

AFM Series - Multi-Position Air Handler (Hydronic Heat)



1. Safety Instruction

Potential safety hazards are alerted using the following symbols. The symbol is used in conjunction with terms that indicate the intensity of the hazard.



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.



WARNING

All power sources should be disconnected prior to servicing. Failure to do so may cause personal injury or property damage.



WARNING

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. In absence of local/state codes, refer to National Electric Code: NFPA 90A & 90B Uniform Mechanical Code.



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.



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

Unit is not approved for outdoor installations.



WARNING

The unit is designed for operation with 108/120V, single phase, 60 Hz power supply. Aspen will not be responsible for damages caused due to modification of the unit to operate with alternative power sources.

2. Ensure These Steps are Completed to Reduce Chances of a Frozen Hydronic Coil

- Ensure the air handler motor and control board are receiving proper power input per the wiring diagram.
- Ensure the hydronic coil has access to a constant water supply as loss of water movement can lead to a frozen coil.
- Prime the water circulator pump using the purge valve per the "Start-Up" section of this installation guide.
- Run the pump for five minutes after priming to ensure no air is in the system.
- If any interruption to the water supply occurs, prime the water circulator pump again.
- Insulate the water piping in unconditioned spaces or within structures that may be unoccupied during freezing conditions.
- If the air handler does not have an internal pump and/or relies on an external boiler system for hot water, the installer may need to rewire the system to ensure that it maintains access to a constant water supply.

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.

4. Installation Preparation

Read all the instructions in this guideline carefully while paying special attention to the WARNING and CAUTION alerts. If any of the instructions are unclear; clarify with certified technicians. Gather all the tools needed for successful installation of the unit prior to beginning the installation.

4A. Clearances

This unit is designed for zero clearance installation on three sides and adequate clearance to provide access for service in the front. A minimum of 2.5 – 3.5 feet clearance is recommended on the front end (Fig 3A-1).

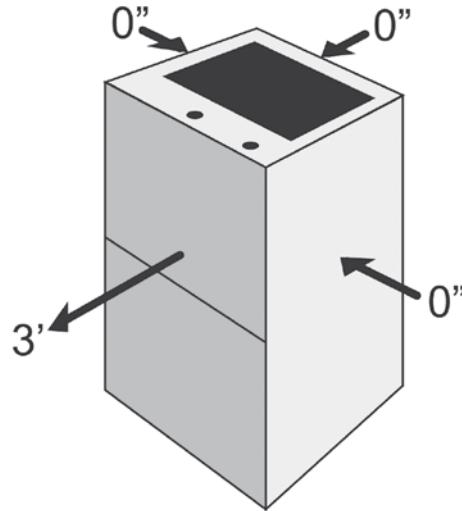


Fig 3A-1. Minimum Clearance for Air Handler

4B. 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 high humidity areas 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.

4C. Condensate Drain Preparation

✓ An auxiliary drain pan must be provided by the installer and placed under the entire unit with a separate drain line that is properly sloped and terminated in an area visible to the home owner. The auxiliary pans provide extra protection to the area under the unit should the primary and secondary drain plug up and overflow. As expressed in our product warranty; **ASPEN WILL NOT BE BILLED FOR ANY STRUCTURAL DAMAGES CAUSED BY FAILURE TO FOLLOW THIS INSTALLATION REQUIREMENT.** The drains from the auxiliary drain pan must be installed according to the local building codes.

4D. Condensate Drain



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 1/4" 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. 4D-1)

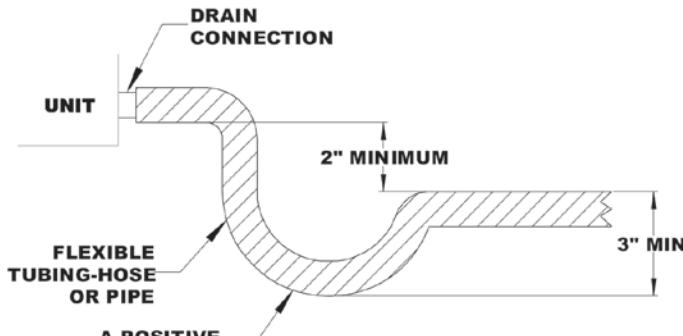


Fig 4D-1. Condensate Drain Trap



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. Aspen 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 (white) and secondary (red) 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.

