

**INSTALLATION AND
OPERATING INSTRUCTIONS
FOR**

**THE
HYPROTHERM
OUTDOOR
FRONT-LOADING FURNACE**

Manufactured by
Hyprotherm Manufacturing LLC
Salem, Arkansas 72576

870-895-2688

INTRODUCTION

Thank-You and congratulations on the purchase of your new HyProTherm Outdoor Wood (or Coal) Burning Furnace! With the purchase of this HyProTherm Furnace, you can now appreciate the high degree of craftsmanship and reliability that are a result of every furnace being carefully hand-built.

Your choice shows the recognition you have for high quality products.

You are now a member of the large international family of HyProTherm customers, who have enjoyed the elegance, efficiency and reliability of our furnaces for many years.

The HyProTherm Furnace was the first and is the leader in the Outside Wood Burning Furnace field. We sell furnaces as far away as Canada, the UK, Ireland, the Ukraine and Spain!

We deem it important to provide you with this user's and maintenance manual: to allow you to use your equipment under the best possible conditions and in the most optimal manner, and furthermore to increase its operating life.

We strongly advise you to read it twice, carefully and keep it handy.

Again, **Thank-You** for purchasing the original HyProTherm Outdoor Wood Burning Furnace

THIS MANUAL INCLUDES IMPORTANT SAFETY INFORMATION.

Your new furnace should have a large specially designed poker FREE - as a bonus! (Often shipped above the boiler in the back of the furnace.)

Hyprotherm Manufacturing LLC
1148 Hwy 62 West
Salem, Arkansas 72576

We are always here to help!

“When in Doubt – Make it Stout”

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SAFETY PRECAUTIONS - WARNINGS

Do not operate this equipment for other than its intended purpose nor other than in accordance with the instructions contained in this manual and all other instructions accompanying the furnace.

For furnaces covered by this instruction book, it is important to observe safety precautions to protect yourself from possible injury. Among the many considerations, you are advised to:

- Observe all safety stickers on the furnace.
- **This furnace must be wired by a qualified electrician in accordance with the National Electrical Code.**
- **Never use any type of petroleum product, petroleum based product, charcoal started, lighter fluid, lantern fuel, kerosene or any other flammable accelerant to start your furnace.**
- **KEEP ALL SUCH LIQUIDS WELL AWAY FROM FIREPLACE WHEN IT IS IN USE**
Keep antifreeze, which is flammable, well away from the furnace.
Only use non-toxic antifreeze. Test antifreeze and other chemicals annually.
- The use of treated wood (painted, treated, etc.) driftwood, and any other salvaged material that can emit noxious gases for the environment and is corrosive towards the components of the appliance is NOT ALLOWED and eliminates the rights of guarantee.
Damage caused from burning unprocessed coal or overloading it, is not covered under the warranty.
- DO NOT BURN GARBAGE, HOUSEHOLD WASTE, STRAW, HAY OR YARD WASTE.
In most areas this is illegal. The furnace is designed to burn seasoned cordwood and coal. Burning other materials can reduce the life of the furnace and will void your warranty.
- Open Loading door slowly— pausing momentarily between the first latch and the safety latch to allow any combustion gases to burn off.
- DO NOT OPERATE THE FURNACE WITH THE DOOR OR ASH PAN OPEN. Always latch the doors securely.
- Always use proper care when installing, operating and maintaining the furnace.
- **Always wear protective gloves and glasses** and be aware that hanging and loose clothing can catch fire! The fire's heat can burn your eyes.
- Do not modify the furnace.
- Do not substitute repairs that can be provided by your dealer, distributor, or Manufacturing Company (Hyprotherm Manufacturing LLC)
- Do not burn with the ash pan door open for any extended period of time, other than for cleaning - it will cause over firing of the fireplace and may cause your water to boil!.
- Failure to heed this warning or any additional warnings on the furnace may result in an accident causing personal injury as well as void your warranty.
- CALL BEFORE YOU DIG!

Disposal of ashes

OPEN THE ASHPAN DOOR FOR THE DISPOSAL OF ASHES. **ASHES SHOULD BE PLACED IN A METAL CONTAINER with TIGHT FITTING LID.** THE CLOSED CONTAINER OF ASHS SHOULD BE ON A NONCOMBUSTIBLE FLOOR OR ON THE GROUND, ALL COMBUSTIBLE MATERIALS, PENDING FINAL DISPOSAL. ARE DISPOSED OF BY BURIAL IN SOIL OR OTHERWISE DISPERSED, THEY SHOULD BE RETAINED CLOSED UNTIL ALL CINDERS HAVE THOROUGHLY COOLED.

All installation and operation must follow Federal, Provincial, State and local codes

20 Year Limited Warranty

25 Year Warranty on roof and siding!

We have a 5-YEAR warranty on the FIREBOX - NOT prorated.

We have a 20-YEAR warranty on the whole furnace - Parts AND Labor.

The water jacket has a 10-year warranty.

Electrical components such as the fan, thermostat and pump *and* the door and grates have a one-year to three-year manufacturer's warranty. We will ship you a new part. Nothing takes more than 10 minutes to replace and we ask you to take care of that.

Years 6-20 are prorated as follows.

Year 6 - 90%
Year 7 - 80%
Year 8 - 70%
Year 9 - 60%
Year 10 - 50%
Year 11 - 40%
Year 12 - 30%
Year 13 - 30%
Year 14 - 30%
Year 15-20 - 20%

Just like your car; the life of your furnace depends upon proper maintenance, oil changes, anti-freeze changes, etc. With proper maintenance your furnace can give you 30 years of dependable service.

You MUST submit a water sample to Image Supply, (800) 672-8251 EVERY YEAR, for professional lab analysis. (See the chemical label)

You MUST follow their recommendations. Image Supply product (5-year Furnace Water Treatment Program) and they have a package that includes 5 years of test kits AND testing is pre-paid!

Take a sample per the easy to follow directions, package it up and mail it back (postage not included). They will mail you back complete results, EVERY YEAR, with interpretation and recommendations. (Allow 2 weeks for results)

This testing procedure will give you complete results and recommendations so you can be assured your system is in top shape for the long haul. The following tests are performed yearly and interpreted for you: Nitrite, pH, Total Dissolved Solids, Bio Test, Iron, Glycol Concentration/Level (if applicable), and Total Hardness.

Exclusions:

1. Disasters, breakdown or faulty operation linked to:

- Inadequate relation between the nominal power of the equipment and the heat requirements of the premises;
- a faulty installation or faulty connections or faulty installation parts;
- damage to the thermostat through overheating due to intensive use:
 - the ash box door is left open;
 - When ventilation convection fan installed and left on uncontrolled with high fires.
- Failure to clean out ash!! Moisture combined with ash will eat through a furnace in short order and is NOT covered under warranty
- an insufficient *or* excessive draft;
- incorrect use;
- non-compatible fuels, destructive and/or damp fuels (treated wood, etc...);
- consumption exceeding the use limits;
- a lack of maintenance;
- the use of electrical or electronic components that are not approved by Hyprotherm Manufacturing LLC.
- any modification, transformation inside the appliance;
- transport and installation.

2. Transport and packaging cost.

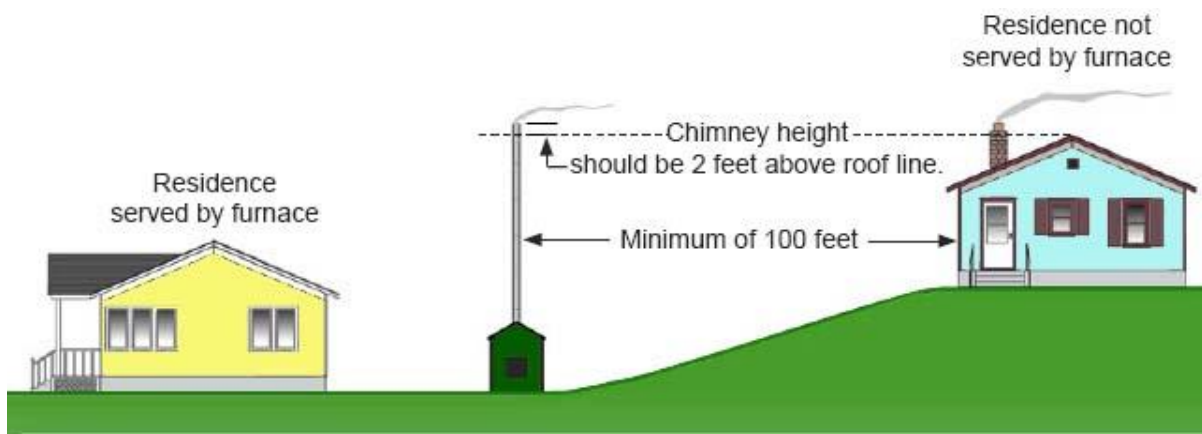
3. All costs not previously accepted by Hyprotherm Manufacturing LLC .

4. Costs due to the non-use of the equipment.

5. The guarantee starts on the date of delivery and is only valid for the original purchaser. The invoice showing the delivery date is the only document valid for the guarantee.

OUTDOOR FURNACE BEST BURN PRACTICES

1. Read and follow all operating instructions supplied by the manufacturer.
2. FUEL USED: You may burn any hardwood or softwood, as well as pallets that have been split up and coal but NEVER burn driftwood or pressure treated wood. Never use the following: trash, plastics, gasoline, rubber, naphtha, household garbage, material treated with petroleum products (particle board, railroad ties and pressure treated wood), leaves, paper products, and cardboard. If you burn softwood, you will have to clean the chimney more often.
3. LOADING FUEL: For a more efficient burn, always add wood before the wood has burned out. Most often it has to be loaded in the morning and at night.
4. STARTERS: NEVER use lighter fluids, gasoline, or chemicals. Good kiln dried scrap lumber is better!
5. LOCATION: It is recommended that the furnace be located with due consideration to the prevailing wind direction. Chimney height can be easily extended with 6" Stovepipe.
 - We recommend a distance of at least 100 feet if prevailing winds blow towards any other residence not served by the furnace, it is recommended that the stack be at least 2 feet higher than the eave line of that residence.
 - If located more than 100 feet but no more than 150 feet to any residence, it is recommended that the stack be at least 50% of the eave line of that residence, plus an additional 2 feet.
 - If located more than 150 feet but no more than 200 feet to any residence, it is recommended that the stack be at least 25% of the height of the eave line of that residence, plus an additional 2 feet.



Chimney height relative to nearest downwind neighbor

The chimney can easily be extended with standard stove pipe, to any height necessary, with zero adverse affect on performance. In fact it may even draft better. Always use a double wall pipe when going through any kind of roof!

6. **Always remember to comply with all applicable state and local codes.**

THE OUTSIDE WOODBURNING FURNACE

How does an outside furnace heat my home?

The HyProTherm outside wood, coal and water-less furnace is designed to save the most energy and provide the most comfortable heating available. It heats your home by heating a firebox surrounded by a steel tank filled with water or air (on water-less models). The water furnace (boiler) is basically a non-pressurized boiler with an atmospheric vent. This hot water is then circulated through underground hot water pipes (Pex Pipe) to a water coil (heat exchanger) installed inside your existing central duct system. You may also need to use a plate exchanger with a boiler or radiant heat.

A typical water-to-air heat exchanger - much like a small radiator or heater core in a car, is installed in your ductwork. When air blows through it, heat is extracted and hot air blows out of your vents.



