

# FIRST CO. VAQ / RAQ SERIES FAN COIL UNIT

## INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

### GENERAL

The manufacturer assumes no responsibility for equipment installed in violation of any code requirement.

These instructions give information relative to the installation of these fan coil units only. For other related equipment refer to the proper instructions.

Material in this shipment has been inspected at the factory and released to the transportation agency in good condition. When received, a visual inspection of all cartons should be made immediately. Any evidence of rough handling or apparent damage should be noted on the delivery receipt and the material inspected in the presence of the carrier's representative. If damage is found, a claim should be filed against the carrier immediately.

### FAN COIL UNIT

The installer must adhere strictly to all local and national code requirements pertaining to the installation of this equipment.

### VAQ UNIT

These units are designed to be installed vertically in the upflow position or horizontally (air flow from right to left) with the field installed horizontal drain pan kit.

### RAQ UNIT

These units are designed to be installed vertically in the upflow position by the following mounting means:

#### Hung on closet wall

Fan coil is equipped with a flange on the rear top plate to allow hanging of the fan coil either on a field fabricated wall bracket or on a bracket manufactured by First Co.

It is recommended that sound isolating material be installed to prevent any undesired transfer of sound.

#### Recessed in a wall

Installation of the fan coil recessed into a partition wall with it's recommended framing is shown in figure 3. This application requires the optional louvered wall panel which must be ordered from First Co.

Wall panel with frame is secured to the studs by screws or nails after the dry wall has been installed. Refer to figure 4 and 5.

#### Closet Platform

##### Front Return

Fan coil is to be set on a platform and secured by screws or nails. Sufficient space for drain piping is required under the platform.

**NOTE:** *Extreme caution must be taken that no internal damage will result if screws or holes are drilled into the cabinet.*

All fan coil units are U.L. Listed for installation with zero inches clearance to combustible materials. This includes the unit cabinet, discharge plenum and connecting ducts. Sufficient clearance must be provided at the front of the unit to allow access to electrical controls and removal of the motor / blower assembly for servicing. This clearance distance should be approximately the same as the depth dimension of the fan coil unit.

### AIR DISTRIBUTION DUCTS

All duct work must adhere strictly to all local and national code requirements. The return air duct must have the same free area as the opening provided on the fan coil unit. If there is no ducted return, applicable installation codes may limit the unit to installation only in a single story residence.

### ELECTRICAL

All wiring must comply with local and national code requirements. Units are provided with wiring diagrams and nameplate data to provide information required for necessary field wiring. (See figure 1) Knockouts are provided on the cabinet for connection of power supply.

These fan coil units are provided with a Class 2 transformer for 24-volt control circuits. Should any add-on equipment also have a Class 2 transformer furnished, care must be taken to prevent interconnecting outputs of the two transformers by using a thermostat with isolating contacts.