4E. Ductwork

Ductwork for air conditioning systems should be installed in accordance with standards of the National Fire Protection Association Pamphlet No. 90A or 90B, and also be sized in accordance with National Environmental System Contractors Association Manual K, 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, and if poorly installed, amplify the slightest vibration to the annoyance level.

All main supply and return air drops should be properly size as determined by the designer of the duct system and should not necessarily be the size of the duct flange openings of the unit.

When installing a central air return grille in or near the living space, it is advisable to design the ductwork so that the grille is not in direct line with the opening in the unit. The use of one or two elbows and acoustical duct liner will also ensure quieter system operation.

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 Only lead free solder should be used to connect water (hydronic) coil to the hot water source.



WARNING Prior to connecting the water (hydronic) coil, make sure that the hot water supply is turned off. Water from the heater could be extremely hot and might result in burns and other personal injury along with equipment damage. Ensure that proper safety gear is being used prior to making connections.



CAUTION Some Aspen 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.

- ✓ 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).

6. Air Handler Orientation

This unit can be installed in vertical or right horizontal position without modifications. In case of a counterflow application, the horizontal drain pan **MUST** be removed. Fig. 6-1 shows the various orientations this air handler can be installed in.



CAUTION

When the unit is used in a horizontal orientation, an auxiliary drain pan **MUST** be provided by the installer and placed under the entire unit with a separate drain line that is properly sloped and terminated in an area visible to the home owner. The auxiliary pan provides extra protection to the area under the unit should the primary and secondary drains become plugged and overflow. As expressed in our product warranty, **failure to follow this installation requirement will void the product warranty**. The drains from the auxiliary drain pan must be installed according to the local building codes.

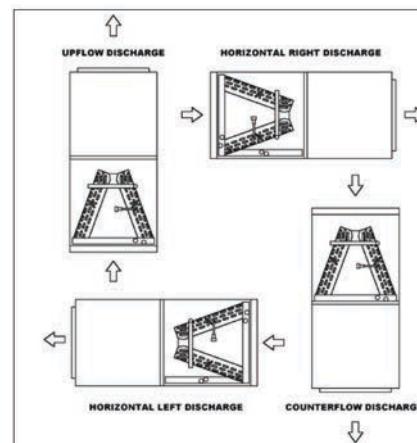


Fig 6-1

6A. Horizontal Left-hand Installation

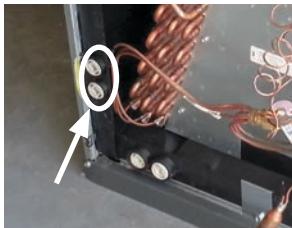


1. With Air Handler in vertical position remove all access panels.



2. Remove horizontal drain pan from right hand side of coil.

3. Relocate the removed horizontal drain pan to the left side of the coil.



4. "P" traps must be installed on primary and secondary drains of the horizontal drain pan.