The HyProTherm furnace can also be connected to any existing Hydronic heating system that operates at 180 degrees or less. *Not for steam systems.*

The HyProTherm can also heat water for household use if the optional internal water to water coil exchanger is ordered.

Water is circulated directly between the outdoor furnace and your hot water heater, via the built in **water to water coil exchanger** in our furnace. The water going to your hot water heater is reheated. The only energy required is maintaining the hot water temperature in the outdoor furnace and a 100 watt pump mounted on the hot water heater vs a typical 4500 Watts for a water heater.

When you shut down the wood burner for the season, simply unplug the pump or turn off the circuit breaker to it. Your existing hot water heater will take over. Please remember to adjust your thermostat, if you had it turned down during the winter.

Heating a **POOL**

A stainless steel shell and tube heat exchanger should be used for heating pools and spas. The chlorine will ruin a brazed plate heat exchanger in short order.

How do the Thermostat Controls work?

The only visible addition to the heating system inside your home is the thermostat which is located near the existing thermostat. The 2nd thermostat is installed so that it turns the blower on inside your existing furnace to force air across the hot water coil (heat exchanger). This forces hot air into your central duct system.. The wall thermostat which regulates the heat from the outside furnace performs a second function as well; when the furnace fan powers up it sends power to the circulating pump in the outdoor furnace to circulate the hot water through the heat exchanger (running only on demand, not 24/7 like most others (if you wire it that way - shown on page 44).

The outside furnace has a hot water thermostat which senses the water temperature of the unit. If the water is not as hot as the thermostat setting then the combustion air blower is automatically turned on (building a hotter fire) and remains on until such temperature is attained.

Where should an Outside Wood Burning Furnace be located?

The outside furnace should be located at least 5 feet from your home (according to UL tests), with the door facing away from the house, so that all fire danger is removed from your home. We recommend slightly further away from structures if possible. The furnace may be installed as much as 100 feet away or more and will still heat your house and hot water. If the furnace is located more than 65 feet away, a larger pump than the one supplied may be needed (up to 85 feet). We also have two pump options for distances over 85 feet or any rise in elevation. For extreme distances (200 ft plus) we recommend that your pump stays on all the time so there is no delay in getting heat. That way there is always hot water available at the heat exchanger when the furnace fan comes on.

Locate the outside wood furnace where it will be convenient for refueling and wood storage. All water and power lines are installed underground between the house and the outside wood furnace in a PVC pipe that is ALWAYS buried below the frost line.

It is also recommended that the furnace be located with due consideration to the Prevailing wind direction. You don't generally want smoke blowing toward your house even though the windows will be closed.

- If located 50 feet or less to any residence not served by the furnace, it is recommended that the stack be at least 2 feet higher than the eave line of that residence.
- If located more than 50 but no more than 100 feet to any residence, it is recommended that the stack be at least 75% of the height of the eave line of that residence, plus an additional 2 feet.
- If located more than 100 feet but no more than 150 feet to any residence, it is recommended that the stack be at least 50% of the eave line of that residence, plus an additional 2 feet.
- If located more than 150 feet but no more than 200 feet to any residence, it is recommended that the stack be at least 25% of the height of the eave line of that residence, plus an additional 2 feet.

Wood Recommendations

We suggest that you burn only cordwood that has been seasoned for 12-18 months. Whole rounds (unsplit) burn best. Burning unseasoned wood is wasteful and inefficient using much of the combustion energy to boil off the excess moisture. Ideally the wood should be split to aid in seasoning and should be around 25% moisture content by weight.

The following are general guidelines for wood selection:

- Hardwoods burn better than softwoods.
- Larger pieces burn better than small pieces.
- 25% moisture content is optimum but our furnaces WILL burn green/wet wood because we have a forced-air induction fan in the back of the furnace, blowing air up through the grates, just like a blacksmith's forge.

However, higher moisture content wastes energy, boiling off water.
Lower moisture content (very dry, old wood) burns rapidly and inefficiently.

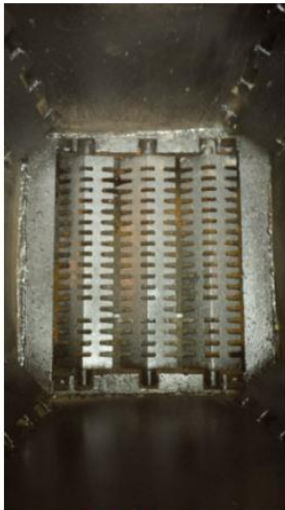
Wood with a lot of moisture can cause more smoke than the chimney can dispose of.

Burning Coal

Any type of processed coal is fine. You can let us know what kind/size of coal you will be burning and we will supply the appropriate grate when you order it. We recommend that you burn a coal and wood mixture. A nice bed of coal (about 8-10 shovels) up to the bottom edge of the door, heaping it in the middle with wood on top, *burns best according to our customers.*

Keep the ash receptacle and firebox clean, as **coal is very corrosive. Damage from burning unapproved coal (run of the mine) or burning excessive amounts, is not covered under the warranty. You may want to add firebrick, placing it on the floor of the furnace or/and elsewhere.**

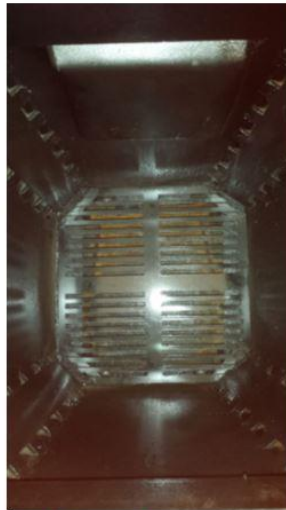
FIVE different **GRATES**



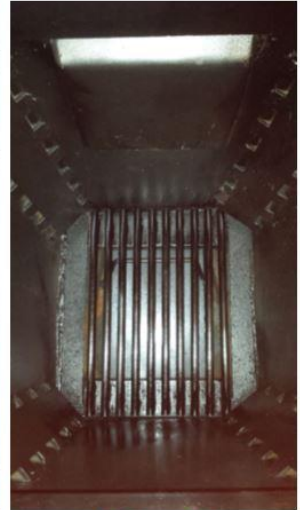
Shaker



Flat Coal



Sawdust



Wood

This furnace is now available now with an optional adjustable CAST IRON shaker grate, for burning coal!!

Flat cast-iron grates are also available, as well as cast-iron shaker grates (above)

GENERAL INFORMATION

Specifications

Type of fuel – Wood and coal only
For outdoor use only
Electrical Rating 115 VAC/ 60 HZ / 1PH
15 AMP Breaker unless you add pumps

Clearance to Combustibles

5 feet (UL Tested specs) further is recommended
Flooring: Non-Combustible

Pex Pipe Routing (original model from 1996 photo shown, but it helps you to understand)



Single zone setup with one pump

- #1. Goes to house heat exchanger
- #2. Return from house heat exchanger
- #3. Power to pump, thermostat and blower
- #4. Inlet to potable water coil (not seen - inside of furnace, in water jacket)
- #5. Outlet from potable water coil
- #6. To manual fill valve on front of furnace. **This is where you connect a water supply** IF you are not hooking up a hot water heater. Use a male 3/4" SharkBite™ fitting.
- #7. Water supply to furnace from manual fill valve, down to one-way valve at #7.
- #8. Optional outdoor hot water supply for a faucet or steam cleaner hookup.
- #9. Drain
- #10. Blower/fan to feed oxygen to fire
- #11. Armstrong Astro-30 Pump, one included (to circulate water)
- #12. Thermostat (for blower)

The furnace shown is a single zone plus hot water. All furnaces come with another hookup for another building at no cost. 2nd Pump not included.

Furnace is now nicely pre-wired with a fan shut-off switch and new style, bigger (75 CFM) fan with a simple solenoid to open the intake flap, as shown below.



1 and 2 with arrow shows direction of water flow for built-in hot water coil in furnace

Location of Furnace

The HyProTherm furnace is designed to be set outside the building to be heated. The furnace must be located a minimum of 5 feet from and facing away from the building. Further is recommended. The furnace should be installed upon a 4" thick concrete pad but you can alternatively use solid concrete pavers or railroad ties. Remember, your furnace will weigh about 3000 lb. or more, when filled with water.

- A) It is recommended that the appliance be located with due consideration to any neighboring residences. Do not locate an Outdoor Wood Burning Appliance within 100 ft of a residence not served by the appliance. Be considerate of neighboring residences, properties, parks, etc.
- B) Review the recommended stack heights on page 8.
- C) Do not locate near any combustible materials, gasoline or other flammable liquids or gases.
- D) Locate away from *dry* grassy areas.
- E) Place far enough away from any building to minimize fire danger.
- F) Check with your insurance company and local codes or ordinances.
- G) Do not install in an area where nearby structures or trees might cause down drafts.
- H) Typically Outdoor Wood Burning Appliances are located 40 to 100 ft down wind from the served structure
- I) Transfer lines in excess of 40 ft will require a larger size pump than the one provided with the appliance.
- J) Locate to allow easy access to wood supply.
- K) To aid in smoke dispersal, extra chimney lengths may be required depending on the distance to surrounding structures. See page 8 for guidance.
- L) It is recommended that the appliance be located with due consideration to the prevailing wind direction.
- M) The furnace requires 115 V 10 Amp electrical service to operate.

Failure to keep the HyProTherm Furnace area clear and free of combustible materials, gasoline and other flammable liquids and vapors can result in severe personal injury, death or substantial property damage.

We recommend the pad to be 48" wide and 10 feet long minimum. If you add extra length it will allow ample concrete in front of the furnace to stand for loading wood and removing ashes. Bigger pads have always proved to be used for wood stacking, extra space to stand or work on the unit.

The space between the inside rear of the furnace and the door will allow a 4 inch water tile type pipe (4") with the plumbing and electrical lines to run directly into the ground. We put a large full-size door on the back that will allow you easy access for the connection of the plumbing and electrical lines.

