THE CLOSED SYSTEM

HEATING SYSTEM INSTALLATION SUPPLEMENT 230

A "closed" heating system is one in which the heating fluid is permanently contained within the heating system and is never removed except for maintenance. The closed system is not connected to the potable domestic water source. A heating system that has a boiler is one example of a closed system.

Radiantec recommends that a quality domestic water heater be used instead of a boiler in underfloor radiant heating systems. There are many good reasons such as:

1. Boilers are engineered to make very hot water. Domestic water heaters are engineered to make moderate temperature water. The task associated with radiant heat is to make moderate temperature water and there are many benefits in doing so.

2. There is no need for an expensive mixing valve or special controls to lower the water temperature.

3. Domestic water heaters are designed to withstand the thermal shock of having a large quantity of cold water dumped into them. Boilers are not.

4. Quality domestic water heaters are not affected by condensation. Most boilers are damaged by condensation.

5. Condensing water heaters operate with exceptionally high efficiency (95+%). Most boilers cannot match this.

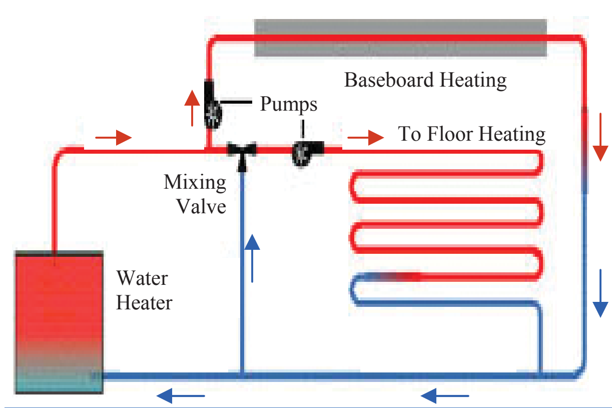
6. A quality domestic water heater is much lower in cost than the equivalent boiler.

7. Domestic water heaters have very high initial heat output due to the heat stored within the tank. This will increase the responsiveness of the system.

8. Quality domestic water heaters can direct vent into plastic pipe instead of into an expensive chimney.

9. Negates the necessity for oxygen barrier tubing because domestic water heaters are constructed of materials designed to handle fresh water.

IF A BOILER MUST BE USED BECAUSE OF CODE, THE NEED FOR ADDITIONAL BASEBOARD UNITS, OR IN A RETROFIT SITUATION, A MIXING VALVE MUST BE USED.



The mixing valve will permit dual temperatures within the system (high temperatures for the baseboard and a lower temperature for the radiant heating). The mixing valve must be of high quality and capable of adjusting both the hot and cold sides. The pump must be placed **after** the mixing valve so that hot and cold water are both drawn together.

INSTALLATION OF THE CLOSED SYSTEM from RADIANTEC COMPANY

INSTALL THE TUBING using Radiantec installation manuals, and consultation with Radiantec technicians.

SELECT AN APPROPRIATE DOMESTIC WATER HEATER OR BOILER
Consider cost and availability of fuel in your area; now, and in the future. In general get the highest quality and highest efficiency you can afford. The unit should be at least 95% efficient. The water heater must have a BTU heating output that is large enough to meet the heating needs of the home on the coldest expected day plus a small extra reserve.

These installation instructions were written assuming that the installer will be using a "Polaris" gas fired water heater instead of a boiler. This unit is an excellent choice because of its outstanding efficiency and high heating capacity.

If another water heater or a boiler is used, certain on site adjustments and modifications may be needed.

INSTALL THE WATER HEATER
The following recommendations are general in nature. The actual installation of the heater may not be a good "do it yourself" project for everyone. The installer should know exactly what he or she is doing. He should review the water heater instruction manual and follow all codes. If no building codes are mandated, the installer should follow plumbing and mechanical codes developed by the International Code Council (ICC). If in doubt, it may be wise to hire a licensed professional. The average home owner should **NEVER** work with gas. Correct installation will result in many years of trouble-free operation. Incorrect installation can result in poor performance, safety hazards and unnecessary expense.

