



INSTALLATION GUIDE & OPERATION MANUAL ASPENPRO R410A CEILING MOUNT AIR HANDLERS

PAT/PET/RET SERIES - HORIZONTAL CEILING MOUNT
ELECTRIC HEAT DX COOL AIR HANDLER
PAS/PES/RES SERIES – UNCASSED CEILING MOUNT
ELECTRIC HEAT DX COOL AIR HANDLER



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1. IMPORTANT SAFETY INSTRUCTIONS

Potential safety hazards are alerted using the following symbols. The symbol is used in conjunction with terms that indicate the intensity of the hazard. It is the responsibility of the owner and the installer to read and comply with the safety information and the instructions accompanying these symbols.



Read the precautions in this manual carefully before operating the unit.



Read the instructions in this manual carefully before operating the unit.



Read the instructions in this manual carefully before servicing the unit.



Read the instructions in this manual carefully before wiring the unit.



Warning or Caution

▲ WARNING

This symbol indicates a potentially hazardous situation, which if not avoided, could result in serious injury, property damage, product damage or death.

▲ CAUTION

This symbol indicates a potentially hazardous situation, which if not avoided, may result in moderate injury or property damage.

▲ WARNING

Certified technicians or those individuals meeting the requirements specified by NATE may use this information. Property and product damage or personal injury hazard may occur without such background.

This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children must be supervised to ensure that they do not play with the appliance.

Product designed and manufactured to permit installation in accordance with local and national building codes. It is the installer's responsibility to ensure that the product is installed in strict compliance with the aforementioned codes. Manufacturer assumes no responsibility for damage (personal, product or property) caused due to installations violating regulations.

▲ WARNING

Disconnect ALL power before servicing or installing this unit. Multiple power sources may be present. Failure to do so may cause property damage, personal injury, or death.

▲ WARNING

This unit is not approved for outdoor installations.

▲ WARNING

HAZARDOUS VOLTAGE!

Failure to follow this warning could result in property damage, severe personal injury, or death.

Disconnect ALL electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized

▲ WARNING

The unit is designed for operation with 208/240 V, single phase, 60 Hz power supply. AspenPro will not be responsible for damages caused due to modification of the unit to operate with alternative power sources.

WARNING

When this unit is installed in an enclosed area, such as a garage or utility room with any Carbon Monoxide producing devices (i.e. automobile, space heater, water heater etc.) ensure that the enclosed area is properly ventilated.

▲ WARNING

This product designed and manufactured to permit installation in accordance with local and national building codes. It is the installer's responsibility to ensure that product is installed in strict compliance with national and local codes. Manufacturer takes no responsibility for damage (personal, product or property) caused due to installations violating regulations. Installation of this unit shall be made in accordance with the National Electric Code, NFPA No. 90A and 90B, and any other local codes or utilities requirements.

▲ WARNING

Do not bypass safety devices.

▲ WARNING

PRESURIZED REFRIGERANT!

Failure to follow this warning could result in personal injury. System contains oil and refrigerant under high pressure. Recover refrigerant before opening the system. Do not use non-approved refrigerants or refrigerant substitutes or refrigerant additives.

▲ WARNING

If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

▲ CAUTION

Only factory authorized kits and accessories should be used when installing or modifying this unit unless it is so noted in these instructions. Some localities may require a licensed installer/service personnel.

▲ WARNING

This product can expose you to chemicals including lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.65Warnings.ca.gov

▲ WARNING

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).

Do not pierce or burn.

Be aware that refrigerants may not contain an odor.

- This appliance shall be installed in accordance with national wiring regulations.
- The space necessary for correct installation of the appliance including the minimum permissible distance to adjacent structures is specified in Section 4 of this manual under "INSTALLATION INSTRUCTIONS AND CLEARANCES".
- For air handlers with supplementary heaters, the minimum clearance from the appliance to combustible surfaces is specified in Section 4 of this manual under "INSTALLATION INSTRUCTIONS AND CLEARANCES", the equipment was tested for 0" clearance.
- A wiring diagram with clear indication of the connections to external control devices and supply cord can be found in Section 16 of this manual.
- The range of external static pressure at which the appliance was tested (add-on heat pumps and ducted appliances with supplementary heaters only) available in Section 11 of this manual.
- The method of connecting the appliance to the electrical supply and interconnection of separate components is detailed in Section 10, LOW VOLTAGE CONNECTIONS and in Section 16, WIRING DIAGRAMS.
- None of the components in this product family are designed or approved to be suitable for outdoor use.
- Refer to Section 13 of this manual for details of Electric Heat Kits that may be used in conjunction with the appliance, field installed heater kit fitting/installation instructions are supplied with the heater kits.

This Air Handler unit is a PARTIAL UNIT AIR CONDITIONER, complying with PARTIAL UNIT requirements of Standard UL 60335-2-40/CSA 22.2 NO. 60335-2-40, and must only be connected to other units that have been confirmed as complying to corresponding PARTIAL UNIT requirements of this Standard.

This appliance is not intended for use at altitudes exceeding 2,000 meters.

2. INTRODUCTION & GENERAL INFORMATION

The P(A,E)S/T & RES/T air handlers are versatile horizontal ceiling mount units. These air handlers have the following standard features:

- **Application Versatility:** Built in mounting tabs for ceiling or furrdown mounting. Louvered ceiling access panel has separate frame that attaches to ceiling joists. Solid access panel available for use with end return installations.

- **Motor:** The (PES/T & RES/T) Air Handlers are equipped with constant torque ECM speeds and torques are controlled by software embedded in the motor to maintain constant torque. Motors are pre-programmed at the factory. The (PAS/T) are equipped with direct drive multi-speed blowers circulate air quietly and efficiently. Two speed motors allow for precise air volume selection. Motor speeds can be easily selected via motor terminals. Blowers mounted on plates so they can be easily removed for service.
- **Cabinet:** Sturdy, galvanized steel cabinet with knockout for duct return. The cabinet is fully insulated with ½" faced insulation to prevent sweating and mold growth, to encapsulate glass fibers, and to provide excellent R-value. Stick pins ensure insulation remains in place. Less than 2% air leakage from cabinet when tested in accordance with ASHRAE standard 193. The unit must be installed according to AspenPro installation instructions.
- **Modular Electric Heat Kits:** Heat kits available with terminal blocks. Available in 3, 5, 6, 8, & 10 KW. Models with electric heat include sequencers and temperature limit switches for safe, efficient operation. Easily accessible controls for quick service. Disconnect does not protrude through the wall panel.
- **Blower:** Direct drive multi-speed blowers circulate air quietly and efficiently. Motor speeds can be easily selected via motor terminals.
- **Electronic Circuit Board:** Electronic circuit board provides 30 sec. ON/OFF blower time delay extracting more heat/cool from the coil
- **DX Coil:** High efficiency rifled copper tubes/enhanced aluminum fins provide maximum heat transfer. All coils are factory leak tested with two-stage pressure decay and mass spectrometer process then nitrogen pressurized, and factory sealed for maximum reliability. Available with either orifice or TXV metering device. Field-installable TXVs are also available. Galvanized metal drain pans with bottom primary and secondary drain connections. All connections 3/4" FPT. Access door allows for coil cleaning.
- **Warranty:** One-year limited parts warranty.

3. INSPECTION

On receiving the product, visually inspect it for any major shipping related damages. Shipping damages are the carrier's responsibility. Inspect the product labels to verify the model number and options are in accordance with your order. Manufacturer will not accept damage claims for incorrectly shipped product.

Gather all the tools needed for successful installation of the unit prior to beginning the installation.

4. INSTALLATION INSTRUCTIONS & CLEARANCES

The P(A,E)S/T & RES/T series of horizontal ceiling mount air handlers are designed for zero clearance installation on the sides and back.

