



Learn how utilities are reducing leaks, increasing revenue, and improving water conservation.

Solid-State Ultrasonic Metering

Solid-state ultrasonic meters are becoming the technology of choice for water utilities that want accurate, durable, safe and intelligent meters that deliver positive ROI and are compatible with advanced metering infrastructure (AMI). Solid state ultrasonic water meters offer many benefits compared to mechanical meters, particularly for water conservation programs.

While not a new technology, ultrasonic meters are now cost competitive with mechanical alternatives with the added benefit of performing extremely well in harsh environments. With no moving parts, there is less wear and tear so they inherently last longer, reducing capital and labor costs. Ultrasonic meters also help utilities better manage their water network, including building precise water balances on accurate granular data.

HOW DO THEY WORK?

Ultrasonic meter use sound waves to measure the speed and flow direction of water. The meter contains ultrasonic transducers that generate and detect sound pulses from electric currents.

Water flows through a pipe where the ultrasonic transducers are located. A signal is sent from the upstream transducer to the downstream transducer and then in reverse. The time to go to the downstream transducer is faster than the reverse and volume is determined based on the time difference between both directions. Meter accuracy is greatly enhanced because the ultrasonic technology has a smaller margin of error compared to mechanical meters. Accuracy at low flow rates is also much higher.



WHAT ARE THE BENEFITS?

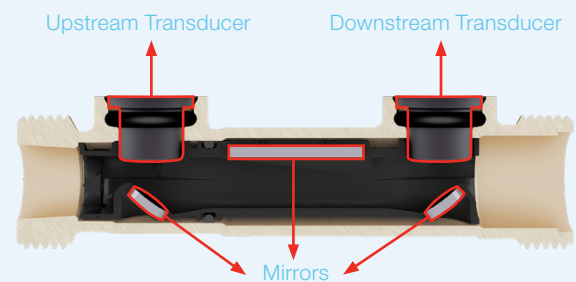
Accurate

Solid state meters have the capability to be more accurate than mechanical meters.

Some vendors, like Itron, offer much higher accuracy performances that improve billing confidence and leak detection.

- » **Consistency:** Ultrasonic meter performance is determined by onboard circuit electronics, with calibration done in the factory versus at a meter shop or in the field. All ultrasonic meters from the same production line will have uniform performance and measurement attributes. Consistent, repeatable performance guarantees fair and accurate billing for all customers.
- » **Leak detection:** Ultrasonic meters are highly accurate at low flow rates. The meter's accuracy level is indicated by the 'R' ratio, which can be found on the meter cover. The higher the 'R' ratio, the higher the accuracy. An accuracy ratio of R800 (MID Class 2) compared to R400 will provide an additional 2% to 3% volume of water billed, based on an average household consumption profile. A high accuracy ratio will allow you to detect leaks, even small leaks in customer homes. In comparison, mechanical meters do not always detect leaks if there is not enough pressure to turn the impeller. The starting flow is a key metric to compare meter performances. Mechanical meter start measuring water around 5 l/h at best, while an ultrasonic meter starts measuring at 1 l/h. At low flow rate, meters can become less accurate. Utilities should make sure the ratio of ultrasonic meters meets their accuracy requirements.

How does an ultrasonic meter work?

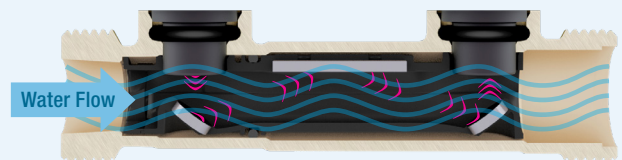


Physical principle:

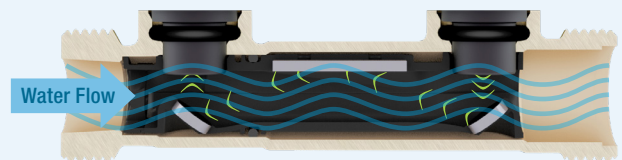
Propagation of acoustic waves in a liquid

Measuring principle:

Difference in transit time between back-and-forth



Signal (faster) sent from upstream to downstream transducer.



