiling or floor for vertical discharge or high on a wall for horizontal discharge. Installation of horizontally discharged terminators is assisted with the SpacePak 90° wall elbow (see page 13). 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).

**FIGURE 1.4: TERMINATOR IN SOFFIT AREA**



**FIGURE 1.5: TERMINATOR IN CLOSET TOP AREA**



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.

## 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 and a factory installed primary float switch.

**NOTICE:** For high altitude systems use the following chart as a guideline for number of outlets.

ALTITUDE	MINIMUM NO. OF OUTLETS PER TON
5000 - 6500'	8
6500' and above	9

# 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.

When selecting a location, consider the locations (as shown in Figures 2.4 and 2.5) 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 and 2.3).

## 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 Figures 2.2 and 2.3).

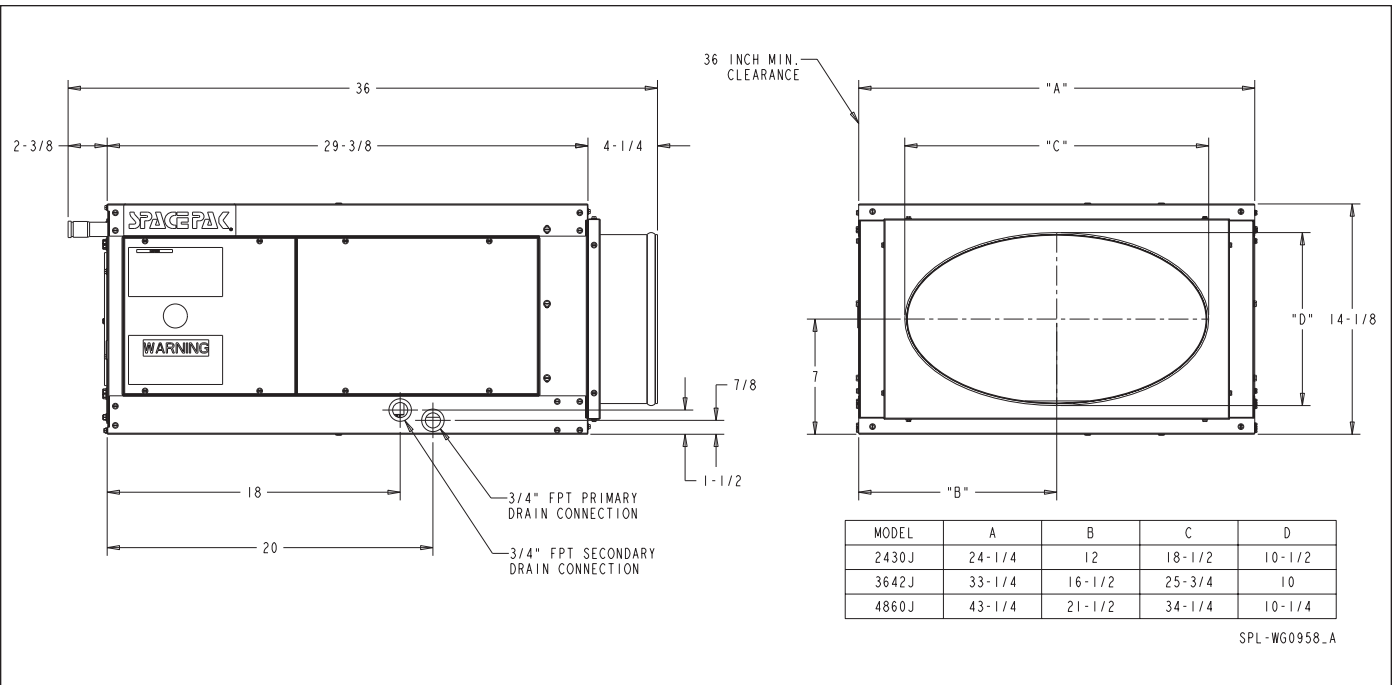
**FIGURE 2.1: MODEL ESP-J SPECIFICATIONS**

Model	System capacity (Nom. Tons)	Electrical Characteristics*	Connections				Recommended Condensing Unit	
			Suction Line (O.D.)	Liquid Line (O.D.)	Cond. Drain (FPT)	Return Inlet (Dia.)	Nominal Capacity (MBH)	Min SEER
ESP-2430J	2 - 2-1/2	230/60/1	7/8"	3/8"	3/4"	15"	24 to 30	13+
ESP-3642J	3 - 3-1/2	230/60/1	7/8"	3/8"	3/4"	19"	36 to 42	13+
ESP-4860J	4 - 5	230/60/1	7/8"	3/8"	3/4"	24"	48 to 60	13+

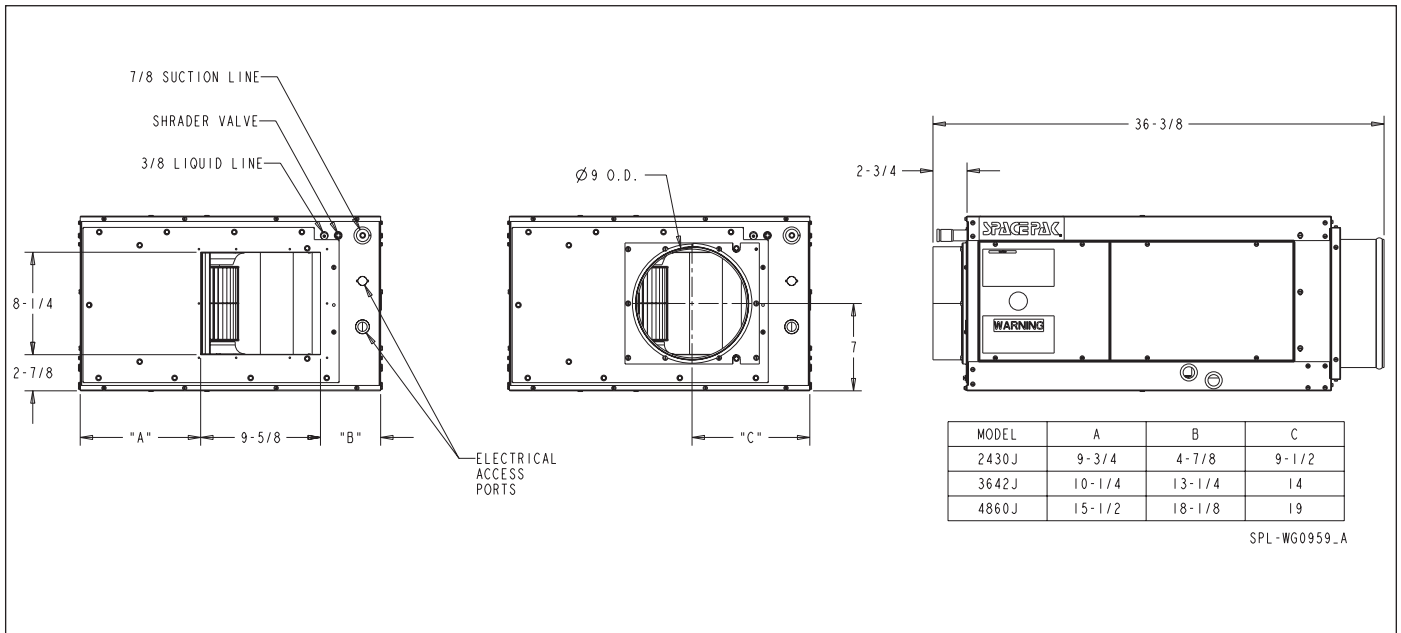
Model	System capacity (Nom. Tons)	Blower				Coil		Ship. Wt. (lbs)
		Std. CFM @ 1.2" W.C.	Wheel Dia. and Width	Motor HP	115V/230V F.L. Amps*	No. of Rows Deep	Flow Control Device	
ESP-2430J	2 - 2-1/2	440, 550	10" x 6"	3/4	5.6/2.8	6	TXV	105
ESP-3642J	3 - 3-1/2	660, 850	10" x 6"	3/4	7.6/4	6	TXV	123
ESP-4860J	4 - 5	880, 1150	10" x 6"	3/4	10.6/5.4	6	TXV	144

\*Unit includes optional conversion kit to 115V.

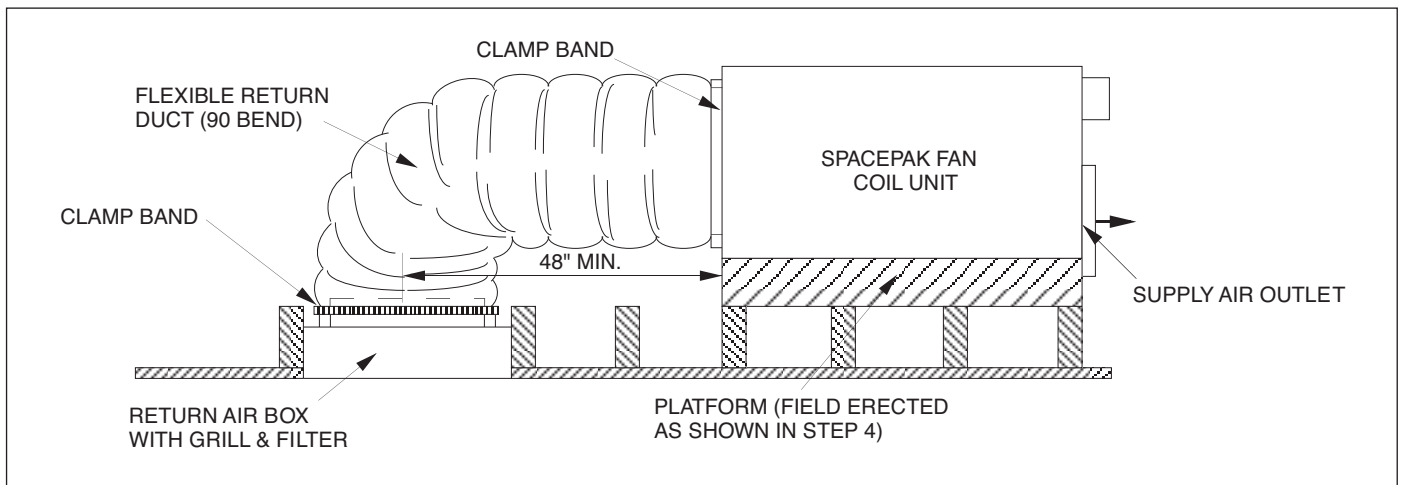
**FIGURE 2.2: UNIT DIMENSIONS AND CLEARANCES (inches)**



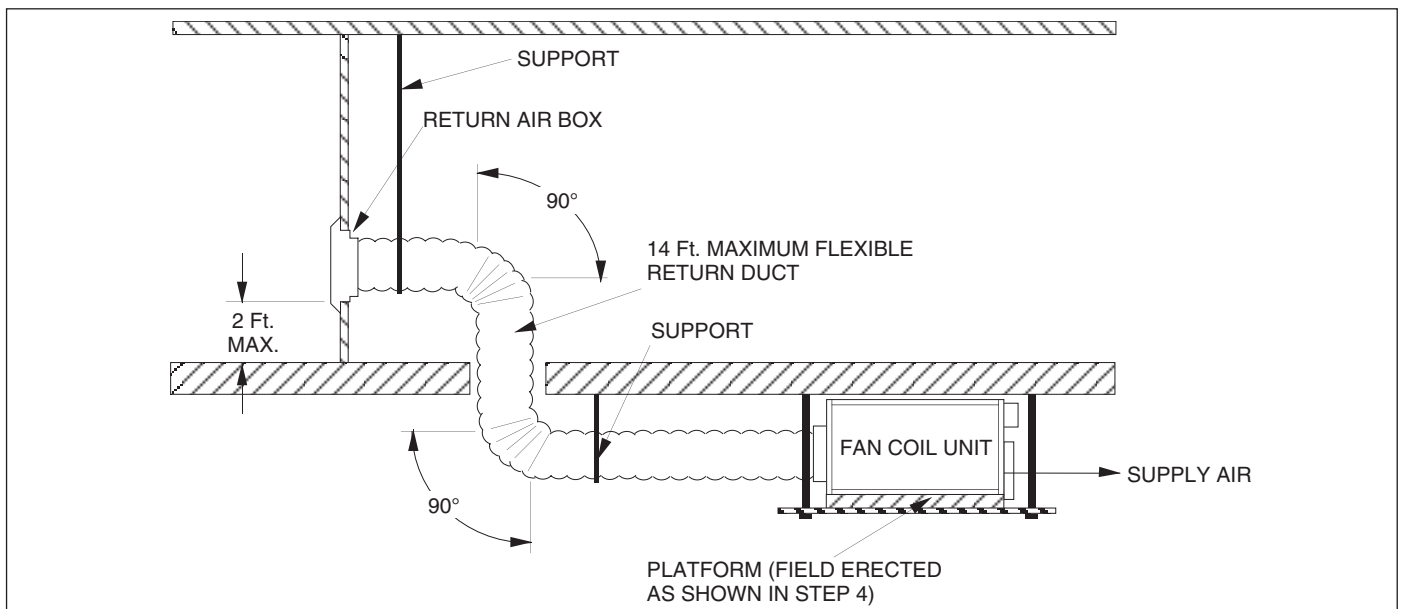
**FIGURE 2.3: CONNECTION LOCATIONS AND ASSEMBLED PLENUM ADAPTOR DIMENSIONS**



**FIGURE 2.4: TYPICAL UNIT INSTALLATION**



**FIGURE 2.5: HORIZONTAL AIR FLOW UNIT INSTALLATION**



## 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 14-1/2" wide by the "A" dimension (Figure 2.6) of appropriate unit size. These openings will accommodate the return air box with sufficient frame lip to cover the opening (see Figure 2.6).