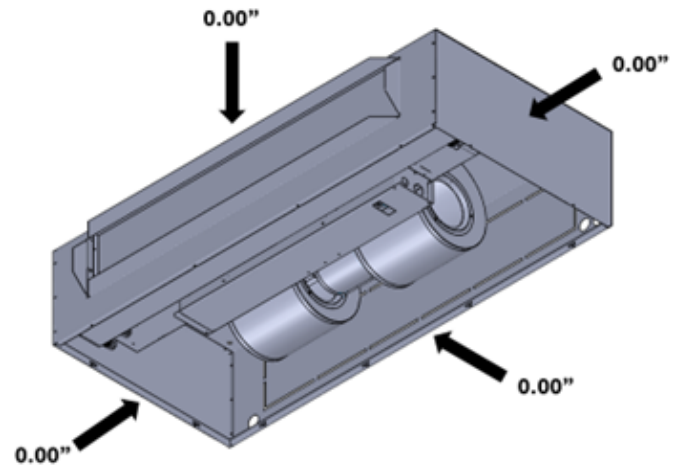


Fig 4.1. Installation Clearance

4.1. Installation Options

If the unit is to be installed in garages, warehouses or other areas where they may be subjected to physical damage, adequate protective barriers must be installed. Unit **MUST** be installed 18" away from source of ignition.

If the unit is located in a high humidity area like attics or unconditioned garage; the air handler casing might experience nuisance sweating. In such installation scenarios, wrapping the casing with a 2" fiberglass insulation with vapor barrier **SHOULD** be used.

4.2. Condensate Drain Preparation

▲ CAUTION

Drain lines from the auxiliary drain pan should **NOT** be connected to the primary drain line of the coil.

The drain lines must be installed with ¼" per foot pitch to provide free drainage. A condensate trap **MUST** be installed on the primary drain line to ensure proper drainage of the condensate. The trap must be installed in the drain line below the bottom of the drain pan (Fig. 4.2)

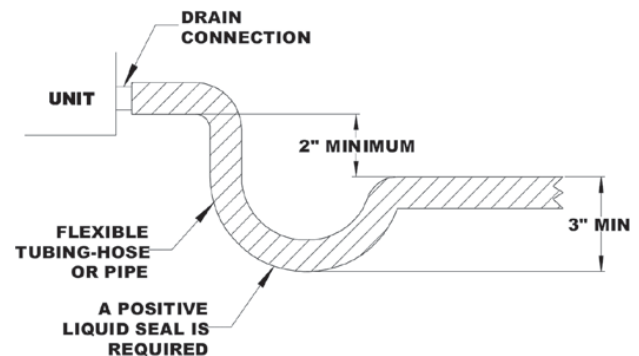


Fig. 4.2 Condensate Drain Trap

▲ CAUTION

Since coil is upstream of the blower, all drains **MUST** be trapped or sealed. Failure to do so will result in condensate overflow from the drain pan. AspenPro will **NOT** be

responsible for any damages resulting from failure to follow these instructions.

▲ CAUTION

If the drain pan is constructed of nylon or plastic; use Teflon tape to connect the drain lines to the threads in the drain pan. DO NOT USE SOLVENT BASED PIPE DOPE. THIS WILL REDUCE THE LIFE OF THE PAN.

The drain pan has primary and secondary drain connections. If a secondary drain line is required, it should be run separately from the primary and should terminate in a highly visible location.

Condensate disposal through the secondary drain line indicates that the primary drain line is plugged and needs cleaning. If a secondary drain line will not be provided, plug the secondary drain. Drain plugs are NOT to be reused without plumbers' tape or putty. Drain line connection should be finger tightened, then turned no more than one complete turn as needed to ensure a firm connection. DO NOT overtighten connection or damage may occur.

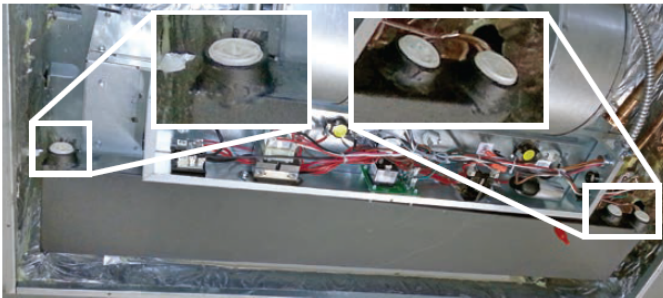


Fig 4.2 Trap Locations

4.2.1 Drain Pan Slope Adjustment

The drain pan can be adjusted up/down and left/right to customize the condensate drainage path using the adjustment screws on both sides of the pan, shown below. Move position 2 to increase pan slope towards drain ports:

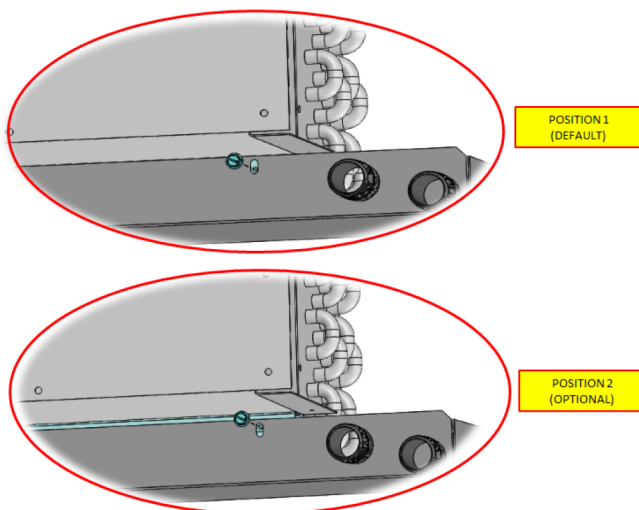


Fig 4.2.1

4.3. Ductwork

Duct systems should be installed in accordance with standards for air-conditioning systems, National Fire Protection Association

Pamphlet No. 90A or 90B. They should be sized in accordance with National Environmental System Contractors Association Manual K, or whichever is applicable.

On any job, non-flammable flexible collars should be used for the return air and discharge connections to prevent transmission of vibration. Although these units have been specially designed for quiet vibration-free operation, air ducts can act as soundboards, can, if poorly installed, amplify the slightest vibration to the annoyance level.

All main supply and return air drops should be properly sized as determined by the designer of the duct system and should not necessarily be the size of the duct flange openings of the unit. (The duct size should never be smaller than the flange openings of the air handler supply and return air openings.)

It is recommended that wherever supply and return air sheet metal duct pass through unconditioned areas, they be insulated to prevent excessive heat loss during heating operation. When applied in conjunction with summer air conditioning, sheet metal duct routed through unconditioned areas should be insulated and have an outside vapor barrier to prevent formation of condensation.

5. INSTALLATION

▲ CAUTION

Ensure that the unit is adequately sized. The tonnage of the outdoor unit should never exceed the tonnage of this unit.

▲ WARNING

The coil was manufactured with a dry nitrogen pre-charge. Release the pressure through the Schrader valve test port prior to installation. If holding pressure is not present, return coil to distributor for exchange.

▲ CAUTION

Some AspenPro coils may include a Schrader valve on the suction manifold. Ensure that the Schrader valve and valve core (where present) are protected from heat during brazing and installation to prevent leakage. Use a core removal tool to temporarily remove the core when brazing. Replace the core once brazing is completed.

▲ CAUTION

Insulation on the suction line MUST extend into the cabinet and continue as far as possible to eliminate condensate dripping onto the access door.

✓ Clean coil fins with degreasing agent or mild detergent and rinse fins clean prior to installation.

✓ The refrigerant line sizes should be selected according to the recommendations of the outdoor unit manufacturer.

✓ Care must be taken to ensure all connection joints are burr-free and clean. Failure to do so may increase chances of a leak. It is recommended to use a pipe cutter to remove the spun closed end of the suction line.

✓ To reduce air leakage, rubber grommets may be present where the lines pass through the coil case. To avoid damage, remove grommets prior to brazing by sliding over the lines. Use a

quenching cloth or allow the lines to cool before reinstalling the grommets.