The Polaris Water Heater is all stainless steel, 95% efficient and vents though the wall or roof with plastic pipe.

The homeowner and installer should pay particular attention to these items:
1. Locate the water heater in the most desirable location first and then locate other components around it.
2. Locate the water heater where it can be eventually removed if necessary and where all components are accessible.
3. The venting of a direct vent water heater should be short and have a minimum number of turns.
4. The water heater should be set upon a short stand to improve access and make installation easier. Many codes also require the water heater to be placed in a shallow plastic pan so that leaks are revealed and do not cause rotting of supporting lumber.
5. The Polaris water heater or any other condensing unit should be located near a drain. A byproduct of the efficient burning of gas is water, and the Polaris can produce up to a couple of gallons of condensate per day. If the heater is installed some distance from a drain, a condensate pump will be necessary (can be ordered from us) which is not very expensive. Use plastic tubing. The condensate has the acidity of lemonade and would corrode metal in a short period of time. Some codes may indicate that a condensate neutralizer be installed (you can order one from us if necessary). This condensate contains the pollutants that most heating units discharge into the air. These pollutants seriously damage the environment causing acid rain, global warming, emphysema, and other respiratory ailments. They are not harmful when discharged into an appropriate drain.

LOCATE AND INSTALL THE "INSTALLATION PACKAGES"

Installation packages from Radiantec have important advantages:

1. They are pre-assembled, pre-tested and pre-engineered.
2. They save an enormous amount of running around and site work time.
3. They are economical because of Radiantec buying power.
4. They help ensure code compliance.

5. They give a neat appearance to the work.
6. Radiantec technicians can easily troubleshoot any problems.
7. Professionals like them because they save time and money.
8. The packages are perfect for do it yourselfers because the highly skilled part is done for them.

THE PLUMBING MECHANICAL PACKAGE (PMP)

A closed heating system needs several mechanical components for proper operation. Here is a list of the components you need and what they do. These components are included in the "Plumbing Mechanical Package" or PMP as supplied by Radiantec. A few other components are included in the Zone Distribution Manifold, and are described later.

1. **The drain valve.** This is where you remove water (or other fluid) from the system, and remove air and other contaminants.

2. **The fill valve.** This is where you add water, (or other fluid) to the system and flush it.

3. **The ball valve.** You will close this valve between the fill and drain valves in order to force the water to go through the system during filling and purging. You can also use this valve to isolate the other components so that you can work on them without draining the system.

4. **Air eliminator.** This device keeps air out of the system. It is so effective that it will even remove dissolved air. It is important to have a good air purger because hydronic heating systems will not work well if air is trapped within them.

5. **Pressure gauge**. Displays the pressure within the system.

6. **Pressure relief valve**. This is a spring-loaded valve that is designed to open whenever the pressure in the system goes above a certain point. The pressure relief valve is a very important safety device. It protects the system and the tubing from catastrophic rupture in the event that everything else fails. It must be open to the atmosphere at all times. It must never be plugged or capped. It should be located such that if it were to open, the vented fluid, which might be very hot, would go to a safe place. This valve must never be removed for any reason. Even though the water heater also has a pressure relief valve, its purpose is to protect the heater and is set much higher than the rating of the tubing in the system.

7. **Expansion tank**. Any fluid that is heated or cooled will expand or contract in volume. If the system is very rigid, the pressure will increase and the system could rupture. The expansion tank is like a balloon within a steel container. It gives the increased volume of the system a place to expand into.

8. **Bell Hangers.** Used to support the PMP and we provide two.

9. **Bushing.** Used to install the expansion tank into the FIP tee.

10. **FIP Tee.** The Expansion tank with bushing is screwed into this tee.

THE ZONE DISTRIBUTION MANIFOLD (ZDM)

The Zone Distribution Manifold (ZDM) is the place where the heated fluid from the heating device branches off to the various heating zones.

A heating zone is any area whose performance is controlled by one thermostat. A heating zone may have any number of circuits or individual loops of tubing. Each heating zone will have a check valve to prevent one zone from back flushing an adjacent zone.