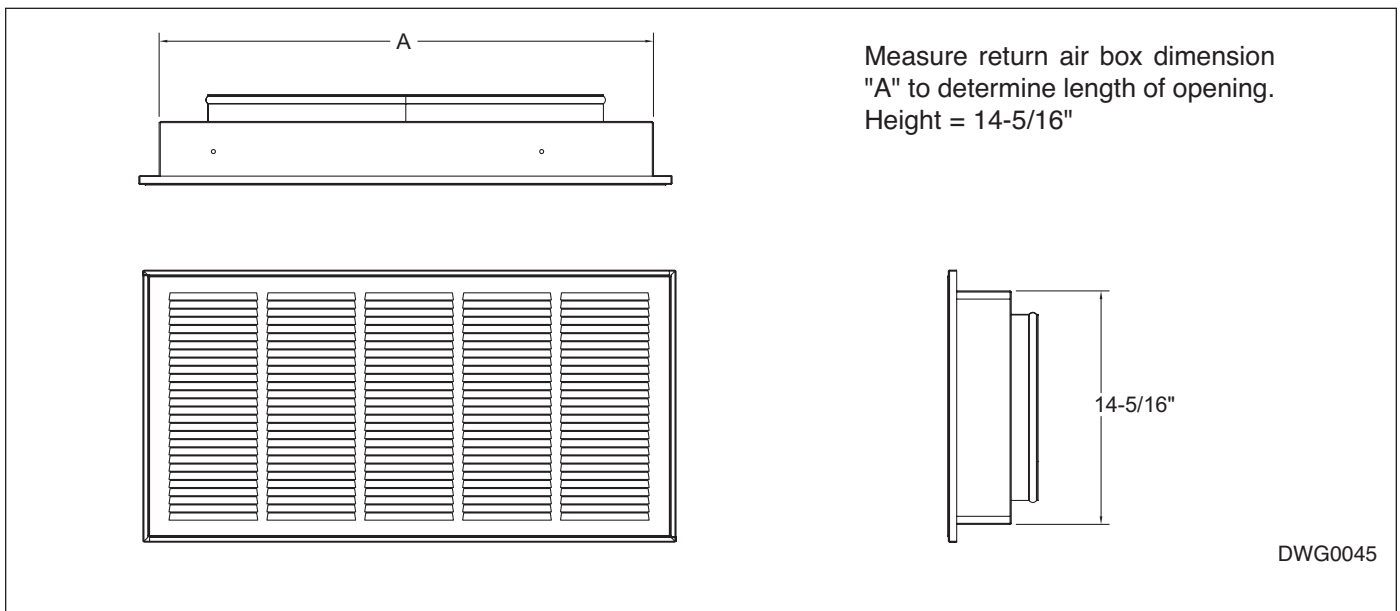
**NOTICE:** The return air adapter may need to be removed from the unit to fit through the opening cut-out.

If joists are on 16" centers, the 14-1/2" 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 according to the same dimensions. 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 2.6: RETURN AIR BOX FRAME DIMENSIONS**



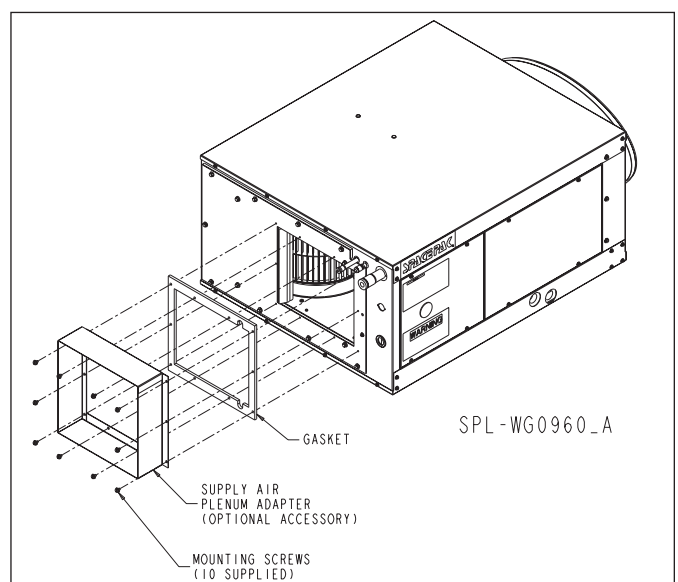
## Step 3: Attaching Supply Air Plenum Adaptor

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

### A. HORIZONTAL DISCHARGE:

Refer to Figure 2.6A and duct installation instructions supplied with fan coil unit.

**FIGURE 2.6A**



## Step 4: Setting the Unit

Construct a platform for the fan coil unit, as shown in Figure 2.8. The platform can be constructed of 2 x 4 x 4 (minimum), 2 x 6, 2 x 8 and 2 x 10 lumber, as necessary to achieve proper pitch of 1/4" per foot for the condensate drain line. Figure 2.7 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 Figure 2.8.

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: Allow 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 box. **DO NOT** let the supply air plenum 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.

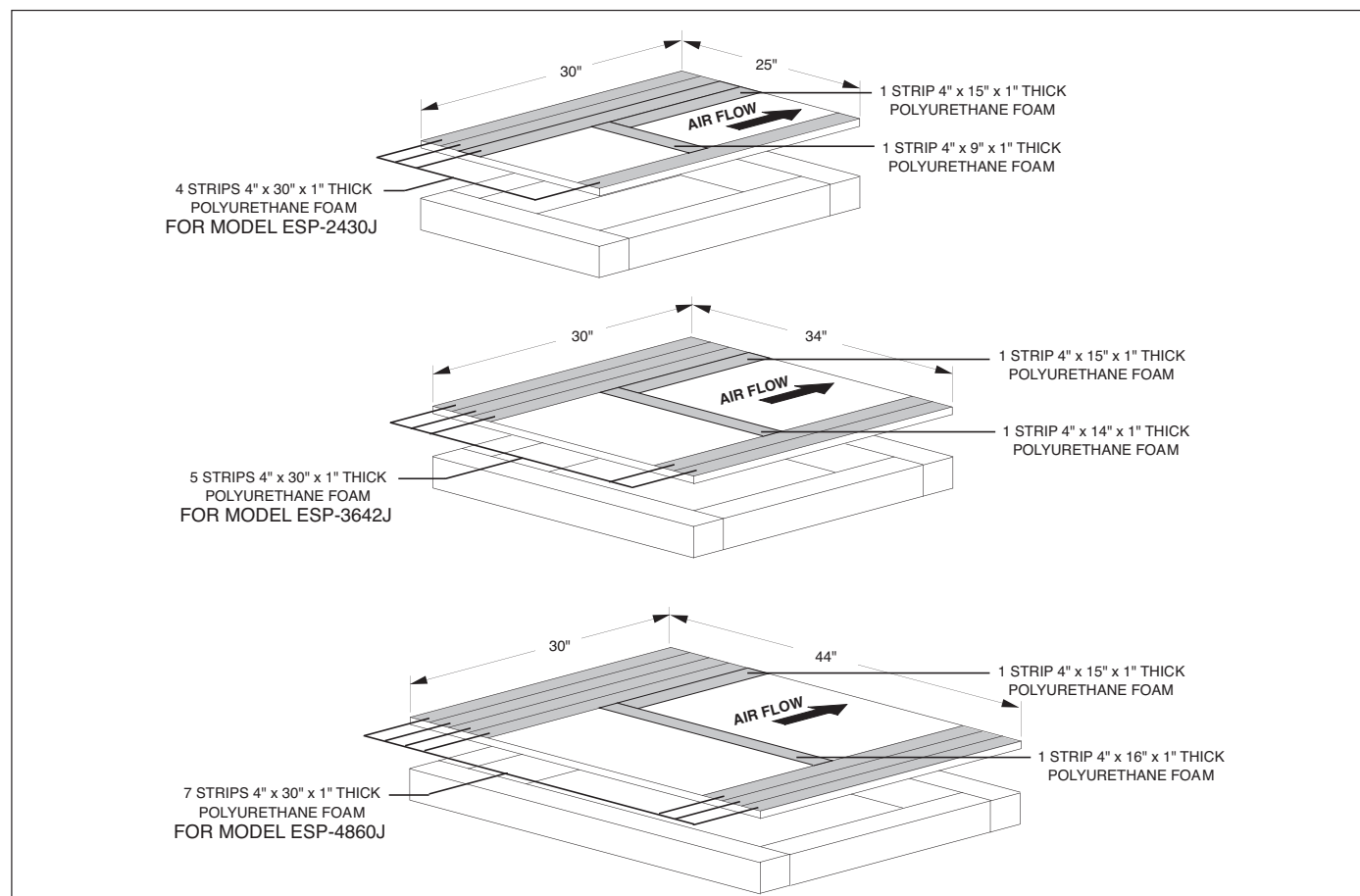
## Step 5: Connecting Refrigerant Lines

Connect refrigerant lines from the outdoor condensing unit to the fan coil unit in accordance with its manufacturer's sizing recommendations for the length of the piping run. Proper line sizing is critical to the operation of the system. Always use proper brazing procedures. A trickle flow (2PSI) of dry nitrogen to avoid scale or blockage in the piping system is recommended while brazing. SpacePak also recommends installing a sight glass on the liquid line outside of the unit as an aid for accurately charging the system.

**FIGURE 2.7: CONDENSATE PIPING RUNS**

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

**FIGURE 2.8: MOUNTING PLATFORMS SHOWN WITH VIBRATION ISOLATION STRIPS**



## Step 6: Installing the Condensate Trap & Line

**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.

Refer to Figure 2.2 for primary and secondary condensate drain locations. Components for the PVC condensate trap are provided in a separate bag with fan coil unit (see Figure 2.9) and should be cemented together with PVC pipe cement.

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

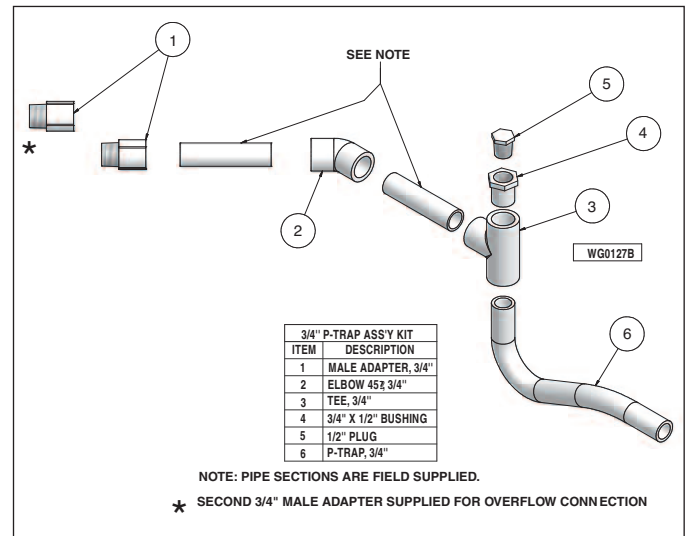
Thread male adapter (see Figure 2.9) into unit's primary condensate drain connection. Assemble and cement remaining components together. Then cement assembly to male adapter. The 45° elbow provides an offset from beneath unit suction line for access to clean-out plug.

Run a condensate line from the trap to a suitable drain that's in accordance with local codes. Make sure the line is pitched 1/4" per foot.

**NOTICE:** The secondary drain connection requires field supplied components to complete installation. Follow local code requirements.

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

FIGURE 2.9: CONDENSATE TRAP ASSEMBLY



## Step 7: 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. Standard wiring diagram is provided in Figure 2.10. Optional wiring diagrams are provided in Figures 2.11-2.14. A separate 230/60/1 power supply is recommended for the unit. Use standard 15-amp circuit breaker and 14-gauge wire from power supply to unit.

Connect power supply to Terminals L1 and L2 on the high voltage terminal block. Connect a ground wire to the equipment ground terminal located next to the high voltage terminal block.

Locate the room thermostat on a wall near the return air box, between 40" to 48" from the floor. Connect the low-voltage thermostat wiring from the room thermostat to the low voltage control block in the unit.

Connect low voltage from air handler to condensing unit as shown in figure 2.10.

Set DIP switches according to application. See page 16, SpacePak J Series Control DIP switch settings.