✓ Use of wet rags/quenching cloth is highly recommended to prevent weld-related damages to the casing and Schrader valve (if present).

5.1. Mounting Air Handler

The unit has pre-drilled holes for ceiling mounting.

To facilitate an easier installation, the blower/fan and heater/AC coil assemblies are removed prior to mounting the enclosure.

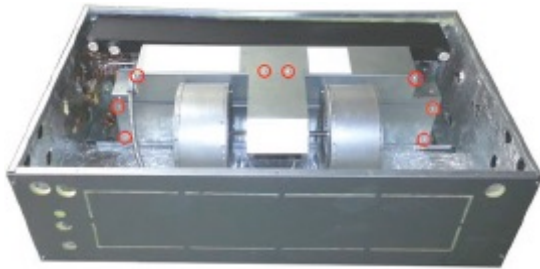


Fig 5.1

5.1.1. Using ¼" nut driver, remove the (8) hex screws as shown in the picture above (Fig 5.1). Remove the control panel cover, disconnect the fan motor wiring, and remove the blower assembly.



Fig 5.2

5.1.2. Using a 5/16" nut driver, remove the hex screws securing the heater/AC coil assembly to the slide brackets. The slide brackets are located on the left and right sides of the assembly. (Two screws per side – Fig .2)



Fig 5.3

5.1.3. Slide the heater/AC coil assembly out of the brackets and remove (Fig 5.3).

5.1.4.



Fig 5.4

5.1.5. Mount the enclosure to the ceiling joists through the four mounting holes using four lag screws.

Installation Support Framing

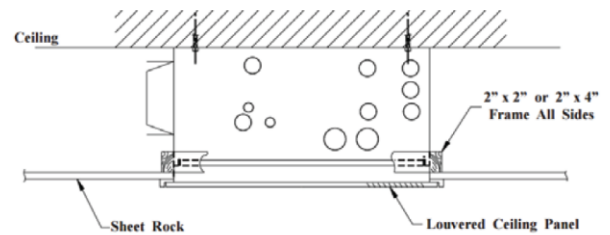


Fig 5.5

Ceiling Panel Frame Installation

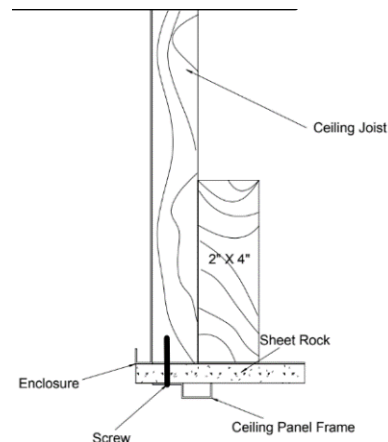


Fig 5.6

After the enclosure is mounted, a 2"x2" or 2"x4" frame MUST be installed around the base of the enclosure to create an airtight seal.

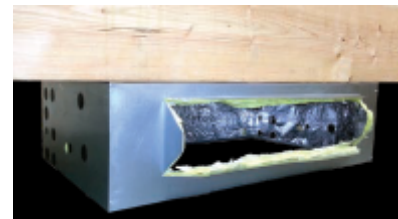


Fig 5.7

5.1.6. Ensure the unit is level to allow for proper condensate drainage (Fig 5.7).

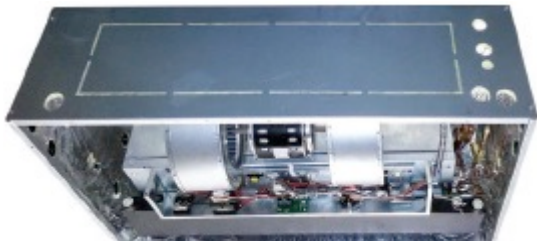


Fig 5.8

- 5.1.7. Reinstall the components removed prior to mounting the enclosure (Fig 6.8).

5.2. Connecting Ducting

- 5.2.1. Secure the supply air ducting to the duct flange of the air handler. Canvas connectors are recommended for reducing potential noise transmission (Fig 5.9).



Fig 6.9

5.3. Remote/Ducted Return

- 5.3.1. To connect return air ducting to the air handler, remove the knockout and cut the insulation on the rear side of the enclosure to install the ducting (Fig 5.10).

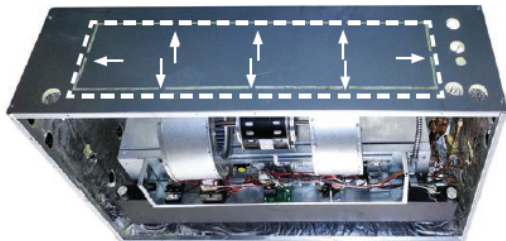


Fig 5.10

5.4. Bottom Return

- 5.4.1. A bottom return installation requires a louvered panel (Fig 5.11).



Fig 5.11

- 5.4.2. A ducted return requires a non-louvered panel (Fig 5.11)



Fig 5.12

- 5.4.3. Both louvered and non-louvered panels are mounted to the ceiling using screws. (Fig 5.12).

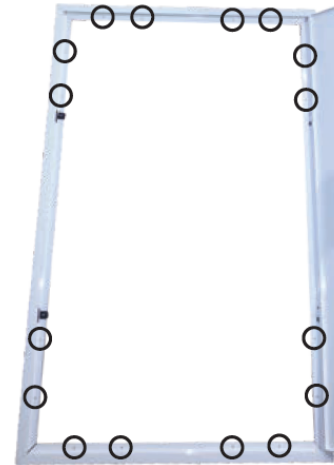


Fig 5.12

6. CONNECTING REFRIGERANT LINES

▲ WARNING

The coil is manufactured with dry nitrogen pre-charge. Release the pressure through the Schrader valve test port prior to installation. If holding pressure is not present, return coil to distributor for exchange.

▲ NOTICE

Refrigerant tubing must be routed to allow accessibility for service and maintenance of the unit.

Pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed.

After completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements:

The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system, cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.

Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the maximum allowable pressure. No leak shall be detected. REFER TO SECTION 12 FOR SYSTEM CHARGING INSTRUCTIONS.

Clean coil fins with degreasing agent or mild detergent and rinse fins clean prior to installation. Refer to Section 6 of this manual for coil cleaning / maintenance guidance.

The refrigerant line sizes should be selected according to the recommendations of the outdoor unit manufacturer.

Care must be taken to ensure all connection joints are burr-free and clean. Failure to do so may increase the chances of a leak. It is recommended to use a pipe cutter to remove the spun closed end of the suction line.

To reduce air leakage, rubber grommets may be present where the lines pass through the coil case. To avoid damage, remove grommets prior to brazing by sliding over the lines. Use a quenching cloth or allow the lines to cool before reinstalling the grommets.

Use of wet rags/quenching cloth is highly recommended to prevent weld-related damage to the casing and Schrader valve (if present).

▲ WARNING

The coils may include a Schrader valve on the suction manifold. Ensure that the Schrader valve and valve core (where present) are protected from heat to prevent leakage.



Fig 6.1

6.1. Release nitrogen holding charge by depressing the Schrader Valve at the liquid line connection on the air handler. If no gas releases from the air handler, contact distributor regarding potential leak.

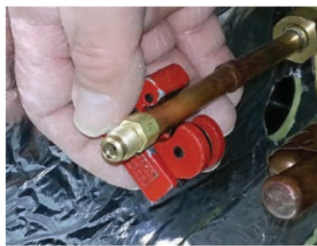


Fig 6.2

6.2. Cut off Schrader Valve fitting at the liquid line connection. Use a tubing cutter for this step. Clean the burr from the cut tubing to reduce the chance of future leaks. Connect the liquid line to the tubing at the indoor unit.



Fig 6.3

6.3. Use a tubing cutter to remove the spun end from the suction line connection at the air handler. Clean the burr from the cut tubing to reduce the chance of future leaks.