Check valves

Note: Radiantec Company prefers to use individual pumps for each zone instead of one large pump and individual zone control valves. If one large pump is used with individual zone controls, that pump must be large enough to provide adequate flow when all zones are called for. And yet, only one or two zones at a time will usually be calling for heat.

The result is a constant waste of electricity and in extreme cases, the possibility of what is called "erosion corrosion," where excess flow physically wears out components. Individual pumps provide safety if one pump fails. If you only have one pump, and that one pump fails, you have a much more urgent situation.

The Zone Distribution Manifold consists of several components. The first is the manifold itself which is shipped in its own crate.

Another component is an "extras" package which includes all of the mounting hardware for the ZDM plus some other miscellaneous components. The extras package includes the DS-60P (digital temperature display), two drain valves with FIP tees, several bell hangers, two bolts with nuts for each pump, two end caps, and extra pump gaskets. All of these components will be in one cardboard box marked "extras package" and will usually be located in the box containing your pumps and controls. This is usually the box that has the packing slip; the shipping label will also describe the contents of the box.

INSTALL THE MOUNTING PANEL AND MOUNTING BOARDS (not provided)

Before you install any of the mechanicals, we advise that you install a "mounting panel" on the wall that the mechanicals will mount to. This is simply a piece of ¾" plywood or OSB that you provide (you can use ½" if you will secure it to a framed wall) and can be cut to different sizes depending on how many zones you have.

For example, the mounting panel for a 2 zone system should be 4' tall and at least 4' wide (wider is ok as shown in the picture where the board was cut at 4' tall x 5' wide). For every zone above 2, add at least 6 more inches to the width. The edge of this mounting panel should be roughly even with or beyond the edge of the heater.

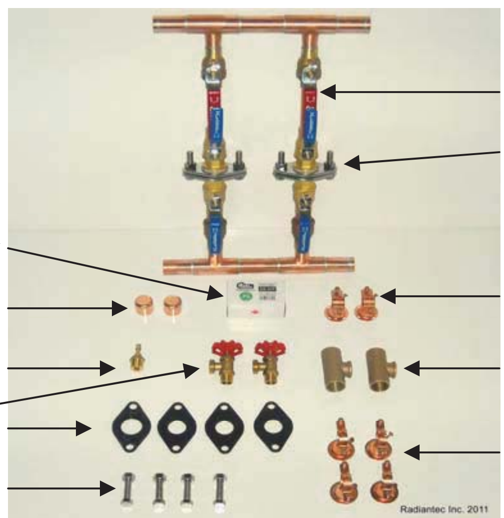
Next, at least 6” down from the top of the heater, you need to install a 2 x 4 at least 38” long (longer is ok). This piece is necessary because the pumps would rub against the mounting panel without it, creating the potential for vibration and noise. Again, this is for a 2 zone system and you should add at least 6” to this board for each zone that you add. Be sure to use a level.

You will also need another short piece of 2 x 4 at least 12” long (again, add 6” or so for every zone that you add) which you will install a little later.

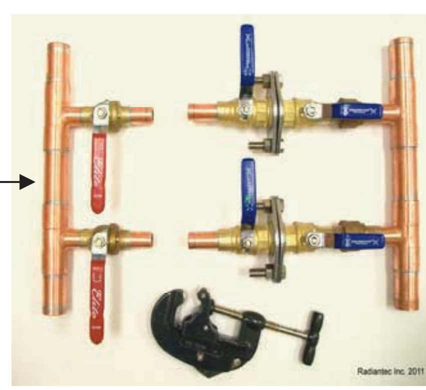
INSTALL THE ZONE DISTRIBUTION MANIFOLD (ZDM)

1. Take apart the box with a Phillips head screwdriver and open the stainless steel clamps to release the copper manifold assembly.

2. Lay out everything to familiarize yourself with the parts and see if everything is there. Please note that these instructions show the installation of a 2-zone system. You should have:



3. Separate the supply manifold from the return manifold by cutting at the black marks between the ball valves. The supply manifold will be the one with the isolation pump flanges. The return manifold has a ball valve for each zone.