**Alternately, the unit may be configured to run on 115V, 60 Hz power. Refer to kit WG0858 for instructions and material to convert from 230V to 115V shipped with the unit.**

## Step 8: 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 required.

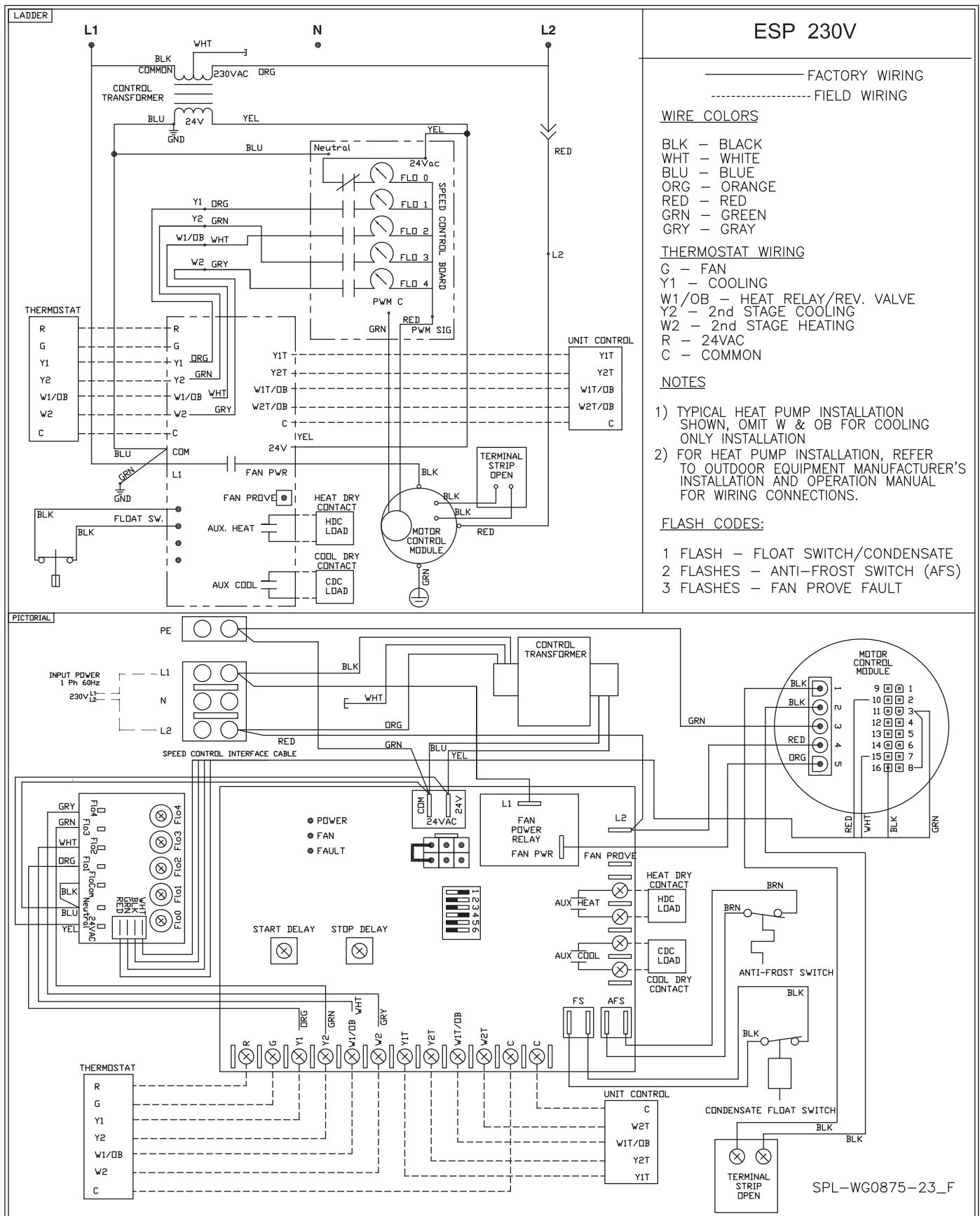
### Plenum Duct Installation

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.

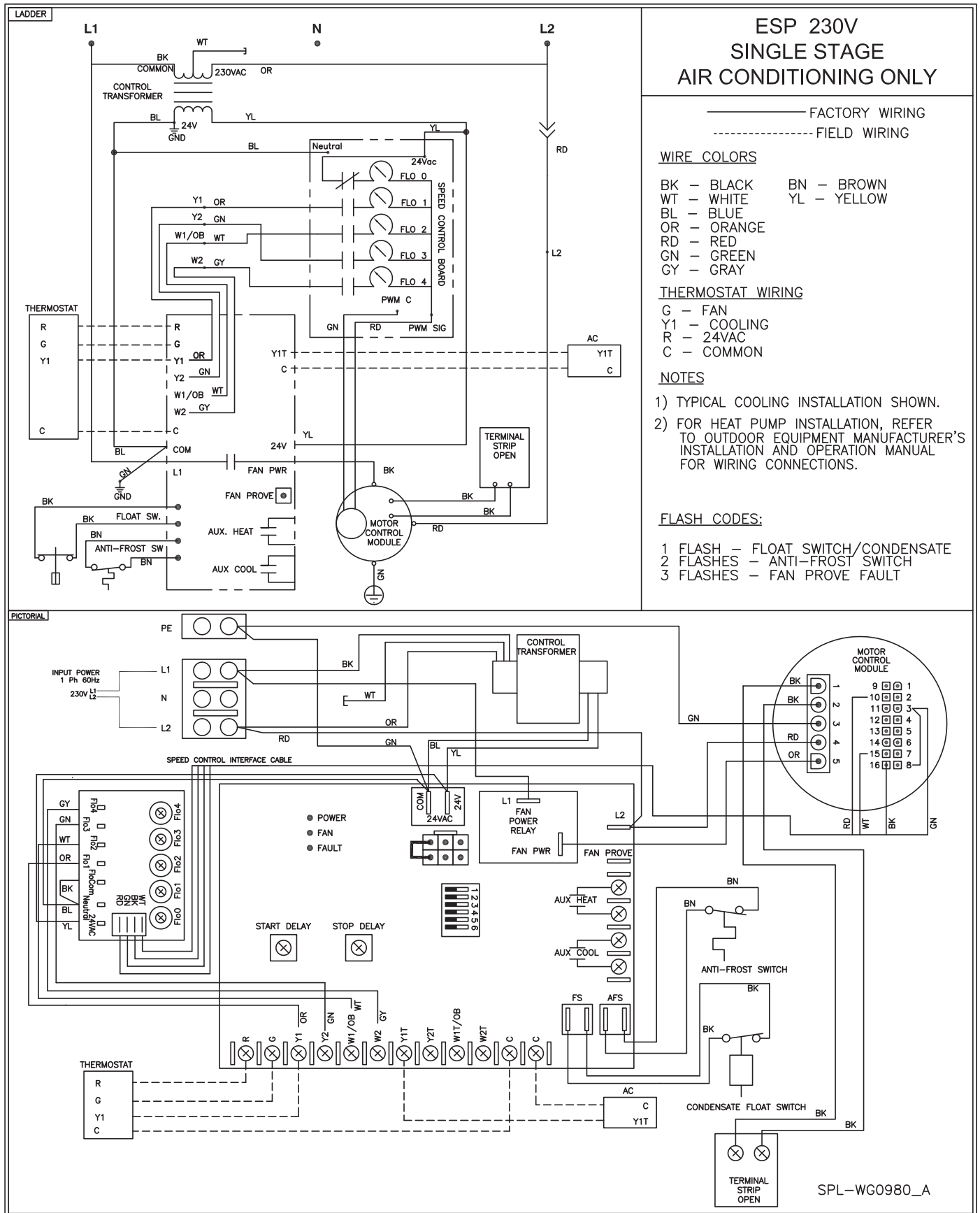
**NOTICE:** Refer to duct installation instructions supplied with fan coil unit or follow manufacturers instructions supplied with other duct system types.

**FIGURE 2.10: MODEL ESP-J 230V STANDARD WIRING DIAGRAM\***

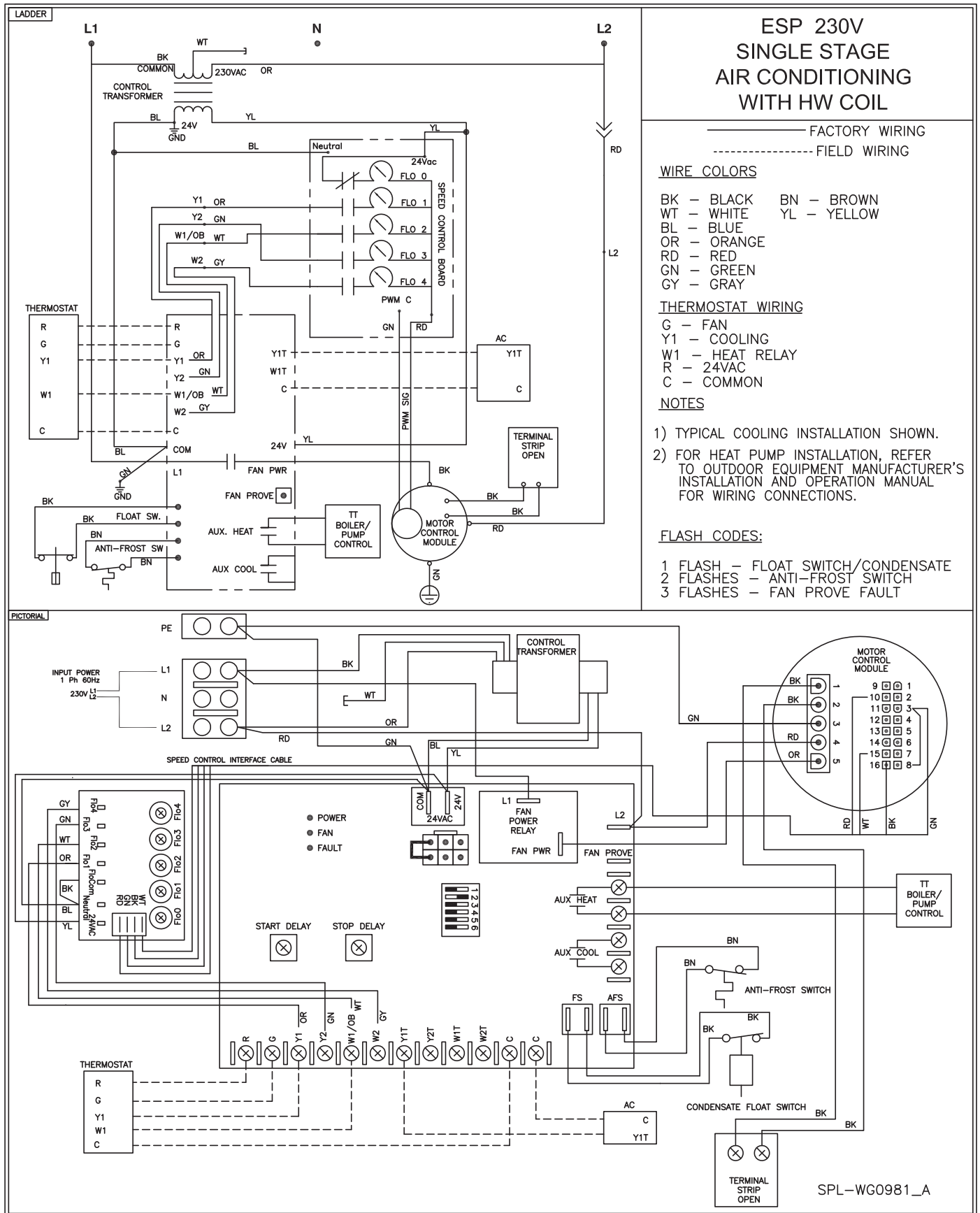


\* For 115V conversion instructions see conversion kit supplied separately with the unit.