6.4. To avoid heat damage to grommets where present, remove these prior to brazing by sliding them over the refrigerant lines and out of the way.

6.5. Check to determine if the evaporator coil has a Schrader fitting on the suction manifold. If yes, remove the valve core to prevent heat damage during brazing. Replace the valve core once the piping has cooled.



Fig 6.5

6.6. If the air handler has a TXV metering device, remove the sensing bulb from the suction line prior to brazing to prevent heat damage from occurring. Replace the sensing bulb once the piping has cooled.



Fig 6.6

6.7. Flow nitrogen through the piping when brazing.

6.8. Braze both refrigerant line connections using proper brazing procedures.

6.9. When all line connections are brazed, perform a proper system evacuation procedure per the outdoor unit manufacturer instructions.

6.10. Seal the penetration openings where the lineset piping enters the air handler cabinet.

7. METERING DEVICES / LIQUID LINE CONNECTION

AspenPro coils are available with two kinds of metering devices a) flowrator / fixed orifice, or b) TXV. The following instructions are separated into sections by metering device.

7.1. Flowrator / Piston or Fixed Orifice

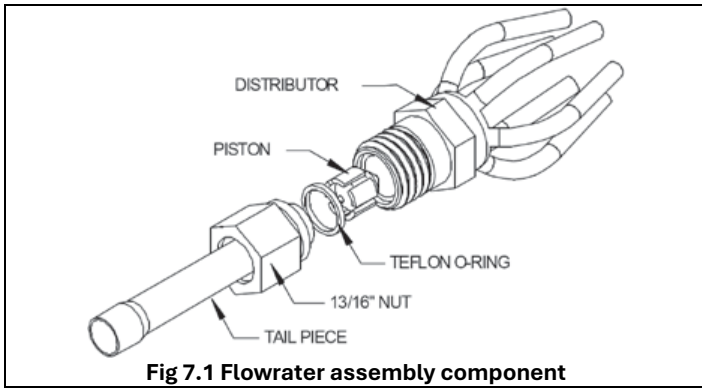


Fig 7.1 Flowrator assembly component

▲ CAUTION

Use Piston sizes recommended by the outdoor unit manufacturer whenever possible. The piston should be sized according to the capacity of the outdoor unit.

▲ WARNING

Failure to install the proper piston can lead to poor system performance and possible compressor damage.

7.1.1. Installation of Piston / Fixed Orifice

NOTE: Photos are for basic illustration / reference purposes only. Actual equipment configuration may differ from that shown.



I-1. Disassemble flowrator body using two wrenches and unscrewing with a counterclockwise motion.



I-2. Replace the Teflon O-ring (located between the halves). Discard Schrader if present.

▲ CAUTION

Be aware of the Teflon O-ring. Be sure to replace the O-ring to attain a proper seal. (The Teflon O-ring is located between the two halves of the flowrator).



I-3. Slide the attachment nut onto the liquid line stub out.

I-4. Braze the stub-out portion to the liquid line and let cool.



I-5. Taking care that the white Teflon seal is still in place inside the flowrator body, firmly seat the stub and screw the attachment nut to flowrator body.

I-6. Tighten nut using no more than 10 ft-lbs of torque. A flare nut open end wrench is recommended to evenly distribute the force across all six sides of the nut to ensure piston body is not deformed.

7.1.2. Piston Replacement

NOTE: Photos are for basic illustration / reference purposes only. Actual equipment configuration may differ from that shown.



Fig 7.1

During some installations, a piston change may be required. If so, the installer **MUST** change the piston. Use piston sizes recommended by the outdoor unit manufacturer. If a sizing chart is not available, use the piston size chart provided below to size the required piston. The size of the piston is stamped on the piston body (Fig 7.1).

II-1. Evacuate the system as per manufacturer guidelines and recommendations.

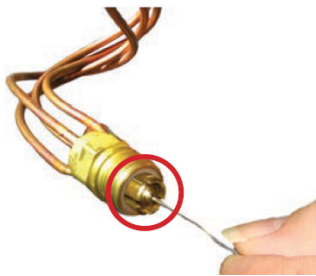
II-2. Turn the 13/16" nut once to release any residual pressure in the coil.



II-3. After ensuring that the coil is free of any residual pressure, disassemble the flowrator body completely using two wrenches. Take great care not to distort the feeder tubes. The wrench used to clasp the nut should be turned in counterclockwise direction to unscrew the nut.



II-4. Slide the 13/16" nut over the lineset and separate the two halves of the flowrator.



II-5. Pull the piston out using a small wire or pick. Verify the piston size (size is typically stamped on the body of the piston - Fig 7.6). If a different piston size is required by the outdoor unit manufacturer, replace the piston using the small wire provided with the piston kit.



II-6. Replace the piston with one of the correct size. Do not force the new piston into the body. Make sure the piston moves freely in body.

▲ CAUTION

Pay close attention to the piston orientation. The pointed end of the piston **MUST** go into the distributor body, towards the coil. Failure to ensure this orientation will cause the piston to be bypassed during operation which might damage the outdoor unit.

II-7. Assemble the two halves correctly and ensure that the Teflon O-ring is present between the two halves (See I-5). Slide the 13/16" nut onto the distributor body.

▲ CAUTION

Be aware of the Teflon O-ring. Be sure to replace the O-ring to attain a proper seal. (The Teflon O-ring is located between the two halves of the flowrater).

II-8. Tighten the nut to a torque of approximately 10 ft.-lbs. **Do NOT overtighten the nut.** Overtightening could crack the nut and/or impede the piston movement during operation.

II-9. If present, slide the rubber grommet back to position to prevent air leakage.

7.2. TXV Coils

▲ WARNING

The sensing bulb and TXV body **MUST** be protected from overheating during brazing. The sensing bulb and TXV body must be covered using a quench cloth or wet cloth when brazing. Pointing the brazing flame away from the valve and sensing bulb provide partial protection only.

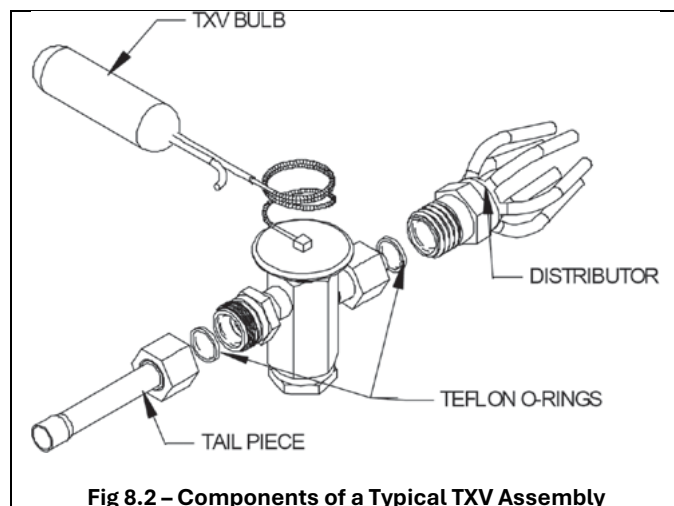


Fig 8.2 – Components of a Typical TXV Assembly

▲ WARNING

Ensure that the TXV selected is compatible with the refrigerant used in the outdoor system. The TXV body is marked with R410a, or R22.

▲ WARNING

The valves should be sized according to the capacity of the outdoor unit. Failure to install the right valve can lead to poor performance and possible compressor damage.

I. TXV Bulb Horizontal Mounting

The orientation and location of the TXV bulb has a major influence on the system performance.

▲ WARNING

Ensure that the TXV bulb is in direct contact with the suction/vapor line. Gap between the bulb and tube should be avoided. Failure to do so will impair the proper functioning of the TXV valve.

It is recommended that the TXV bulb be installed parallel to the ground (on a horizontal plane). The bulb position should be at 2 o'clock or 10 o'clock. Fig. 7.3 shows the recommended position for the TXV bulb installation in the horizontal plane.