4. The supply manifold will get one bell hanger per zone because of the added weight of the pumps. Connect the bell hangers to the ZDM (leave them loose as you will need to remove them). You will receive the exact number necessary for your particular installation. If you feel that you need more, simply phone us to order them; there will be an additional charge, however.

Next, put the manifold up to the mounting board and mark the location of the bell hangers. Be sure to use a level! The manifold should be located so that it is at the end of the mounting board and the top of the bell hangers should be flush with the top of the board to allow clearance for handles on the PMP (installed later).

Once the bell hangers are marked, take them off of the ZDM and screw them into the mounting board. Then, put the manifold in place and slightly tighten the hangers around the manifold. You will initially leave these a little loose so that the ZDM can swing towards you during a future installation procedure.

5. Separate the pump flanges by backing off the nuts that connects them, install two of the oblong pump gaskets (one on the top and one on the bottom) that came in your extras package (discard the round o-rings that may have come with the pumps), and secure the pumps to the manifold using the bolts that came with your package (two held the flanges together, there are more in the extras package).

Be certain that the pumps are turned roughly at a 45 degree angle with the electrical box facing out (see photo). This will allow you easy access once it becomes time to wire them to the relay box. Also, the pumps should be installed in the order of smallest to largest in relation to the heater. This minimizes the likelihood of a large pump "starving" a smaller pump if they both come on at the same time. There are arrows on the back of the pump to indicate direction of flow. Be sure they are pointed up.

6. Now that the pumps are in place, it is time to install the top mounting board that was mentioned earlier. This board should be at least 12" long for a 2 zone system. Loosely attach the ¾" bell hangers to the ¾" stub of copper that is coming out of the top of the pump. Next, swing the ZDM up into place to mark the spot for the mounting board.

bell hangers

Swing the ZDM back down out of the way and mount the board to the mounting panel with screws and be sure to use a level. Once again, swing the ZDM back up and mark the location of the bell hangers. The bell hangers can now be taken off of the copper stubs and secured to the mounting board with the screw. Once this is done, swing the ZDM up one last time and secure it to the bell hangers. You can also tighten the 1" bell hangers on the trunk of the ZDM.

7. The return manifold can now be installed and it can be located virtually anywhere. It can be located directly below the supply manifold, offset (as shown in the photos), or even across the room if necessary; you will just have a longer run of copper or PEX to get back to the water heater. This header will get only two bell hangers regardless of how many zones are present.

8. Prepare the FIP tees for soldering (clean and flux) and slide them over the end of both the supply and return manifolds (the side closest to the heater). The drain valve will screw into these tees once everything has been soldered together. The drain valve will want to be pointing downward.

Next, prepare the end caps for soldering and slide them over the end of the manifold.

INSTALL THE PLUMBING MECHANICAL PACKAGE (PMP)

1. Take the package out of its crate with a Phillips head screwdriver. The expansion tank will be in a separate box. You will find two bell hangers, a FIP tee and a bushing in a plastic bag that is taped to the valve handle.

The PMP will come with end caps for pressure testing at the factory and to protect the tube ends during shipment. Take them off by cutting or unsoldering and discard.

The Plumbing Mechanical Package (PMP) is intended for the flow to be from left to right. If this is not convenient, simply plumb it right to left. If you unsolder something, use wet rags to prevent unsoldering of adjacent parts. A little space could be saved by cutting the PMP between the fill valve and the air eliminator and making an L shaped PMP.

2. Next, slide the end of the PMP into the FIP tee for the drain valve and mark the location for the bell hangers. Make sure you use a level. Then, install the bell hangers so the top of the bell is at the top edge of the board. This will allow clearance for the valve handles to open and close. Now, you can attach the PMP to the bell hangers.

3. The air eliminator may have a screw cap. If so, it will have been tightened so that it doesn't fall off during shipment. After flushing and pressure testing, loosen it and leave it loose permanently so that it can perform its function of letting air out of the system.

4. The PMP will be connected to the source of hot water at one end (next to the drain valve at the far left), and to the Zone Distribution Manifold at the far right.

HOOK EVERYTHING TOGETHER AND PRESSURE TEST

When you connect from the water heater to the PMP and then to the ZDM, and back again, select the copper tubing size based upon the rate at which water will flow through the tube. The same size pipe should be used for the return line from the ZDM back to your water heater.

