

WHITE PAPER

Know the Flow: Measurement Where You Need It the Most

*Authors: Tim Door – McCrometer Sales Development Manager – Municipal
Memphis Huff V – McCrometer Product Manager / Quality Lead*

Abstract

Water scarcity, increasing populations, and climate change are shifting the global perception of the value of water to be seen not just as a commodity, but as an invaluable resource to be protected. Over the coming years, there will need to be sweeping systematic change making water measurement and management increasingly critical to preserving our water resources. To further complicate this, many of the existing water treatment and distribution systems currently in place desperately require upgraded technology, and cannot shut down or stop service to the communities they serve. The resulting inaccurately metered systems or unmetered lines lead to costly water loss.

McCrometer, Inc., a global leader in flow measurement technology for more than 65 years, provided the market with their patented full profile insertion electromagnetic meter, the FPI Mag®. This meter guarantees the same specified accuracy of traditional “full bore” or “flanged” mag meters with a much simpler, more versatile, and cost-effective installation.

Industries and Applications

McCrometer’s FPI Mag services the municipal and industrial markets across a wide range of applications. Raw water intake, water well production, water treatment plants, filtration systems, pump stations, and water distribution are some of the many areas in which the FPI has great success. Focus and success of the FPI Mag has been in more difficult applications across the water distribution network and is now in use globally in the fight to reduce leakage in the municipal water networks.

Challenges

A major challenge involved with flow meter measurement is installing new equipment into existing infrastructure. In cases where



the system may not be shut down given the critical nature of its operation, the ability to install measurement equipment while running is mandatory. Even if the process may be interrupted for the purposes of connecting new equipment, space restrictions or access to piping may be impractical to utilize full bore technology. The sheer size of the pipe may even result in budget concerns if additional manpower or equipment is required to move heavier piping structures.

Solution

McCrometer's FPI Mag meter employs a unique and innovative 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. As an insertion type mag meter, the FPI Mag offers significant benefits in that it may be installed without shutting down the process and can be installed in locations that are not practical for full-bore meters. The insertion design removes the need to cut and flange large pipes, allows retrofitting through existing flow meters, and does not require isolated pipe to achieve its superior performance. The multi-electrode design of the meter captures readings across the full profile of the flow providing accuracy equal to that of full-bore magnetic flow meters.



The FPI Mag is available for either single direction or bidirectional flow measurement across nominal line sizes of 4" to 138". With an operational range of 14-140° F (-10 - 60° C) up to a pressure of 250 pounds per square inch (PSI), the insertion-style meter may be used across a wide range of applications. With no moving parts and a single-piece design, the innovative flow meter is low maintenance and generally immune to clogging by sand, grit, or other debris. The sensors' electrodes, available in stainless steel and Hastelloy, are embedded in a heavy-duty 316 stainless-steel sensor body for maximum structural integrity and coated with an NSF certified 3M™ fusion -bonded epoxy guaranteed for the life of the meter.

McCrometer's FPI Mag is paired with our preprogrammed converter offering alternating current (AC) and direct current (DC) power options. Dual 4-20mA outputs that are galvanically isolated and fully programmable for zero and full scale are standard for this meter. Additional output options include HART, Modbus, and Smart Output™ for compatibility with Sensus and Itron systems. The converter offers an 8-line graphical display and 6-key touch pad that allows for in-field programming and may be remote mounted if required.

The FPI Mag meter package is manufactured under a quality management system certified to ISO 9001. The meter is CE compliant and certified by MET for use in Class I, Division 2 hazardous locations.

The accuracy for a calibrated FPI Mag meter is as follows:

- ± 0.5% for velocity 1ft/s (0.3m/s) to 32ft/s (9.8m/s)
- ± 1.0% for velocity 0.3ft/s (0.1m/s) to 1ft/s (0.3m/s)





The FPI Mag's accuracy claims were tested by an independent third party, Utah State Water Research Laboratory, proving that the Full Profile Insertion meter meets the accuracy claims. Please see Lit No. 30121-37, "The Study of the FPI Accuracy", for additional details of this testing.

The FPI Mag for Flow Data Acquisition

The FPI Mag provides critical flow monitoring data when used across multiple metering points throughout water, wastewater, or industrial flow systems. These multiple data inputs, combined with other technology as part of a larger operation, assist users in making

informed decisions about daily processes.

Mag meters, and in particular insertion-style mag meters, are designed in a way that allows for multi-use benefits. The high accuracy, flexible installation, and minimal straight-run requirements create the opportunity to use the insertion-mag meter as more than just a flow measurement device. In older or unreliable systems mag meters can be utilized as leak detection devices, measuring at different points throughout the piping system to navigate weaknesses and potential liabilities. When installed in acquisition and deployment applications, the flow meter is a verification tool collecting data to provide proof that what is being paid for is actually flowing through the pipe.

Ultimately, the flow meter is a management tool when implemented as one part of a whole system. The FPI Mag, being engineered for that explicit purpose, solved what other mag meters couldn't accomplish; its multi-electrode design allows it to be more versatile across industries, where users need data the most.

Conclusion

Protecting and preserving our water resources is vital to maintaining healthy ecosystems and sustaining our current luxuries. With an increased attention to water in recent years, minimizing water loss has become a major focus for improving efficiencies across our distribution networks.

McCrometer's FPI Mag provides accurate measurement at both low flow rates, where accuracy is difficult to achieve, and high flows where inaccuracy results in lost revenue. When technology that offers ease of installation, flexibility across applications, reliability in performance, and top tier accuracy is presented, plant and distribution network operators are selecting the FPI Mag as their meter of choice.