Signal (slower) back from downstream to upstream transducer.

The time difference between both directions is used to determine volume.

Extremely Durable and Long Lasting

Unlike mechanical meters, ultrasonic meters have no moving parts. As a result, utilities do not have to replace or repair parts that wear out or fail, ensuring a longer service life. However, not all ultrasonic meters are the same, so it's important to consider the following when selecting a meter.

- » **Durability:** Installing durable meters that perform in all conditions will help utilities save money by lowering maintenance and replacement costs. For example, the meter circuit board must be protected from elements like water, sand and dust. This is particularly important for meters that are installed in pits. The LCD screen should not be subjected to direct sunlight, and the meter electronics must be resistant to extreme temperatures. Robust meters will last longer and offer a positive return on investment.
- » **Battery life:** Ultrasonic meter asset life is dependent on the battery. A bigger battery is not necessarily better—a battery optimized for how the meter will be used is ideal. Here are some things to consider:
 - **High quality batteries** last longer in the field. Manufacturers must provide test results to demonstrate how their meters perform over time. Environmental conditions, including heat and humidity, will affect battery life over time. Make sure the ultrasonic meter battery you are considering has been tested in harsh conditions.
 - **Managing and transferring usage data** also affects battery life. Utilities should work with vendors to define what data they need and how often they need it. Selecting a vendor with experience in data collection, management and transmission is critical to maximizing your ultrasonic meters' battery life in the field. Consider solutions that are flexible and give you options for managing data transfer, including how much data and how frequently that data is collected and then transferred from the meter to your meter data management system.

Provide Valuable Data

Ultrasonic meters provide frequent, high-quality data to help utilities better manage the distribution network. The value from additional information—and actionable insights—will lead to reduced losses and increased revenue. A key enabler is advanced metering infrastructure (AMI) networks that provide daily data transmissions to a centralized headend system, delivering the full benefits of solid-state metering. Automated meter reading (AMR) networks typically provide weekly or monthly data transmissions (walk-by or drive-by mobile data collection) and will not provide the same level of data granularity as AMI networks. They are still capable of supporting data analytics and prove quite useful when AMI network coverage is inadequate. Here are some ideas things to consider when developing a data management strategy.

- » **AMI and AMR systems provide valuable insights** so you can make informed decisions about your network. There are many factors to consider when selecting a system. If utilities are not ready to move to an AMI network, walk-by or drive-by systems are a good option. In addition, there are metering devices that will allow utilities to transition from AMR to AMI without having to replace meters. A hybrid solution is also a good option in remote areas where you might have coverage issues. This will ensure all customers are billed and revenue is collected.
- » **Meters are the key to accurate data collection** that can be fed into analytic platforms, which provide metrics and KPIs to help lower operational cost. Data granularity is fundamental to successful water conservation programs. Reducing real losses in the water network also requires granular data to build water balances and other advanced analytics dashboards. Large amounts of data, collected and transmitted more frequently, does impact battery life—so vendors must find the right balance between how often data is sent and how long batteries will last. Vendor experience in data transfer and battery lifetime optimization is key here.

Intelis wSource - Smart, accurate, durable and intelligent



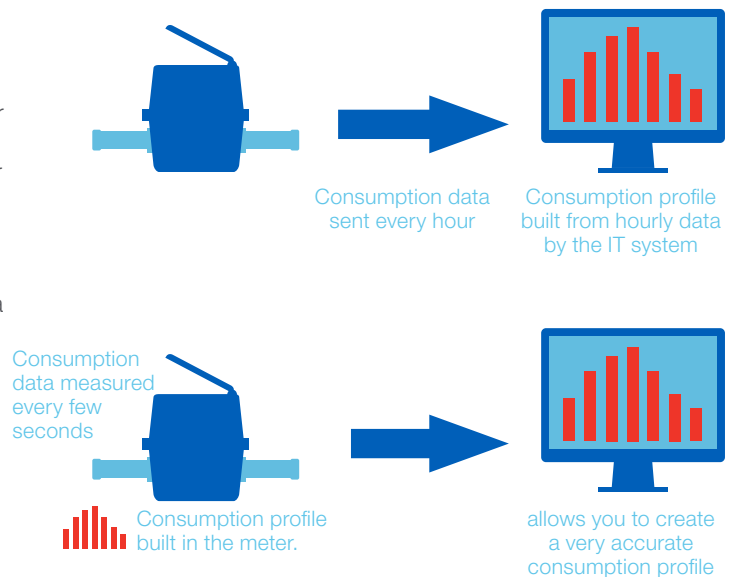
Intelis wSource is the most accurate residential smart water meter available with AMR backup that protects revenue for the life of the meter. No moving parts to wear out and durable components extend meter life and lower operating costs.

