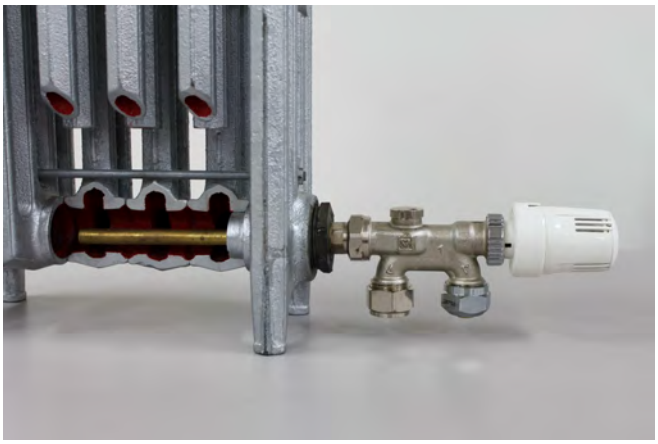
Converting one pipe steam to two pipe hot water
with single entry non-electric control valves

There are still many one pipe steam systems in residenti al applications. With increasing energy costs and the consumer 's desire to be more comfortable there are opportunities to come up with a simple and cost effective method to convert a one pipe steam system to a two pipe circulating hot water system.



What is the answer?

The single entry injection valve.

Where did this technology come from?

In Europe when they encountered the first oil embargo back in the 70's, the governments looked for concrete ways to save energy. One of the first things they did was force consumers to convert their steam systems to circulating hot water.

The structures of most homes in Europe were quite old and the heating installers had to come up with creative ways to convert their systems without destroying the architectural integrity of their homes. One of the options was the single entry valve

How do you determine if this is the right solution for your next project?

The first thing that has to occur is to survey the radiation to make sure there are push nipples across the top of the steam radiator. If they do not have push nipples then the valve will not work. Single entry injection valves rely upon the circulation of water through the passage ways of the steam radiator. If the hotter water cannot move through the radiator giving up its heat to the space then you will have a very dissatisfied customer. After it has been determined that the radiators are candidates for conversion, a heat loss of each respective room to be conditioned must happen.

Once you have the BTU requirements, then a survey of the reduced heating capacities of the steam converted radiator must be done to make sure they will adequately heat the space. The EDR (equivalent direct radiation) for one square foot of heating surface of a steam radiator is 240 BTU's. You will need to reference the chart provided to see how many square feet of steam each radiator has and multiply the listed output below. If your style radiator is not listed consult us for more information.

Below are the discounted capacities for lower delivery water temperatures seen in hydronic systems:

Average delivery water temperature	BTU's per square foot of heating surface
180°F	170
170°F	150
160°F	130
150°F	110

If you have confirmed performance you are ready for the next step.

How does it work?

As you can see by the image there is a 12" injection tube on the valve. This is the supply of your hot water heating system. The supply water is injected and gently flows through the top of the radiator columns and as the heat is given up to the space, the cooler water falls to the bottom of the radiator and is brought back to the heating system through the return of the single entry valve which is around the injection tube (see image).

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What is the installation process?