5. Reinstall all access panels to the unit.

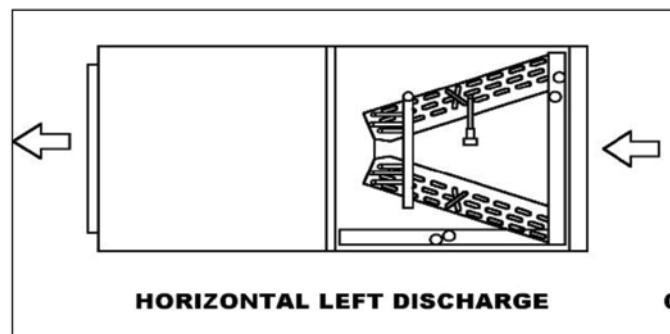


Fig 6A-1 - Air flow direction in Horizontal Left application

6B. Counter Flow Installation

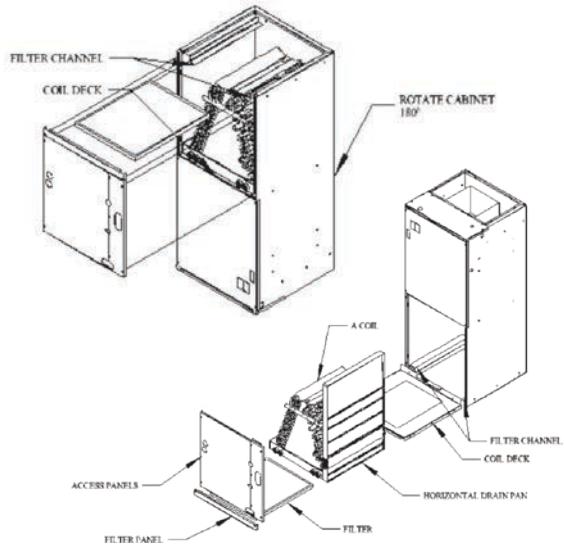


Fig 6B-1 - Air Handler Parts and Changes for Counter Flow



1. Before positioning the Air Handler in the counter flow position, remove lower access panels, filter panel and filter.



2. Remove the A-Coil assembly with the horizontal drain pan; discard the horizontal drain pan (not required for counter flow application).



3. Rotate the Air Handler 180° to the counter flow position.



4. Remove the coil deck and filter channel, rotate the filter channels 180° and re-attach in the same location they were removed from.



5. Rotate the coil deck 180° and re-attach in the holes near the center of the cabinet (screws not provided).



6. Slide the A-coil assembly into the cabinet on the coil deck (without the horizontal drain pan). Note: Push the coil pan assembly all the way to the rear of the cabinet until it locks under the bracket in the rear.



7. Place the 3" x 16" counter flow plates at the outside bottom of the coil as shown in Fig. 6B-3.

8. Replace the access panels and filter panel.

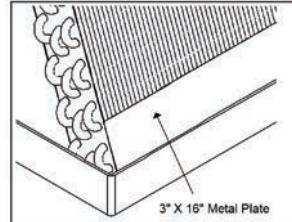


Fig 6B-3 - Position of plates required in counter flow

7. Connecting Ducting

1. Secure supply air ducting to the top of the air handler. Canvas connectors are recommended for reducing potential noise transmission.

2. Secure the return air ducting to the air handler cabinet.

8. Metering Devices/Liquid Line Connection

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

8A. Flowrator Coils

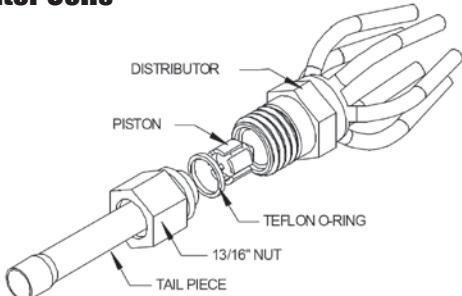


Fig 8A-1. Flowrator assembly components



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.



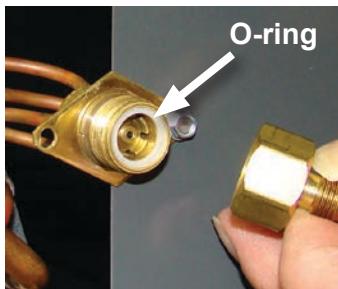
WARNING Failure to install the proper piston can lead to poor system performance and possible compressor damage.

I. Installation

Note: Photos are for basic illustration 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.

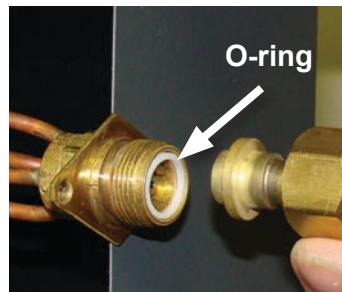


CAUTION Be aware of the Teflon O-ring. Be sure to replace the O-ring to attain a proper seal. (The Teflon O-ring is located between the two halves of the flowrator)



I-3. Slide attachment the 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 the nut to a torque of approximately 10-30 ft-lbs. Do NOT overtighten the nut. Overtightening will impede the piston movement during operation.

II. Piston Replacement

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



Fig 8A-2

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 8A-2).

Use the chart below when matching coil with an outdoor unit with a different nominal capacity than the coil.