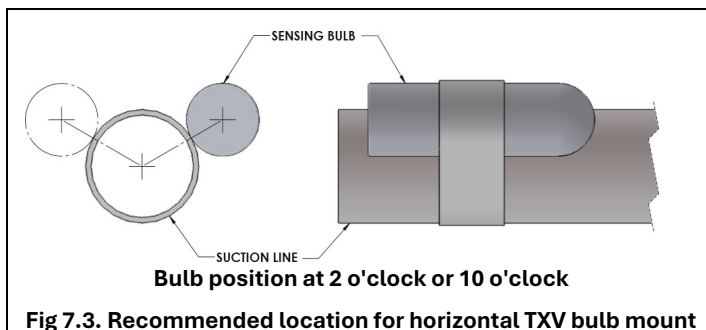


Fig 7.3. Recommended location for horizontal TXV bulb mount

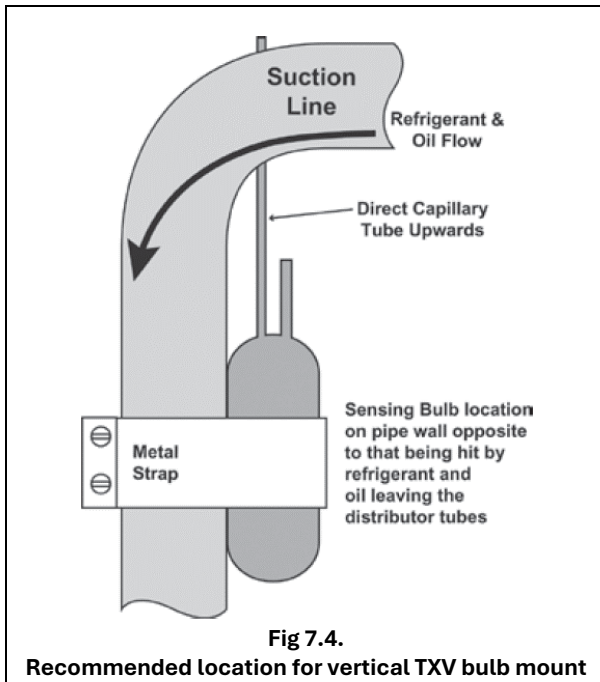
The TXV sensing bulb **SHOULD** be mounted on the suction line approximately 6" from the TXV or coil housing using the metal clamp provided. In order to obtain a good temperature reading and correct superheat control, the TXV sensing bulb must conform to ALL of the following criteria:

1. The sensing bulb **MUST** be in direct and continuous contact with the suction line.

2. The sensing bulb should be mounted horizontally on the suction line.
3. The sensing bulb **MUST** be mounted at the 2 o'clock or 10 o'clock position on the circumference of the suction line.
4. The sensing bulb **MUST** be insulated from outside air.

A properly mounted sensing bulb will prevent false readings caused by liquid refrigerant that may have formed inside the suction/vapor line. Insulation will protect the sensing bulb from false readings due to contact with warm air.

II. TXV Bulb Vertical Mounting



As recommended in Section 7.1, the TXV sensing bulb should be mounted in a horizontal plane in relation to the suction/vapor line. However, some installation configurations may require that the sensing bulb be mounted vertically. In this instance, place the bulb opposite the piping wall being hit by refrigerant and oil leaving the distributor tubes, and with capillary tubes directed upwards as shown in Fig. 7.4.

▲ CAUTION

If the TXV sensing bulb is mounted vertically; the capillary MUST be directed upwards. The bulb must be mounted on the wall opposite to that being directly hit by the refrigerant and oil leaving the distributor tubes.

III. Field-Installed TXV Retrofit

Note: Photos are for basic illustration purposes only. Actual equipment configuration may differ from that shown.

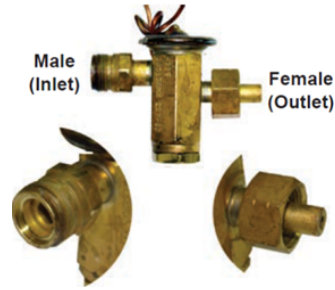
▲ WARNING

Do not attempt to touch brazed joints while hot. Severe burns may result.

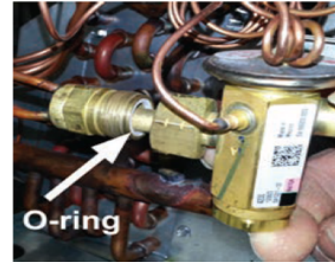
When installing an expansion valve, it is not necessary to slide the coil out of the housing.

For disassembly and piston removal refer to section 7A-1

III-1. Inspect the TXV box to confirm that the valve is compatible with the refrigerant in the system.



III-2. Remove the valve from the box and note the location of the inlet side (threaded male port) and the outlet side (female)



III-3. After ensuring that the Teflon O-ring seal is still in place inside the flowrater body, screw the female swivel nut onto the flowrater body.

III-4. Slide the attachment nut onto the liquid line stub out (See 8A, I-3)

III-5. Braze the stub-out portion to the liquid line and let cool.

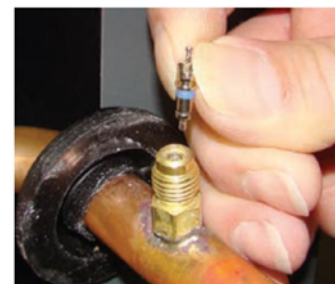


III-6. Remove the additional Teflon O-ring seal from the box and place on the shoulder just inside the TXV inlet port. Screw the nut attached to the stub-out portion of the flowrater body onto the inlet port of the TXV

III-7. Tighten all connections taking care to use proper back

III-8. Remove the valve identification sticker from the valve and place it adjacent to the AspenPro model number on unit name plate.

III-9a. Some AspenPro coils come with Schrader valve on the suction line. **If a Schrader port is present:**



A. Remove the valve stem from the Schrader port mounted on the suction line.



B. Screw flare nut on TXV equalization tube onto the Scradar valve stem.

III-10. Mount the sensing bulb as described in section 8B-I or 8B-II.

▲ CAUTION

When handling or manipulating the equalizer tube, take great care not to kink or make extreme bends in the tubing.

▲ CAUTION

Using a non-bleed expansion valve may require the use of a hard-start kit. Follow the outdoor unit manufacturer's guidelines.

8. LEAK CHECK / STANDING PRESSURE TEST / VACUUM TEST

8.1. Standing Pressure Test

1. Following outdoor unit manufacturer instructions and recommendations, Using dry nitrogen or dry helium, pressurize the field piping and indoor coil to the lower of the maximum operating pressures listed on the nameplates of the indoor and outdoor units (likely 600 psi).
2. The test pressure after removal of the pressure source shall be maintained for at least one (1) hour no decrease of pressure indicated by the test gauge, with the test gauge resolution not exceeding 30 psi.

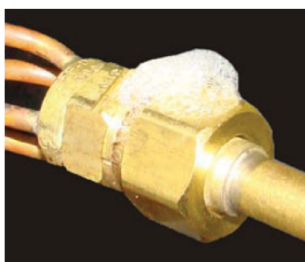


Fig 8.1

3. Check for leaks by using a soapy solution at each field-made brazed joint and screw-on line connections. A leak will produce bubbles in the soap solution. No refrigerant shall be used for pressure testing to detect leaks.

4. If any leaks are discovered, remove nitrogen pressure and repair leaks. Repeat steps 1-3.

8.2. Vacuum Test

Important: Do not open the service valves until the refrigerant lines and indoor coil leak check and evacuation are completed.

1. Evacuate until the micron gauge reads no higher than 350 microns, then close off the valve to the vacuum pump.

2. Observe the micron gauge. Evacuation is complete if the micron gauge does not rise above 500 microns in one (1) minute and 1500 microns in ten (10) minutes.
3. Once evacuation is complete, blank off the vacuum pump and micron gauge, and close the valve on the manifold gauge set.
4. All procedures for charging the system with refrigerant shall be according to the instructions provided by the manufacturer of the outdoor unit.