Use 3/4" tubing for up to 8 gallons per minute.
Use 1" tubing for up to 16 gallons per minute
Use 1 1/4" tubing for up to 25 gallons per minute.

In most cases, the supply and return line to the ZDM will be the same size as the PMP. If in doubt, give us a call and we'll be happy to assist you.

Screw a 1” x 1” female threaded adapter to the port on the top of the Polaris water heater labeled “hot water out.” Now run copper to the PMP which is connected to the ZDM. On the horizontal run of copper between the heater and the PMP, you will install the FIP tee that came with your PMP. This will serve two purposes. Initially, you will screw the schraeder valve into it to pressure test the system. Once the test is done, the expansion tank will screw into it. Make all connections using standard soldering techniques

The return header can connect into either one of the two bottom ports on the tank using the same detail as above; one is labeled “cold water inlet” and the other is labeled “heating system return.” Since all of the ports access the same body of water, either port will work equally well. The port that is not used should be capped with a 1” bronze cap. You will also need to cap the port labeled “heating system outlet.” If you are using a heater other than the Polaris, this return should go into the port labeled, “cold water in.”

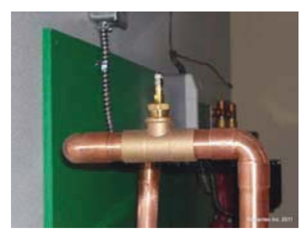
Now that everything is soldered together, you can screw the drain valves into the FIP tees. Be sure to use teflon tape and/or thread compound.

PRESSURE TEST

It is a good idea to pressure test your work with air before you put it in service. You may also want to pressure test your work as you go. If a leak is detected, you have a better idea of its location. Air will leak in places where water will not. If the system passes the air test, you know that the system will not leak water.

Radiantec provides you with a way of pressure testing with an apparatus that is threaded into the FIP tee as mentioned in the previous section. This apparatus consists of two components; a tire type air stem with 1/8” male threads that screws into a 3/4” male x 1/8” female bushing.

1. Screw the air stem into the bushing and then screw the bushing into the FIP tee. You should use teflon tape and pipe thread compound on all of the threads. The end result is shown to the right.



2. The pressure relief valve is set for 75 psi. If you plan on pressure testing above that, you will need to first adjust the valve. To do this, unscrew the cap on the top of the valve. Next, take a flat head screw driver and turn the inside of the valve clockwise to raise the pressure or counter clockwise to lower it.

3. Add air with anything that will blow up a tire. Watch the pressure gauge. You should pressurize up to at least 75 PSI or to whatever is mandated by your local codes. The pressure relief valve should operate at about 75 psi. Be certain that it does. Pressure test at that level for several hours. There may be a very small drop in pressure due to temperature change or from expansion of the plastic tubing, but that should be all. **Pressure testing can present hazards if the system should burst. Be sure that all copper fittings have been soldered. Wear safety glasses and remove bystanders.**

4. Find any leaks with a diluted dish liquid solution. Patience and diligence at this time will pay itself back with many years of trouble free performance.

5. Let the air out by backing off on the screw of the pressure relief valve. Set the pressure relief valve at the appropriate setting with reference to the pressure gauge (30 psi is typical). Let the rest of the air out with a drain valve.

6. Take the pressure testing plug out and replace with the expansion tank. The expansion tank should be set for system operating pressure. The expansion tank comes pre-charged at 12 psi.

Now you are ready to fill and flush the system.

FILL AND FLUSH THE SYSTEM

The closed system is filled with two garden hoses and a washing machine hose (a garden hose with two female ends).

When building the system, make sure that you design enough shut off valves so that you can make the water flow only one way. If there are two or more ways for the heating fluid to go, it will take the easiest way, and the air bubble may not be forced to move.

Note: Never attempt to fill tubing within a slab that is below 32°F. ! The water will freeze on contact and possibly damage the tubing

1. Hook one garden hose up to a faucet and then up to the fill valve on the PMP by way of the washing machine hose. Then attach the other garden hose to the drain valve and take the opposite end outside or to a drain. Secure this end so it doesn't become loose and flop around under pressure of the water and make a big mess while you are somewhere else.