Outdoor Unit Capacity	R22 Orifice Size	R410a Orifice Size
12,000	0.041	N/A
18,000	0.055	0.049
24,000	0.059	0.055
30,000	0.068	0.059
36,000	0.074	0.068
42,000	0.080	0.074
48,000	0.084	0.080
60,000	0.092	0.089

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

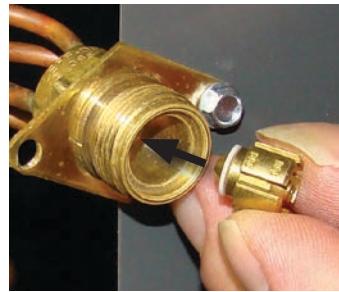
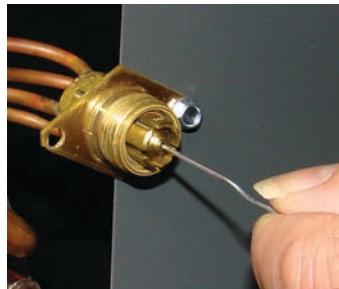
II-2. Turn the 13/16" nut once to release any residual pressure in the coil.



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 counter-clockwise 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 7A-2). 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 white 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 flowrator)

II-8. Tighten the nut to a torque of approximately 10-30 ft-lbs. Do NOT overtighten the nut. Overtightening will impede the piston movement during operation.

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

8B. TXV Coils

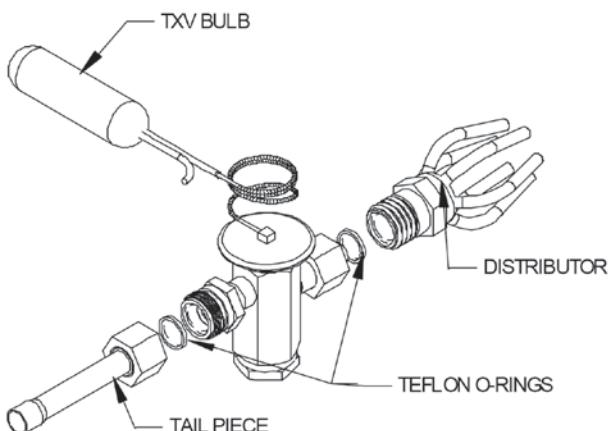


Fig 8B-1. Components of a typical TXV assembly



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.



CAUTION Ensure that the TXV selected is compatible with the refrigerant used in the outdoor system (R22 or R410A). TXV caps are painted green for R22 or pink for R410A. In absence of color, the caps will be marked with the compatible refrigerant.



CAUTION 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.



CAUTION 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. 7B-2 shows the recommended position for the TXV bulb installation in the horizontal plane.

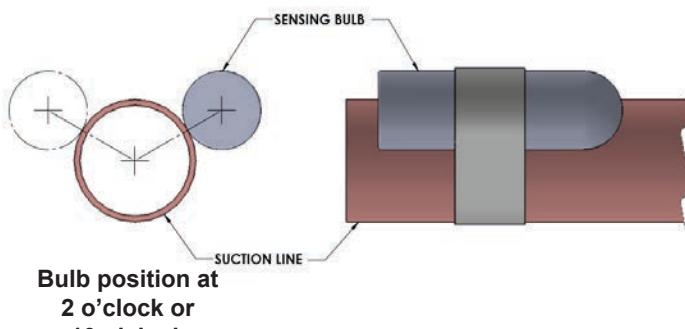


Fig 7B-2. Recommended location for horizontal TXV bulb mount

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

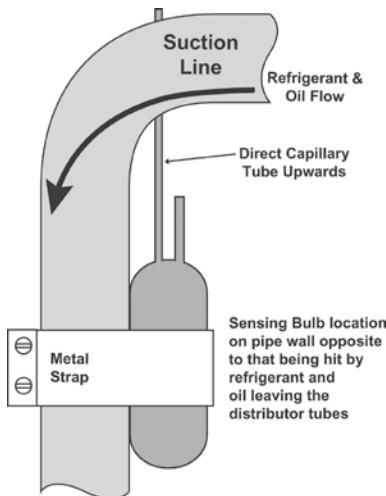


Fig 8B-3. Recommended location for vertical TXV bulb mount



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.