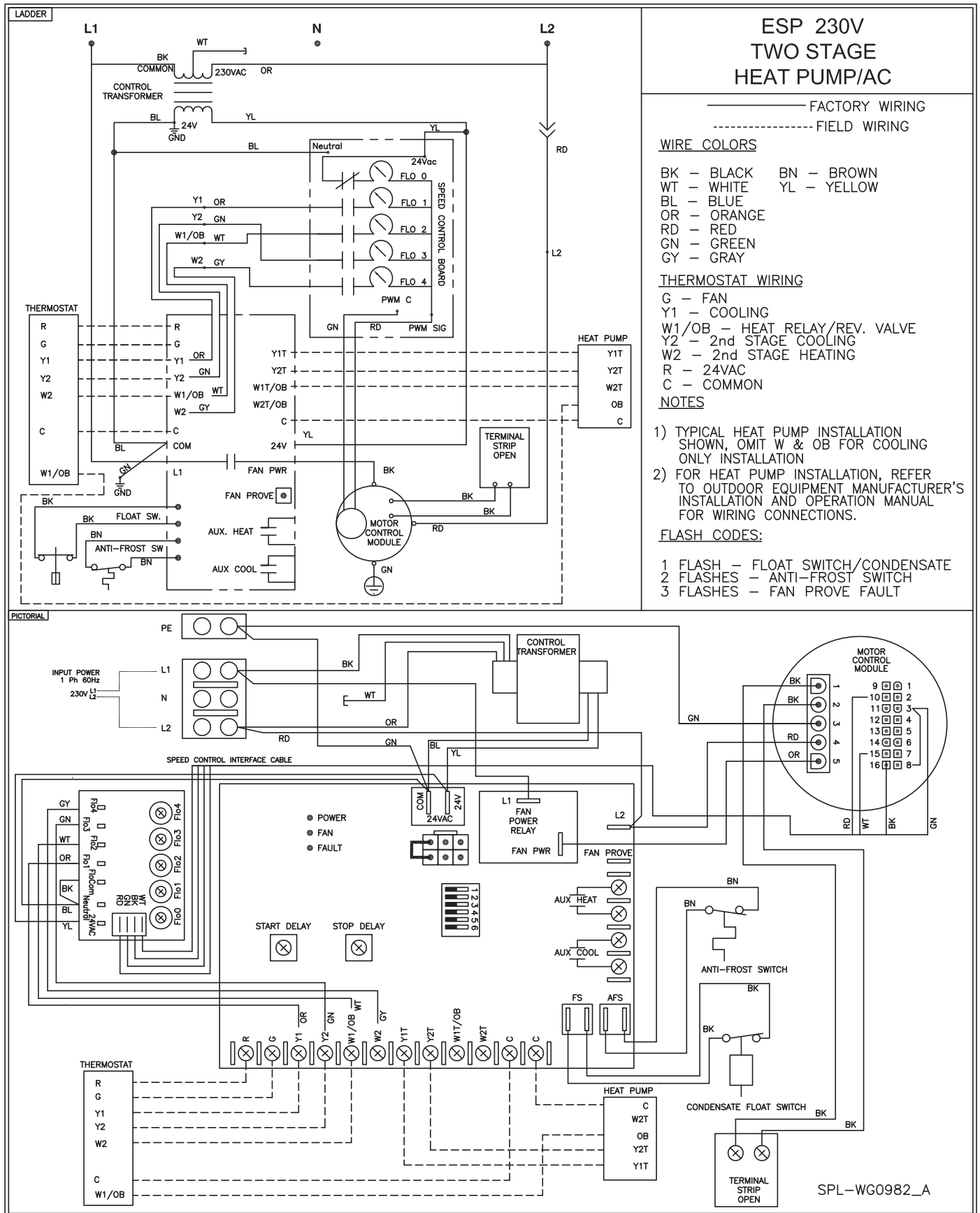
**FIGURE 2.11: SINGLE STAGE AIR CONDITIONING ONLY WIRING DIAGRAM**



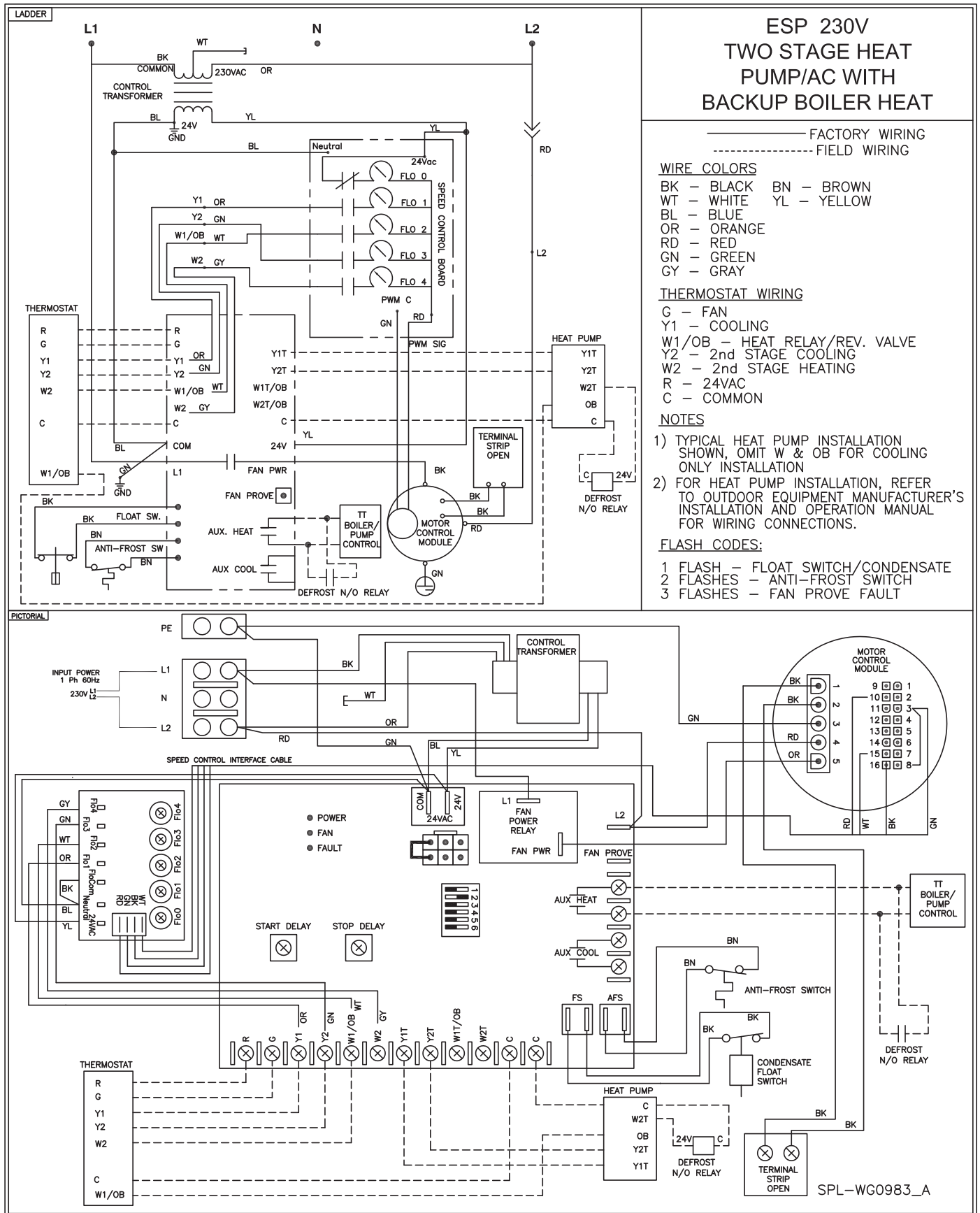
**FIGURE 2.12: SINGLE STAGE AIR CONDITIONING WITH HW COIL WIRING DIAGRAM**

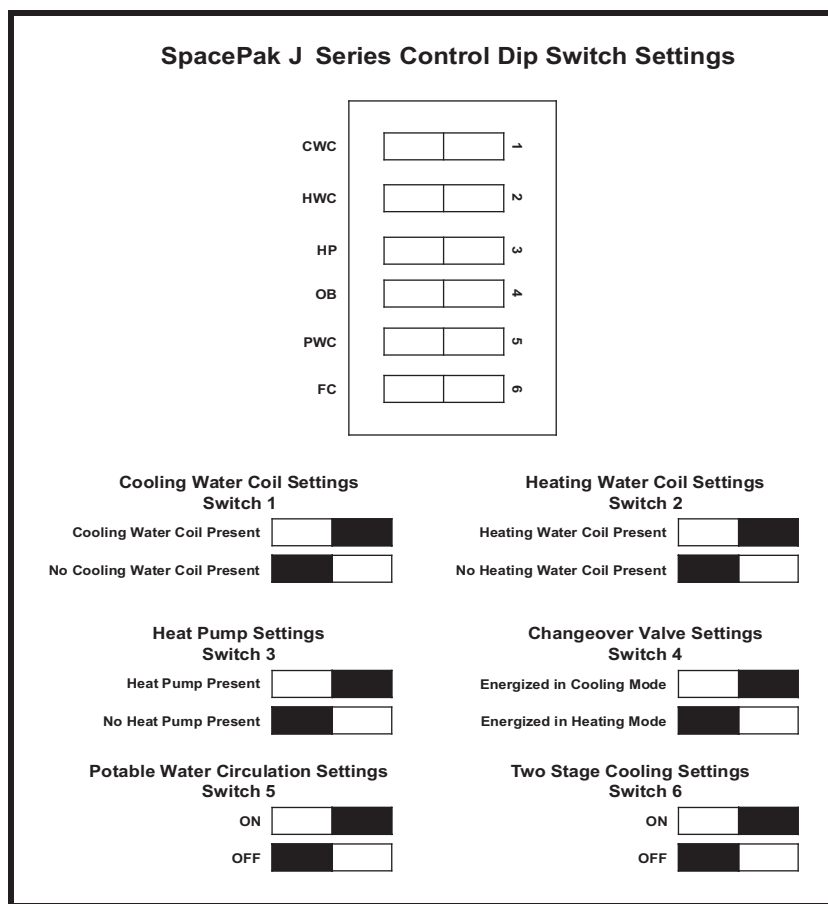


**FIGURE 2.13: TWO STAGE HEAT PUMP/AC WIRING DIAGRAM**

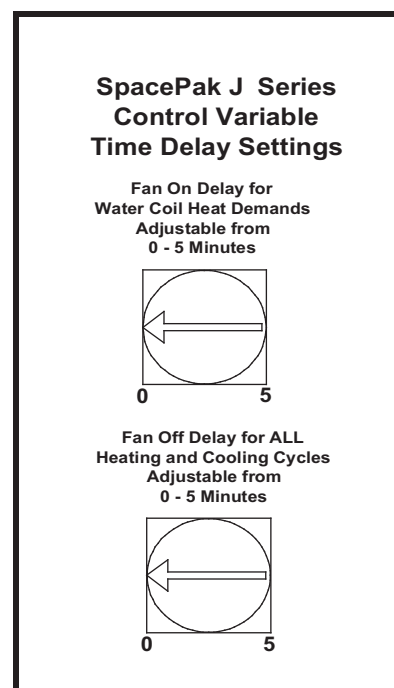


**FIGURE 2.14: TWO STAGE HEAT PUMP/AC WITH BACKUP BOILER HEAT WIRING DIAGRAM**





**FIGURE 2.15: CONTROL DIP SWITCH SETTINGS**



**FIGURE 2.16: CONTROL VARIABLE TIME DELAY SETTINGS**

## SpacePak J Series Control Indicator LEDs

### Power Indicator

The Power indicator will blink to indicate that the control is operational.

### Fan Prove Indicator

The Fan Prove indicator will illuminate when there is power to the fan.

Note: The Fan Prove Terminal will also energize with 24VAC when the above conditions are met.

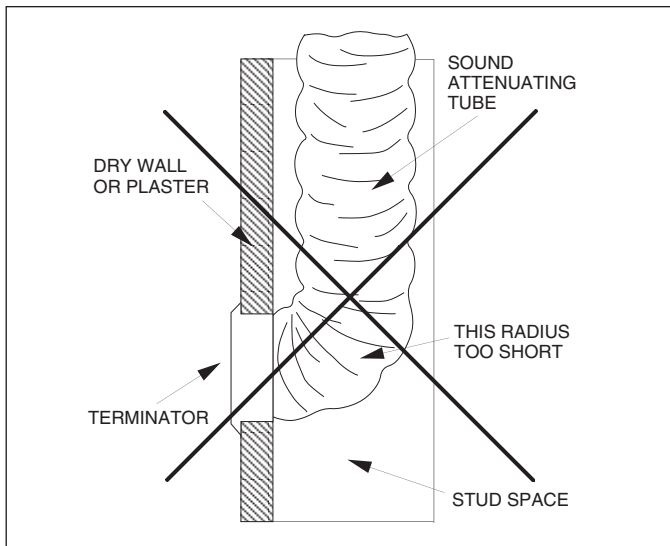
### Fault Indicator

Fault Flash Codes:

Float Switch	1 Flash
Anti-Frost Switch	2 Flashes
Fan Prove Fault	3 Flashes

Note: All Flash Codes are latched until power is cycled, even if the fault is cleared. The Float Switch requires power to be cycled to resume operation.

**FIGURE 2.17: INCORRECT TUBING INSTALLATION**



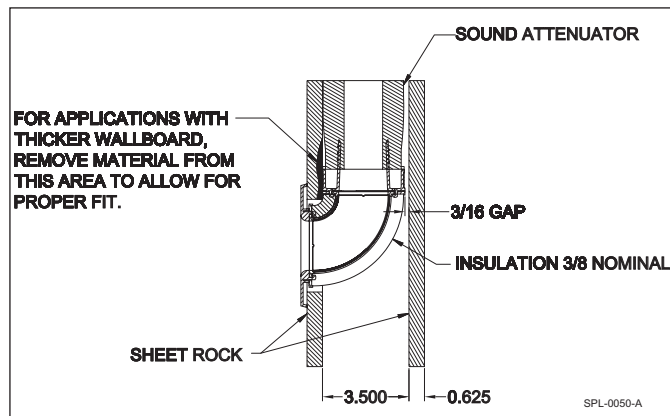
### Room Terminator & Sound Attenuating Tubing Installation

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).

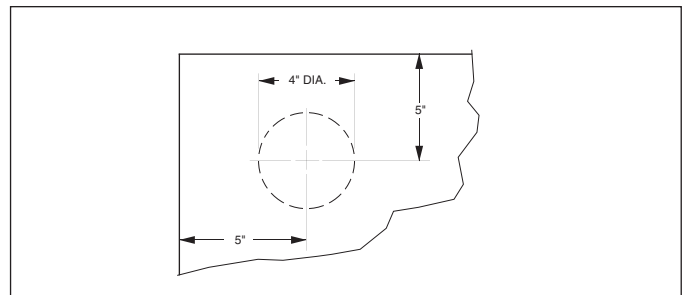
**FIGURE 2.18: INSTALLATION WITH KWIK CONNECT WALL ELBOW**



In marking location for room terminator (see Figure 2.19), the center of the terminator should be approximately 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. Verify there is at least 2" for tubing assembly clearance all around this hole by visual inspection or inserting a bent piece of wire to feel for obstructions. 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.

**FIGURE 2.19: TERMINATOR MEASUREMENTS**



Assemble spring clips to terminator plate with screws provided in installation kit. Tighten clips until they are close to the thickness of the material they are being mounted to.

Assemble the room terminator to the sound attenuating tubing by simply fitting the two pieces together and twisting until tight (see Figure 2.18). 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).

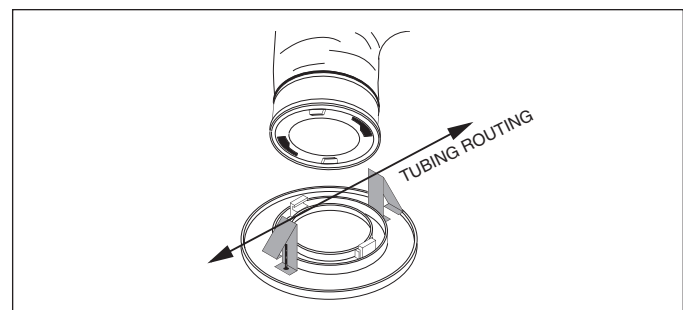
**NOTICE:** Do not shorten sound attenuating tube length. The result would be unacceptable noise.

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**

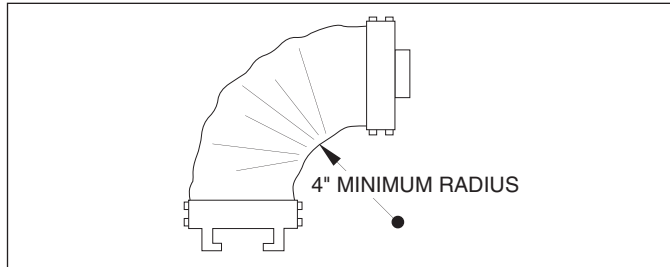


## Supply Tubing Installation

Kwik-connects and balancing orifices are provided in the Installation Kits. Plenum take-offs, gaskets and fasteners are supplied in the separate plenum take-off kit.