### WIRING DIAGRAM

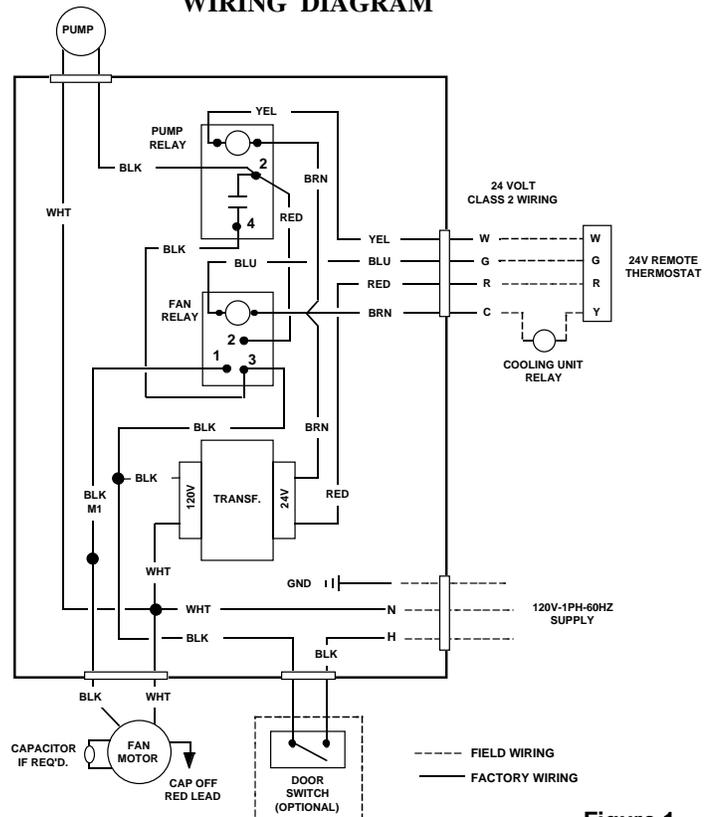


Figure 1

## EVAPORATOR COIL PIPING

These fan coil units are supplied with a direct expansion refrigerant coil. The refrigerant metering device is a fixed orifice piston and is installed at the factory. This permits the unit to be matched with either a standard condensing unit or heat pump.

The suction and liquid refrigerant lines must be sized in accordance with the outdoor unit manufacturer's recommendations. Connections at the fan coil unit require a flare for the liquid line and a sweat connection for the suction line.

Condensate drain lines must be installed with adequate slope away from the unit to assure positive drainage. Since the drain pan is located on the suction side of the blower, a negative pressure exists at the drain pan and a minimum trap of 1-1/2 inches must be provided in the drain line to assure proper drainage.

## HOT WATER COIL PIPING

Figure 2 illustrates a typical piping schematic for an Aqua Therm System.

The hot water coil connections are 3/4 inch nominal (7/8" OD) copper except the 60VAQ is 1 inch nominal (1-1/8" OD). The hot water supply to the fan coil should be on the right when facing the fan coil upright and from the front.

All piping between the water heater and fan coil unit should be copper and should not exceed 200 feet of total piping. It is recommended that 3/4" nominal (7/8"

OD) piping be used on 18 - 48VAQ units and 1" nominal (1-1/8" OD) on 60VAQ units to prevent excessive head pressure losses. (Consult the factory for other piping applications.)

It is also recommended that all piping be adequately insulated to prevent freezing when piping is run in an unconditioned space.

**NOTE:** A hot water coil freeze protector is available for applications where the fan coil is located in ambient air locations (attics, crawl spaces, etc.) or within structures that may be unoccupied during freezing conditions. Consult the factory for additional information.

### WARNING

**An expansion tank may be required if a back-flow preventer is installed in the system.**

**Solder Connections** - All copper joints in the water lines must be made with **low temperature -non lead solder.**

**"T" Connections** (at the water heater)- Water lines to and from the fan coil unit **must** be taken from the horizontal connection of the "T" fittings in the vertical hot and cold water supply lines at the water heater. This ensures that any air in the system will be purged each time water is used in the dwelling. (See figure 2)

**Isolation Valves** - Two valves are recommended to be installed within the circulating loop to permit servicing of the system if required and to assist in purging the system. (See figure 2)

## OPERATION AND MAINTENANCE

Prior to start-up, inspect the blower to assure the wheel turns freely without rubbing on the housing. Check to see that the air filter is properly positioned in the unit, then replace the access panels.

**NOTE:** The blower door must be in place for the unit to operate due to the door switch.

### WARNING

**To prevent pump damage, the fan coil unit should not be energized for heating until both isolation valves have been opened and the hot water coil and all water lines have been purged of air.**

## HEATING CYCLE

### START - UP

- 1) Fill the water heater. Open a hot water faucet while filling the water heater to vent the air. When the tank is full and all the air is purged, close the faucet.
- 2) Ignite the water heater and set the thermostat to 140 degrees.
- 3) Purge the air handler's hot water coil and lines.

**NOTE:** It may require purging several gallons of water so either have a bucket available or a means of discarding the water.

Close valve number 1 and open valve number 2. (See figure 2) Next, open the air bleed valve. When all of the air is purged from the lines close valve number 2 and open valve number 1. After all the air is purged from the coil and lines, open both valve number 1 and 2 and close the air bleed valve.