2. Close off all of the zones except one by turning the ball valves on the ZDM. Next, in the zone that is open, close off all of the circuits of tubing except one. Your plan is to fill and purge each circuit of tubing within a zone individually.

3. Close the air vent on the air eliminator so it will not become clogged with debris. Also close the ball valve between the fill and drain valves so that water will be forced through the system. Now, turn on the water faucet and open the fill and drain valves and let the water flow into the system. You may also turn on the circulating pump for additional flow.

Water will begin to flow into the open zone and circuit. The first circuit of the first zone will take the longest to fill and purge because the entire distribution system as well as the heater will be filled at this time.

4. After awhile, water should start to come out of the hose attached to the drain valve in hissing and sputtering bursts. Allow the flow to become smooth and continuous for at least 3 minutes. Air can sometimes be trapped in a bend in the tubing and it sometimes takes several minutes to remove it. Once you feel all of the air and debris are removed from the circuit, open circuit number two and close circuit number one. Repeat the above procedure for all other circuits as well as all other zones. **You may have to repeat this process a few times to get all of the air out, but once the air is out, it does tend to stay out.**

5. When you believe that all of the air and any debris are purged from the system, close the drain valve and let the incoming water pressurize the system. System pressure should rise immediately. If not, significant air remains in the system and the air is acting like an expansion tank. Continue to isolate, purge, and flush.

6. A closed system should have adequate pressure to raise a column of water to the highest point in the system plus about 5 psi. One psi will raise a column of water about 2.3 ft. Therefore, if the highest point in the system were 15 ft above the pressure gauge, the suggested pressure would be 11.5 psi (15 ft / 2.3 ft per psi + 5 psi).

Unscrew but do not remove the cap on the top of the air eliminator so that it can perform its function. If it leaks, you need to take it apart and clean it. You may need to add a little additional pressure to the system (about 5 psi) to compensate for the elimination of dissolved air in the water over the next few days of operation.

7. If you are going to fill the system with an antifreeze solution, it is best to fill and flush the system with straight water first. Then add a calculated amount of pure antifreeze solution, with a sump pump, and circulate to make the proper mixture (see directions below).

Now you are ready to fire up the heater and attach the controls to the pumps. We will discuss controls in another section.

ADDING ANTI-FREEZE TO THE SYSTEM

If you decide that anti-freeze is necessary in your closed system, the following instructions give you a good idea of how it can be installed. We always recommend that a non-toxic anti-freeze be used, with the primary ingredient being propylene glycol (if there is a spill or leak, children or pets will not get sick if they consume or play in it). **The type of anti-freeze should be approved for use in a hydronic heating system.**

If a domestic water heater will be used as the heating source, it should be permanently marked with the following words: “DO NOT USE FOR POTABLE WATER.”

These instructions were written under the assumption that the system has already been filled, purged of air, and pressurized.

1. Determine the total volume of water in your system by adding the volume of the water in your heating source to the volume of water in the tubing and piping by following the guide below:

- 1/2” PEX tubing: .921 gallons/100’
- 5/8” PEX tubing: 1.38 gallons/100’
- 3/4” PEX tubing: 1.84 gallons/100’
- 7/8” PEX tubing: 2.70 gallons/100’
- ¾” type L rigid copper: 2.51 gallons/100’
- 1” type L rigid copper: 4.28 gallons/100’
- 1 ¼” type L rigid copper: 6.12 gallons/100’

2. Now, determine what ratio of anti-freeze to water will give you the best protection for your area by reading the instructions on the label of the anti-freeze you are using. Some companies may recommend a 50% ratio while others might recommend a 30% ratio. The temperature you want to protect against will also determine the appropriate ratio.
For example, if you calculate that there are 100 gallons of water in your system and that a 30% ratio of anti-freeze to water will give you the best freeze protection, you will need to inject 30 gallons of pure anti-freeze (100 gallons x .30 = 30) into the system. Be aware that you will want to purchase more anti-freeze than what is actually needed for your system as it is difficult to install all of it without injecting an excessive amount of air.