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

**FIGURE 2.21: MINIMUM TUBING BEND**



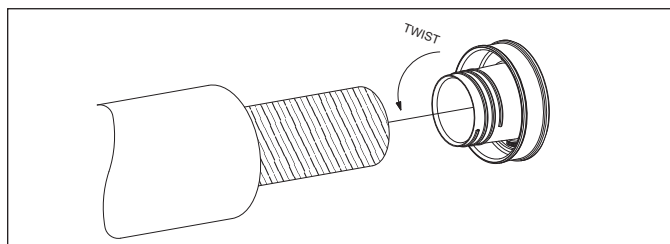
At the plenum, all supply tubing connections must be a minimum of 18" from any plenum tee, plenum elbow or the fan coil unit.

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.

R6 Supply tubing comes in 100-foot sections (R8 tubing comes in 75-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 tube. At the open end of the supply tubing a kwik-connect will be installed (see Figure 2.22). First, push back the cover and the insulation exposing approximately 4" of the inner core. Fold in any tails or frays that may be present after cutting the supply tubing. Second, hand compress the corrugations until they are densely compacted 1-1/2" to 2" from the open end of the supply tube. Third, thread kwik-connect into the inner core until snug. Fourth, pull the insulation and cover forward and tuck it into the deep groove on the back side of the kwik-connect. Fifth, wrap the connection securely with UL181 approved tape.

**FIGURE 2.22: KWIK-CONNECT INSTALLATION**

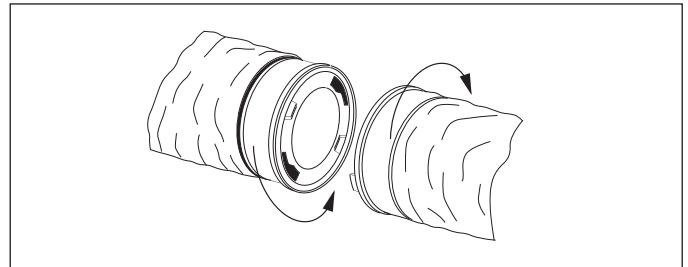


When finished, simply twist together (see Figure 2.23) the kwik-connect on the sound attenuating tube, and wrap the connection securely with tape.

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

To cut a hole in the plenum, refer to duct installation instructions supplied with fan coil unit. Sheet metal duct requires a 2-1/16" hole.

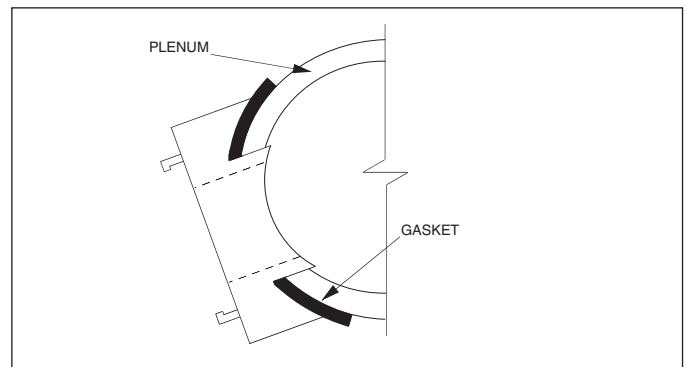
**FIGURE 2.23: CONNECTING TUBING**



Remove the hole cut-out from the plenum. Make sure there is no "flap" left inside plenum that could block hole during operation.

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 2.24).

**FIGURE 2.24: TAKE-OFF INSTALLATION**

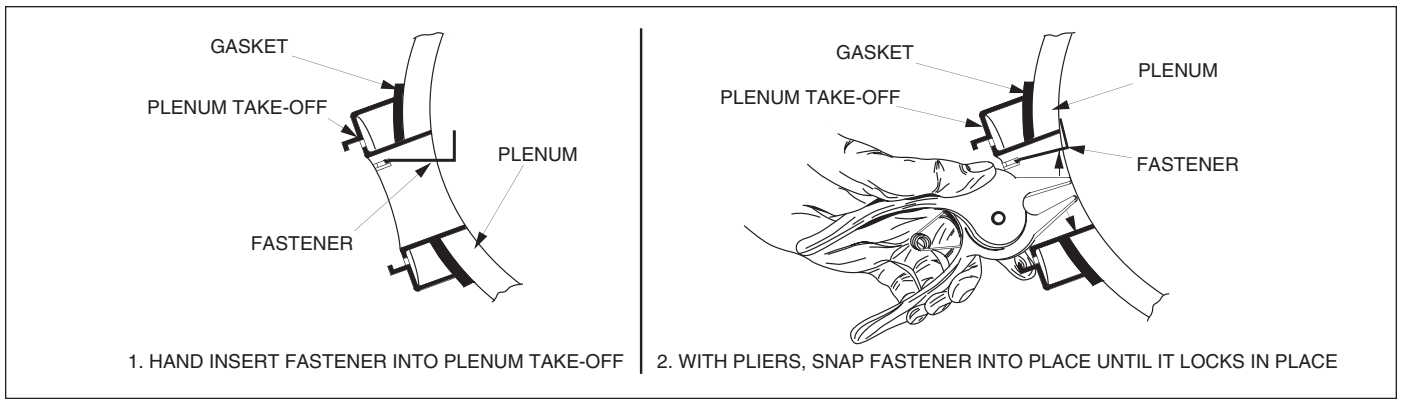


**NOTICE: Gasket must be installed to seal plenum take-off to prevent air leakage.**

Position the plenum take-off to match the curvature of the plenum duct. Hand insert the four plenum take off fasteners one at a time such that each clip reaches the interior of the duct. Using the SpacePak pliers, snap the fasteners into place until they lock in place (see Figure 2.25).

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

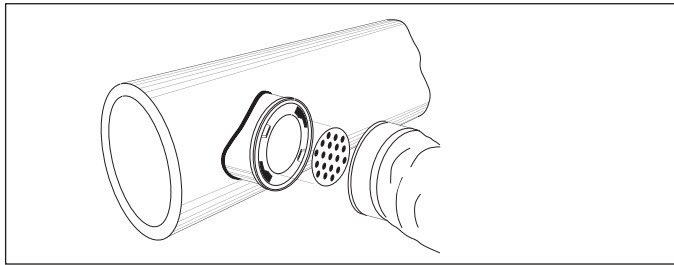
**FIGURE 2.25: PLENUM TAKE-OFF FASTENER INSTALLATION**



In accordance with your calculations as to requirements for balancing orifices, mount the orifice in the outlet of the plenum take-off (see Figure 2.26), 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 2.26: ORIFICE INSTALLATION**

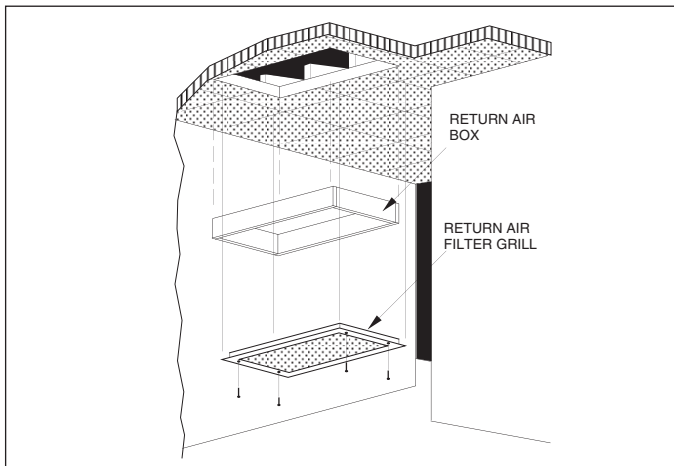


### Return Air Box & Duct Installation

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 2.27).

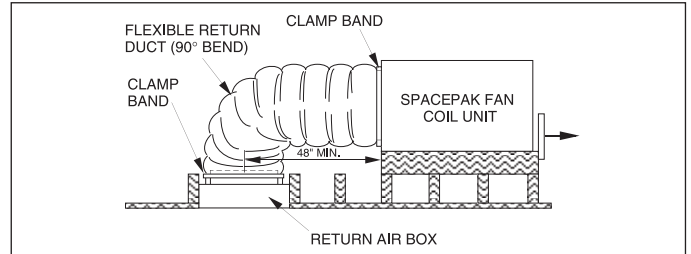
**FIGURE 2.27: RETURN AIR BOX INSTALLATION**



Remove the grill and the filter from the grill frame. Insert the frame into the box and mount in place with the screws provided through a hole at each corner of the frame. Finally, place the air filter into the frame and replace the grill. Turn the latches a quarter turn to lock the grill in place.

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 2.28). 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 2.28).

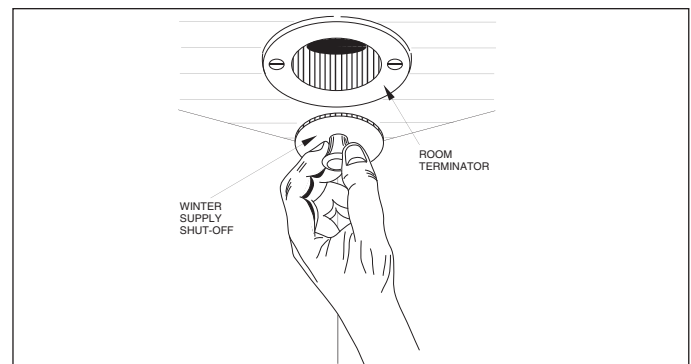
**FIGURE 2.28: RETURN AIR DUCT INSTALLATION**



### Winter Supply Shut-Off Installation

Simply insert winter supply shut-offs into the room terminator openings (see Figure 2.29). 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.

**FIGURE 2.29: WINTER SUPPLY SHUT-OFF**



## Step 9: B & C Series Unit Retrofits

For retrofitting an ESP-J series unit to an existing ESP-B or C series, some modifications will need to be made to the current system. The necessary changes are below and the extent of the changes is dependent upon the model of the unit. (Refer to Figures 2.30 / 2.31 / 2.32)

### ESP-2430 Retrofits

The 7" duct can still be utilized with a transition kit (Part No. BM-6918) available from SpacePak. This kit will reduce the main plenum from 9" to 7" to adapt to the existing 7" duct.

### ESP-3642/4860 Retrofits

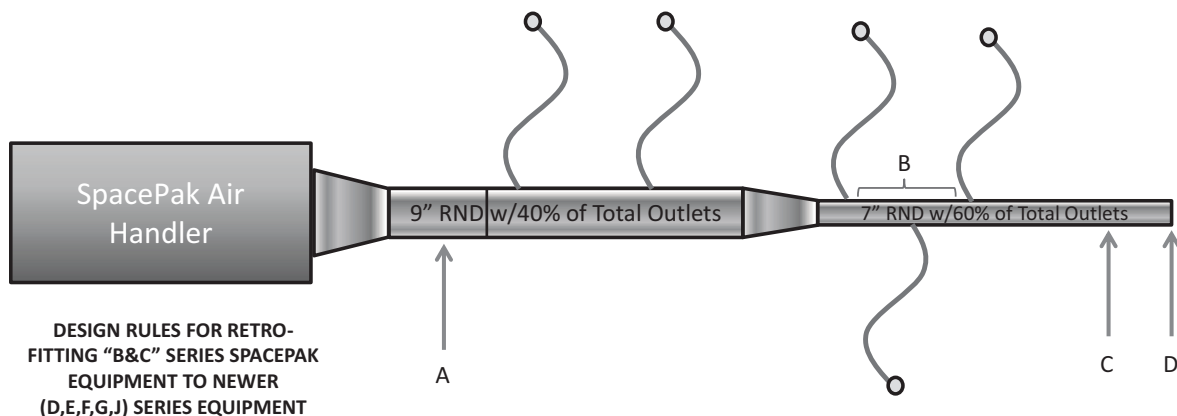
The existing plenum duct, which is typically 7", will need to be replaced with 8" X 8" duct board or field supplied 9" round duct. The return duct and return grille will also have

to be replaced with the proper parts for the replacement model. The reason for this change is the amount of air supplied by current models is 30% higher than the B & C Series models. The existing 7" duct work will reduce the air flow and cause excessive static pressures resulting in lack of performance and could possibly freeze up the coil which will result in compressor failure due to short cycling.

### NOTICE FOR ALL RETROFITS

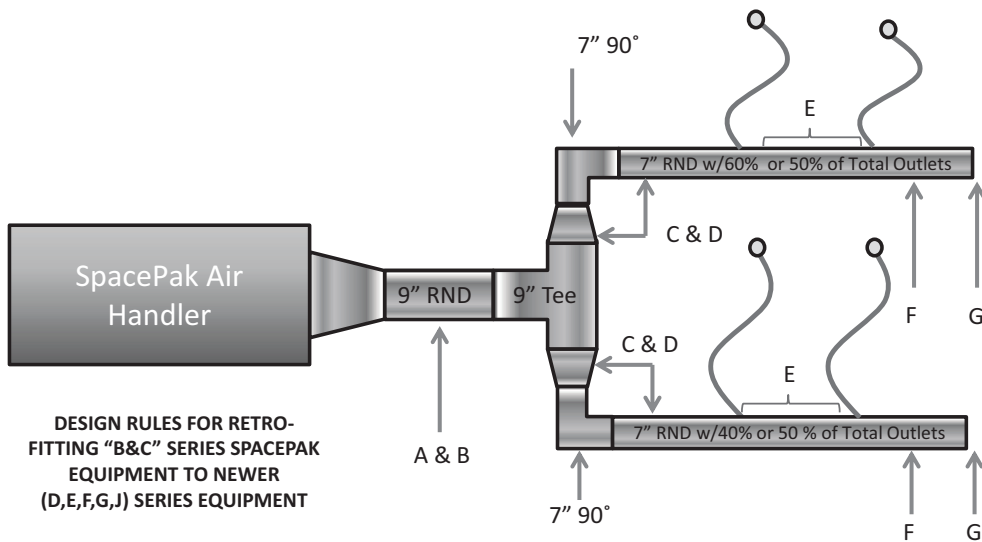
It may be necessary to add outlets to the system. The number of additional outlets will be dependent upon the external static pressure which should be measured with a manometer. This measurement should be between 1.2-1.3" WC. For more details on this test procedure and location for the test, refer to the System Start Up and Adjustment section in this installation manual.

