



Smart Water Begins at the Meter

A WHITE PAPER BY NEPTUNE TECHNOLOGY GROUP INC.

During the 20th century, most water meters operated mechanically – measuring the volume of water passing through the meter as it turned a rotating disc, turbine rotor, oscillating piston, and other internal parts. In this second decade of the 21st century, the water industry has begun adopting ultrasonic technology for cold water measurement.

Neptune Technology Group (Neptune®) has developed an ultrasonic water meter, the Neptune MACH 10® meter. It measures the difference between the speed of a signal sent against a flow and a signal traveling in the direction of the flow. The faster the flow, the greater the time between the signals. By comparing upstream and downstream times, fluid velocity can be calculated.

Today's ultrasonic technology typically requires less battery power than other solid state flow measurement technologies. The resulting ultrasonic water meters support higher-frequency measurement that provides continuous readings multiple times per second. The greater the frequency, the better and more consistent the accuracy at low flows.

Planning for higher flow rates to accommodate fire sprinklers or irrigation systems using traditional mechanical meters often required a larger size meter – sacrificing sensitivity to lower flows. Using an ultrasonic water meter such as the MACH 10 is ideal for applications requiring a wider operating range, including water lines that service a combination of potable and residential fire service or irrigation systems.

NO PARTS TO WEAR MEANS LONGER SUSTAINED ACCURACY

Through its absence of moving parts, an ultrasonic water meter is also well-suited to reclaimed water or sandy water conditions, such as in drought-stricken areas. Debris such as sand and dirt pass through easily with no effect on meter accuracy.

The ultrasonic water meter's no-moving-parts design eliminates wear points. This helps to ensure greater sustained accuracy and reduced material and labor costs during its lifetime, compared with a traditional mechanical meter.

This, in combination with continuous measurement, means that over a decade-and-a-half to two decades, water that might otherwise have gone unmeasured by a mechanical meter is captured, saving potentially millions (of gallons as well as dollars) in non-revenue water.

TECHNOLOGY THAT COMPLEMENTS OTHERS

The latest ultrasonic metering technology can be integrated with other field-proven technologies. A fully-potted electronics enclosure can be combined with a maincase cast in lead free, NSF 61 compliant bronze. Unlike with a composite meter body, the bronze maincase prevents stripped threads or broken meter spuds that can occur during installation or from piping stress.



Radio frequency (RF) data transmission is easily integrated with ultrasonic metering as well. The encoded metering output, plus RF transceivers, create an easy-to-install, powerful, and solid foundation for automatic meter reading (AMR) or advanced metering infrastructure (AMI).

Installation is made still easier because the compact physical profile of the MACH 10 ultrasonic water meter alleviates sizing or positioning concerns, fitting within shallow pits and even the smallest meter boxes, for precise positioning.

An ultrasonic meter incorporates smart technology that allows water utilities to:

- Correlate reverse flow events with data from acoustic leak sensors along distribution lines;
- Identify and address intermittent and continuous leak events earlier;
- Integrate automatic alerts with on-screen diagnostics to help field crews with work orders; and
- Assist homeowners to better understand their water consumption.

THE CITY OF BENICIA, CALIFORNIA – AN ULTRASONIC METER CASE STUDY

The City of Benicia, California, comprised of nearly 10,000 residential water services, recently set out to upgrade its aging metering population to better serve its residents. A five-person crew was stuck in a never-ending cycle of reading meters each month, so City officials knew it was time to make a change.

“We had 71 meters pulled and tested, with accuracy ranging from 14 to 99 percent, and a dozen had zero percent accuracy at low flows,” said Christian DiRenzo, Assistant Director of Public Works/Utilities for the Bay Area city. “For an investment to be made, we had to have the best product available.” It was the ideal time for a full changeout, and DiRenzo selected the Neptune MACH 10 ultrasonic meter as the lynchpin for Benicia’s new metering system. He noted it being free of the moving parts that could wear down and its high level of sustained accuracy over the life of the meter.

With new California legislation, effective in October 2017, stating that unaccounted-for water levels must be ten percent or less, Benicia was eager to get its ultrasonic meters in service as part of their overall AMI program. Paired with radio frequency technology, they will deliver timely, accurate information to Benicia over a fixed network, allowing the city to:

- Address apparent losses and identify non-revenue water amid rate increases;
- Implement water utility programs without having to invest in additional personnel; and
- Offset unpredictable variations in water supply and storage due to weather.

Benicia’s new fixed network system is performing at a 99 percent message success rate, and DiRenzo appreciates how the technology also allows his team

to collect reads via mobile when needed. Now the City:

- Reads and bills its accounts without sending out a truck;
- No longer needs to hire additional resources to read meters; and
- Can reallocate existing resources to address main breaks, system leaks, and customer service.

As Benicia begins to bring hourly water consumption data from its ultrasonic meters into the Neptune advanced host software, DiRenzo plans to take advantage of the leak detection capabilities of the MACH 10, particularly at low flows. He anticipates the results and impact on “operational efficiencies and increased income.”

With a no-moving-parts design, high-resolution, increased accuracy, and adaptability, ultrasonic water meter technology is providing water utilities such as the City of Benicia more flexible, more efficient, and more affordable options to leverage AMR and AMI data.

For technology that works for you, learn more about ultrasonic metering and the Neptune MACH 10 at neptunetg.com and connect to what’s next in water.