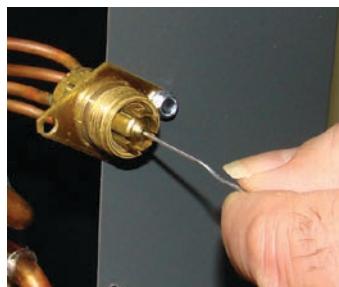
III. Field-Installed TXV Retrofit

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

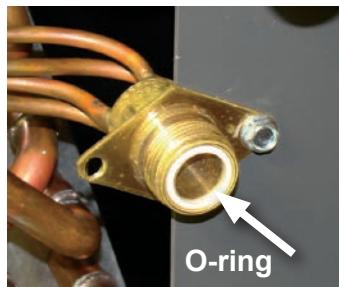
When installing an expansion valve, it is not necessary to slide the coil out of the housing.



III-1. Disassemble the flowrator body using two wrenches. Unscrew the body with a counter-clockwise motion.

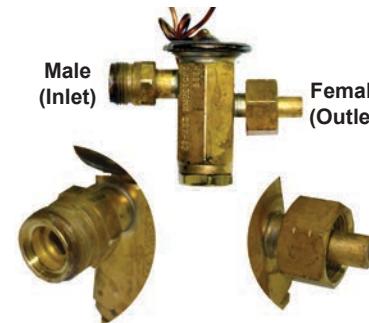


III-2. Remove the existing flowrator piston using a small wire or pick.

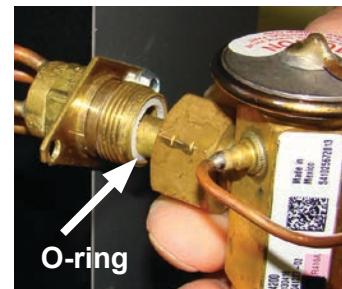


III-3. Replace the Teflon O-ring seal in place (located between the halves).

III-4. Inspect the TXV box to confirm that the valve is compatible with the refrigerant in the system.



III-5. Remove the valve from the box and note the location of the inlet side (threaded male port) and the outlet side (female swivel nut port).



III-6. After ensuring that the Teflon O-ring seal is still in place inside the flowrator body, screw the female swivel nut onto the flowrator body.

III-7. Slide attachment the nut onto the liquid line stub out (See 8A, I-3)

III-8. Braze the stub-out portion to the liquid line and let cool.



WARNING

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



III-9. 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 flowrator body onto the inlet port of the TXV.

III-10. Tighten all connections taking care to use proper back up.

III-11. Remove the valve identification sticker from the valve and place it adjacent to the Aspen model number on unit name plate.

III-12a. Some Aspen coils come with a 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 on to the Schrader valve stem.

III-12b. In some cases, a suction line schrader port may not be present. **If a Schrader port is NOT present:**



A. Install a field-supplied braze-on schrader valve like that shown on the suction line near the intended sensing bulb mounting location. Follow valve manufacturer instructions and recommendations for installation.

B. Attach equalizer tube to valve as described in section III-12a above.

III-13. Mount the sensing bulb as described in section 8B-I or 8B-II.

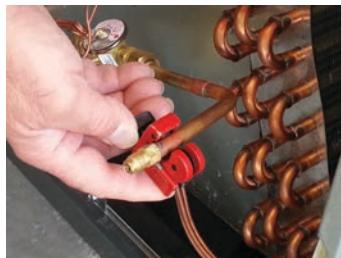


CAUTION When handling or manipulating the equalizer tube, take great care not to kink or make extreme bends in the tubing.

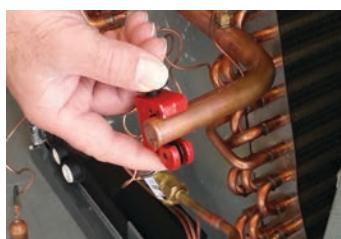
9. Connecting Refrigerant Lines



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



2. Cut off Shrader 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.



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.

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.



5. Check to determine if the evaporator coil has a Shrader 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.

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.



7. Flow nitrogen through the piping when brazing.

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

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

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

10. Leak Check

1. Following outdoor unit manufacturer instructions and recommendations, charge the system with dry nitrogen to a maximum pressure of 150 PSIG.



2. Check all brazed and screw-on line connections by applying a soap solution to the joint. A leak will produce bubbles in the soap solution.