**FIGURE 2.30: STRAIGHT DUCT OR SHOTGUN LAYOUT**



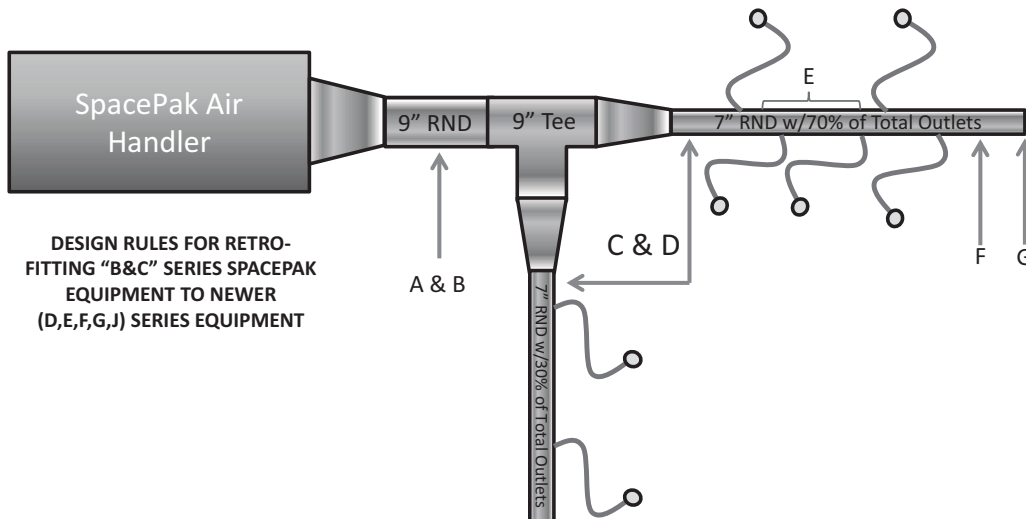
- A: No outlets in the first 18" of straight pipe coming off the Air Handler
- B: Minimum distance between outlets is 6" on center
- C: Minimum distance when placing an outlet from end cap is 12"
- D: NEVER place an outlet in the End Cap

**FIGURE 2.31: HORSESHOE LAYOUT**



- A: Minimum distance from the air handler outlet to first tee or elbow is 18"
- B: No outlets in the first 18" of straight pipe off of the air handler
- C: Minimum distance of straight pipe after any tee or elbow is 18"
- D: Minimum distance when placing outlet after any tee or elbow is 18"
- E: Minimum distance between outlets is 6" on center
- F: Minimum distance when placing an outlet from the end cap is 12"
- G: Never place an outlet in the end cap

**FIGURE 2.32: SIDE BRANCH**



- A: Minimum distance from the air handler outlet to first tee or elbow is 18"
- B: No outlets in the first 18" of straight pipe off of the air handler
- C: Minimum distance of straight pipe after any tee or elbow is 18"
- D: Minimum distance when placing outlet after any tee or elbow is 18"
- E: Minimum distance between outlets is 6" on center
- F: Minimum distance when placing an outlet from the end cap is 12"
- G: Never place an outlet in the end cap

# 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 in approximately 2 minutes. 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.

AUTO position on the thermostat will stop and start your system when the temperature setting is satisfied. The ON position on the thermostat will stop the outdoor unit only when the temperature setting is satisfied and the indoor unit will continue to run, recirculating indoor air.

The fan coil unit is equipped with a protective device called an anti-frost control which will automatically stop the outdoor unit (while the indoor unit continues to run) if ice accumulates on the indoor unit evaporator coil causing abnormal operating conditions. When the accumulated ice has melted, the anti-frost control will restart the outdoor unit.

The fan coil unit is equipped with primary float switch, and the system will automatically shut down if the drain pan is full of water (condensate) and not draining. The system requires service.

## 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.

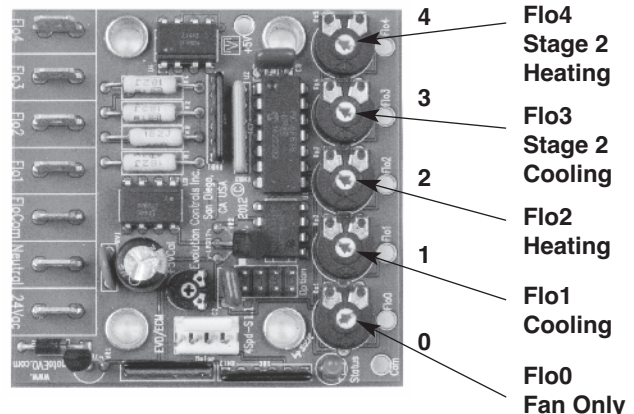
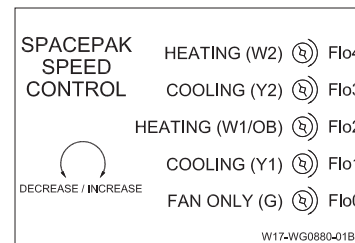
## SYSTEM START-UP & ADJUSTMENTS

1. Place thermostat fan switch in ON position and cooling indicator in OFF position. In about 2 minutes, 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. Measure/adjust blower voltage/speeds
  - a. Remove the control box cover located on the side of the unit.
  - b. With the unit powered and operating from a conventional thermostat, ensure there is no conditioning call (Thermostat is satisfied) and switch the fan control to "Manual" or "On" to create a G call.

**NOTE: IF NO AIRFLOW DURING W OR Y CALL, POTENTIOMETER MAY BE IN "OFF" POSITION. TURN CW TO ACHIEVE AIRFLOW**

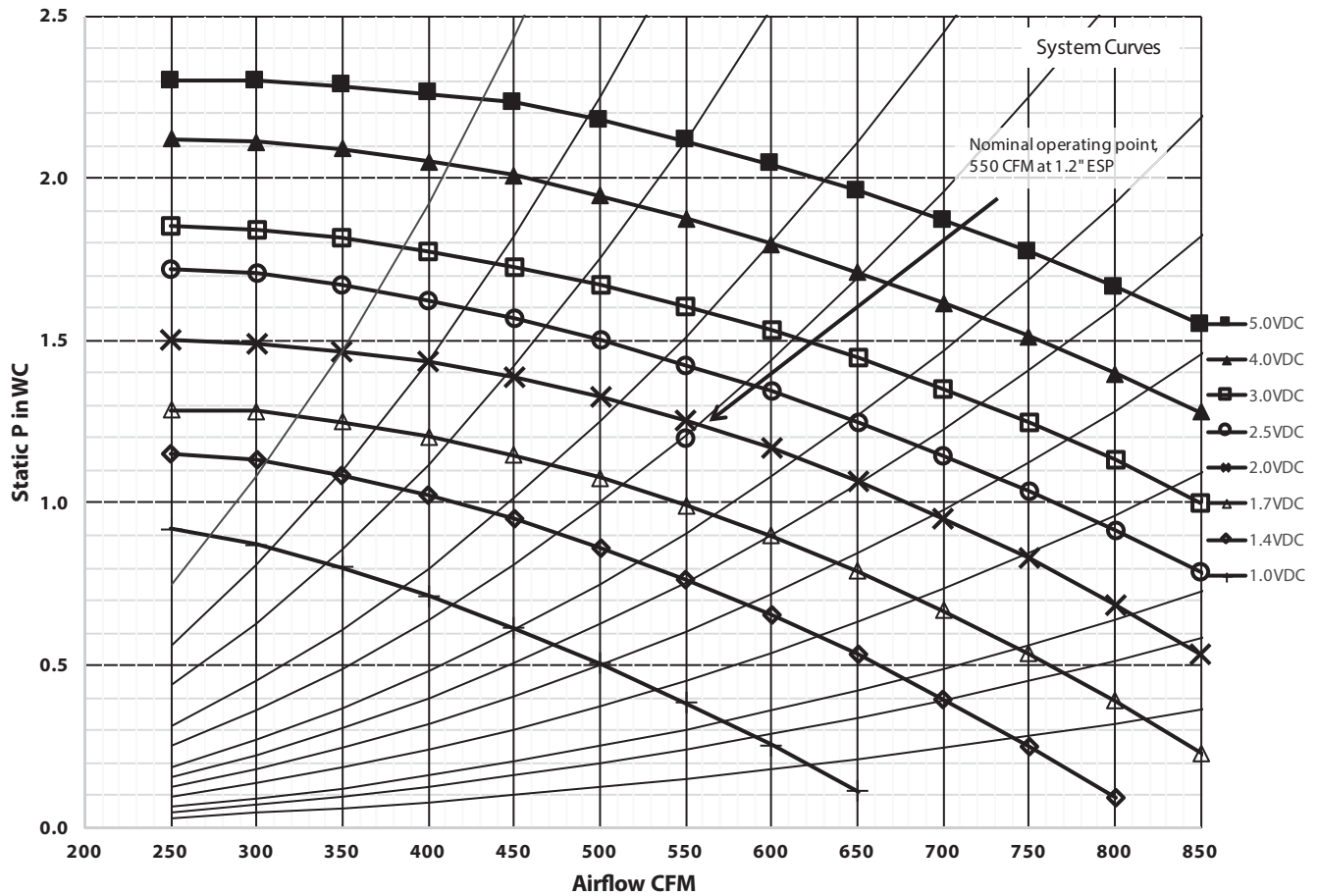
- c. Place the ground/neutral probe in the lower right hole marked "COM" and the volt probe in the hole marked "Flo0" (for fan only, G call) and measure DC volts between 0 and 5V. Adjust the potentiometer adjacent to the "Flo0" to achieve the desired volt reading. Repeat for remaining adjustments marked Flo1 through Flo4 as indicated on the label inside the cover. (Refer to Figure 3)
- d. To determine unit airflow, in CFM, measure the voltage corresponding to the current conditioning call, and measure the external static pressure in the plenum, at least 18" from the unit or nearest transition point. Locate the static pressure on the left side of the charts (Figure 3.2/3.3/3.4) and read across until you reach the curve corresponding to the measured voltage. From the point where this crosses, drop a line straight down to read the airflow at the bottom of the chart. For system settings of 1.2" static pressure, refer to tables in Figures 3.21, 3.31 and 3.41.
- e. To adjust airflow, locate the nearest system curve, and follow parallel to this curve while adjusting the signal voltage to achieve the desired airflow. If the static pressure falls above or below the desired operating range for the given airflow, then the air delivery system must be adjusted. To lower static pressure, provide additional outlets to the system, to raise the static pressure, install restrictor orifices as described in the Installation and Operations Manual.
- f. Replace the speed control cover.

**FIGURE 3: SPEED CONTROL PANEL**



## OPERATING SETPOINTS-2430J

**FIGURE 3.2**  
SpacePak XXX -2430J

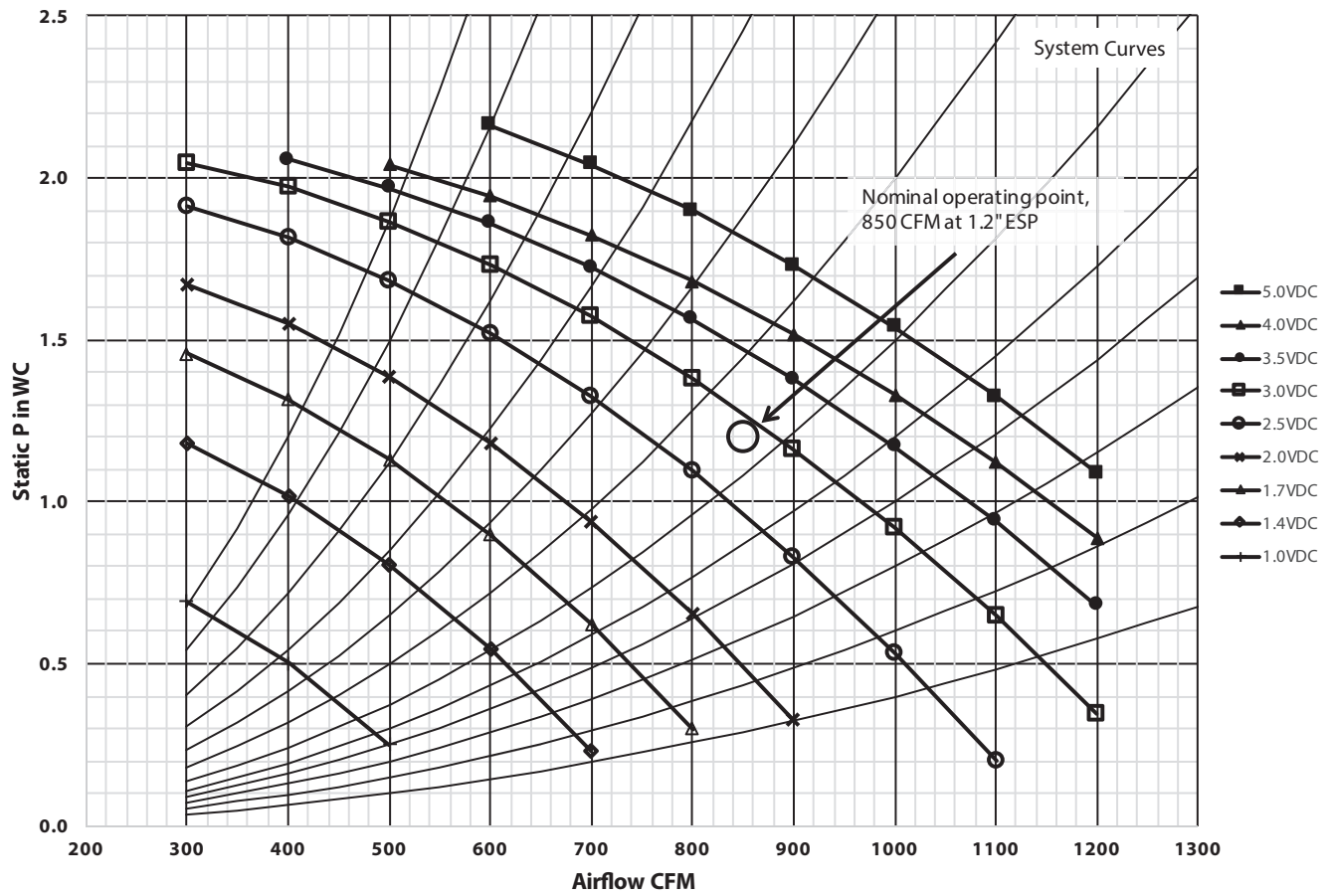


**FIGURE 3.21**

Static P "WC	CFM's @ Speed Control Setting (VDC) -2430								
	5.0V	4.5V	4.0V	3.5V	3.0V	2.5V	2.0V	1.5V	1.0V
2.2	475	380							
2.0	638	547	455	260					
1.8	680	640	600	485	370				
1.6	830	770	710	633	555	420			
1.5		815	755	693	630	500	250		
1.4			800	735	670	565	440		
1.2				825	770	688	580	300	
1.0					850	765	680	460	
0.8						850	760	555	350
0.6							830	650	460