Important: Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks.

After charging the system, all indoor field-made joints of the field piping shall be checked for refrigerant leaks using an electronic leak detector calibrated for R22 or R410a (depending on the application) having a sensitivity of 5 grams per year or better.

With no leaks or weak connections present, evacuate the system and charge as per the outdoor unit manufacturer instructions and specifications.

▲ NOTICE

Test pressures for field made refrigerant joints shall have a sensitivity of 5 grams per year of refrigerant or at least 25 times the maximum allowable pressure. No leaks shall be detected in the systems.

9. ELECTRICAL LINE VOLTAGE WIRING

▲ WARNING

Disconnect ALL power before servicing or installing this unit. Multiple power sources may be present. Failure to do so may cause property damage, personal injury, or death.

▲ WARNING

Before obtaining access to terminals, all supply circuits must be disconnected.

▲ WARNING

A fused disconnect switch must be field provided for the unit to be in compliance with UL 60335-2-40 Clause 7.12.2.

These units are designed for single phase 208/240 volts, 60 HZ power supply. Wire selection and wiring must be in accordance with the latest edition of the National Electric Code or in Canada the Canadian electrical Code, and local codes to determine correct wire sizing. Unit terminals are designed to accommodate copper and aluminum wiring. If aluminum wiring is used: All applicable local and national codes must be followed, please observe special precautions relative to sizing, wire connections and corrosion protection.

All models with 3, 5-, 6-, 8- or 10-kW electric heaters are arranged for single circuit connections. Not intended for simultaneous operation of electric heat and reverse cycle heating. Refer to the top part of wiring diagram at the end of this guide for detailed information.

Line voltage wiring should be routed through the access holes at the top of the air handler. To minimize air leakage, seat the wiring

entry point on the outside of the unit. Proper electrical conduit connection fittings should be used. Connect the power wiring to the line side connections on the air handler. The electrical ground wire should be connected to the grounding lug. Ensure both the field supplied ground wire and air handler GREEN ground wire are both secured to the grounding lug of the air handler (Fig 9.1).

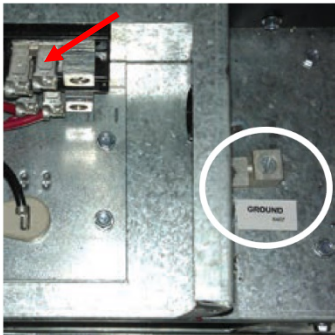


Fig 9.1

If the line voltage being supplied to the air handler is 208-volt single phase, the line voltage tap on the low voltage transformer needs to be moved from the 240-volt tap to the 208-volt tap. If this is not done, the secondary output voltage of the transformer will be too low (Fig 9.2.)

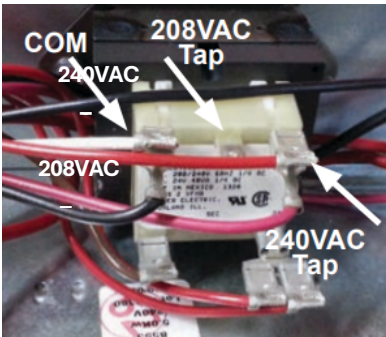


Fig 9.2

10. LOW VOLTAGE CONNECTIONS

A 24 V power supply is provided by an internally wired low voltage transformer that is standard on all models. If the line voltage being supplied to the air handler is 208-volt single phase, the line voltage tap on the low voltage transformer needs to be moved from the 240-volt tap to the 208-volt tap (See Fig 9.2). If this is not done, the secondary output voltage of the transformer will be too low.

Connect the field wiring at the pigtails supplied with the air handler as specified in Wiring Diagram, 16.1 & 16.2

▲ NOTICE

All wiring must comply with local and national electrical code requirements. Read and heed all unit caution labels.

10.1. Single Stage Cooling with Electric Heat

The air handler comes factory setup for a single stage cooling system. If factory installed accessory electric heaters are preinstalled, the unit will also have a low voltage wire for the electric heat (Fig 10.1.1).

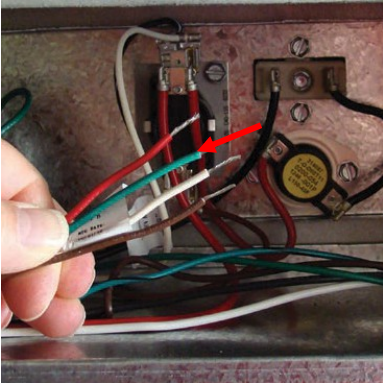


Fig 10.1.1

See the Wiring Diagrams in section 18 - shows the typical electrical connections required for A/C only and heat pump application.

During cooling mode operation, the indoor blower G wire will energize a time delay relay inside the air handler. After a short time delay period, the time delay relay will send out a 24-volt signal to the low voltage terminal on the motor. Fan delay periods are 7 seconds ON delay and 65 seconds OFF delay. (See wiring in Section 18)

The Y wire from the thermostat is not connected at the air handler. This wire goes directly to the outdoor unit 24 volt wiring to turn on the outdoor condensing unit when a call for cooling takes place. The 24-volt common for the outdoor unit circuits is connected at the air handler Brown wire.

The electric heater low voltage wiring W terminal is wired directly from the thermostat to the air handler. The blower will delay on a heat call ON for a period of 5 seconds. The OFF-delay period is 60 seconds.

10.2. Heat Pump Application

Installation of heat pump kit (HPK-001) is required for highlighted cases of Heat Pump applications with emergency electric heat. Refer to chart below for applicability of the heat pump kit on a case by case basis.

Electric Heater Size (kW)					
P(A/E)S/T RES/T	10	8	6	5	3
18					
19					
20					
24					
25					
26					
28					
30					
31					
32					
36					
37					

11. AIR VOLUME ADJUSTMENT

Air volume needs to be set to the level recommended by the outdoor unit equipment manufacturer. Most systems will require around 400 CFM of indoor air for every 1 ton of system cooling capacity. The air volume must be set prior to attempting system charge.

The PAS/T air handler is equipped with a PSC type motor. The speed of this motor is set by placing the appropriate winding lead wire on the “MTR” terminal of the control board. Unused motor winding leads are to be placed on the “BLANK” terminals on the control board. The air volume level produced by the air handlers at varying external static pressure levels is shown in Table 11.1.

The PES/T & RES/T air handler are equipped with a constant torque ECM Motor. This motor will try to maintain proper motor torque to achieve programmed air volume levels at varying levels of external static pressure. The air volume level produced by the air handlers at varying external static pressure levels is shown in Table 11.2.

Use a Magnehelic Gauge with a 1” scale and two static pressure tips to measure the static pressure during the air volume adjustment procedure. The high port static pressure tip should be placed in the supply duct near the outlet of the air handler. The low port static pressure tip should be placed in the return air duct near the entrance to the air handler. The factory provided air filter should be in place inside of the air handler.