4) Switch the room thermostat to the "Heat" position and raise the temperature setting to a position approximately ten degrees above room temperature.

**NOTE:** The door switch must be activated to operate the unit.

The pump should energize and begin circulating the hot water through the coil. If the pump is operating properly and the water temperature in the water heater has reached the set point, then the hot water inlet at the fan coil unit will be hot. If the pump is running but hot water is not circulating, open the air bleed valve long enough to purge any remaining air from the hot water lines and coil. This will allow the pump to begin circulating hot water.

5) The water heater thermostat should be adjusted so that the water temperature entering the hot water coil is as close to

TYPICAL PIPING SCHEMATIC

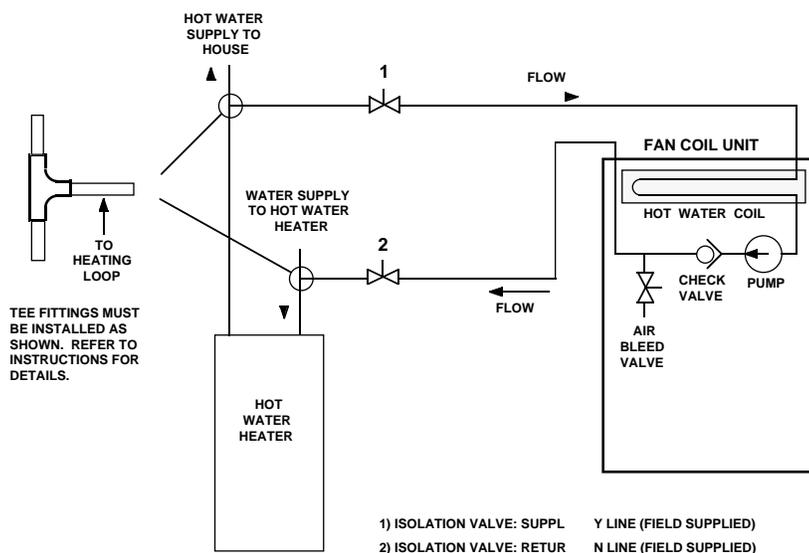


Figure 2

140 degrees as possible with the system energized and operating long enough for all temperatures to stabilize.

**AIR FILTER**

The air filter should be cleaned or replaced as often as necessary to prevent restriction of air flow. Always replace the filter with the same type as originally furnished.

**BLOWER MOTOR**

The blower motor should be cleaned and oiled with a good grade of SAE 20 oil

annually. Normally a few drops of oil in each bearing is sufficient.

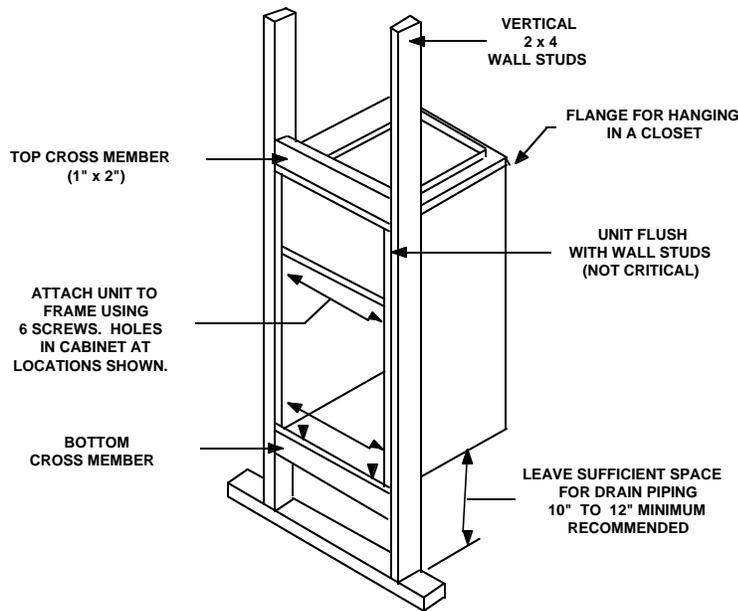
**PUMP REPLACEMENT**

Disconnect electrical power before servicing the unit.