# OPERATING SETPOINTS-3642J

**FIGURE 3.3**  
SpacePak XXX -3642J



**FIGURE 3.31**

Static P "WC	CFM's @ Speed Control Setting (VDC) -3642								
	5.0V	4.5V	4.0V	3.5V	3.0V	2.5V	2.0V	1.5V	1.0V
2.2	520								
2.0	730	635	540	460	380				
1.8	860	795	730	640	550	410			
1.6	970	910	850	800	695	550	360		
1.5	1,020	965	910	830	740	610	430		
1.4	1,060	1,010	960	890	790	680	490		
1.2	1,150	1,095	1,040	980	880	755	590	340	
1.0	1,230	1,190	1,150	1,095	985	840	680	450	
0.8	1,280	1,260	1,240	1,150	1,080	915	750	580	
0.6	1,310	1,295	1,280	1,230	1,180	980	820	630	300

# OPERATING SETPOINTS-4860J

FIGURE 3.4

SpacePak XXX -4860J

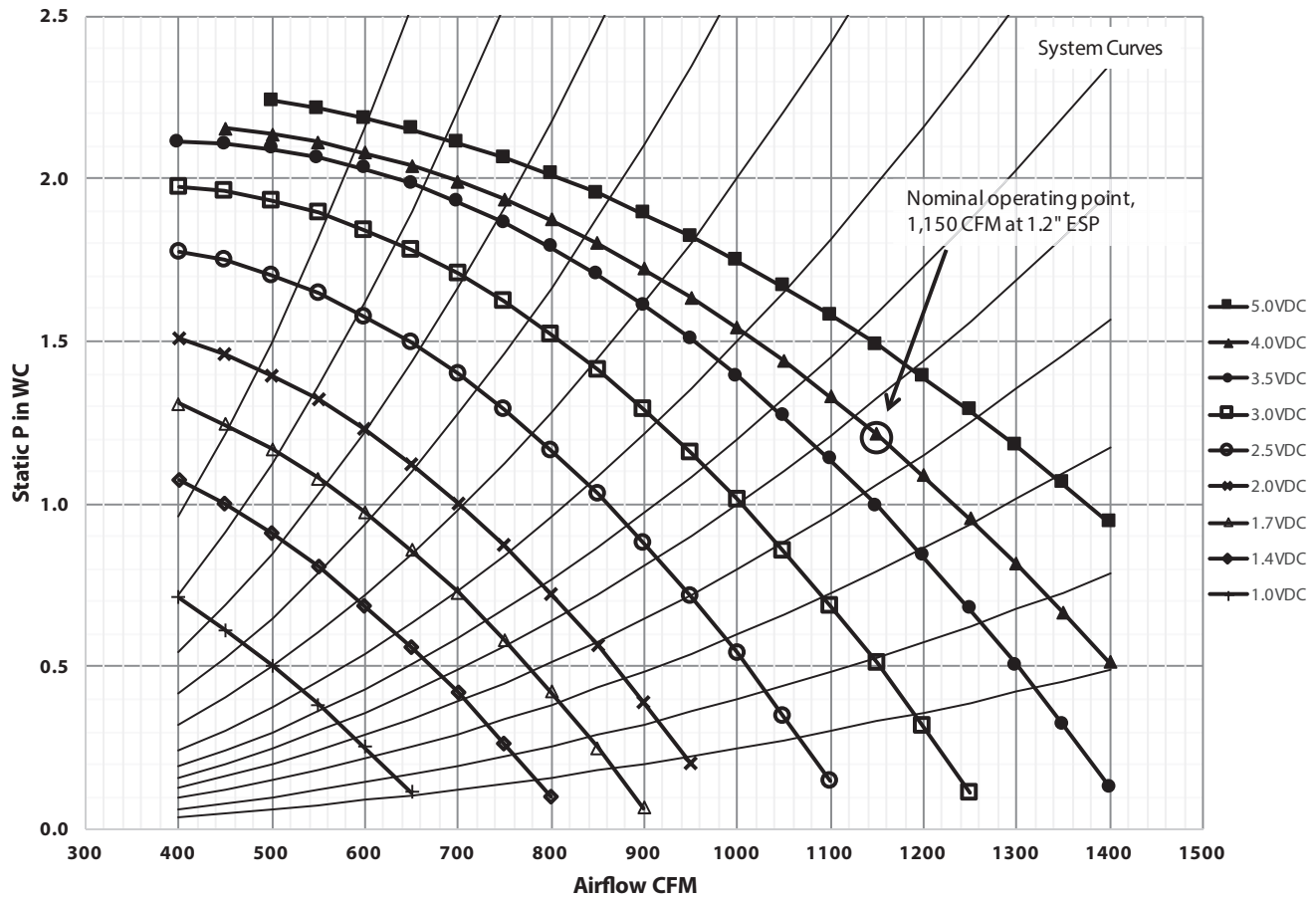


FIGURE 3.41

Static P "WC	CFM's @ Speed Control Setting (VDC) -4860								
	5.0V	4.5V	4.0V	3.5V	3.0V	2.5V	2.0V	1.5V	1.0V
2.2	520								
2.0	760	728	695	625					
1.8	920	885	850	800	630				
1.6	1,040	1,005	970	900	760	585			
1.5	1,100	1,060	1,020	950	810	650	400		
1.4	1,145	1,108	1,070	1,000	860	700	500		
1.2	1,240	1,195	1,150	1,080	940	785	640		
1.0	1,325	1,280	1,235	1,140	1,005	860	705	500	
0.8	1,410	1,355	1,300	1,215	1,070	925	775	590	300
0.6	1,470	1,420	1,370	1,275	1,120	985	840	675	450

5. Check that system static pressure is within acceptable limits (minimum 1.2" WC - ,maximum 1.3" WC). You can use a U-tube manometer to check the external static pressure on the duct system.

1. Puncture a 1/4" diameter hole in the plenum duct at least 18" from the fan coil unit.
2. Insert the high-side manometer tube into the hole so that the end is approximately flush with the inside wall of the plenum, and perpendicular to the direction of airflow.
3. System static pressure should be between 1.2" and 1.3" WC.
  - a. If the pressure is higher than 1.2" provide additional supply runs to increase airflow or lower the fan speed by turning the fan speed adjustment for the current mode of operation counter-clockwise to reduce the static pressure.
  - b. If the pressure is lower than 1.2", look for leaks in the supply plenum, restrictions in the return system (including clogged filters) If more than the recommended number of supply runs are installed, you may install flow restrictors (orifices) in these runs. If the number of runs is appropriate for the load, increase the static pressure by turning fan speed adjustment for the current mode of operation clockwise to increase the static pressure.

6. 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.

7. 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.

8. For outdoor unit start-up, follow manufacturer's instructions.

9. Check that temperature drop across evaporator coil in the indoor unit is between 20°F to 28°F.

**NOTICE: Do not introduce refrigerant liquid to system through suction port. Liquid in the suction line may damage the compressor.**

**NOTICE: Before adding refrigerant to system verify Item #5 in "System Start-up & Adjustment" section has been performed.**

10. Verify that system refrigerant is correct by measuring subcooling at liquid service port. Subcooling should be in accordance with outdoor unit manufacturers recommendations..

11. Check the super heat leaving the evaporator coil against the corresponding suction pressure from the schrader fitting at the fan coil unit. Superheat value should be between 9°F and 12°F.

12. If a sight glass has been installed on the liquid line at the air handler check for the presence of flashing. If flashing is occurring, check and adjust subcooling by adding refrigerant.

## CHARGING COOLING ONLY SYSTEMS

After start-up, allow the system to operate for approximately 30 minutes in order to establish stable operating conditions. Check that the temperature drop across the evaporator coil is 20°F to 30°F. Do not attempt to adjust the charge at ambient temperatures below 65°F.

Verify and adjust refrigerant charge based upon outdoor unit manufacturer's published recommendations.

**▲ CAUTION** Releasing refrigerant gas into the atmosphere is a criminal offense.

## 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 3.5.

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

2. For systems with average supply tubing lengths of 15 feet or less, use column A. For systems with supply tubing lengths greater than 15 feet, use column B.

**NOTICE: The number of outlets and average length of the supply tubing has a significant effect on the overall system performance. It is highly recommended that the adjustment factors outlined in the SpacePak Application Manual are accounted for prior to any installation.**

B. Orifice Combinations: Should orifices be required to balance the system (installed at plenum take-off), refer to the combinations listed in Figure 3.6.

**FIGURE 3.5**

NOMINAL TONNAGE	MINIMUM RECOMMENDED NUMBER OF FULLY OPEN OUTLETS		
	MODEL	A	B
2	ESP-2430J	12	14
2-1/2	ESP-2430J	15	18
3	ESP-3642J	18	21
3-1/2	ESP-3642J	21	25
4	ESP-4860J	26	28
5	ESP-4860J	30	35

**FIGURE 3.6**

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 3.7 for adjustment factors.

**FIGURE 3.7**

2" SUPPLY TUBING LENGTH ADJUSTMENT FACTOR CHART								
RUN	6'	8'	10'	12'	15'	20'	25'	30'
FACTOR	1.18	1.14	1.11	1.06	1.0	.9	.8	.66

## 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 evaporator 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 outdoor condensing 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 outdoor unit is operating.
  - a. Confirm that compressor and fan are operating properly.
  - b. Confirm voltages to outdoor unit.

### IF FAN AND COMPRESSOR AT OUTDOOR UNIT ARE NOT RUNNING

1. Check Fault Indicator. See Flash Codes, page 12. Float switch fault will stop fan and compressor.
2. Check for tripped circuit breaker or blown fuse at either the main fuse box or at unit disconnect box on or near the condensing unit. Replace blown fuse with same size and type.
3. Review Troubleshooting Guide beginning on page 28 of this manual.

# TROUBLESHOOTING GUIDE

## CONDITION: ESP-J & CONDENSING UNITS RUN, BUT COOLING INSUFFICIENT

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Low Suction Pressure	Check blower motor as described on page 32 in this manual.	If defective, replace motor.
	Check that filter in return air box is clean.	Clean air filter.
	Check system refrigerant charge.	Charge to proper subcooling according to manufacturer's instructions.
	Check for dirty evaporator coil.	Clean evaporator coil.
High Suction Pressure	Check for air bubbles in system refrigerant.	Charge to proper subcooling according to condensing unit manufacturer's instructions. Install sight glass near indoor unit and monitor.
	Check calculated heat gain to be sure that equipment is sized properly.	Take necessary action.
	Check for obstructions near condensing unit which could cause recirculation of air.	Remove obstructions.
Low Head Pressure	Check system refrigerant charge.	Charge to proper subcooling according to condensing unit manufacturer's instructions.
	Check calculated heat gain to be sure that equipment is sized properly.	Take necessary action.
High Head Pressure	Check condenser fan motor according to condensing unit manufacturer's instructions.	If defective, replace fan motor.
	Check for dirty condensing unit coil.	Clean condensing unit coil.
	Check system refrigerant charge.	Charge to proper subcooling according to condensing unit manufacturer's instructions.
	Check for dirty evaporator coil.	Clean evaporator coil.
	Check for obstructions near condensing unit which could cause recirculation of air.	Remove obstructions.
	Check for restricted liquid lines.	Remove restrictions and kinks from lines.
Distribution System Air Leaks	Check all joints in air distribution system.	Make sure all joints are air tight. Verify static pressure as described on page 32 in this manual.

**CONDITION: ESP-J UNIT & CONDENSING UNIT WILL NOT START**

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Thermostat Not Level	Check level of thermostat	If necessary, level thermostat.
Defective Thermostat	With volt meter, check resistance of thermostat contacts.	If resistance, thermostat is O.K. If no resistance, replace thermostat.
Loose Low Voltage Wiring	Check all wiring connections for tightness.	Tighten all loose connections.
Defective Low Voltage Transformer	Check transformer as described on page 32 in this manual.	If defective, replace transformer.
Inadequate Electrical Service	Check electrical service against minimum requirements.	Replace electrical service with adequately sized service.
Flash Code - 1 Flash (Float Switch)	Check drain plan and condensate trap.	Clean condensate trap.