UNIT MODEL	SPEED TAP	CFM V. EXTERNAL STATIC (DRY COIL)				
		0.10	0.20	0.30	0.40	0.50
PAS/PAT 18/19/24	HIGH	895	840	780	715	645
	LOW	750	705	660	610	535
PAS/PAT 20/25	HIGH	1015	955	890	830	755
	LOW	785	740	700	650	590
PAS/PAT 26/31/36	HIGH	1035	965	890	810	720
	LOW	875	810	740	670	580
PAS/PAT 28/32/37	HIGH	1155	1075	1010	930	850
	LOW	960	900	840	770	700
PAS/PAT 30	HIGH	1130	1055	985	915	835
	LOW	930	875	820	760	700

TABLE 11.1

UNIT MODEL		SPEED TAP	CFM V. EXTERNAL STATIC (DRY COIL)				
			0.10	0.20	0.30	0.40	0.50
PES/PET 23/26	RES/RET 18	TAP 5	900	850	805	765	650
		TAP 4	840	805	760	705	595
		TAP 3	805	460	705	665	565
		TAP 2	705	665	615	580	495
		TAP 1	655	605	555	500	425
PES/PET 27	RES/RET 24/25	TAP 5	975	925	875	835	710
		TAP 4	915	865	815	780	660
		TAP 3	865	825	780	730	620
		TAP 2	805	760	695	655	560
		TAP 1	730	675	615	565	480
PES/PET 28	-	TAP 5	1180	1130	1070	1015	860
		TAP 4	1115	1060	1015	950	810
		TAP 3	1015	950	900	860	730
		TAP 2	910	850	795	745	630
		TAP 1	815	745	685	640	454
PES/PET 29/34	RES/RET 30/31/36	TAP 5	1195	1140	1085	1050	890
		TAP 4	1115	1060	1015	965	820
		TAP 3	1000	950	895	850	725
		TAP 2	920	860	805	745	630
		TAP 1	815	760	700	640	545
PES/PET 33	-	TAP 5	1220	1165	1115	1060	900
		TAP 4	1140	1100	1060	1000	850
		TAP 3	1010	965	910	860	730
		TAP 2	885	860	775	735	625
		TAP 1	815	765	705	665	565
PES/PET 35/38	-	TAP 5	1305	1255	1195	1130	960
		TAP 4	1230	1165	1115	1070	910
		TAP 3	1130	1085	1040	1000	850
		TAP 2	1045	980	935	900	765
		TAP 1	935	885	810	775	650

TABLE 11.2

- 11.1.1. Select a starting speed tap from the CFM table. The blower motor has selectable speed taps labeled 1 through 5 (Fig. 11.1). The speed taps are energized by 24 volts received from the time delay relay. When two stage cooling units are used, both the first and second stage fan speed taps will be energized at the same time. The motor will run at the speed generated at the highest motor speed tap.

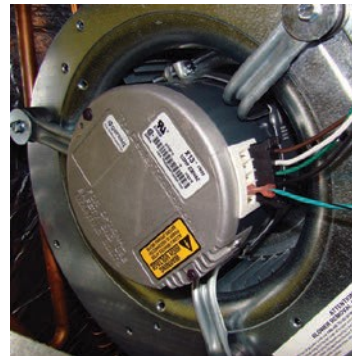


Fig 11.1

- 11.1.2. Call for fan only operation at the thermostat.
- 11.1.3. Read the external static pressure level on the Magnehelic gauge.
- 11.1.4. Make speed tap selection changes to get the air volume as close as possible to the required level.
- 11.1.5. If the static pressure is above 0.5” w.c., excessive turbulence or duct friction needs to be reduced. (Obstructions in the duct system can also cause excessive static pressure.)
- 11.1.6. When proper air volume is established, move on to the charging procedure.

12. SYSTEM CHARGING

▲ WARNING

Units designed for use with R410a refrigerant **MUST** be charged with R410a refrigerant.

▲ CAUTION

An improperly charged system will likely cause loss in system performance and may damage the compressor.

▲ CAUTION

Refer to outdoor unit manufacturer charging guidelines and recommendations. The recommendations given below are general in nature and are **NOT** to supersede outdoor unit manufacturer specifications.

Where addition of charge is required to complete installation, interconnecting refrigerant piping length and diameter shall be taken into consideration.

1. Bring airflow up to the maximum CFM possible according to Table.
2. Evacuate refrigeration system to micron level required by outdoor unit manufacturer.
3. Release system charge from outdoor unit and call for cooling.

4. Use outdoor unit equipment manufacturer specific charging charts if available and make proper charge adjustment based upon outdoor unit instructions.
5. If outdoor unit instructions and charts are not available, use Aspen provided charts. Make certain indoor air temperature is near comfort level setpoint 75F, prior to establishing superheat and subcooling levels.

12.1 TXV Coils:

If the unit is equipped with a **fixed TXV**, add refrigerant until the subcooling measures at the outdoor unit liquid line matches the subcooling recommendations of the outdoor manufacturer. If the charge is unavailable charge the unit to a subcooling value of 8°F +/- 1°F.

If the unit is equipped with an **adjustable TXV**, add refrigerant until the subcooling measures at the outdoor unit liquid line matches the subcooling recommendations of the outdoor manufacturer. If the charge is unavailable charge the unit to a subcooling value of 8°F +/- 1°F.

▲ NOTICE

When adjusting the TXV, the valve stem or adjusting screw should not be adjusted more than a ¼ turn at a time. To adjust superheat, turn the valve stem clockwise to increase and counterclockwise to decrease.

- 12.1.1. If subcooling and superheat are low, adjust TXV to 8°F +/- 1°F superheat, then check subcooling.
- 12.1.2. If subcooling is low and superheat is high, add charge to raise subcooling to 8°F +/- 1°F then check superheat.
- 12.1.3. If subcooling and superheat are high, adjust TXV valve to 8°F +/- 1°F superheat, then check subcooling.
- 12.1.4. If subcooling is high and superheat is low, adjust TXV valve to 8°F +/- 1°F superheat and remove charge to lower the subcooling to 8°F +/- 1°F.

The TXV should NOT be adjusted at light load / ambient conditions of 60°F or below.

12.2 Fixed Orifice / Piston - Flowrater Coils

Add refrigerant until the superheat measured at the outdoor unit suction/vapor line matches the superheat from the chart below.

Outdoor Temp	Superheat		
°F D.B.	Min	Nom	Max
65	30	35	40
70	26	30	34
75	21	25	29
80	17	20	23
85	12	15	18
90	8	10	12
95	4	5	7
100			

13. ELECTRIC HEAT

This air handler is available with factory installed 3kW to 10 kW electric heater kits ONLY. Refer to this product's Specification Sheet for electric heater kit electrical data. If replacing this option, the ONLY heat kits that are permitted to be used are the HTS series. Refer to the air handler unit's Serial & Rating plate or this product's Specification Sheets to determine the heat kits. No other accessory heat kit besides HTS series may be installed in these air handlers. Not intended for simultaneous operation of electric heat and reverse cycle heating. See the following tables:

UNIT MODEL		HEAT KIT	SPEED TAP	MINIMUM CFM REQUIRED FOR EHK
PES/T 23/26	RES 18	HTS03	T1	475
		HTS05	T2	551
		HTS06	T3	632
		HTS08	T4	670
		HTS10	T5	727
PES/T 27	RES 24	HTS03	T1	537
		HTS05	T2	622
		HTS06	T3	694
		HTS08	T4	741
		HTS10	T5	793
PES/T 28	-	HTS03	T1	608
		HTS05	T2	708
		HTS06	T3	917
		HTS08	T4	903
		HTS10	T5	964
PES/T 29/34	RES/T 30/36/37	HTS03	T1	608
		HTS05	T2	708
		HTS06	T3	808
		HTS08	T4	917
PES/T 33	-	HTS10	T5	998
		HTS03	T1	632
		HTS05	T2	698
		HTS06	T3	817
		HTS08	T4	950
PES/T 35/38	-	HTS10	T5	1007
		HTS03	T1	736
		HTS05	T2	855
		HTS06	T3	950
		HTS08	T4	1017
		HTS10	T5	1074

Table 13.1 – Electric Heat Kits

UNIT MODEL	HEAT KIT	SPEED TAP	MINIMUM CFM REQUIRED FOR EHK
PAS/T 23/26	HTS03	LO	485
	HTS05	LO	485
	HTS06	LO	485
	HTS08	HI	560
	HTS10	HI	560
PAS/T 27	HTS03	LO	475
	HTS05	LO	475
	HTS06	LO	475
	HTS08	HI	575
	HTS10	HI	575
PAS/T 28/29	HTS03	LO	600
	HTS05	LO	600
	HTS06	LO	600
	HTS08	HI	700
	HTS10	HI	700
PAS/T 31	HTS03	LO	540
	HTS05	LO	540
	HTS06	LO	540
	HTS08	HI	645
	HTS10	HI	645
PAS/T 34	HTS03	LO	640
	HTS05	LO	640
	HTS06	LO	640
	HTS08	HI	730
	HTS10	HI	730

Table 13.2 – Electric Heater Kit

14. START-UP

To properly check the unit's operation, the installer should have an electrical current measuring device (0-10amp Amprobe, Fluke) air pressure measuring device (0-1.0 in slope gauge), and a temperature measuring device (0-200F thermometer).

