CONTRACTOR
THE NEWSMAGAZINE OF MECHANICAL CONTRACTING
Reprint from June 1998

Injection stations better than using mixing valves

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CONTROLLING HYDRONIC water temperatures for heat distribution by using injection stations rather than utilizing conventional mixing valves provides many advantages.

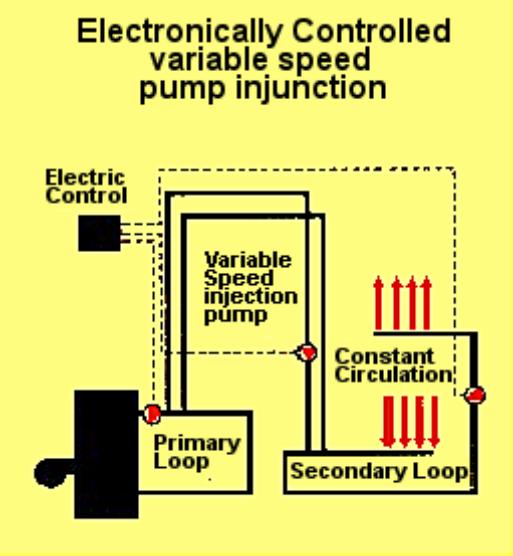
The main drawback of three-way and four-way mixing valves and their associated actuators and electronic controls is cost.

Two basic injection methods, however, accomplish flow temperature modulation:

Injection by means of a variable speed circulator and electronic controls;
Injection by means of a non-electrically controlled modulation valve utilizing the system pump as a four-way mixer.

All mixing and injections control strategies are designed around the constant system circulation concept: A continuous flow of system heating water is established through the heat distribution system (secondary loop), simply by recirculating 100% of the system return back into the system supply, bypassing the heat source 100%. At that control mode, zero BTU's are released into the building (i.e. no demand for heating presently exists).

As soon as heating demand arises, the mixing valves start to gradually modulate into the open position, allowing just enough heat source water to be injected into the secondary loop to meet the instantaneous heat loss demand of the building. In that sense, mixing valves are nothing else but injection devices with internal injection points. The injection volume is controlled by the valve position. In the case of electronic injection, the injection point can be anywhere on the secondary loop within the suction side of the system circulator. Here the injection volume is controlled by a variable speed injection circulator.



In the modulating valve injection method, the injection point is also external on the suction side of the circulator. However, the system circulator is also utilized as the injection circulator, essentially acting as a four-way mixer, and assuring constant circulation. The injection volume in this case is fine-tuned by means of a modulating two-way valve.

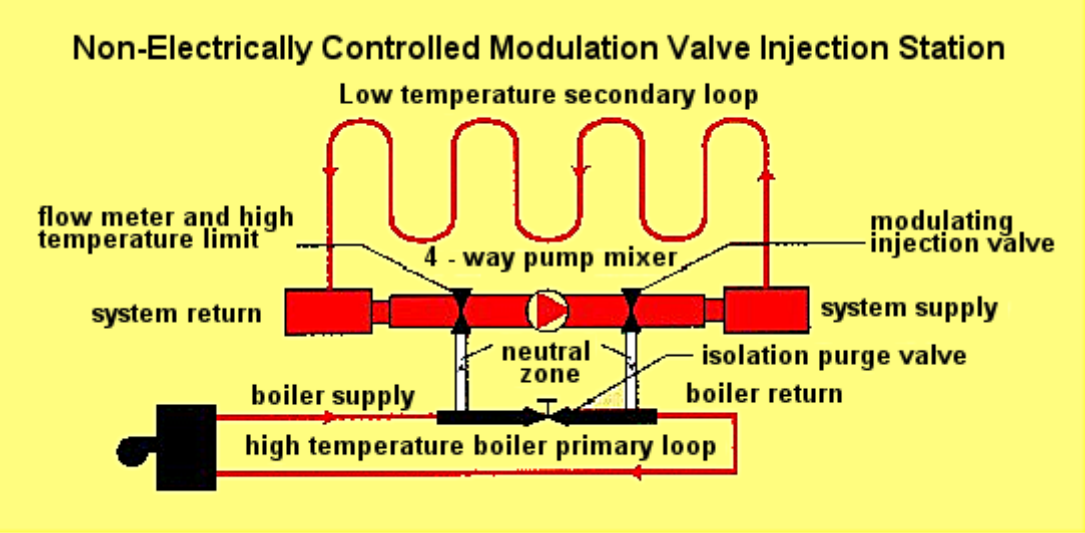
The technical advantages of injection systems over mixing valves can be numerous, depending on application. Various other types of injection methods being practiced besides the two shown as examples, each with its own set of advantages and disadvantages.

System cost and installation simplicity are always the main factors in system selection. The "Fred Flintstone" approach in control strategies has always stood the test of time. The hydraulic configuration of any hydronic system has always been the determining factor of how the control actuation has to be designed around it, ultimately deciding system cost, system reliability, as well as, installer and user friendliness.

The modulating valve injection method as shown in the schematic above is an interesting one. It gives you a wide variety of control options of non-electric controls as well as electronic controls. The high water temperature limit issue for floor heating is elegantly solved simply, safely and inexpensively by utiliz-

ing a flow meter. The whole unit comes as a super compact, preassembled and pressure-tested station ready for wall mounting.

In the case of multi-temperature floor heating system requirements,



this station is ideal, dramatically reducing distribution piping cost and eliminating a multitude of circulators and electronic controls.

Boiler return pre-tempering is accomplished via the same principle as on four-way mixing valves.

The built-in neutral zone as sures non-inter-ference from other consumer pumps, a common problem with mixing valves. The primary loop pipe sizing attached to the station allows for adding boiler water volume and constant flow to low water content boilers, critical for proper boiler operation.

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