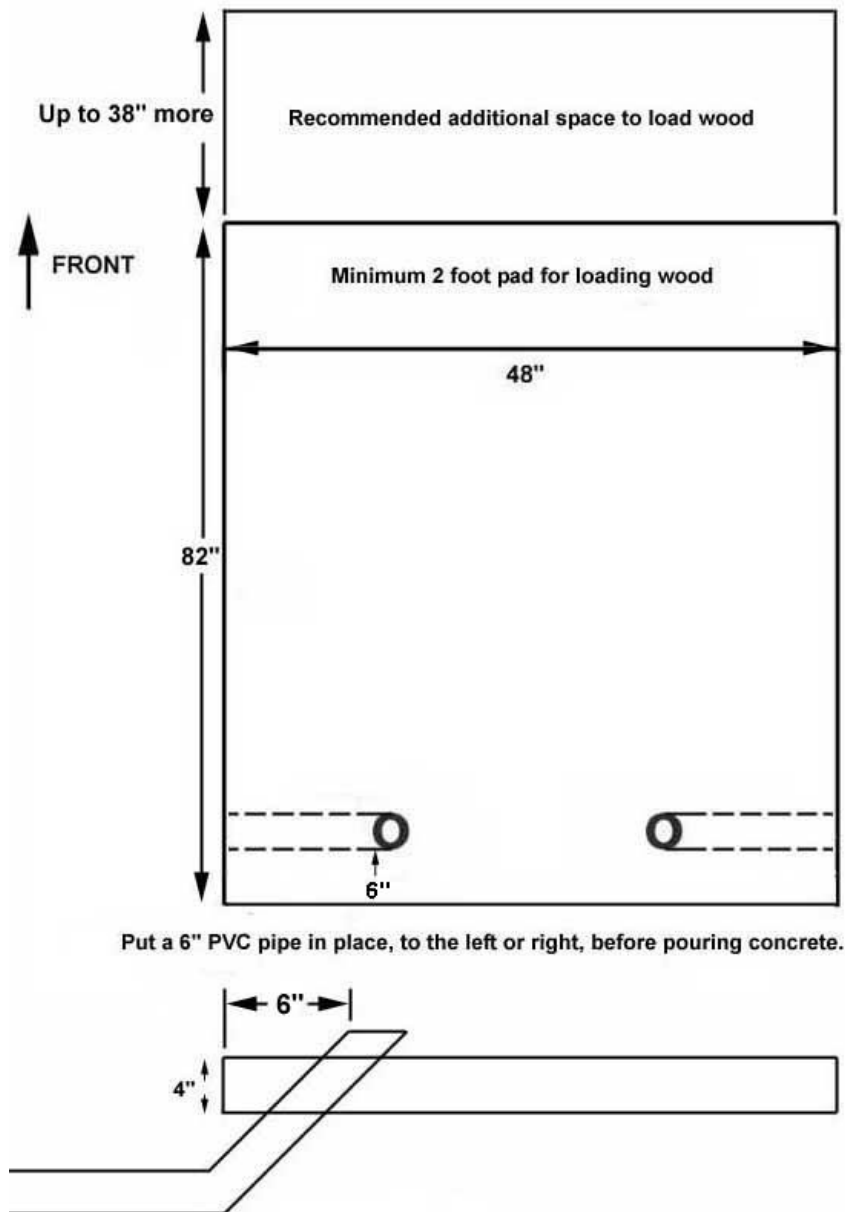
The insulated Pex pipe (shown in a PVC pipe above) is always buried below the frost line and most jurisdictions require a 2-foot minimum depth for the electrical wire. See the illustration below

Recommended pad sizes are 36" longer than the furnace, at a minimum to give plenty of room to stand on solid ground at the loading door.

PREPARING YOUR FURNACE

After placing your new HyProTherm Furnace upon the concrete pad, you are ready to continue the installation process.

185 pad shown below. 82" pad gives 2 feet in front but I prefer 2 feet in back and an additional 3 feet up front!



The piping can go in *any* direction. It just needs to be in the proper spot above the concrete pad. **Install a ground rod, 4-6 feet deep and attach a 12 or 14 gauge wire, with a clamp and attach it to the frame of the furnace.**

Photo of Pouring Cement Pad with corner framed off for Pex Pipe.



It IS better to have your piping in place and pour the concrete around it, as shown:



PREPARING YOUR FURNACE continued...

1. Simply open the large rear door to gain access to the rear of the furnace, to make plumbing and electrical connections.
2. The plumbing and electrical lines for your furnace must be installed underground in a watertight, preferably pre-insulated pipe.

The water lines should be buried below the frost line to prevent heat loss. The depth of the trench varies in different regions of the country. Be completely sure about the correct depth before the Pex Pipes are installed underground. Always bury any underground cable at least 18" deep, but 24" is preferable. Pipes buried at least 24" deep are less likely to be bothered by spading forks and other tools commonly used around the yard.

3. *Call your local building inspector's office for that information.*
4. A trench must be dug wide enough to accommodate a 4" black corrugated pipe, 4.75" diameter. All electrical lines should be run inside a watertight pipe unless you are using UF rated, direct bury wire and your county allows the wire to be in the same trench as the piping.
5. **Install a ground rod, several feet deep and attach a 12 or 14 gauge wire, with a clamp and attach it to the frame of the furnace.**

HINT: Remember to run a twine or small rope through the 4" black corrugated pipet as well to facilitate pulling wire or anything else through that may be added or changed in future!

6. If more than one location is to be heated, then an additional pipe (set of Pex pipes) must be installed underground to that location.
7. This pipe will run from the rear of the furnace to the location to be heated.

The listing below describes each line and their function.

1. One water supply line to heat exchanger placed into existing heating system. This one is attached at the circulating pump.
2. One water return line from heat exchanger. (All of these must be at least 1" pipe) This line is attached at one of the nipples at the bottom of the furnace using the installation kit, with the two valves.
3. One #12/3 W/Ground UF underground Romex wire. The extra insulated wire supplies power to your pump, from your fan in your existing furnace, instead of running a thermostat wire and installing a relay (more to go wrong). **This allows the pump to only run on demand.** Otherwise, you can use 12/2 wire.

4. One water supply line to indoor plumbing for filling the furnace. (Optional)

OR

If you are heating your hot water with the optional internal water to water coil exchanger, simply run 2 x 3/4" water lines to your water heater. One of those will supply the water to fill the furnace, so a separate pipe isn't needed. You will have a total of 4 Pex lines running to your house in this scenario.

If more than one location is to be heated, a second set of (2) Pex pipes will need to be installed underground for the water lines and line voltage thermostat wire and power wire of the second location. If the 2nd location has a furnace, you wire it as the first and no thermostat wire is needed. Locate this pipe at the opposite side of the outdoor furnace per diagram on page 14 (unless it's running in the same direction. In that case both pipes can be on the left. Do not put any pipes in the center because the fan is there,

HINT: Label the water lines or install them before burying the pipe and lines

Insulation of Pex Pipe

Insulate the Pex pipe with the thickest foam insulation available, where it is exposed in the back of the furnace, however it does stay warm there, if there is a fire, from heat radiating from the pump and galvanized fittings and shut-off valve.

Try to keep the Pex pipe underground (warmer) as it enters the house. A 5" hole in concrete block or the wood band above a basement or foundation is easily made for the pipe. If it has to come above-ground to come through the sill plate or attic it MUST be well insulated, as shown below, using a pre-insulated assembly of Pex, insulated inside a 4.75 OD pipe.



Filling furnace with water

If using the optional internal water to water coil exchanger, you will have a source of water already plumbed into the back of your furnace. Otherwise a dedicated fresh water supply line is plumbed into the fill valve loop at the rear of the furnace. Using either method once connected simply turn on the manual fill valve at the front of the furnace and allow it to fill until water runs out the overflow.

Be sure to open the valve at least once a week (ON THE SAME DAY, SO THAT YOU WILL REMEMBER) during heating season to keep the furnace topped off. Failure to do so may result in circulating pump failure.

PUTTING COOLING/HEATING FLUID TREATMENT in boiler:

If using the optional internal water to water coil exchanger, treatment may be added to the furnace prior to sealing the coil cover (see below)

IMPORTANT: The **optional internal water to water coil exchanger** cover **MUST** be sealed as shown on Page 63.

If not using the afore mentioned **optional internal water to water coil exchanger** a capped 2" port can be found on the top/rear part of the water jacket under the insulation. Use this port to add your anti corrosive treatment.

Wiring up your house thermostat

If you have other than a single-speed fan, a boiler or are unsure about anything, you will need to consult an HVAC technician.

These instructions are for a forced air furnace, with a single-speed fan
Most existing thermostats have a fan switch that you can set to ON or AUTO. Set to ON. Simply remove the thermostat cover and you will see a wire running to that switch, usually marked as terminal G.



Disconnect the wire that runs to the G terminal, on your existing thermostat.

Purchase a simple, 2-wire thermostat (like a simple ON/OFF switch) Heating only - no A/C. Usually less than \$15.

With a simple 2-wire thermostat, just use those 2 wires. **Connect one wire to Terminal G and connect the other wire to the wire you just removed.**

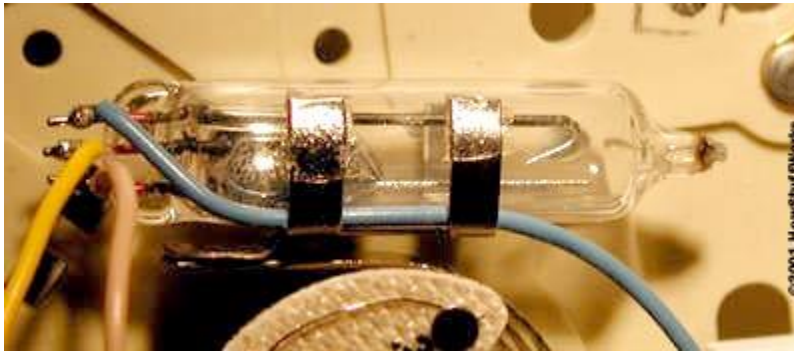
If you are using a thermostat with more than 2 wires, find the two wires that run to the mercury switch shown below (or bi-metal switch or thermistor on a digital thermostat) that make a connection when you turn the thermostat up. Those 2 wires are wired into the fan switch wire(s) above at to Terminal G and the wire you just removed on the existing thermostat.

(The two wires are shown below (next page), as tan and blue on a 3 terminal mercury switch)

Never assume that a wire color (or letter code) is correct for the function it should perform; check it out first

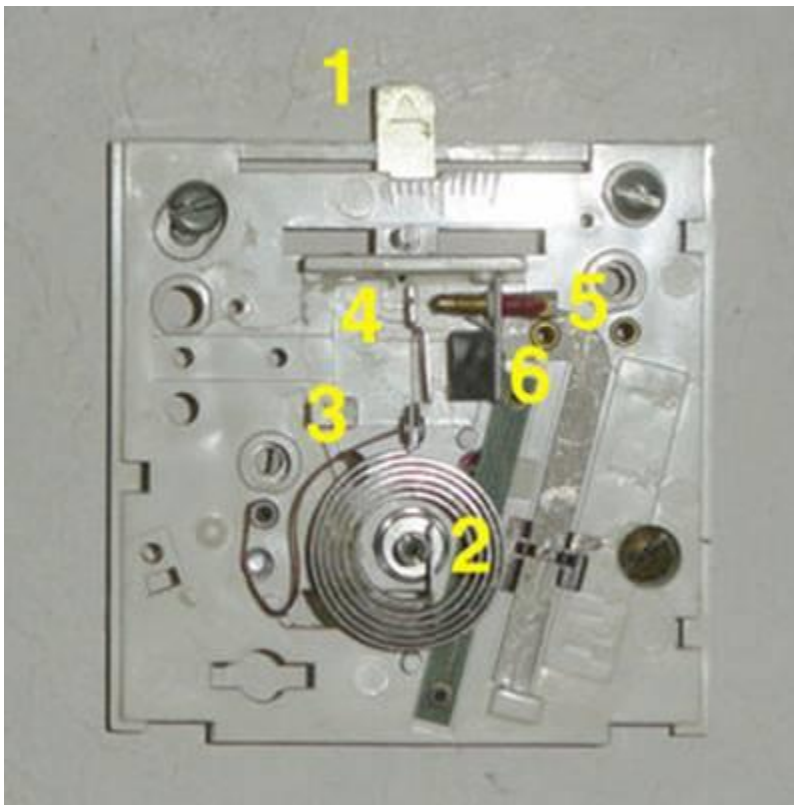
Assemble the new thermostat on the wall **and turn the fan switch on the existing thermostat to ON**, if you haven't done so. That's it!

If you have air conditioning currently and want to use it - turn the original thermostat back to automatic and turn the new thermostat as high as it will go. This will ensure that the new thermostat is always supplying power to the fan.



