FPI Mag® Flow Meter

Next Generation Mag Meter: How It Works For You
McCrometer’s patented FPI Mag technology employs a ground-breaking configuration of coils and electrodes in a tube that is inserted into the pipe to measure the full profile of the flow stream. In practice, the FPI Mag meter performs just like a full bore mag meter, but this unique form gives it an advantage in a wide variety of applications.

– John Callison, Regional Sales Manager, McCrometer
What is the FPI Mag?

Magnetic flow meters - technically referred to as electromagnetic flow meters and more commonly called mag meters – are among the most widely used flow meter types today across municipal and industrial applications. Mag meters are highly accurate and can be used on commercially available pipe sizes. They rely on the principle of electromagnetic induction known as Faraday’s law.

Traditional mag meters, sometimes referred to as “full bore” mag meters, consist of a flow tube with a coil on the outside and electrodes on the inside. If a member of the engineering community or those involved in plant process and operations was asked to describe a mag meter, they will most likely describe this configuration.

The FPI Mag meter represents the next generation of development of magnetic flow meter technology and employs a unique and ground-breaking configuration whereby the coils and electrodes are assembled in a tube that inserts into a pipe perpendicular to the full profile of the flow stream. The advantages of this configuration are numerous in a wide variety of applications. In fit and form the FPI Mag is unique; in function the FPI Mag meter is just that – a mag meter.

How the Next Generation Mag Meter Developed

Insertion mag meters have been around for many years, and they offer significant benefits:

- Insertion meters may be installed without shutting the process down
- Insertion meters are “hot tappable”
- Insertion meters can be installed and removed with unequaled simplicity
- Insertion meters can be installed in locations that full bore meters cannot

However, most insertion meters are “single point” meters. That is, they consist of a sensor tube that houses one electrode, and only partially inserts into the flow stream. Although the benefits listed above are realized, there is a trade-off - single point meters do not have the same accuracy of the FPI Mag meter. The FPI Mag was developed to tackle that issue and is a meter that offers accuracy equal to the full bore magnetic flow meters. How? There are a series of electrodes placed at equal intervals that span the diameter if of the flow stream in a full pipe. The cross sectional area of the flow is measured and potential variances in the flow profile are captured.
Why Choose the FPI Mag Meter?

Reason #1: It is a mag meter!
Magnetic flow meters are highly accurate and are the most widely used of all flow meter technologies that exist today. Generally speaking, the upstream and downstream run requirements are the same as a full bore meter: five pipe diameters upstream and three diameters downstream.

Reason #2: The FPI Mag captures the full flow profile.
As noted previously, other insertion meters do not span the diameter of the flow stream therefore; they cannot capture variances in the flow profile or achieve the same accuracy as the FPI Mag meter.

Reason #3: The FPI Mag uses highly advantageous insertion technology.
In this area, the FPI Mag meter truly shines. Consider what is required to install a full bore mag meter: shut the line down, depressurize the line, drain the line, cut the line in two locations, install flanges, employ the necessary personnel and equipment to do this, and finally bolt the meter into place. Then, open the valves, check for leaks, etc... Further consider how this process becomes magnified with larger pipe diameters.

To install the FPI Mag meter: Hot tap. Attach installation fittings. Insert meter. That is it. Although hot tap is very common to many people in industry, there are other methods of providing a port for the installation of an insertion device. Use of Weldolet® fittings and strap-on or bolt-on saddles are also widely used.

Finally, insertion style meters and specifically the FPI Mag meter can be installed in places that it are simply impossible to deploy a full bore meter. For instance, installation can be made in small or tight vaults, pipe work in ceiling or basement areas, or in complex pipe galleries, etc.
What Are Some Applications Where the FPI Mag Meter Wins?

Line size
This is somewhat obvious, but does require some explanation. The most common line sizes for water distribution in North America are between 6” and 14”. This makes sense when you look at the big picture; that is, distribution lines running from water plants to homes in neighborhoods across the land. In most metropolitan areas, the line sizes can be significantly larger. The Hultman Aqueduct in the Greater Boston Area is one example. In this case, a 10-mile long 138” pipe supplies water to the City of Boston and its surrounding communities.

Although unique, it exemplifies how insertion technology wins relative to other possibilities. In the case of Hultman, the pipe is very large…certainly larger than what a full bore meter could accommodate. The pipe is also concrete lined. What other technologies could be used? The pipe is buried so strap-on Doppler technology is eliminated as an alternative. Ultrasonic transit-time meters require installation of sensors on the inside wall of the pipe. When concrete lined, the adhesive method and quality comes into question. The technology may work but what happens if the sensor becomes dislodged? Shutting down a 138” line to do a repair is no small task. Insertion style meters, specifically the FPI Mag, provide an ideal solution. Although this line size is quite unique, this application exemplifies the benefit of insertion technology to the engineer and end user.

Efficiency Studies

One of the hottest topics in plant operations is the subject of cost efficiencies. When we look at plant operations relative to efficiencies, there are two key factors to consider: power and loss. Power is simple; pumps make up the overwhelming majority of power costs and are universal in plant operations. They are commonly evaluated and repaired, upgraded or replaced to maximize their efficiency, thereby reducing costs.

In recent years with increased attention to water; our most precious resource, water loss has come to the foreground of perspective for improving efficiencies. As many of our plants and much of our distribution has aged, technology has advanced. Adding flow meters to monitor flow and capture losses has become a common initiative for municipalities. When technology that offers ease of installation, flexibility in application and reliability in performance and accuracy is presented, these municipalities are choosing the FPI Mag as the meter of choice.
The FPI Mag Can Easily Be Placed Into and Removed From Service

There are two scenarios where there it is highly desirable to remove a meter from service: periodic cleaning and calibration. In the former scenario, the FPI Mag meter with its inherent insertion technology, holds extreme advantage over a full-bore mag. Consider applications in which iron or manganese are present. Over time it is possible that build-up can occur on the electrodes of a meter and ultimately affect its performance. In the case of the full bore mag, this can be a particularly frustrating condition. With the FPI Mag, it becomes a simple matter of extracting the meter, in most cases in a matter of minutes, cleaning the sensor, and putting the meter back into service. In the latter scenario (and also indirectly related to efficiencies), plants often prefer or require periodic calibration of the flow meter(s). As before, the FPI Mag can be removed from service and calibrated at McCrometer’s NIST certified flow laboratory. Regardless of line size, the FPI Mag is uniquely suited to municipal operations that desire the ability to remove the meter from service quickly, easily, and with no interruption in service.

Summary and Conclusion

The FPI Mag offers significant advantage over its full bore counterpart, primarily because of the ability to insert and extract the meter under live conditions with ease, and simplicity. The FPI Mag has accuracy equal to that of a full-bore mag meter, framing it an obvious choice as the “Next Generation Mag Meter.”
If you're interested in reducing installation costs of your next mag meter, need to replace a full-pipe meter with or without stopping water flow, or you just want more information; click the button below and an FPI Mag Specialist will contact you within one business day.

CONTACT US TODAY

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