A New Breakthrough In Flow Metering

By Mark Gimson

Municipalities that are looking to accurately measure their water flow rates often fall into one of three categories:

1. They want a flow control valve that has the ability to vary flow rates over time but would rather not to have to install a flowmeter, a valve with an actuator and positioner.
2. When filling a reservoir they would like to know how many gallons have been used.
3. They would like to install a conventional flowmeter in their control valve station but don't have the space.

The common choice in the municipal world to date has been the electcro-magnetic flowmeter due to cost, reliability, turndown etc. Unfortunately they require straight runs upstream and downstream prior to the meter – typically 5 pipe diameters upstream and 2 diameters downstream to give reasonable accuracy. There are other technologies but they also require straight runs and in many cases even more than the magnetic flowmeter.

Regardless of the flow technology chosen, if using the flow signal for control there is still the task of tying this into a control valve with all of the programming and additional equipment that this entails.

Alternatively, there are "in-valve flow measuring" technologies, which fall into three main categories:

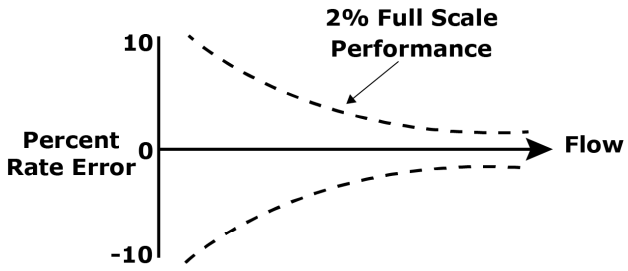
1. In-valve turbine meter
2. In-valve insertion vortex metering
3. Calculated flow measurement using position transmitters and differential pressure transmitters that calculate the flow rate from a known position on the valve C curve.

Each of these technologies is not without merit but also has its problems. Turbine meters require clean water and maintenance. Vortex meters are prone to vibration effect (giving a flow reading when there is actually no flow) and plugging or damage due to foreign objects in the line. In utilizing the flow calculation method, accuracy is dependent upon having an accurate valve Cv curve and due to the number of instruments required - differential pressure transmitter and position transmitter, there is also the risk of compounding of errors. This is also the least accurate of the 3 measurement types.

Accuracy should always be considered with all of these methods. The current in-valve technologies are meters that are typically rated with a % of full scale accuracy. While they may be 2% what does that really mean? While the number quoted is important, equally important is the statement after the percentage sign. A % of full scale meter, while being accurate at full flow, can be dramatically different at low flow rates, which you would expect to see in a control valve scenario.

As you can see in Figure 1 below, a 2% of full scale meter can still be within specifications at 8 to 12 units, which at a reading of 10 units is +/- 20% accurate. A big difference from the 2% you thought you had.

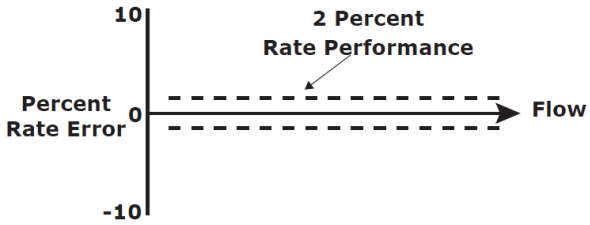
Fig 1.



Flow (units)	Absolute Error (2% Full Scale)
100	2% of 100 = 2 units
50	2% of 100 = 2 units
25	2% of 100 = 2 units
10	2% of 100 = 2 units

A better flowmeter would be a meter that has a percentage of reading accuracy as in Figure 2 below.

Fig 2.



Flow (units)	Absolute Error (2% Rate)
100	2% of 100 = 2 units
50	2% of 50 = 1 unit
25	2% of 25 = 0.5 unit
10	2% of 10 = 0.2 unit

From this example you can see that this meter is accurate from 9.8 units to 10.2 units, which is a much better proposition for accurate control.

A new flow meter with greater accuracy and ease of use

Singer Valve has recently joined forces with McCrometer to introduce the Single Point Insertion Electro-Magnetic flowmeter installed into a control valve. This is a 2% of reading flowmeter that has been flow profiled and tested in McCrometer NIST traceable flow laboratory in Hemet, California. This means that

the unit is guaranteed accurate to the 2% of reading throughout the specified velocity range, and as it has already been profiled to match the Singer valve it works right out of the box.

The insertion probe extends into the flow stream, in one of the valve inlet connections and protrudes into the valve equivalent to 1/8 of the valve diameter size and is a bullet nose, flow clean profile to eliminate clogging or build up. The unit can be installed on any of the Singer Valve models from 4" to 36" valve sizes. It can be installed on either side of the valve on the inlet connection and only requires 3 pipe diameters upstream clearance.

The sensor is rated for continuous submergence and is removable. It only protrudes from the valve 4.6" to 6.3" and only requires 8" – 12" clearance for maintenance.

It is supplied with a convertor that not only gives an LCD readout screen but also gives a 4-20mA output along with 4 programmable digital outputs.

Pricing is very competitive and certainly a lot less capital than a conventional magnetic flowmeter on the large sizes.