Mercury Switch

Top and Bottom wires in the switch are typically used.



Examples of Mechanical Non-Programmable Thermostats at Lowe's

Be sure that the one you choose will work with just 2 wires, like a light switch.



Plumbing Parts Needed

A. The pump needs a 1" SharkBite™ style-fitting adapter screwed into a flange that is supplied and already mounted to the pump. The flange is a female 1" NPT. See the picture below to help visualize this. It's the brass fitting on the bottom of the pump. SharkBite™ fittings are best!

B. SharkBite™ style-fittings (Do not buy the copy-cats!) can be purchased from any good plumbing store or Lowe's or Home Depot.

The Pex Pipe connected to the bottom of the pump runs to the house and normally runs to your heat exchanger - unless you have a boiler or are installing a hydronic system. In that case, you will need a brazed-plate heat exchanger. which is normally used between the two systems to keep the water separate AND to keep the indoor system pressurized and the auto-fill valve working exactly as it is now.. See end of this section for more information on hooking up a brazed-plate heat exchanger.



C. The pump comes already mounted directly to the furnace *without* a shut-off valve. However it is a good idea to install a shut-off valve above the pump (as pictured on page 24, so that if the pump ever has to be changed, the water supply can be shut off so water doesn't flow out of the furnace. This will come in your kit.

Simply add a valve and a 1" pipe nipple, threaded on both ends, as shown below.

Install a shut-off valve above the pump



Start by unbolting the pump, using a socket and ratchet and a wrench.



Do not loose the seal! Unscrew the flange with a pipe wrench.



Wrap the threads on the elbow with pipe thread tape.
Wrap the threads on the small pipe with pipe thread tape.



Screw the short piece of pipe tightly onto the shut-off valve.

SharkBite fittings, etc.



Screw the flange onto the pipe, tightening all. Make sure that the shut-off valve handle will clear the pump.



Reattach the pump and bolt on the bottom flange. Screw the fitting shown above (with the Teflon tape on it), onto the flange.



Make sure the pipe is cut absolutely square and insert the sleeve, if using SharkBite fittings. ProBite fittings do not use this sleeve.

See next page for completed picture of pump installation



Pump and shut-off valve installed. New models come pre-wired.

D. It is also a good idea to but TWO shut-off valves on the return lines. This helps bleed the system of air and is a big help when troubleshooting.

See the picture below. Note that two different types of shutoff valves are used; a regular faucet valve and a 90-degree shut-off valve.

DO THIS NOW! Testing a new furnace - for Trouble-shooting down the road
pg 56



Adding two shut-off valves (a shut-off valve and faucet drain) on the return lines is done so that if there is a potential problem with a stopped-up heat exchanger or bad pump, it can be diagnosed easily by the owner, without the need for a service call.

See **TESTING** for more information.

Adding two shut-off valves with our installation kit is easy!

All of the parts shown below are included PLUS you get a shut-off valve for your pump and SharkBite™ style Pex fittings.

Screw the fittings on tightly, in the order shown.



1. Remove the existing cap on one of the return/drain ports on the bottom - left or right (if there is one) with a pipe wrench. Leave the elbow in place (not shown here)



2. Put Teflon tape on a small pipe (with pipe thread fittings) as shown. Make sure you wrap the tape the correct way, as shown. Wrap the opposite way from the way it screws on.



3. Screw the shut-off valve onto that pipe.



4. Screw another pipe (wrapped with Teflon tape too) onto the shut-off valve, followed by the 'T' and the Pex fitting. Be sure to orient the 'T' and shut-off valve so that the shut-off valve handle clears the drain. You can also turn the shut-off valve on the opposite way (direction) because the valve works either way.



5. Here is the finished result. Now connect the Pex pipe.



5. Be sure to use the plastic insert if using genuine SharkBite™ fittings. The Pex pipe MUST be cut square! ProBite™ fittings do not use this insert.



6. Sharkbite™ fitting below. Simply push the pipe all the way in until it seats.



6. The Pex pipe is shown attached here.



Installation pictures shown of the wiring on Legacy (original) models OR if you have to replace a pump and add a pigtail (plug)

All new models are nicely pre-wired for you!



Replacing Pump or Pigtail: Wiring

Remove cover

Insert wires through grommet; leaving it loose for now.



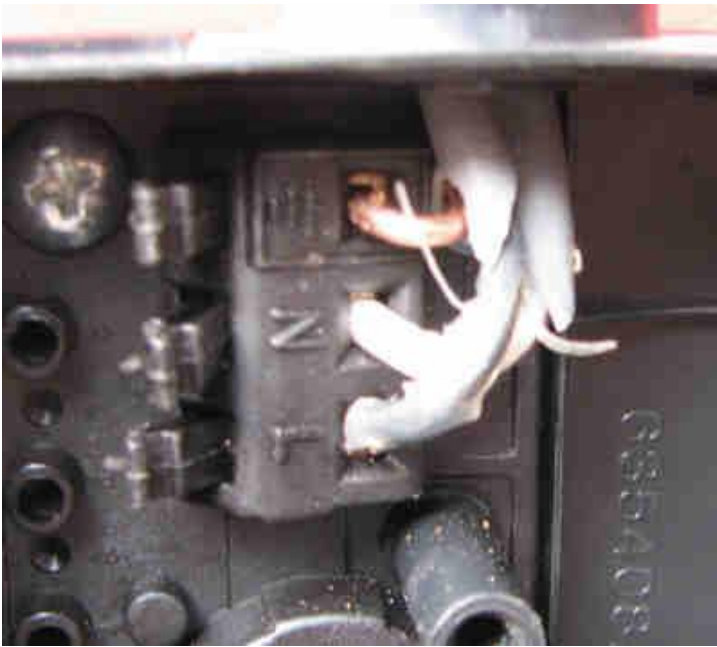
Strip wires 1/4"



Connect Black to the L (live) terminal (bottom) of the pump
White to common (center) of the pump
Ground (bare copper) wire, goes to the top ground terminal, as shown below.
Tighten grommet at the top, finger tight.
Reinstall cover.

TACO Brand Pumps

Taco pumps have a cover that you remove. Inside you will find two wires. The white is the neutral wire in the black is hot, as normal. Be sure to attach the ground wires to the green ground screw.



Wiring a replacement fan/blower

Remove fan from the flange by removing the three bolts and three nuts and the gasket. Be careful not to loose the gasket.



Be sure to use a clamp (shown below) to prevent fraying of the wires. I also used a piece of wire insulation to protect the two single wires running to the solenoid.



Use wire nuts to tie both wires together) power and common) - all three wires together (shown here) if using a solenoid activated damper.

Tighten the nut and screws on the wire clamp.



Push the wire nuts down (shown above) so that you can put on the cover. Be sure to ground the fan as shown (copper wire to screw in box).



The solenoid is shown activated above, with the door all of the way open.

Run the wire from the fan connections to the solenoid in parallel, so that when the fan comes on, the solenoid is activated.

Use the type of fully insulated terminals shown below.



The solenoid activated damper was started by customers 2-3 years ago, making home-made ones for their furnace. They reported back to us about how well they worked and how much wood they saved and asked us to offer it as an option - which we happily did.

Bolt the fan back on, using the three bolts and three nuts and the gasket.

Completed installation shown below.



Be sure to use fully insulated wire terminals shown on the previous page (NOT the ones shown here).

Photo showing dry well fitting location for Ranco Thermostat



There is a plug in the threads, where the dry well is supposed to be screwed in (between pumps).

Do this when the tank is empty or FAST!!

Have the dry well prepared with Teflon tape.

Installing the Heat Exchanger in the Plenum or Ductwork

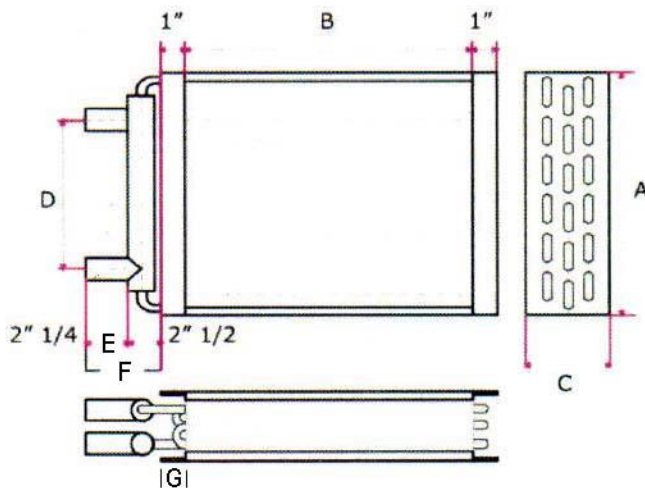
If you have Air Conditioning, the heat exchanger must be installed between the furnace and the evaporator coil. Failure to do so *may* result in freezing of the heat exchanger. If you can't place the heat exchanger between the furnace and the evaporator coil, you must drain the heat exchanger before using the A/C every summer.

The heat exchanger must be installed so that it is airtight. No air must be able to flow around it or out of the ductwork. Use adhesive backed foam tape (used for insulating doors and windows) around the water coil. Use foil tape to seal off the heat exchanger and the hole(s) you make.

Make sure the fittings are easy to get to once it's installed. Remember, there should be no splices in any water lines!

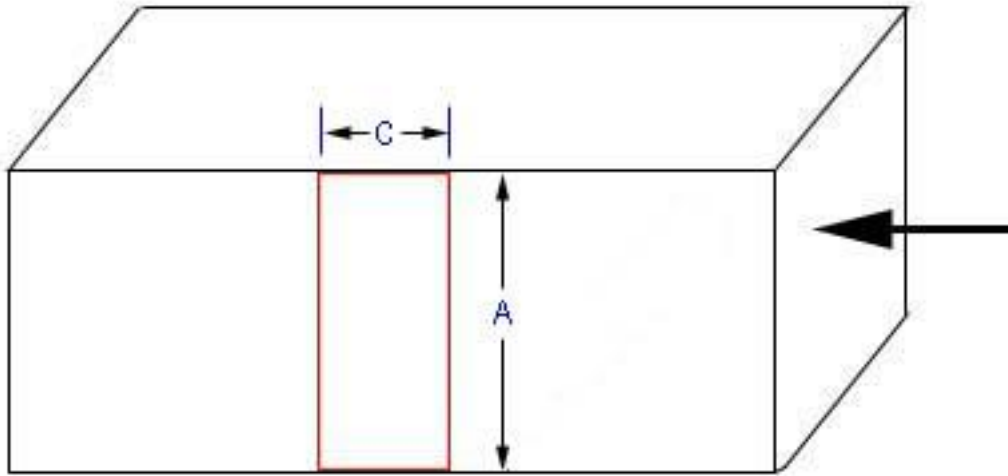
You should be able to find a heat exchanger to fit most popular sizes of plenums. If you can't find one, then you must have your ductwork modified to accept the heat exchanger. This is best left to a professional unless your ductwork is made up of fiber board. In all cases **wear protective gear, gloves and glasses and a mask.**

Measure the width of the heat exchanger (Dimension A in next diagram). Measure the thickness of the heat exchanger (Dimension C).



Start by cutting a hole in the side of your ductwork ON BOTH SIDES is best; the thickness of the heat exchanger (Dimension C) and the height (Dimension A). This allows the heat exchanger to slide all the way through, so that supports are not necessary and you have more of the core inside the plenum, with air-flow over it!