Install the Amprobe to measure blower current, the slope gauge to measure static air pressure at the units and the temperature device to measure unit supply and return air temperature. Before taking measurements, be sure that all registers, grilles and dampers are open or set to their proper positions. Be sure that clean filters are in place. Temperature measuring device must be installed to obtain average temperature at both inlet and outlet. For outlet, measure temperature of each main trunk at a location far enough away to avoid heater radiation and read the average temperatures. See Section 12 CFM Tables for the CFM that should be achieved at various external static pressures.

15. FINAL SYSTEM CHECKOUT

15.1. Make certain all cabinet openings are properly sealed and any grommets moved during installation are moved into proper place.

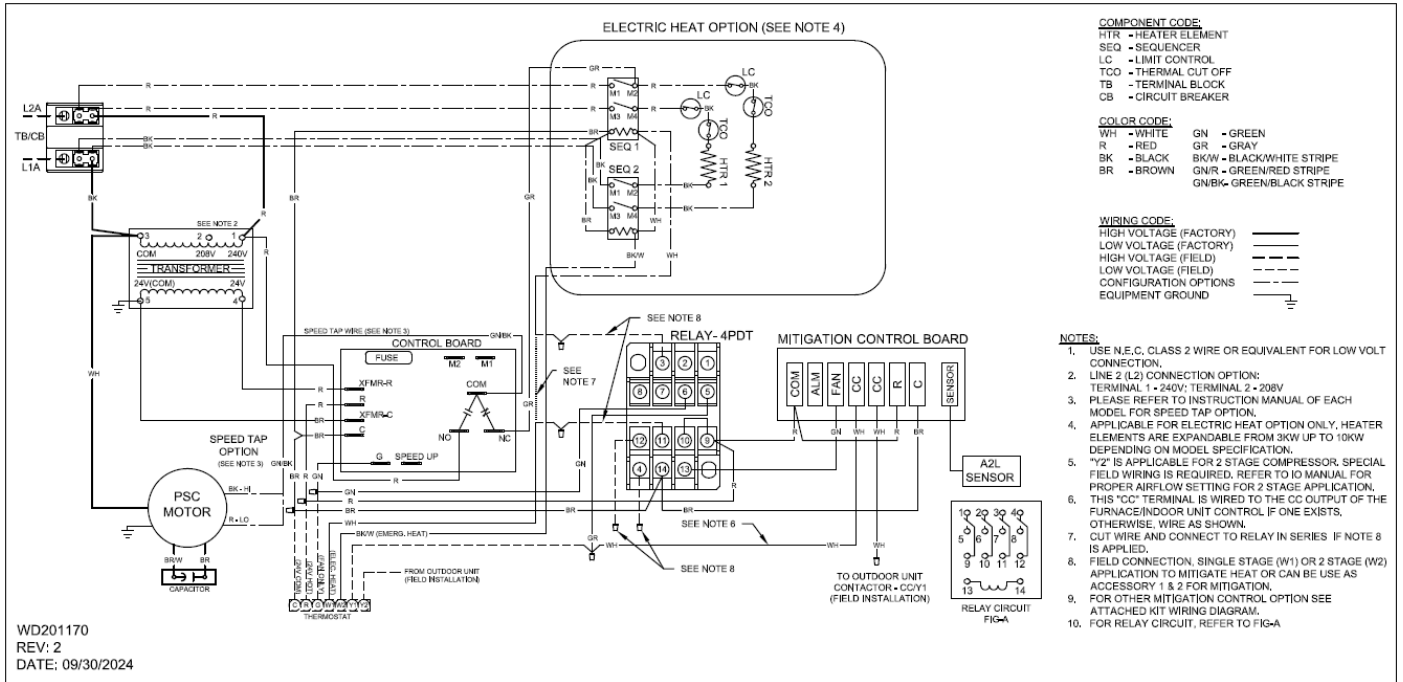
15.2. With cooling system operating, check for condensate leakage.

15.3. Perform leak detection inspection of refrigerant circuit and connecting piping.

15.4. Secure all cabinet doors

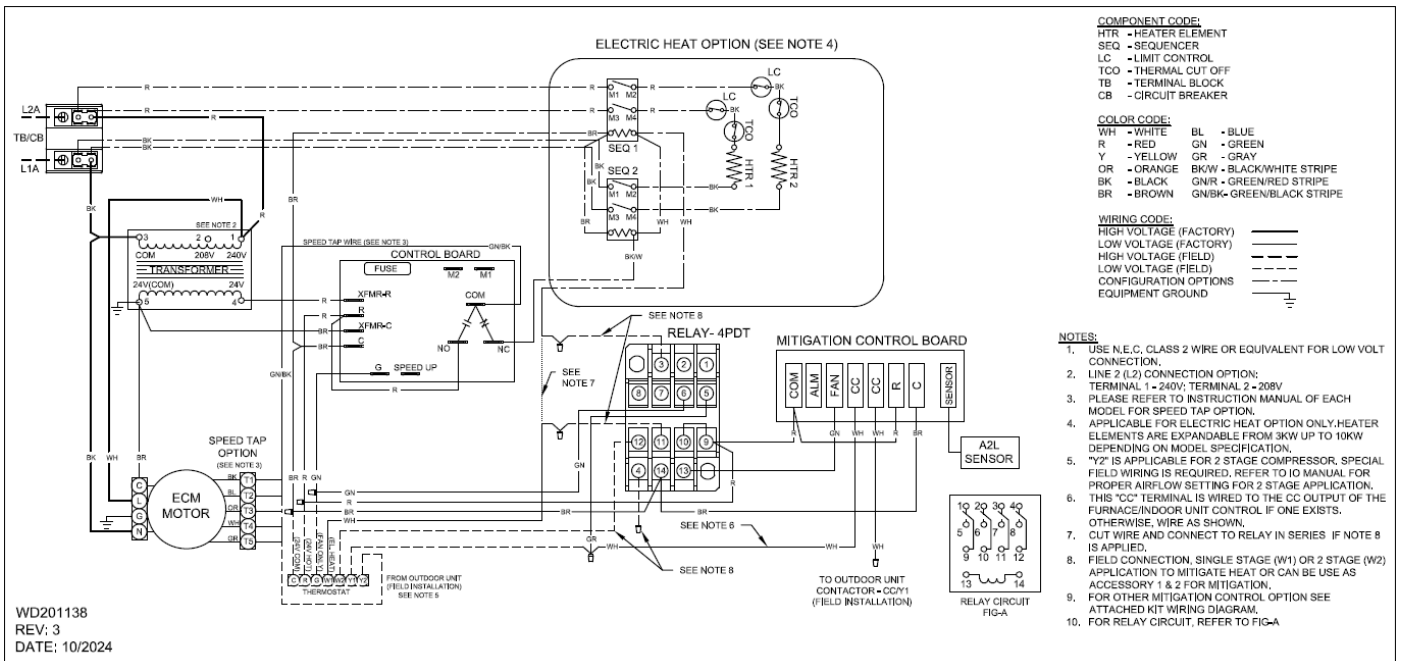
16. WIRING DIAGRAMS

WIRING DIAGRAMS



NOTE: Wiring Diagram is subject to change. Always refer to the wiring diagram on the unit for the most up-to-date wiring.

Figure 16.1 - PSC Motor



NOTE: Wiring Diagram is subject to change. Always refer to the wiring diagram on the unit for the most up-to-date wiring.

Figure 15.2 - ECM Motor



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