3. If any leaks are discovered, relieve system pressure and repair leaks. Repeat steps 1-3.

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

11. Electrical Installation

These units are designed for a single phase 120 volts, 60 Hz power supply. Wire selection and wiring must be in accordance with the National Electric Code and/or local codes. Unit terminals are designed to accommodate copper or aluminum wiring. If aluminum wiring is used, please observe special precautions relative to sizing, wire connections and corrosion protection.

Fig.11-1 shows the typical electrical connections required for A/C only and heat pump applications.

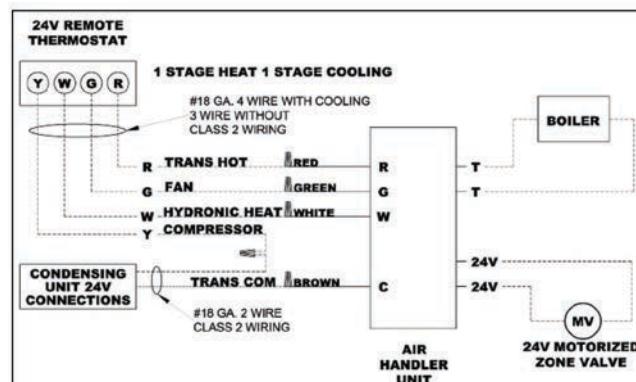


Fig 11-1.

Line voltage wiring should be routed through the access holes at the top of the air handler. 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 11B-2).



Fig 11B-2.

11A. Single Stage Cooling



Fig 11A-2.

During cooling mode operation, indoor blower wire "G" will energize a time delay relay located on the control board 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. (See Schematic Fig 22-1.) Fan time delay periods are 30 seconds ON delay and 120 seconds OFF delay.

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 circuitry is connected at the air handler brown wire. (See Fig11-1.)

The hydronic heater low voltage wiring terminal "W" is wired directly from the thermostat to the air handler. The indoor blower, on a call for heat, will ON delay for a period of 5 seconds. When the call for heat has been satisfied, the indoor blower will have an OFF delay time period of 60 seconds.

11B. Two Stage Condensing Units

If the outdoor condensing unit is a two stage model, a field provided Y2 wire can be connected to the motor using an electrical spade connector. The number 4 and 5 terminals on the motor are speed taps that will increase the blower speed for second stage cooling operation. Both the G and Y2 terminals will be energized at the same time during a call for second stage blower speed operation. The motor will run at the speed where the Y2 wire is connected (Fig 11B-1).



Fig 11B-1.

Operating CFM based upon each speed tap number is shown on the electrical wiring diagram of the unit. Final air volume adjustments should be made by referencing total external static pressure (Table 11B-1).

MODEL	SPEED TAP	CFM V. External Static Pressure				
		0.10	0.20	0.30	0.40	0.50
AFM18-24	Tap 5	900	853	797	738	673
	Tap 4	670	646	613	592	553
	Tap 3	500	476	452	421	400
	Tap 2	900	853	797	738	673
	Tap 1	400	381	360	339	312
AFM30-36	Tap 5	1150	1087	1030	975	910
	Tap 4	1080	1048	1010	960	895
	Tap 3	900	862	825	796	745
	Tap 2	700	663	632	600	552
	Tap 1	500	473	449	421	395
AFM42-60	Tap 5	1850	1806	1752	1700	1650
	Tap 4	1704	1656	1600	1532	1470
	Tap 3	1494	1461	1426	1400	1360
	Tap 2	1350	1310	1272	1229	1170
	Tap 1	676	652	621	600	555

Table 11B-1.

11C. Jumper Placement

The unit ships with a micro-processor based board which controls the electrical functioning of the unit. An inspection of the controls is recommended prior to startup.

Fig.11-C2 provides a schematic of the control board present in the unit. The unit ships from the factory with the aquastat jumper in the OFF position (right two pins) and the heating selector in the HW position (right two pins). If an aquastat is used in the application, the jumper should be changed to ON position (left two pins).

Note: Terminals T and N located on the top right side of the board are not intended for field use and should be left disconnected.