WARNING! Metal edges are very sharp! Where protective gloves and use caution!



Cross section of plenum showing air blowing in it from right

Cut hole where red lines are

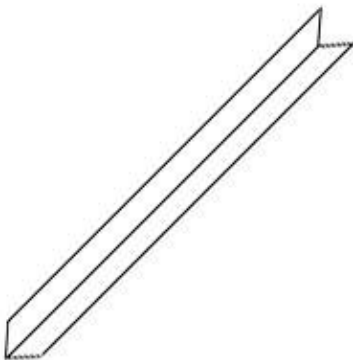
Slide the heat exchanger into the whole for a test fit. Ideally the tubes (D and E) should stick out of the plenum. The header and tubes (F) can stick out of the plenum as well, if necessary. **Having the heat exchanger supported by both sides of the plenum, is best. Cut a whole in BOTH sides, if possible.**

As long as the whole coil surface (B) is in the plenum, you should be good even if a little more of the header (F and even G) sticks out.

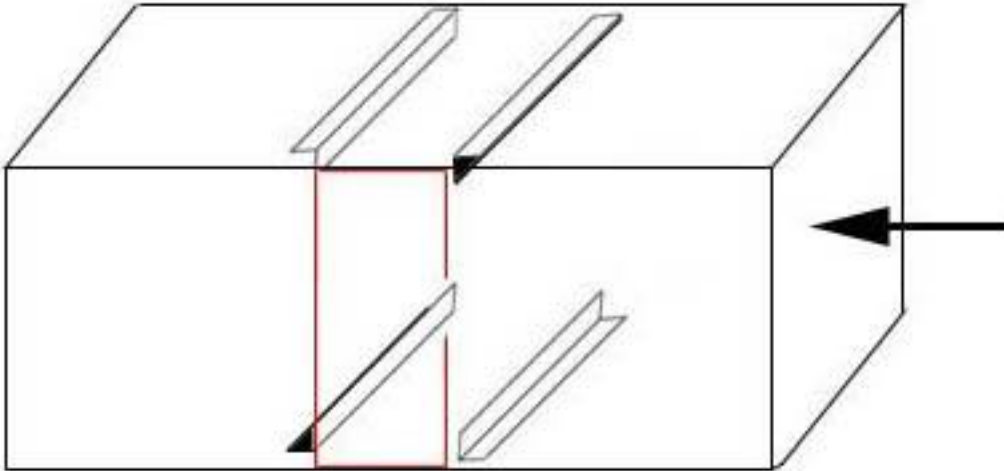
While test fitting it, try to determine how much tape is needed around it. A different amount (thickness) may be needed on different sides. You can purchase different thicknesses of tape so that it will fit and seal properly.

Place foam tape around the outside of the heat exchanger to seal it off so that it fits tight and air can't blow by it.

The heat exchanger needs to be installed so it won't move around, **if you aren't cutting holes in both sides - THE BEST WAY**. The easiest way is to fabricate some pieces of metal into an 'L' shape, approx. the length of the heat exchanger like shown below.



This is what the braces will look like. Very simple.



Install the braces as shown above. Simply put them in place, the proper width apart (Dimension C). Drill through the duct work and your newly made 'L' pieces and pop rivet or screw them into place. You will need four pieces, two each on the top and bottom.

Slide the heat exchanger carefully into the plenum to check the fit again. If all looks good you can seal off the ends of the heat exchanger and the hole you made in the plenum with foil tape made for ductwork.

Bleeding a Heat Exchanger

With the pump running (turn the thermostat up to 90 F so that the pump comes on), simply close the brass shut-off valve (yellow handle) on the return line quickly, holding it for 3-4 seconds. Then open the valve. Repeat the procedure 4 times.

If you're unsure if all the air is getting out, you can attach a hose to the faucet style valve and insert it in a 5-gallon bucket. Open the valve. Then simply close the plastic valve on the return line quickly, holding it for 3-4 seconds. Then open the valve. Repeat the procedure 4 times. That way you can see if bubbles are coming out of the line.

Air Flow through Plenum

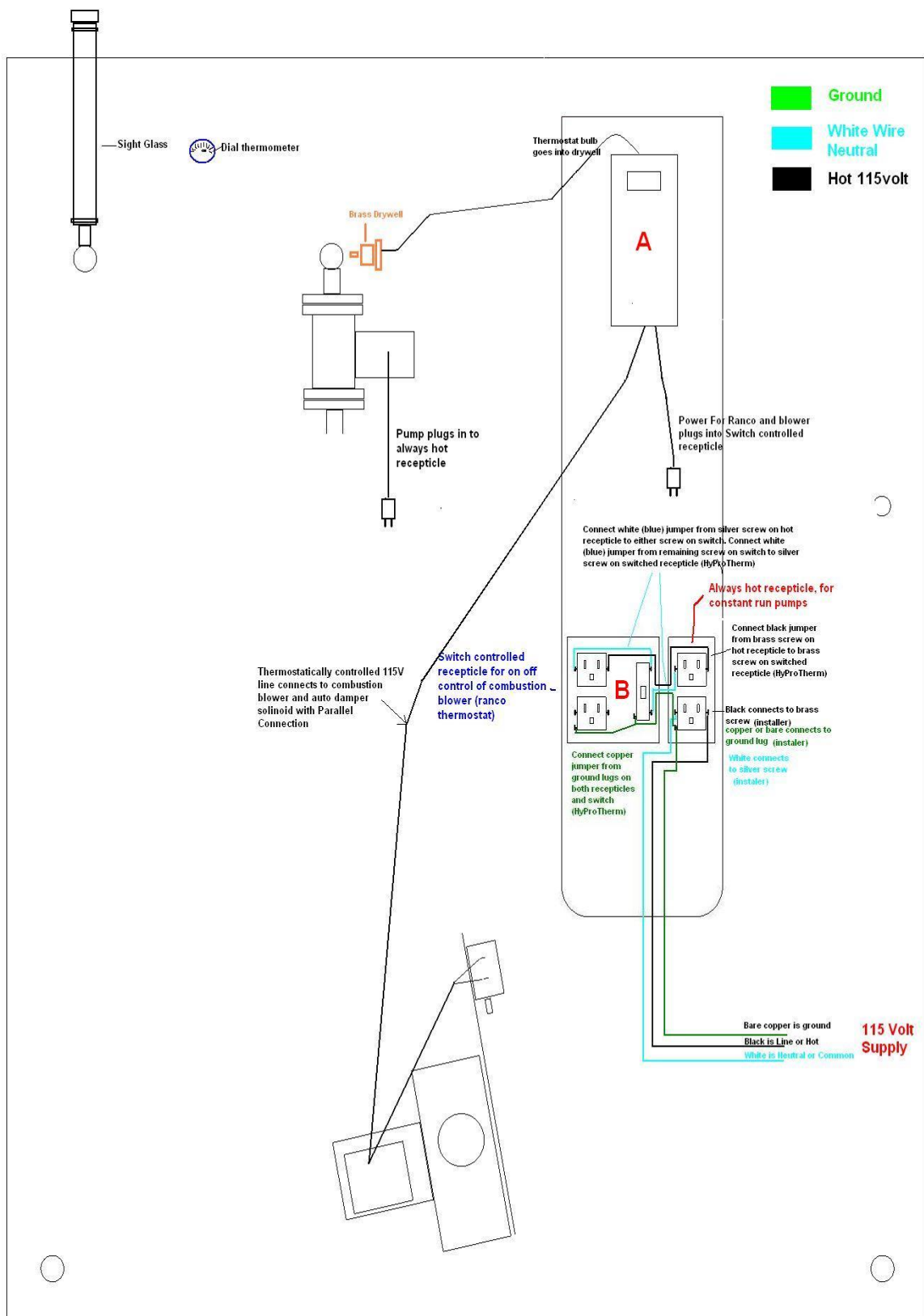
If you need more airflow, the pulleys can usually be changed on the fan or/and motor to give a higher fan speed. Or if is a multi speed fan, the wiring can be changed/moved. Please consult a specialist about this.

Connection of Power to Furnace (ALL NEW MODELS ARE NICELY PRE-WIRED)



Simply run your 3 wires to the box with the two outlets on the right.

The switch in the left box is for turning off the power to the outlets on the far left. That way, when you are loading the boiler, the thermostat, and therefore the fan can be turned off BUT REMEMBER TO TURN IT BACK ON! (Leaving the rear door pen will help you remember)



PUMP RUNNING ON DEMAND – Not 24/7

Black wire in 12-3 wiring goes from the pump and runs to house, to the fan inside existing furnace (IF running pump on demand). Consult the factory on doing that change to the wiring.

Hooking up the Hot Water Heater

With an electric hot water heater, we recommend that you drain the water and unscrew the pop-up valve (it could be on the side or on the top) and replace it with a 'T' fitting (using Teflon or plumbers tape). See the photos on the next page. Screw the pop-up valve back on one side of the T and mount the circulating pump on the other side of the T. Attach the Pex pipe to the pump with a SharkBite or ProBite 3/4" fitting (outgoing cool water).

Remove the drain and do the same, putting in a T with the drain screwing back in on one side and the Pex Pipe connector (incoming heated water) on the other.

PREFERABLY use the existing Hot Water Heater Thermostat!

TURN POWER OFF and then remove existing wires on thermostat and move them out of the way. Connect power wire to one terminal and use another wire to the 2nd terminal to power up the pump. Reverse procedure the next year when using your H/W heater again.

OR if you want to add another thermostat:

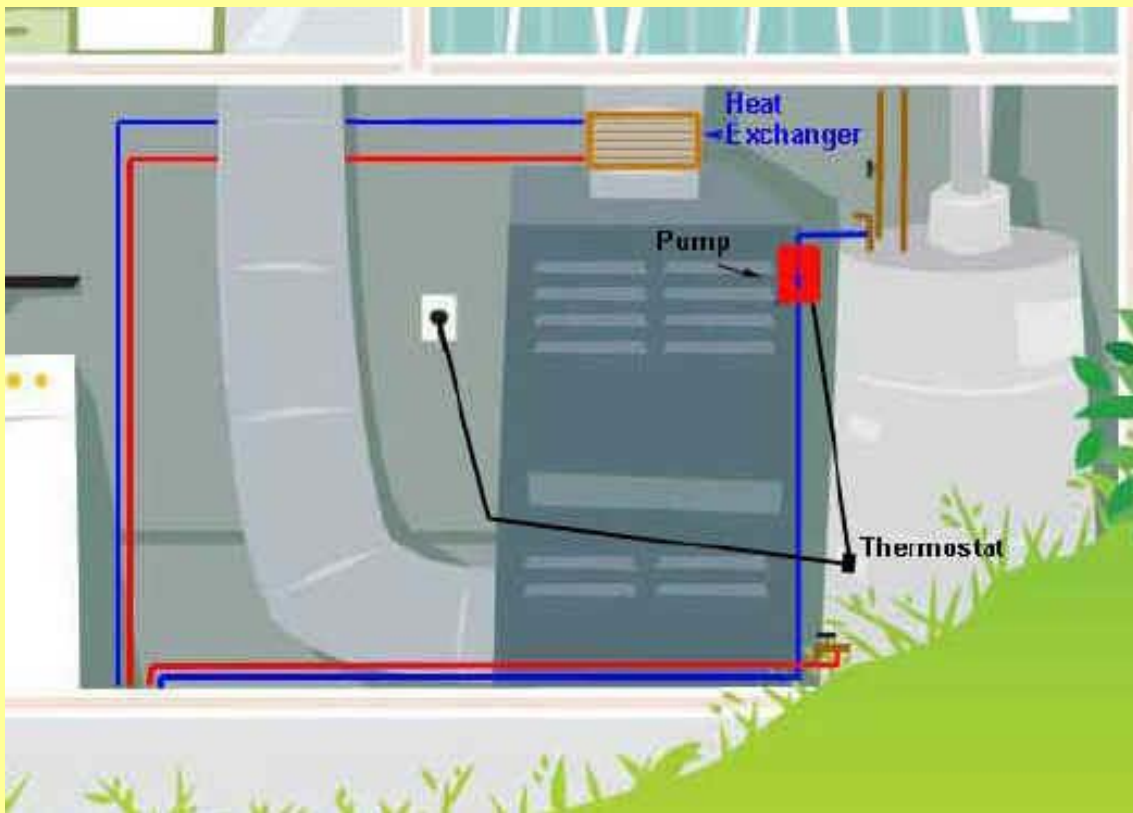
Remove the lower access plate on the hot water heater Or cut a hole if there is not one (as with a gas hot water heater). Mount a surface-mount hot water heater thermostat on the tank with silicone around the outside edge **ONLY**, to hold it in place - above, below or beside the existing thermostat, at the bottom element.

