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### Episode 63 Title: Meter Magic

In this episode of *It's Your Water*, Mike Urbans is joined by Dave Smith from AQ Matic to discuss the transformative benefits of ultrasonic water meters. They cover the shortcomings of traditional mechanical meters, the innovation behind ultrasonic technology, and how professionals can retrofit ultrasonic meters into existing systems for improved accuracy and reliability.

### Why AQ Matic Developed the Ultrasonic Meter:

- **There are challenges with traditional meters.**
  - **Mechanical Wear and Tear:** Paddle wheels and turbines rely on moving parts that wear out, clog, or become inaccurate over time.
  - **Maintenance Burden:** Frequent cleaning and part replacement are needed due to fouling from sediment, iron, or debris.
  - **Inaccuracy at Extremes:** Traditional meters struggle with low or high flow rates, leading to unreliable measurements.
- **There is industry demand for a better solution.**
  - Professionals are looking for a low-maintenance, high-accuracy option compatible with existing systems.
  - Provide a retrofit solution for existing systems.

### How Ultrasonic Meters Work:

- **Time of Flight Technology:**
  - Sound waves are sent downstream and upstream through the water.
  - The time difference between the waves calculates flow rate (velocity) and direction.
  - The meter can also measure water temperature based on sound speed.
- **Advantages:**
  - No moving parts: Eliminates wear and fouling.
  - Highly accurate at all flow rates, including low flows where mechanical meters fail.
  - Bidirectional flow and temperature measurement add versatility.



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### Retrofitting with AquaMatic Ultrasonic Meters:

- **Compatibility:**
  - Ultrasonic meters are designed to work with common three-wire pulse generation systems used in brands like Clack, Pentair, and of course, AquaMatic.
  - They are drop-in replacements for traditional mechanical meters, using the same wiring and connections.
- **Steps to Retrofit:**
  - **Step 1:** Disconnect the existing mechanical meter:
    1. Turn off water flow and remove the old paddle wheel or turbine meter.
    2. Inspect plumbing connections for compatibility with the ultrasonic meter.
  - **Step 2:** Install the ultrasonic meter:
    1. The ultrasonic meter has a compact, stainless steel design with the same male and female threading as traditional meters.
    2. Ensure proper alignment and secure connections to avoid leaks.
  - **Step 3:** Connect to the control system:
    1. Use the same three-wire pulse connection from the previous meter.
    2. Input the **K-factor** (laser-engraved on the ultrasonic meter) into the control system for accurate calibration.
  - **Step 4:** Test and verify:
    1. Turn on water flow and confirm that the meter is functioning correctly.
    2. Check for LED flow indicators and verify accurate data in the system's interface.
- **Key Features for Retrofitting:**
  - **Plug-and-Play Installation:** Ultrasonic meters use the same wiring and power supply as mechanical meters.
  - **Compact Design:** Stainless steel housing fits standard meter installations with minimal plumbing adjustments.
  - **Laser-Engraved K-Factor:** Ensures precise calibration for flow data in the system.



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**Applications for Ultrasonic Meters:**

- Water softeners and filtration systems.
- Industrial processes like irrigation, media blasting, and chemical feed systems.

**Next generation applications to include:**

- **Chemical Feed Pumps:**
  - Ultrasonic meters with 4-20 mA output (coming soon) will integrate seamlessly with advanced chemical feed systems.
  - Accurate flow measurements ensure precise dosing and resource management.
- **Building Management Systems:**
  - Future models will connect with management platforms, allowing centralized monitoring and control.

**Potential Challenges:**

1. **Air Pockets in Pipes:**
  - Ultrasonic meters require full water pipes for accurate readings. Voids or bubbles can disrupt sound wave measurements.
2. **Power Requirements:**
  - Unlike some mechanical meters, ultrasonic meters need a power source. Most installations can draw power from the existing system, but standalone battery options are still in development.



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