| Impeller Meters | Positive Displacement - Pulse Controlled - Chemical Feed Pumps | Application Brief |
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**SYSTEM**

Positive displacement chemical feed pumps are reliable, relatively inexpensive injection devices usually using a solenoid to drive a plunger in a chemical filled feed from a storage tank. One precise volume of chemical is injected into the main pipeline on each stroke of the piston. Usually the injection rate can be adjusted both by setting the stroke length and the pulsing rate. Simple pumps of this type "pulse" at fixed time intervals. More sophisticated pumps accept signals from external devices, usually in the form of dry contact closures. One contact closure results in one stroke of the pump.

**PROBLEM**

Continuous monitoring of water quality is often expensive or impractical. Injection of a measured amount of chemical at fixed time intervals works reasonably well in closed loop systems or open loop systems where flow rates are held constant however when flow rates vary greatly, this approach can become inefficient and costly. At times of low flow, the fixed injection rate can result in over treatment and wasted chemicals. At times of peak flow, insufficient chemicals may be injected to effectively treat water. Proportional injection based on flow rate can be an effective alternative, but flow monitoring equipment can be expensive to purchase, especially when large pipe sizes are to be monitored. The installation of standard flow sensing equipment frequently requires the piping system to be depressurized and drained, disturbing normal facility of operation and adding to installation costs.

**SOLUTION**

Badger Meter's flow monitoring system solves each of these problems. Water treatment systems based on flow proportioned chemical injection can be accurate, reliable, and cost effective. This is certainly true for open loop systems where inlet water quality is known to remain relatively stable. Badger Meter offers flow sensors for most pipe sizes and materials from as small as ½" to in excess of 36". Hot Tap models permit installation in fully pressured systems without disruption of system operation. Models are available which permit installation into operating pressurized systems. Badger Meter's Series 2100 is capable of providing flow information and pulse data.

Several Badger Meter products can provide the scaled pulse output that is needed to drive this type injection pump. If a local display of flow rate or total is required the full-featured Series 2100 or economical Series 1500 can be used. If a blind transmitter is sufficient, the Model 320 is a good choice. The Series SDI Flow Sensor with a Scaled Pulse output option can provide all the features in one product (hot tap, local display, programmable pulse output).

**EXAMPLE:**

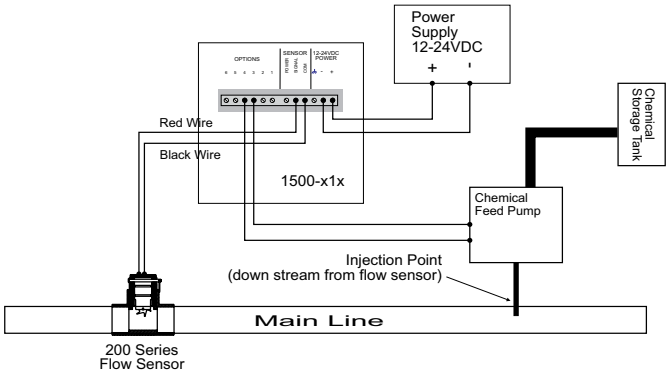
Water flowing in a 6" pipe is to be treated to maintain residuals of 8 parts per million (PPM). The maximum flow rate is expected to be 1000 GPM, and the injection pump is designed to inject at a maximum rate of 2.5 GPH when operating at its maximum of 100 Strokes/Minute. To make fine adjustments easer for the operators, the piston stroke length us usually initially set at 50%. If a full stroke is ~0.0004 Gallons/Stroke, then a 50% setting would result in the injection is about 0.0002 Gallons each time a stroke is initiated by our scaled pulse output.
The required Gallons/Pulse setting for the scaled pulse output of our flow meter is computed as follows:

$$\frac{1{,}000{,}000\ \text{Gallons}_{(\text{Water})}}{8\ \text{Gallons}_{(\text{Chemical})}} * \frac{0.0002\ \text{Gallons}_{(\text{Chemical})}}{1\ \text{Stroke}} = 25\ \text{Gallon}_{(\text{Water})}/\text{Stroke} = 25\ \text{Gal/Pulse}$$

At the maximum flow rate of 1000 GPM, an injection rate of 25 Gallon $_{(\text{Water})}$ /Stroke would result in 40 Strokes/Min. This is less than the maximum 100 SPM rating of the pumps, so the system should work well even at maximum flows.

**ADVANTAGES**

1. Sensor installation without water service disruption.
2. Economical.
3. Pulse output rates compatible with standard injection pump rates.
4. Water uniformly treated under varying flow conditions.
5. Chemical usage optimized.
6. Reduced cost / gallon for treated water.

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Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding contractual obligation exists.

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Please see our website at **www.badgermeter.com** for specific contacts.



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