Temporarily hold the thermostat in place with strong tape, first and while the silicone is drying (24 hrs). A tube is about \$8 or less at your local hardware store. Smear the bottom of the thermostat with dielectric grease (available at auto parts stores) before installing it. This facilitates better heat transfer to the thermostat.

Wire it so that 110V is on one terminal and the pump on the other, just like a light switch. Common and ground wires go to the pump.

Alternatively, you can use the existing thermostat by totally remove the existing wires **AFTER TURNING OFF THE CIRCUIT BREAKER** and use wire nuts to protect them and you. Wire the thermostat up as shown but remember that you will have to move the wires back and forth every year. Remember to mark the wires so that you remember where they go!

You just saved \$200 for a side-arm heat exchanger PLUS you would have to buy a tempering valve or anti-scald valve! You can still use the heater as normal in the summer and it also serves as a backup in the winter, *automatically*. Just turn your thermostat down lower, than the one you just installed. OR if you don't want a backup, turn your Hot Water heater circuit breaker off during the winter. Turn the breaker back on in the summer and remember to turn up thermostat for normal use.

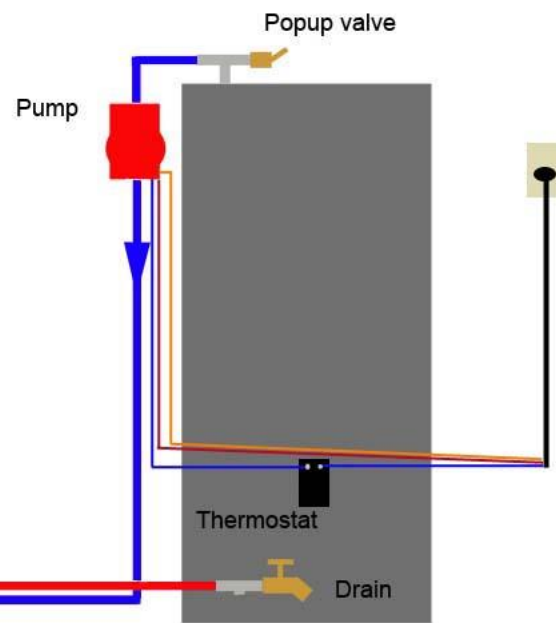


NOTE: The Hot Water coil is submerged in the big tank of water in the outdoor furnace.

Alternatively, you can run the incoming (hot) Pex pipe to a brazed plate heat exchanger for your hot water heater – *before* running to your heat exchanger for your furnace. It is usually about \$175. In this case, you would only need 3 Pex lines running to your house, which may save a little, if the furnace is going to be a long distance away. The downside is that your pump on the furnace would have to run continuously (24/7), instead of cycling on and off as needed. They don't use a lot of electricity (about 100 watts) but it is increased wear and tear. Eliminating the built-in water coil reduces the cost of the furnace by \$100. Our system is a LOT better because you have accurate temperature control. You don't end up with scalding water as is possible with the external plate HE or side-arm.

Gas Hot Water Heater

For a gas heater, there is usually a plate than can be removed to gain access to the tank itself (or cut an access hole). Simply mount the thermostat on the tank and follow the other instructions for water hookup above.

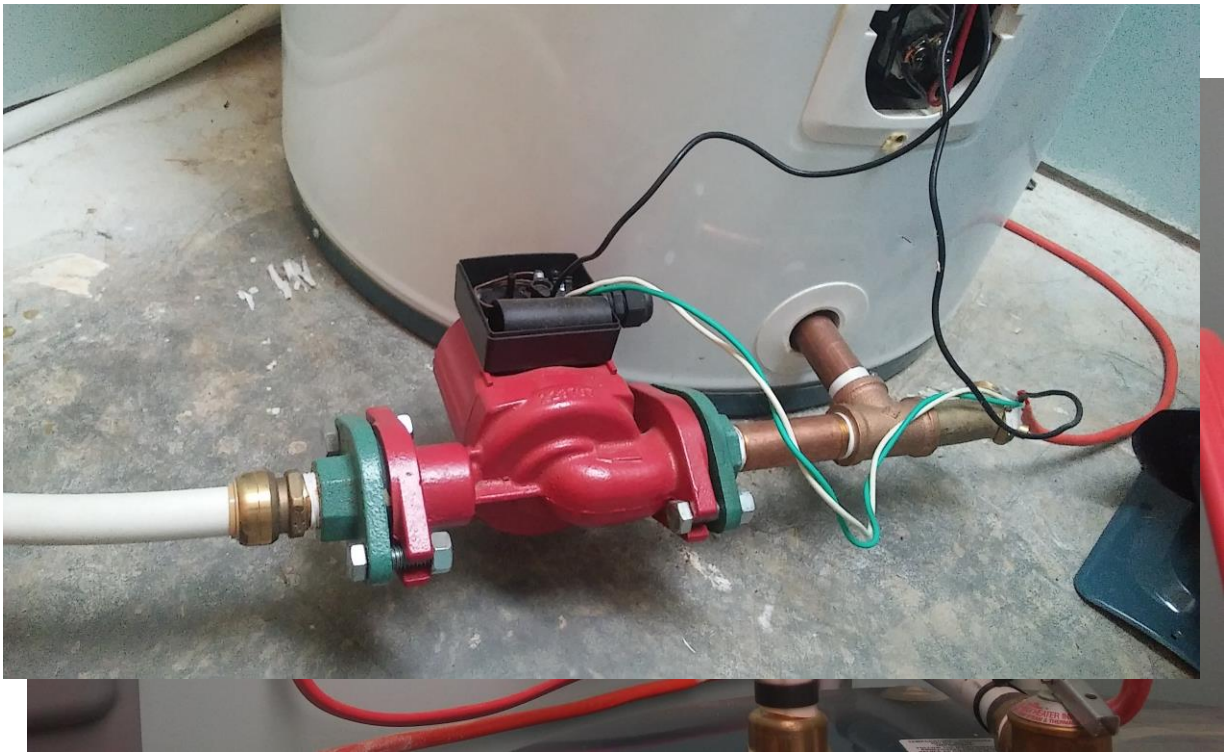




Customer supplied photograph: *Make sure using a single unprotected wire is safe and to code in your area.*



When you shut down the wood burner for the season, simply disconnect the wiring to the hot water heater thermostat and reconnect the heating elements or/and unplug the pump or turn off the circuit breaker to it. Your existing hot water heater will take over. Please remember to adjust your thermostat, if you had it turned down during the winter.



Connect return line from the outdoor boiler to the cold water inlet on the hot water heater, as shown below.



Unscrew drain and screw 'T' into its place. Remount drain on one side and attach flange with pump on the other side.

Use TEFLON tape, as shown, on all threaded fittings.

TURN OFF POWER TO HOT WATER HEATER!

Power wire (I used an extension cord as shown in the 2nd photo above) and it goes to thermostat (after disconnecting wires to the heating elements). (BLACK wires)

The other terminal on thermostat is wired to pump. (BLACK wires)

Neutral (white) and ground (green) wires connect to the pump.

Hooking up a Pool or Spa

A heat exchanger should be used to transfer heat from the outdoor wood furnace to the pool or spa. You don't want nice clean pool water circulating through the furnace.

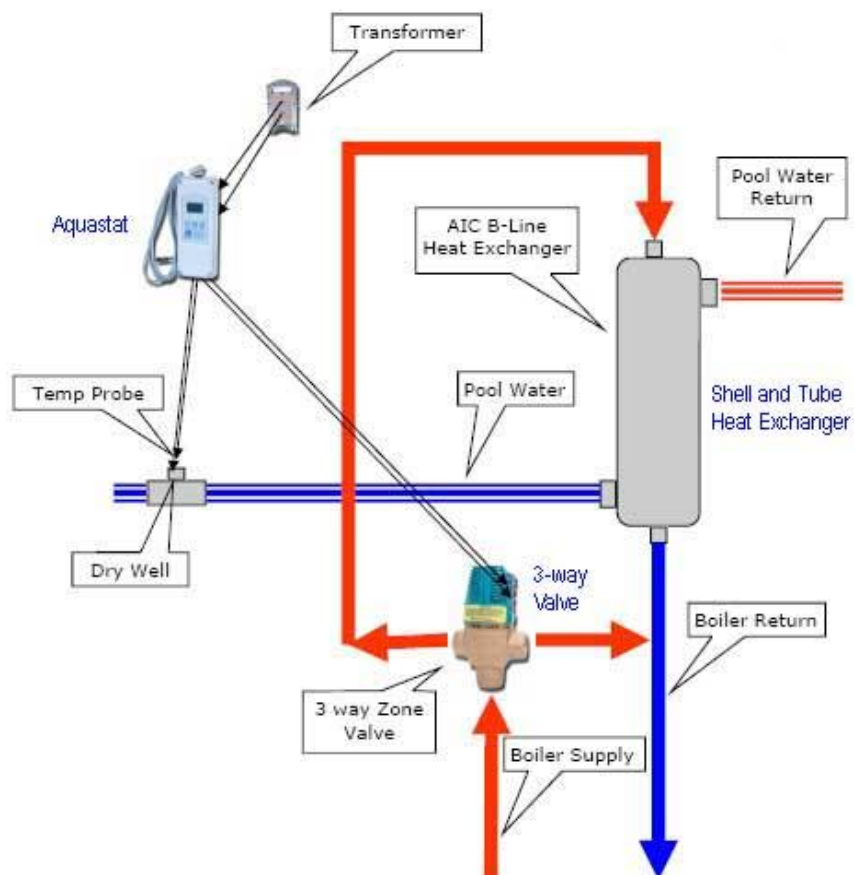
Never use a brazed plate heat exchanger for a pool as the chlorine will destroy it in short order.

ALWAYS use a Stainless Steel shell and tube heat exchanger for this purpose.

If the spa isn't too big and you are NEVER going to use the built-in domestic hot water heat exchanger to heat your hot water, then may be able to utilize that for your spa or hot tub. It is too small to heat a pool.