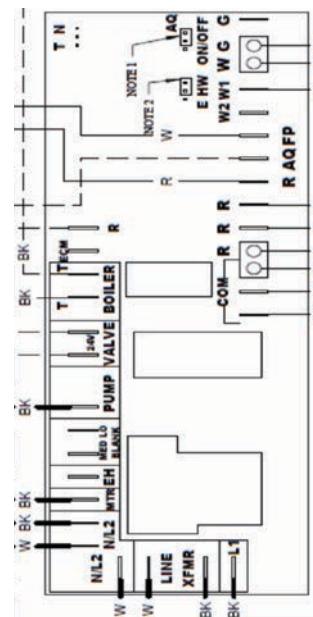


Fig 11C-2.



CAUTION The aquastat (AQ) jumper must be in the OFF position at all times, except for when an aquastat is used. If the jumper is moved to the ON position without installing an aquastat, the blower will not be energized.

19D. Pump/Valve/Boiler Wiring

On units shipped from the factory with a pump installed (Fig 11D-3), the pump will be energized on a call for heat.



Fig 11D-3.

On units that were shipped without factory installed pumps, two black wires should be connected to the terminals marked "BOILER" T T (see Fig 11C-2). In applications where a boiler provides the hot water supply, these wires should be connected to the boiler control wiring. Terminals "BOILER" T T are normally open dry contacts.

In applications where a valve or pump is used to regulate the hot water supply, the two black wires located on the "BOILER" T T terminals should be removed and placed on the two terminals marked "VALVE". These wires should be connected to a 24V valve or pump relay according to local requirements and instructions of the valve or relay manufacturer.

On a call for heat, 24V will be sent to the field-installed valve or pump relay, the valve will open or pump relay will close contacts allowing the pump to run. Water will circulate through the water (hydronic) coil for 60 seconds prior to energizing the blower. After the thermostat is satisfied, the blower will continue to stay energized for a minimum of 30 seconds. The additional blower run time helps maximize heating efficiency.

11E. Freeze Protection Sensor Wiring

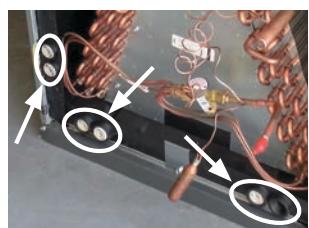
The freeze protection sensor is connected to the "FP" and "R" terminals. This sensor is normally open and will close when the sensor detects a temperature of less than 40°F. The pump will operate and stay ON for a minimum of 30 seconds.

The board has a built-in timer which circulates hot water 6 times a day for 60 seconds to prevent the hydronic coil from freezing.

12. Condensate Drain

1. Select desired condensate drain openings according to air handler orientation. Both Primary and Secondary outlets can be used.

2. Pipe condensate system using proper PVC fittings.



3. Ensure a minimum 2" trap is installed in the condensate drain. Locate the trap near to the connection opening on the air handler. See illustration.

13. 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.

This air handler uses 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 13-1.

MODEL	SPEED TAP	CFM V. External Static Pressure				
		0.10	0.20	0.30	0.40	0.50
AFM18-24	Tap 5	900	853	797	738	673
	Tap 4	670	646	613	592	553
	Tap 3	500	476	452	421	400
	Tap 2	900	853	797	738	673
	Tap 1	400	381	360	339	312
AFM30-36	Tap 5	1150	1087	1030	975	910
	Tap 4	1080	1048	1010	960	895
	Tap 3	900	862	825	796	745
	Tap 2	700	663	632	600	552
	Tap 1	500	473	449	421	395
AFM42-60	Tap 5	1850	1806	1752	1700	1652
	Tap 4	1704	1656	1600	1532	1479
	Tap 3	1494	1461	1426	1400	1364
	Tap 2	1350	1310	1272	1229	1175
	Tap 1	676	652	621	600	559

Table 13-1.

Use a Magnehelic Gauge with a 1" scale and two static pressure tips to measure the static pressure during the air volume adjustment procedure (Fig. 13-1). 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.