1. The steam radiator isolation valve is removed.
2. The ⅛" hole is plugged where the steam air vent was located
3. Some radiators have a screwdriver slot plug in the top of the radiator, remove and replace the plug with a ⅛" ips coin vent for air elimination. If there is no tapping, then one must be provided to receive the coin vent.
4. Most single pipe steam radiators are piped with either 1" or 1 ¼" black steel pipe, you will have to install a 1" × ½" or 1 ¼" × ½" reducing bushing to receive the ½" male thread spud on the single entry valve.
5. ½" or ⅜" PE RT can now be run to each single entry valve like electrical wire, you can use in some cases the same routing as the steam risers. It is not a good idea to use the actual steel pipe risers over again as abrasion from contraction and expansion of the heating pipe could cause premature failure of the pipe. If your are not a plastic heating pipe person, copper tube or iron pipe can be used in its place.
6. The single entry valve has standard by-pass ability in the valve so you can feed multiple radiators with non-electric thermostats and still have independent temperature control at each radiator location. Pipe size for series radiator installation needs to be paid attention to as well as pump sizing. If you are unsure about pipe size or pump selection for your project, consult us.
7. The best piping strategy to install single entry valves is a manifold system where they get placed in strategic locations to take advantage of the most efficient method to route your piping. This is referred to as a home run system; running an independent supply and return to each single entry valve/radiator location. In most cases ⅜" PE RT is sufficient to handle the BTU capacity of the radiator when installing a direct supply and return system. Using this strategy allows you to minimize your supply and return mains and limit your developed runs to each radiator taking advantage of the small diameter ⅜" tube for easy routing of the tubing.
8. Zoning- the best approach is to install individual non-electric thermostats on each single entry valve. This provides independent temperature control at each radiator. The advantage of non-electric thermostats is the modulation of surface temperature on the radiator as the thermostat dynamically changes the flow rate into the radiator to match the air temperature requirements of the space. This provides the best comfort and maximum economy of operation for the system.
9. Pump control- a simple high limit thermostat can be placed in the residence to shut the system down if all radiators have been satisfied by the local non-electric thermostat on the single entry valve. Another option is simply to put the circulator on a summer/winter switch. If the boiler is of conventional design, the summer/winter switch should work with a Honeywell L8124 series boiler aquastat that maintains temperature. You can be aggressive with the high and low limit setting if you want to take advantage of low delivery water temperatures during the fall and spring seasons.
10. If you are concerned about exposed pipe to your single entry valve, use the HRDB 50 2" on center snap around floor escutcheon and 7" cover tubes. Remember any plastic exposed to sunlight can experience ultra violet ray degradation over time and the cover tubes are UV resistant. This provides good insurance against premature failure of the plastic heating pipe.
11. Boiler consideration-obviously new equipment with state of the art controls is most desirable, but one can take a modular approach to the conversion. Most modern steam boilers are suitable for conversion from steam to hot water by removing the low water cutoff, pressuretrol and relief valve. You would then install a new boiler high limit control (M/H L8124), 30# relief valve, circulator pump and all necessary hydronic accessories. The near boiler piping will have to be changed for a hot water system. You now have a new hydronic boiler plant . Over time you can defer the new boiler purchase until you feel the time is correct.

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SQ. FT. OF RADIATION PER SECTION

OLD STYLE COLUMN RADIATORS

N° of COLUMNS	1	2	3	4	5	6
Width	4½"	7⅜"	9"	11½"	12½"	2½"
Heigth In.						
45"	3½	5	6	10	—	—
38"	3	4	5	8	10	—
32"	2½	3⅓	4½	6½	8½	—
26"	2	2⅔	3¾	5	7	7
23"	1⅔	2⅓	3¼	4½	—	—
22"	1⅔	2¼	3	4	6	6
20"	1½	2	2¾	3½	5	5
19"	—	—	—	—	—	—
18"	1⅓	1¾	2¼	3	5	4⅓
17"	—	—	—	—	—	4
16"	—	—	—	—	4	3¾
15"	—	1½	—	—	—	—
14"	—	—	—	—	4	3
13"	—	—	—	—	3	3

TUBE TYPE RADIATORS

N° of TUBES	3	4	5	6	7
Width	5"	7"	8¾"	9¾"	12½"
Heigth In.					
38"	3½	4¼	5	6	—
36"	3½	4¼	5	6	7
32"	3	3½	4½	5	6
26"	2⅓	2¾	3½	4	5
25"	—	—	—	—	—
23"	2	2½	3	3½	4½
22"	—	—	—	—	4½
20"	1¾	2¼	2⅔	3	3⅔
19"	—	—	—	—	—
18"	—	—	—	—	3½
17"	—	—	—	—	3
16"	—	—	—	—	3
15"	—	—	—	—	—
14"	—	—	—	—	2½
13"	—	—	—	—	—

THIN TUBE RADIATORS

N° of TUBES	2	3	4	5	6
Width	3½"	4"	4¾"	6"	7⅞"
Heigth In.					
38"	2.5	2.6	—	—	—
36"	—	—	—	—	—
32"	2.0	2.4	—	—	3.7
26"	—	—	2.4	3.0	3.0
25"	1.6	1.6	2.0	—	3.0
23"	—	—	—	2.1	—
22"	1.3	1.4	1.8	—	—
20"	—	—	1.8	—	2.3
19"	1.1	1.2	1.6	—	2.3
18"	—	—	—	—	—
17"	—	—	—	2.0	—