We have tried many different ways of hooking up pools with different systems, thermostats, etc where the pump goes off an on to control the water temperature. The main problem is that when no heat is being extracted out of the furnace, the water can boil. It is best to utilize a system whereby the pump runs all of the time so that the water can't just sit stagnant in the furnace, overheat and boil.

Instead of the thermostat controlling the fan, connect it so that it controls a 3-way valve. When the water needs to be heated up, the circulating water is routed to the heat exchanger. When the water reaches a preset temperature, the 3-way valve bypasses the heat exchanger and sends the water back to the outdoor furnace. This system works the best. A kit is available to make the installation super easy!

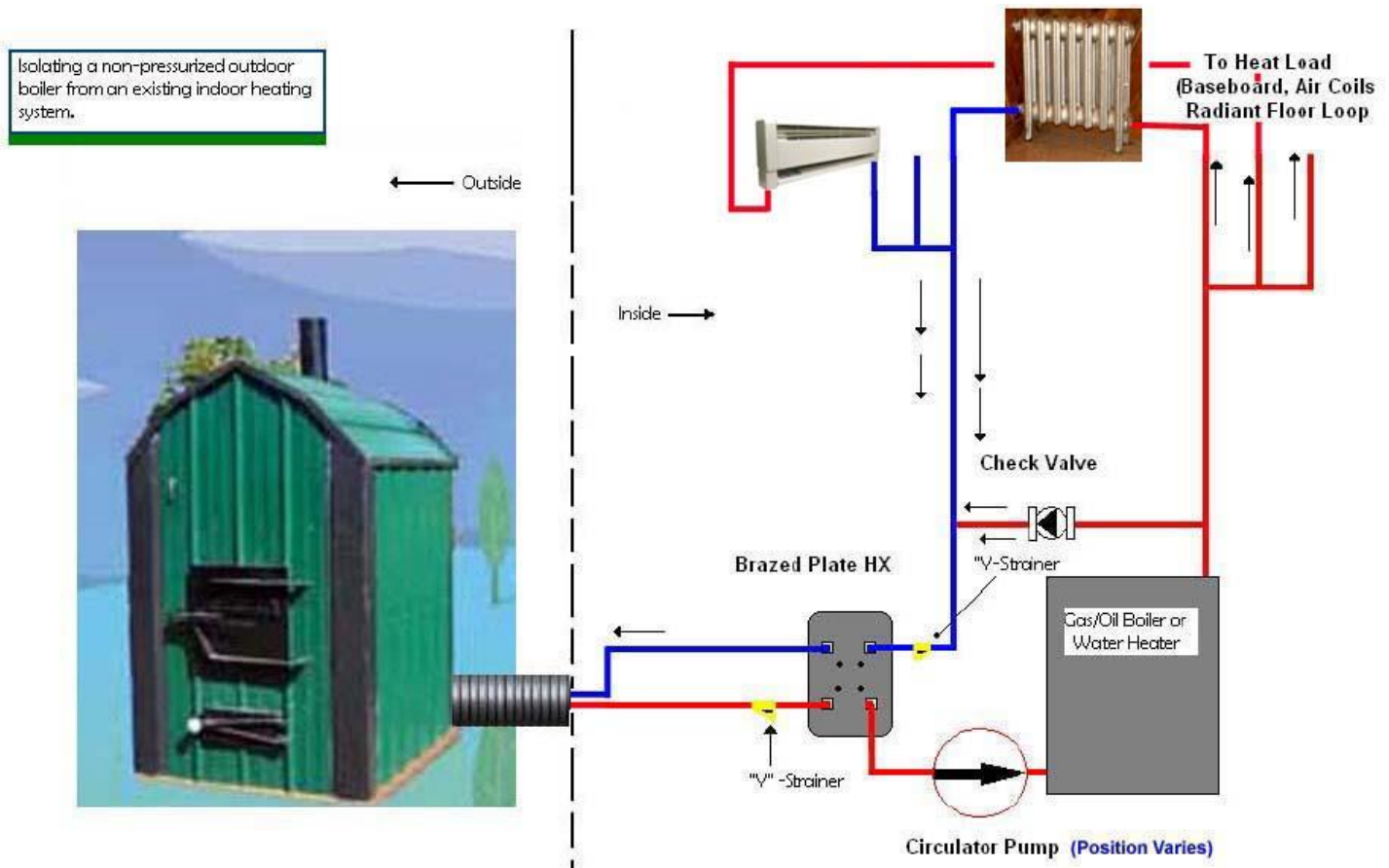


Pool / Spa Kit

| Part | SKU | Qty |
|---|---------|-----------------------|
|  | BRS01 | 1 |
|  | AQ002 | 1 |
|  | PR01 | 8 |
|  | PT01 | 1 |
|  | PMS01 | 3 |
|  | TR11024 | 1 |
|  | ZV103 | 1 |
|  | PM0101 | 2 |
|  | DW001 | 1 |
|  | B-Line | Not Included with Kit |

Hooking up the Outdoor Furnace to an Existing Boiler

Again, we need to use a heat exchanger to transfer heat from the outdoor furnace to the boiler or hydronic system so that the two systems remain isolated from each other. The hookup is very similar to that shown below.



The 2 systems are totally isolated from each other so that the existing Hydronic system remains undisturbed and functions exactly as it did before. This is just an example. Your system *will* be different but it shows where the brazed plate heat exchanger ALWAYS goes. Always in the return line to your current boiler.

All pumps and controls remain essentially the same as you have them now but *remember to order a digital thermostat*, as explained on page 36.

Water that circulates through the outdoor furnace is never circulated through the home's Hydronic system – or visa versa.

When you stop using the outdoor furnace, the heat exchanger (brazed plate) will continue to heat the hot water in the line, and by convection, that water will circulate to the outdoor furnace. This will cause your existing boiler to come on, even if your house or domestic hot water system (if do equipped) is not calling for heat. The simple solution is to shut off both shut-off valves at the outdoor furnace. This will stop the water from circulating - saving you energy.

If your system does not have the circulator pump in the position above but has it between your boiler and radiators or baseboard heaters, etc., you may not have enough heat accumulated in the boiler to heat your domestic hot water, for those systems so equipped because your main pumps are not running enough to circulate the water through the late exchanger.

You can either accept this or add a circulator as shown but it **MUST** include a return line as shown (the red line above the boiler). Some residual water (heat) may find itself flowing to your heating system, depending on how it is set up but hopefully you will have thermistor valves that open and close the circuits as needed.

Starting a Fire

Use small pieces of split kindling together with crumbled newspaper or cardboard, and add larger pieces. Kiln dried lumber (as shown) works great!! Remember: The smaller the better; the drier the better.

Using a blow torch is NOT recommended! It does not properly start a log on fire. Use kindling! Dry lumber (kiln dried 2x4's for example, are great!)





You have a great fire!!

If you have poor draft, make sure the chimney is not clogged!

Heat up the chimney by twisting some newspaper into a torch and hold it up into the stove until the draft is reversed.

TESTING

This should be done when the furnace and heat exchanger are first installed so that you will know that the water flow is like in *your* system, for future reference.

IMPORTANT! Perform these Steps on a new furnace:

1. After the furnace has been filled and running, close the left (yellow handle) valve, at the return, so that water won't drain out.

Connect a garden hose or washing machine hose and put it in a 5-gallon bucket. Open the faucet style valve. Turn on the pump. If it runs on demand, you may have to turn on the furnace (raising the thermostat if necessary).

2. **Record the amount of time it takes to fill the 5-gallon bucket.** Ideal is 20 - 30 seconds or less. Write that figure down on the inside of the furnace with a permanent magic marker, near the valve for future reference. Turn off the valve.
3. Next, disconnect the Pex line at the pump output. Install a short piece of Pex Pipe or washing machine hose about 4-6 feet long and insert the pipe/hose into a bucket. Turn on the pump by turning on the furnace (raising the thermostat if necessary).
4. Record the amount of time it takes to fill the 5-gallon bucket. If it is 10 seconds, for example, write that figure down on the inside of the furnace, next to the pump for future reference. Turn the pump off.

These figures can be used to check for proper pump sizing AND for futures diagnostics (comparing current figures with future figures), if things should change (heat output diminishes) down the road.

(You may be able to use the circuit breaker to turn the pump off and on if you have already raised the thermostat high enough to make the pump come on.)

Maintenance

Clean out ash!! Moisture combined with ash will eat through a furnace in short order and is NOT covered under warranty. With our grate and ash pan, you can remove the ashes while the fire is still burning.

Creosote – Formation and Need for Removal:

When you burn pine and other soft woods, or the wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapors condense in the relatively cool chimney flue (exposed to the outside air). As a result, creosote residue accumulates on the flue lining. When ignited this creosote makes an extremely hot fire.

The chimney should be inspected at least twice a year during the heating season to determine when a creosote buildup has occurred. Sometimes, you need to check it weekly!

When creosote has accumulated it needs to be removed to reduce the risk of a chimney fire. **Your fire may not even burn if the chimney gets clogged up!** 5" chimney brushes are available on Amazon or search Google.com

Door Seals

Periodically, during the heating season, check the sealing of the silicone seal. The silicone seal withstands high heat and molds itself to the shape of the door, providing an excellent seal that won't deteriorate like a rope seal.

END OF SEASON:

- Power: Turn off power supply at the appropriate circuit breaker
- Chimney: Clean and inspect chimney! 5" chimney brushes are available on Amazon or search Google.com. Use the chimney cap to keep rain water out.
- Firebox & Ash trough: **Remove ashes**, soot, and hardened deposits from the fire chamber by using putty knife or wire brush. Coat inside of firebox with a light coat of motor oil to protect steel during the off-season.
- Doors: Oil door hinges and latch.
- Plumbing: Ensure fittings on both ends of tubing are tight AND at all locations.

DO NOT DRAIN WATER FROM FURNACE!

Moisture from rain or condensation must not be allowed to accumulate in the firebox or ash pan during the off-season. Failure to perform preventive maintenance may result in corrosion damaging the boiler resulting in possible severe property damage. This is NOT covered under warranty!

Replacing the Optional hot water coil in the furnace

In areas where this a lot of lime or other minerals (hard water) it may be necessary to clean out or replace the hot water coil in the furnace. Thankfully, this is an easy job. On some other models it can take 2 hours or more to do this – if they even have a built-in coil!

Our new design cover is smaller, flat and easier to seal! It is not L-shaped now.



This allows you to fill the furnace to the very top of the water jacket, allowing the rust protection to reach the top plate of steel and to completely envelope the chimney (which also heats up the water!



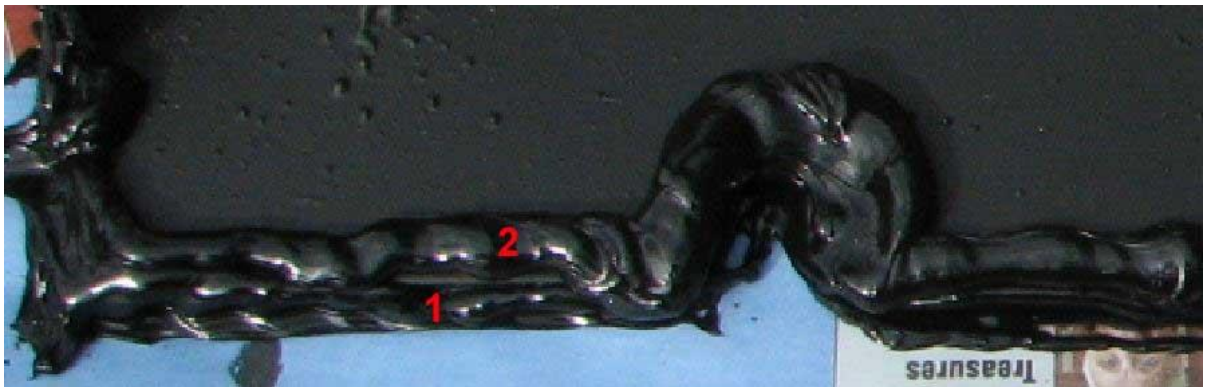
This cover **MUST** be sealed with silicone as shown below.

