Composing A Sonata For The Smart Water Network

Whether we like it or not, everything around us is getting smarter. And perhaps the closest water industry analogy to what's taking place with our personal phones, cameras, and other "smart" gadgets lies in the metering sector.

Advanced metering infrastructure (AMI) and the Internet of Things (IoT) have already taken water meters to a new level, one that promises only to expand. Blazing the trail has been Master Meter, which seems to unveil a new innovation every time we turn around. The latest will be the Sonata, a residential answer to solid-state flow measurement. To discuss the future of the smart water network and how this new device fits in, Water Online conducted a Q&A with Master Meter's Greg Land, product manager for solid-state measurement.

How do you define the "smart water network"?

I define it as a complete system of water management devices, sensors, and software that provides current information to the utility and end user which improves system efficiency while also helping to reduce costs or losses.

Monthly readings provide exactly what a utility needs to produce a bill and

to notice trends and events such as leaks. But in some cases these events are weeks or months old before anyone can respond. A smart water network is more than an AMI that obtains multiple reads daily. At the core of it all is smart data that comes from smart flow measurement sensors that continually monitor and report not only a read, but a collection of other alarms and identifiers.

How do you see the IoT changing the metering industry? What might be possible for a utility now that wasn't before?

I see it eventually being the standard for a water system. IoT benefits the utility customer as much as the utility. Moving beyond the range of features currently found with AMI networks, the interconnected world of IoT pairs AMI

data with disparate inputs from other systems to bring new paradigms in value creation. For instance, homeowners can understand and forecast their irrigation-related water consumption in view of National Weather Forecast data, soil porosity databases, and other related inputs. One data set, such as weather data, may alter the action of another data set, like scheduled irrigation, and its impact on water budgeting and AMI.

How much revenue can be lost by a utility due to non-revenue water (NRW)?

The actual dollar amount will vary based on a wide variety of factors. But, as an example of how much revenue is lost through NRW, one industry report stated that the U.S. could gain access to an additional $3 billion in self-generated cash flow by reducing NRW.

Inaccurate water meters are among several components that can contribute to a rise in NRW. When a meter begins to lose accuracy, a utility might not notice it if it's gradual, but when hundreds or thousands of meters lose accuracy over time it starts to represent itself through increased NRW. This is why it is so important to select a meter that can maintain accuracy for the life of the meter. One way to accomplish this is through solid-state flow measurement. This year at the AWWA Annual Conference & Exposition, Master Meter will present our residential solution for solid-state measurement: the Sonata.

How does the Sonata's technology help a utility curb water loss?

The technology behind the ultrasonic flow measurement of the Sonata means it will not have gradual wear and deterioration which leads to loss in accuracy and revenue. Additionally, solid-state technology allows the Sonata to improve upon low-flow measurement of mechanical meters, allowing the utility to capture lower flows with greater accuracy. The impact is immediate and lasts for the life of the meter.

What data can the Sonata collect that a traditional meter cannot?

In addition to the all-important meter reading, the Sonata will be able to help identify small leaks, excessively high consumption that is indicative of a burst pipe, and periods of reverse flow in the meter that could be a result of a cross connection or a contamination threat. A tamper alarm will notify if the meter has been removed, stolen, or momentarily turned around, which could be a sign of water theft. When it is time to replace the meter, the Sonata will notify by an alarm that the battery is reaching the end of its life.

How does ultrasonic metering technology work and what makes it precise?

Ultrasonic transit-time measures the velocity, or speed, of water by sending ultrasonic sound bursts through the water and determines the time it takes the sound wave to travel from one transducer to another. This is done both with and against the flow direction. Both calculations are compared and the difference between the two establishes the flow rate and volume of water used.

What makes this technology so precise is the meter's ability to adapt to changing factors inside the meter. For example, if the water temperature changes, the speed of sound changes slightly. The Sonata is capable of determining the water temperature so flow calculations remain precise. Another example is in the event sand, rocks, or other debris that pass through the meter. Some solid-state meters use sonic reflectors that are placed in the center of the pipe to assist in acoustic sound measurement. This leaves them exposed to damage. The Sonata does not have sonic reflectors in the flow path, meaning we have reduced the likelihood of these devices being damaged. An additional benefit of this is that we significantly reduce the head loss caused by these reflectors.

How do you address the concerns holding utilities back from investing in AMI?

A utility is a provider of one of the world's most precious resources. It's about making each of us more accountable by managing our part of the system, whether it is the family on a budget who cannot afford an unexpectedly high water bill, or a utility striving to get their NRW down and they cannot wait until the next billing cycle to see if their hard work is paying off. We are all water managers and when we work together with real-time data, we get real-time results that have a lasting impact for everyone. You can't get that in monthly readings. You need the analytics of an AMI to provide a premium service like this.

What do you say in response to a consumer concerned that smart meter systems are too invasive?

It is true more data and analysis of usage patterns are needed in a smart meter system, but the purpose of it is to reduce loss and save both the utility and the customer money.

What else are you working on that speaks to the range of Master Meter's AMI offerings?

This summer, Master Meter is releasing the residential ultrasonic flow measurement sensor, the Sonata, in sizes ranging from 5/8" to 1". Partnered with our commercial ultrasonic flow measurement sensor, the Octave, our Harmony MDM Software, and our Allegro AMI system, Master Meter is able to provide a complete solution for any utility ready to make the leap to a smart water network. ■