- » **Provides unmatched accuracy to protect revenue and detect leaks**
Intelis wSource's billing accuracy is the highest on the market, even at low flow rates and in adverse installation conditions. Utilities can protect their revenues and ensure fair billing. Thanks to its low starting flow and very high accuracy at low flow rates, Intelis wSource is able to detect leaks in households to help save water and support water conservation initiatives.
- » **Built For The Long Run to Help Lower Operating Costs**
Intelis wSource is designed with robust components capable of withstanding harsh conditions (including heat, humidity, and intermittent water supply) to lower maintenance and replacement costs. Its battery protect features will secure the meter lifetime. Intelis wSource will operate in the field for 15 years.
- » **Safeguarding your data**
Intelis wSource is designed to ensure that valuable data gathered in the field is received and processed. It supports both AMR and AMI for uninterrupted data. No manual read is needed, enabling staff to focus on high value activities. With wM-Bus AMR backup, utilities can collect billing data even when the AMI network is down. Its 2-way mobile interrogation modes help save time when collecting mobile data.
- » **The 4Ds promise, Deep Data Driving Decisions**
Extensive data set drives informed decision making. Intelis wSource provides high data quality and granularity to support utilities in optimizing the water network operations. Intelis wSource provides customer profiles so you can recommend water conservation programs.
- » **Keep customer service informed**
Intelis wSource provides timely notifications and alarms to keep your customer service team up-to-date. It helps improve customer satisfaction with freezing pipes and leak notifications. It supports theft reduction thanks to tampering and zero consumption alerts. Its remote monitoring features ensure permanent visibility on meter operations.

» **Choosing the right data set is critical.** Granularity is not enough. For water conservation programs to succeed, utilities must provide customers with water consumption information to help drive behavioral changes. And that data needs to be timely and accurate. Experience in building efficient data sets is important. Here are two examples for building individual consumption profiles:

- **Option 1:** Provide highly granular consumption data (every hour, as an example) to build individual consumption profiles in the analytics system. The meter will send data every hour so that the utility can measure how much water has been used during the day at different flow rates. Individual profiles can then be compared to a reference profile to assess over or under consumption. This allows utilities to provide consumption information to consumers to help drive behavior change.
- **Option 2:** Build the profile in the meter. An ultrasonic meter measures water flow every few seconds. Building the consumption profile inside the meter, and storing it in the data set, avoids over-reaching in terms of data transfer and thus overburdening the battery and reducing useful battery life. Moreover, this approach enables a superior accuracy of the consumption profile (built from water consumption measurement every few seconds, rather than every few minutes).

There are several advantages to option two. First it provides more granular data (every few seconds rather than every few hours), leading to more precise consumption profiles. And it will dramatically save meter battery lifetime, as the data stored in the meter can be transmitted less frequently (couple of times a day rather than every few hours).



CONCLUSION: FUTURE PROOFING THE MANAGEMENT OF WATER

Data is everything. Solid-state, ultrasonic meters not only ensure fair, accurate billing today, but they are instrumental in combating water scarcity and helping utilities manage every drop of their water supply. In a situation of global water stress, ultrasonic metering is the foundation that utilities can build their water conservation programs upon for today—and far into the future.



To learn more about the Intelis water meter, visit itron.com

Additionally, you can connect with Itron Distributors or Itron Direct.

To learn more visit itron.com

We create a more resourceful world

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