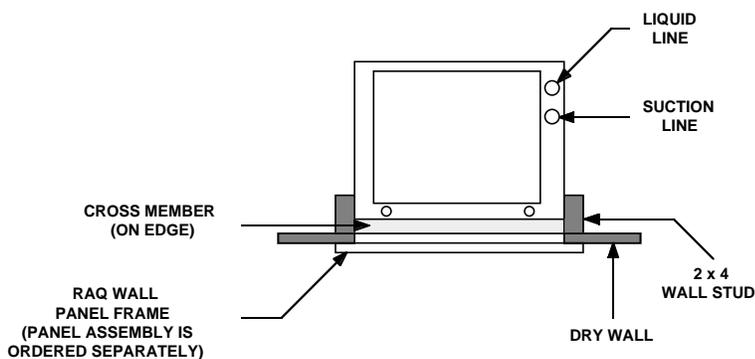
To replace the circulator pump, close the isolation valves and relieve the water pressure within the heating loop. Disconnect the pump's 115 volt power lines within the control box and remove the four hex head screws securing the pump motor to the pump's volute.

Reverse the above steps for reassembling the pump, however make sure that the pump or volute has the rubber o-ring in place before assembling.

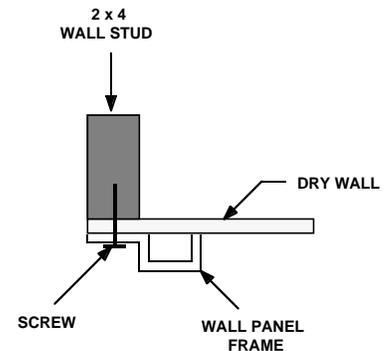
**RAQ RECESSED WALL MOUNTING**



**SUPPORT FRAMING**  
Figure 3



**INSTALLED UNIT TOP VIEW**  
Figure 4



**DETAIL OF WALL PANEL FRAME INSTALLATION**  
Figure 5

## TROUBLESHOOTING

### (Most likely problems and cause)

**Important:** For system to operate properly **power should be turned ON and all shut - off valves should be OPEN.**

#### **Pump does not run:**

These pumps may sometimes "stick" due to non - use and fail to start. Before replacing pump:

1. Turn off power. Remove large screw plug in end of pump motor and turn shaft several times with a small screwdriver. Replace plug and start system. Pump should start.
2. If pump **has** to be replaced, first shut off all isolation valves between the water heater and air handler and relieve the city water pressure by opening the air purge valve. Then remove the four "allen" head screws that attach the pump motor to the pump volute rather than un-soldering the entire pump assembly.

#### **Pump is noisy:**

Air may still be in the heating loop. Re-purge the system as described under "start - up procedure".

#### **Water heater T & P valve "weeping":**

This situation usually occurs in those systems located in areas where local codes require the installation of a "backflow preventer" in the cold water supply line to the water heater. This situation is caused by the expansion of the water when heated. An expansion tank may be required to solve this problem. Contact local plumbing authorities for assistance.

#### **Hot water circulates through hot water coil during cooling cycle:**

Check valve may be stuck open allowing "thermosyphoning" (circulation) of hot water.

#### **Insufficient or no heat:**

1. Air still in heating loop. Re-purge system.
2. Inlet and outlet piping connections at the air handler may be piped backwards.(See "Hot water piping".)
3. Water heater thermostat not turned up high enough.
4. Water heater thermostat not calibrated properly.
5. Restricted or improperly installed dip tube in water heater.
6. Restriction somewhere in heating loop. Confirm that no other check valves or devices have been installed in the heating loop except as supplied by First Co.  
**Note:** Some water heaters come with two factory installed check valves located on the space heating connections. Since the circulating pump in the **Aqua Therm**<sup>®</sup> system may not be able to open these valves in addition to the **Aqua Therm**<sup>®</sup> check valve, these two valves should be removed before installation.
7. Air handler or hot water coil not large enough.
8. Water heater not large enough.