SEALING THE HOT WATER COIL COVER

Place the hot water coil cover on newspaper and run a bead of silicone all around the edge (1) and then run a thick bead on top, right near the edge (2)



Close-up view of how much silicone is on the edge (1), top (2) and around the holes cut for the piping. USE PLASTIC or LATEX GLOVES because this is VERY messy!



Once the lid is in place, press the silicone into the corners with your finger and around the copper pipes, for a very good seal. Use a mirror and flashlight to check your work!

This will stop steaming, resulting in water loss and damaged insulation.

Optional installation of Hot Water Coil



You can see the water coil now (A different opening and fittings with this old design).

Simply loosen and remove the compression fittings (now metal) and slide the coil out the top.

A 50 foot copper coil is readily available at most hardware and home improvement stores, already coiled up! Simply straighten the ends and reattach the Pex pipe.

Alternatively you could take the coil to a radiator shop to have it cleaned out. With current copper prices this may be cheaper!

Reinstall the steel plate (WELL SEALED with SILICONE as shown on previous pages) and pull the insulation back down.

Trouble-shooting poor water flow or little or no heat

1. Check to make sure that the furnace is full of water. Simply open the valve on the front until water flows out of the overflow tube.
2. Make sure you have a good fire!
3. Be sure that the chimney is not clogged up and the grates are clear! 5" chimney brushes are available on Amazon or search Google.com
4. A. Check to be sure the pump is running when the thermostat is raised.
B. Your inside furnace fan should come on at the same time.
C. See if air is blowing out of the vents.
5. Make sure that the water is hot. You can check this at the drain on the stove, or at the pump by removing the Pex Pipe and turning on the pump.
6. Watch the fan to see if it comes on when the water temperature drops in the furnace. You can test the fan by carefully connecting the two wires at the thermostat together **AFTER TURNING OFF THE POWER!**

If the fan comes on when you connect the two wires but won't come on by itself when the water temperature drops, you need to replace the thermostat. These are standard COMMERCIAL hot water heater thermostats available for about \$10-15 at any good hardware store. You can substitute a residential thermostat (goes up to 150F) in most cases or as a temporary measure

7. Close the left (yellow handle) valve so that water won't drain out. Open the faucet style valve.
8. If water flows out freely, then you know that there isn't a blockage there. Close the valve.
9. Connect a hose and put it in a 5-gallon bucket. Open the valve. Turn on the pump. If it runs on demand, you may have to turn on the furnace (raising the thermostat if necessary).
10. Record the amount of time it takes to fill the 5-gallon bucket. Turn off the faucet type valve. Compare that figure to the one you wrote down on the inside of the furnace, near the valve, when it was installed (Page 47). If the figures are the same or very close to it, you can assume that the pump is working properly and that there aren't any blockages. However, you may have a heat exchanger with a coating of minerals on it such as lime. This will need to be cleaned as it will inhibit heat transfer.. (See heat exchanger cleaning procedure at end of this section)
11. If the figures are lower than original proceed to 12 to find out why the flow is so low.

12. Remove the pump and open the valve above it. If water flows freely, you know that there is no blockage there. If good, proceed with next step.
13. Next, disconnect the Pex line at the pump output. Install a short piece of hose or Pex pipe, about 4-6 feet long and insert the pipe into a bucket. Turn on the pump by turning on the furnace (raising the thermostat if necessary).
14. Record the amount of time it takes to fill the 5-gallon bucket. Turn the pump off. Ideal is 20 seconds or less BUT compare that figure to the one you wrote down on the inside of the furnace, near the valve, when it was installed. If the figures are the same or lower, there is likely a problem with the pump.
15. At this point you should have been able to determine if the flow rate is good at all points and where the problem might be or if there is a blockage.
16. If you have a fire and the water is hot and circulating without restriction and the furnace fan is on, you should have heat! In some case air might be trapped in the heat exchanger and so the bleeding procedure below may need to be performed.

NOTE: It is rare since we use a powerful forced-air induction fan but if you have poor draft or a downdraft, heat up the chimney by twisting some newspaper into a torch and hold it up into the stove until the draft is reversed. A chimney cap also helps in this regard.

If it is difficult to start the fire (RARE) the reasons could be:

Not enough air: Make sure that fan is on or open the ash pan door (approx. 1 cm gap).

CLOGGED Chimney or Grates! Be sure the chimney is not clogged with creosote! 5" chimney brushes are available on Amazon (5" Round Poly Chimney Brush by **WoodEze**) or search Google.com

Bad or no kindling: Use small pieces of split kindling together with cardboard and add larger pieces. Remember: The smaller the better, the dryer the better.

[Dry lumber \(kiln dried 2x4's for example, are great! Cut them up for cheap firestarters\)](#)

Down draft or cold chimney (rare): Heat up the chimney by twisting some newspaper into a torch and hold it up into the stove until the draft is reversed.

Heat Exchanger Cleaning Procedure

A specialist experienced in chemical cleaning should perform this procedure.

The easy way out – if you didn't use the proper chemicals for protection:

(1) Remove Heat Exchanger, takes about 10 minutes. (2) Drop off at local radiator shop. (3) Pick up serviced and repainted heat exchanger, cost \$20. (4) Re-Install unit, another 10 - 15 minutes. (5) Job done, have a glass of wine..... What could be easier?

CLR works fine to clean exchangers. Even the label suggests cleaning heating coils, coffee makers, etc.

Some people recommend using Phosphoric acid or Ph-Oshop-Ric. Muriatic acid causes hydrogen embrittlement of metals over time, which Phosphoric acid (mostly) avoids.

Muriatic acid is a MAJOR hazard if it spills - especially on you!

You can also try Marsolve (203-834-8278) or <http://www.marsolve.com/marsdis.htm>

Also recommended and much safer, is Safe-React Formula E is designed as a direct replacement for Muriatic acid. It is effective for pH adjustment, industrial descaling, cleaning heat exchangers and many other jobs that normally require hazardous acids. Safe-React Formula E is a concentrated formula, to be used the same way Muriatic acid is normally used. http://www.safe-react.com/formula_e.htm

Fill a 5-gallon bucket with Safe-React or CLR per the instructions for dilution - or riskier - a 10-12% solution of Hydrochloric acid (sometimes called Muriatic Acid) or Phosphoric acid to water. It can be purchased at your local swimming pool supply store. MURIATIC ACID is a liquid cleaner that dissolves rust, lime and other minerals on hard surfaces.

See http://www.athea.com/label_PDFs/140muriaticlabel.pdf

Place both the supply lines and return lines in bucket with a submersible pump on the supply side. You may have to run the pump for three to eight hours. You should be able to see the process working as water flows into the bucket.

Sometimes reversing the flow can free up deposits encrusted in the heat exchanger in stubborn cases.

Disclaimer

All installation and operation must follow Federal, Provincial, State and local codes.
Do Not consider outdoor wood furnaces for built up urban areas.
Do Not Operate under Pressure.

All electrical and plumbing should be done by qualified personnel and conform to national and local building, electrical and plumbing codes.

Manufacturer is not liable for damages to personnel or property for misuse, improper installation of equipment or for knowing local installation codes. Owner assumes all responsibility for this.

Replacing or Repairing
Your HyProTherm Furnace
Door Seal
(For Old Style (Legacy) Hydronic furnaces only)

To Repair a leaking door seal you will need:

- A metal putty knife or similar metal scraper (approx 1" wide)
- Soapy water or alcohol
- Cleaning rags or towels
- **100 percent rubber silicone General Purpose RTV Silicone** (does not need to be high temp and any color may be used) up to two large tubes may be required. We use TremPro 644 General Purpose RTV Silicone Sealant from Fastenal. It is available nationwide.
- A caulking gun (to apply the silicone)
- Wax paper

1. First remove remaining door seal with a putty knife or similar metal scraper. It is not necessary to remove all of the original silicone seal but; all loose material should be removed.
2. Next clean door seal trough with alcohol or soapy water to remove any soot or tar buildup and wipe dry. This will insure good cohesion with the new silicone you will be adding.
3. Next fill the area between the outer metal lip and the square inner bar with a thick bead of silicone (silicone should be at least 3/8" thick/deep). This usually takes about 1/2 a large tube of silicone per side. ***Do not apply sparingly*** as any excess silicone is easily trimmed off with a knife once it is fully cured.
4. Cut or tear wax paper (or Saran Wrap) into strips about 3" wide. Cover the fresh silicone seal with these strips to prevent it from sticking to the door flange when making the seal impression.
5. Close door (*not completely*), just enough insure contact has been made between door seal and flange of furnace. Contact should leave an impression in fresh silicone indicating all surface areas of door seal and furnace flange are touching. Some extra silicone may squeeze out from around and under the wax paper during this step and is to be expected if adequate amounts are used. This excess may be removed later.
6. Open door and allow new silicone seal to cure for a full 24 hours before putting furnace into operation. The wax paper may be removed prior to use but is not necessary. Excess silicone that may have squeezed out while making the impression may be removed or cut away at this time.

This new door seal should get your furnace back into serviceable condition and can be expected to last for several years. These steps may be followed to repair either door seal at any time but are especially easy to do prior putting the furnace into operation for a heating season.

You do NOT need High Heat silicone but you will need two large tubes (11 oz)

O'Reilly Auto Parts sells the big tubes of black RTV silicone for caulking guns, for \$9.99 ea.

The brand we use is:

TremPro 644 RTV Silicone

www.vintagetrailersupply.com › ... › [Caulks & Sealants](#) - [Similar](#)

TremPro 644 RTV is a one-part, acetoxysilicone sealant that cures to a flexible rubber when exposed to moisture present in the air. It has a vinegar odor when ...

[TremPro 644 Silicone Sealant...](#)

\$6.95 - etrailer.com

TremPro 644 RTV | BuildSite.com

www.buildsite.com/product/trempro-644-rtv

1. High Temperature Silicone Sealant RTV, TremPro 644 - Item Detail

Tremco - High Temperature Silicone Sealant RTV, *TremPro 644*, Size - 10.1 oz. (300 ml.) cartridges. Item #: 42474564481065323. Mfg Item #: 81065 ...

2. Tremco, Inc 6445005 312 10.1 oz Tremco TP 644 Clear RTV One ...

www.drillspot.com/.../tremcoinc_6445005_312_silicone_sealant_pac...

\$4.72 - In stock

TremPro 644 RTV may also be used on site where a gun grade sealant is required. It is easily gunnable over a wide range of temperatures and has excellent ...

3. Sealants - Forest River Forums

www.forestriverforums.com › ... › [Prime Time](#)

use *TremPro 644 RTV Silicone* made by Tremco. Here's some additional info that I received

4.

OR CALL THE FACTORY TOLL-FREE AT 855-895-2688 to order