**CONDITION: ESP-J UNIT WILL NOT START, BUT CONDENSING UNIT RUNS**

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Speed Control Adjustments Set to Zero	Remove electrical box cover to access the speed control.	Ensure all five speed control potentiometers are turned clockwise slightly from the zero (fully counter-clockwise) position.
Shorted Or Broken Wiring	Check wiring.	If necessary, repair or replace wiring.
Loose Low or High Voltage Wiring	Check all wiring connections for tightness.	Tighten all loose connections.
Defective Blower Motor	Check motor as described on page 32 in this manual.	If defective, replace motor.

**CONDITION: ESP-J UNIT RUNS, BUT CONDENSING UNIT WILL NOT START**

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Defective Thermostat	With volt meter, check resistance of thermostat contacts.	If resistance, thermostat is O.K. If no resistance, replace thermostat.
Loose Low Or High Voltage Wiring	Check all wiring connections for tightness.	Tighten all loose connections.
Flash Code - 2 Flashes (Anti-Frost Switch)	With volt meter, check for 24v at terminal "AFS".	If no voltage, check coil for ice. If ice is present, check air filter, return air duct & blower motor for air flow.  If no ice on coil, check anti-frost switch for continuity. If no continuity, replace switch.  If 24v, switches are O.K.
Shorted Or Broken Wiring	Check wiring.	If necessary, repair or replace wiring.
Condensing Unit	Check according to manufacturer's instructions.	Repair or replace as directed by manufacturer.

**CONDITION: ESP-J UNIT WILL NOT START, BUT CONDENSING UNIT CYCLES**

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Incorrect Low Voltage Connections	Check low voltage connections against wiring diagram.	Correct low voltage connections.
Loose Low Voltage Connections	Check all wiring connections for tightness.	Tighten all loose connections.
Defective Blower Motor	Check motor as described on page 32 in this manual.	If defective, replace motor.

**CONDITION: ESP-J UNIT CYCLES, BUT CONDENSING UNIT RUNS**

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Blower Motor	Check motor as described on page 32 in this manual.	If defective, replace motor.
	Check motor amps and compare to nameplate ratings.	If excessive, motor may be overloaded. Check supply duct for breaks or leaks.

**CONDITION: ESP-J UNIT RUNS, BUT CONDENSING UNIT CYCLES**

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Flash Code - 2 Flashes (Anti-Frost Switch)	With volt meter, check for 24v at terminal "AFS".	If no voltage, check coil for ice. If ice is present, check air filter, return air duct & blower motor for air flow. If no ice on coil, check anti-frost switch for continuity. If no continuity, replace switch. If 24v, switches are O.K.
Thermostat in Wrong Location	Check that thermostat is in vicinity of return air box.	If necessary, relocate thermostat.
Loose Low Or High Voltage Wiring	Check all wiring connections for tightness.	Tighten all loose connections.
Defective Blower Motor	Check motor as described on page 32 in this manual.	If defective, replace motor.
Condensing Unit	Check according to manufacturer's instructions.	Repair or replace as directed by manufacturer.

**CONDITION: SWEATING AT ESP-J UNIT SUPPLY OUTLET**

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Air Leak At Supply Air Plenum Adaptor	Check taped joint at adaptor.	Tape joint properly.
Insulation at Outlet Not Installed	Check for insulation at outlet.	Install insulation.

**CONDITION: EXCESSIVE NOISE AT TERMINATOR**

POSSIBLE CAUSE	VERIFICATION	SOLUTION
High Supply Air Plenum Static Pressure	Check static pressure as described on page 32 in this manual.	Check for and add flow restrictors as necessary in supply runs.
		If necessary, add additional outlets.
Sound Attenuating Tube Not Installed	Check for installation of sound attenuating tube.	Where necessary, install sound attenuating tube.
Tight Radius In Sound Attenuating Tube Or In Supply Tubing	Check all tubing for tight radius.	Where necessary, correct radius.
Incorrect Supply Tubing Length	Check that all supply tubing runs are 9' minimum (includes 3 ft sound atten. tube).	Where necessary, correct supply tubing length.
Improperly Balanced System	Check that correct size orifices have been installed.	Properly orifice supply tubing runs.

**CONDITION: EXCESSIVE NOISE AT RETURN AIR GRILL**

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Return Air Duct Not Installed Properly	Check for minimum 90° bend in return air duct.	Correct bend in return air duct to minimum 90°.
Dirty Return Air Filter	Remove and inspect.	Clean or replace air filter.

**CONDITION: EXCESSIVE VIBRATION AT ESP-J UNIT**

POSSIBLE CAUSE	VERIFICATION	SOLUTION
Foreign Matter in Blower Wheel	Check for loose or damaged blower wheel.	Replace blower assembly.
Blower Wheel Damaged or Unbalanced	Remove and inspect blower assembly.	Remove any foreign matter and retest fan vibration.

### CHECKING ESP-J BLOWER MOTOR

1. With voltmeter, check for selected voltage at input terminals, L1 to N for 115V, L1 to L2 for 230V. Measured voltage should be  $\pm 10V$  of selected line voltage.
2. Refer to **SYSTEM START-UP AND ADJUSTMENTS** section. Ensure that the operating speed for the current operating mode is adjusted, and none of the speed adjustments are set to "zero" (Fully CCW).
3. Once any time delay has expired, the motor should respond, by ramping up or down at a perceptible rate, when the speed adjustment screw is moved at least  $\frac{1}{4}$  turn.

### CHECK ESP-J LOW VOLTAGE TRANSFORMER

1. Verify that the unit is configured for the selected line voltage connected to the input terminal strip, 120V or 230V. Refer to **STEP: 7 Wiring the Unit**.
2. Measure the input voltage, either 120V **L1** to **N**, or 230V **L1** to **L2**. Input voltage should be within  $\pm 10\%$  of nominal value.
3. If no voltage or voltage outside this range, verify building power supply.
4. If proper voltage is present at the input terminal strip, check transformer secondary voltage for 22-28V across the blue and yellow terminals at the 24VAC terminal strip.
5. If measured voltage is zero, or outside this range, replace the transformer.

### CHECK EXTERNAL STATIC PRESSURE

You can use a U-tube manometer to check the external static pressure on the duct system.

1. Puncture a  $\frac{1}{4}$ " diameter hole in the plenum duct at least 18" from the fan coil unit.
2. Insert the high-side manometer tube into the hole so that the end is approximately flush with the inside wall of the plenum, and perpendicular to the direction of airflow.
3. System static pressure should be between 1.2" and 1.3" WC.
  - a. If the pressure is higher than 1.2" provide additional supply runs to increase airflow or lower the fan speed by turning the fan speed adjustment for the current mode of operation counter-clockwise to reduce the static pressure.
  - b. If the pressure is lower than 1.2", look for leaks in the supply plenum, restrictions in the return system (including clogged filters) If more than the recommended number of supply runs are installed, you may install flow restrictors (orifices) in these runs. If the number of runs is appropriate for the load, increase the static pressure by turning fan speed adjustment for the current mode of operation clockwise to increase the static pressure.



## 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

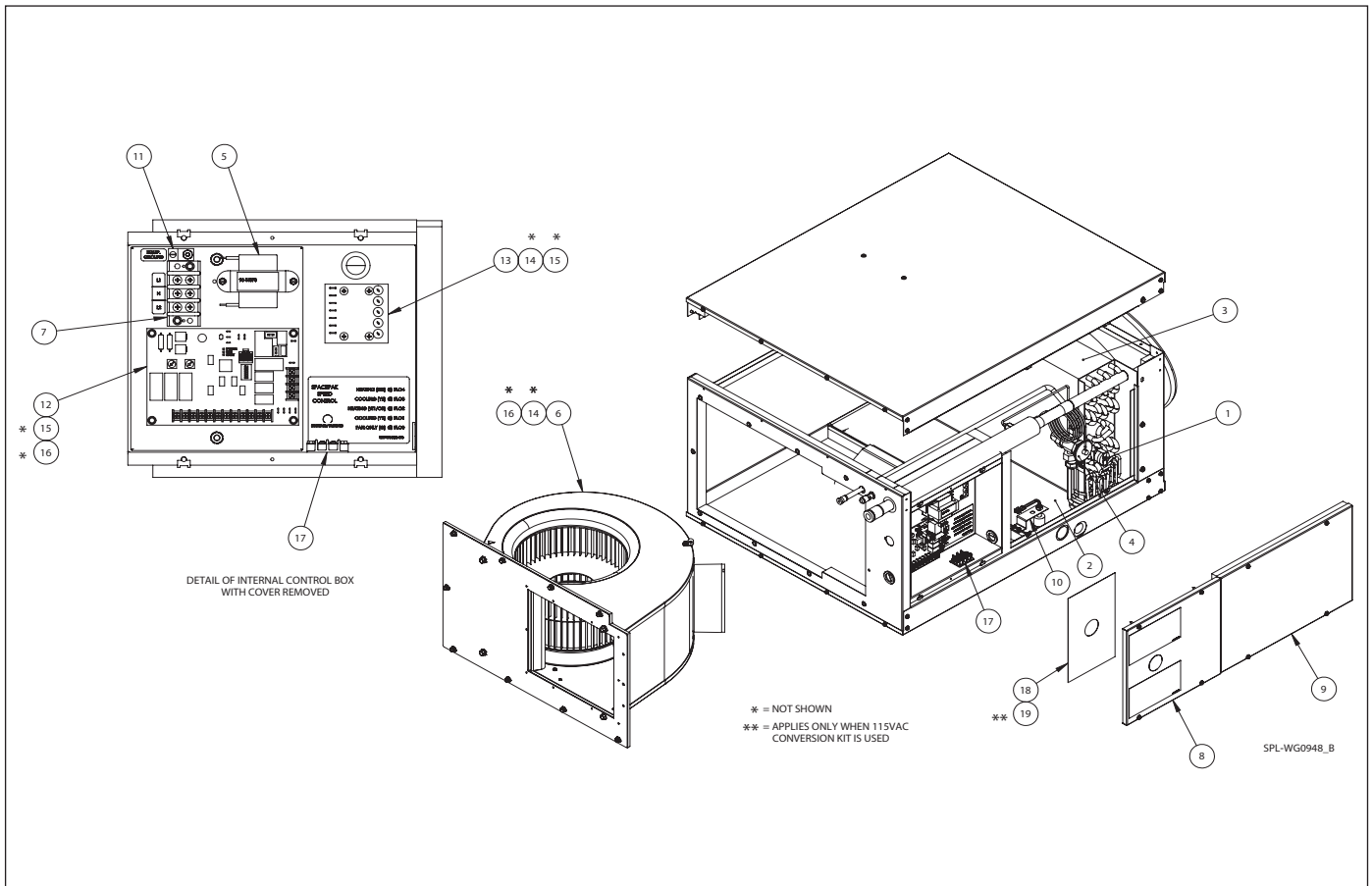
Glycol?: \_\_\_\_\_ (Y/N); % Solution: \_\_\_\_\_

NOTES: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

ITEM	PART DESCRIPTION	UNIT SIZE	PART NUMBER
1	ANTI-FROST SWITCH	ALL SIZES	460RWG0387-01
2	PRIMARY DRAIN PAN	2430J	W06RWG0220-22
		3642J	W06RWG0220-23
		4860J	W06RWG0220-24
3	COIL ASSEMBLY, R410A	2430J	469RWG1003-02
		3642J	469RWG1003-03
		4860J	469RWG1003-04
4	THERMAL EXPANSION VALVE, CHATLEFF CONNECTION	2430J	W28RWG0641-02
		3642J	W28RWG0641-03
		4860J	W28RWG0641-04
5	TRANSFORMER ASSEMBLY	ALL SIZES	460RWG1002-01
6	BLOWER ASSEMBLY	ALL SIZES	W35RWG0802-10
7	TERMINAL BLOCK (HIGH VOLTAGE)	ALL SIZES	W09RWG0422-01
8	ELECTRICAL CONTROL BOX COVER	ALL SIZES	462RWG0913-01
9	SIDE ACCESS PANEL ASSEMBLY (COIL SIDE)	ALL SIZES	462RWG0914-01
10	PRIMARY FLOAT SWITCH	ALL SIZES	455RWG0543-01
11	CABLE CONNECTOR (GROUND)	ALL SIZES	W09RWG0313-01
12	CONTROL BOARD	ALL SIZES	W11RWG0478-01
13	EVO-ECM SPEED CONTROL BOARD	ALL SIZES	W11RWG0806-01
* 14	CABLE, EVO-ECM CONTROL	ALL SIZES	W11RWG0807-01
* 15	SPEED CONTROL HARNESS ASSEMBLY	ALL SIZES	W11RWG0944-01
* 16	MOTOR CONTROL HARNESS ASSEMBLY	ALL SIZES	W11RWG0844-01
17	VOLTAGE SELECT TERMINAL STRIP	ALL SIZES	W11RWG0421-01
18	WIRING DIAGRAM LABEL, 230V	ALL SIZES	W49RWG0875-23
19	WIRING DIAGRAM LABEL, 115V	ALL SIZES	W49RWG0875-12

\* ITEMS NOT SHOWN BUT CONNECTION POINTS ARE INDICATED ON EXPLODED VIEW.

**FIGURE 4.1: MODEL ESP-J GENERAL ASSEMBLY**



## **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.**





IN UNITED STATES: 260 NORTH ELM ST. WESTFIELD, MA 01085 (413) 564-5530/FAX (413) 564-5815  
IN CANADA: 7555 TRANMERE DRIVE, MISSISSAUGA, ONTARIO, L5S 1L4 (905) 670-5888/FAX (905) 670-5782