3. Pour the pure anti-freeze into a large, clean plastic barrel. A sump pump will be necessary to inject the anti-freeze into the system. The pumps used in your system **are not** capable of “sucking” the anti-freeze into the tubing.

4. Open all of the valves in front of the pumps and on the circuits of tubing. Hook the sump pump to a hose and using the washing machine hose that was used for filling the system, connect it to the fill valve.
Connect another hose to the drain valve and run it outside or to a drain. Close the valve between the drain and fill valve, open the fill valve, and turn on the sump pump. The anti-freeze will enter the system and an equal amount of water will be discharged down the drain. **Be sure that the sump pump remains submerged so that air is not injected into the system!**
When all but the bottom ¼ or so of the anti-freeze is injected, close the fill and drain valves and turn off the pump. Be sure to re-open the shut-off valve between the fill and drain valves.

5. Re-pressurize the system by attaching the house water supply to the fill valve. **Be certain to completely fill the hose before attaching it to the fill valve to minimize the injection of air into the system.** Pressurize up to the level that you determined earlier.
Now, turn on all of the pumps and run them awhile to thoroughly mix the water and the anti-freeze together.

You are now ready to fire your heat source.

TROUBLE SHOOTING

1. When the thermostat calls for heat, the pump should come on and circulate the heating fluid throughout the system. The pump may be very quiet and hard to hear. You can improvise a stethoscope with a toilet paper tube or you can place one end of a screwdriver on the pump and the other end on a bone near your ear.

2. The heating unit should come on and make hot water. If not, the heating zone may not be putting out any heat. If the heating unit is running constantly, it is either too small for the purpose or not putting out its rated output.

3. The heating fluid coming out of the zone should be about 10-15 degrees cooler than what it went in at. This is ideal, but many systems perform satisfactorily with different temperature drops. If the water seems to be coming out cold, suspect that it is not flowing at all.

4. When you have no flow, suspect air in the system. That is the number one cause. Isolate, purge, and flush the zone in question again. On occasion, you may have to repeat this process more than once.

5. Verify that flow through a section of tubing is possible with a garden hose. If flow is blocked, check all valves to ensure they are open and allowing flow. Make sure all check valves are installed in the correct position, with the arrows pointing in the direction of flow. Also consider there may be debris or a kink in the tubing. If you have respected the minimum bending diameter of the tubing, there is no kink. You can back flush by removing the pump.

6. A pump that is spinning but unable to circulate the fluid because of air or a blockage will generate a great deal of heat by friction. This could give the illusion that hot water is flowing when it is not. You need to feel the temperature of the pipe farther away from the pump.

7. The return pipe may feel warm because of conduction from other pipes that are operating even when it is not flowing properly. Again, feel the temperature of the pipe farther away from the other pipes.

8. If you can make water flow well with a garden hose but you cannot make it flow with the pump, the problem is either the pump or air entrapment. Is the pump in backwards? Do you have the right pump in the right zone?

9. **95% of the time, the problem is trapped air.**

THINGS YOU WILL NEED

1. Installation packages (Plumbing Mechanical Package), (Zone Distribution Manifold)
2. Sheet of ¾" plywood or OSB
3. 2 x 4 at least 50" long and 12" longer for every zone more than 2
4. Phillips and flathead screwdrivers, drill attachment (optional)
5. Drill with 1/8" bit
6. Soldering kit
7. Pipe cutter
8. Screws to attach plywood to the wall
9. Two adjustable wrenches
10. Pressure testing equipment
11. Level

Important notice - These design and installation suggestions are of a general nature and they are based upon our 30 years of experience. It is important to understand that every project is a little different. It is the role of the designer to incorporate all available information into the project. Radiantec makes no representation that these general suggestions are applicable to any particular project. Radiantec takes no responsibility for the design of any heating project. Radiantec makes no representation about the completeness of the information provided. It is important to comply with all building codes.

- Plumbing Mechanical Package
- Return ZDM
- Relay Box
- Expansion Tank
- Supply ZDM
- Digital Temperature Display
- Check Valves