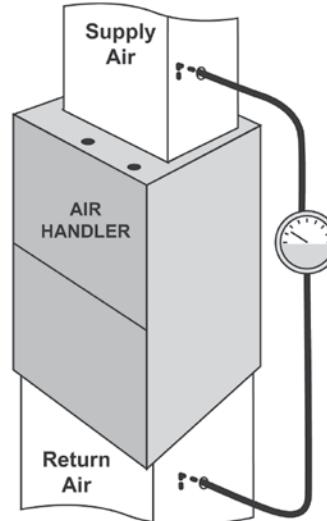


Fig. 13-1

1. Select a starting speed tap from the CFM table.

The blower motor has selectable speed taps labeled 1 thru 5 (Fig. 13-2). 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. 13-2

2. Call for fan only operation at the thermostat.

3. Read the external static pressure level on the Magnehelic gauge.

4. Make speed tap selection changes to get the air volume as close as possible to the required level.

5. If the static pressure is above .5" wc, excessive turbulence or duct friction needs to be reduced. (Obstructions in the duct system can also cause excessive static pressure.)

6. When proper air volume is established, move on to the charging procedure.

14. System Charging



CAUTION

An improperly charged system may cause degradation in system performance and damage the compressor. After installation of the coil, refer to the outdoor unit manufacturer for charging techniques and amount of charge. If outdoor unit manufacturers charging instructions are unavailable, then refer to instructions below to charge the system.

1. Bring airflow up to the maximum CFM possible according to Table 13-1.

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.

14A. Flowrator 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			

Table 15B-1.

14B . Expansion Valve Coils

Add refrigerant until the subcooling measured at the outdoor unit liquid line matches the subcooling recommendation of the outdoor manufacturer. If chart is unavailable charge the unit to a subcooling value of 8°F +/- 1°F.

15. Adjustment Of Heat Anticipator

After all connections are made, start-up and checkout must be performed before proper evaluation of the entire system can be made. Make sure that heat anticipator is properly set as noted on thermostat instructions. Load requirements can vary in each residence and it may be necessary for the installer or homeowner to make slight adjustments to the heat anticipator setting for longer or shorter cycles. It is recommended to change the setting no more than plus or minus 0.05 amps at a time. Greater changes can cause the unit to rapid cycle or remain on excessively.

16. Start-Up

Ensure that motor is pre-loaded with program from factory.



WARNING

The hot water (hydronic) coil and all water lines **MUST** be purged of air prior to starting the pump. Failure to do so could result in pump damage. Aspen will not be responsible for any property or personnel damage caused by failure to follow this instruction.



WARNING

Hot water flowing to the coil should be in the range of 120° - 180° F. Water at these temperatures can cause first-degree burns. Use of proper safety gear while installing or servicing the equipment is strongly recommended as is installation of a water-tempering valve (for water temperatures of above 140°F) to supply lower temperature water to fixtures in the house. N170L series or equivalent should be used.



WARNING

Installer **MUST** open water lines and run system to a.) ensure pump is primed and waterflow is constant and b.) ensure there are no leaks in the coils, connections, and/or water piping. Failure to do so could result in water leaks and property damage. Aspen will not be responsible for any damage caused by failure to follow this instruction.

Connect the hydronic coil to the water heater system as shown in Fig 16-1 and 16-2. Use flexible piping and insulate all pipes. Plumbing must be in compliance with state or local codes (Code CMR248 in Massachusetts). The units for hydronic heat have different top and heater box configurations. This configuration is not suitable for electric heat. DO NOT try to install hydronic heater in a unit not equipped for it. Verify connections: hot water to "in" and cold water to "out". 7/8" OD stubs are provided for plumbing connections. Bleed the air flow system through the bleeder port or optional valve.

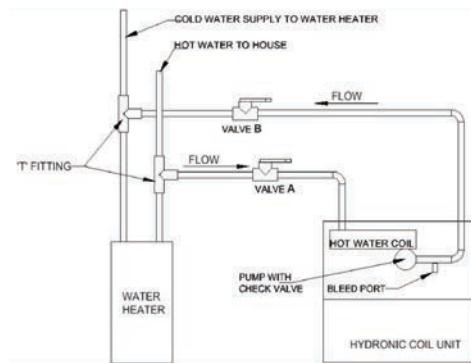


Fig 15-1.

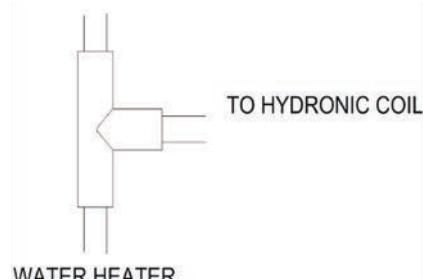


Fig 16-2.