Flow Meters: Problems and Solutions

- Why do we use flowmeters in water treatment
- What technologies are being used
- What are the limitations of each technologies
- Installation Recommendations
- What are the solutions when a flow meter goes south on you
Why Using a Flowmeter?

Pacing chemical dosage systems (GPM)
- Chlorine Gas
- Chlorine Liquid
- pH solutions (Lime, Soda Ash, Caustic)
- Alum and Other Coagulents
- High Flow Alarms to SCADA System

Determine Water Usage (Gallons)
- Of your own Town
- Of another Town
- Of the Fish Plant

Determine Distribution System Leaks
- Noticing more volume than usual
  - Flow rate going up
  - Flow Total going up
Technologies Most Used

• Paddlewheel
• Magmeter
• Insertion magmeter
• Ultrasonic Clamp-on
Flowmeter Components

Flow Sensor
Flow Transmitter
Compact Design
• Flow Transmitter mounted to the sensor
Paddlewheel

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Paddlewheel – Pros & Cons

**Benefit(s):**
- Low Purchase Cost
- Low Installation Cost
- Easy to remove

**Downside(s):**
- Susceptible to Dirt and Wear
  - Dirt (Weed)
    - Sluggish or stop sensing all together
  - Wear (Bearing)
- No Output Signal Below a Certain Velocity
Magmeter
Magmeter – Pros & Cons

Benefit(s):
• Full bore
• No moving parts
• Long Life
• Will Provide Output Signal at Most Velocity

Downside:
• In-Line
• Requires Good Pipe/Flowmeter Grounding
Insertion Magmeter
Insertion Magmeter – Pros & Cons

Benefit(s):
• Low Installation Cost
• Easy to remove
• No moving parts
• Long Life

Downside:
• In Dirt Path
• Requires Great Pipe/Flowmeter Grounding
Ultrasonic Clamp-On
Ultrasonic Clamp-On – Pros & Cons

Benefit(s):
• Not Intrusive
• Low Installation Cost
• Same price small or large pipe
• Installs on all pipe materials
• Easy to remove
• No moving parts
• Long Life

Downside:
• Same price small or large pipe
Installation Recommendations
Installation Recommendations

1. \(\geq 20 \times DN\)
2. \(\geq 20 \times DN\)
3. \(\geq 15 \times DN\)
Installation Recommendations

Size does matter!

- Pipes too large have low velocity
- Some technologies will not provide an output at low flows or at all
Installation Recommendations

What is 4-20mA Output Signal?

- Flow proportional signal to pace the dosage system: Gas, Sodium Hypo Pump, pH Pump...
- Signal Varies between 4mA and 20mA (i.e. 0 – 300GPM)
  - 4mA = 0 GPM
  - 20mA = Maximum of the set range 300 GPM
  - If fish plant closed permanently, flow range should be set lower and pump dosage re-adjusted
- Polarity Sensitive
  - 2-wire output
  - Wired backward = 0 signal
Flowmeter Issues

- **Submersed**
  - Most electronic enclosures not made to be submersed
  - Magmeters coils will be damaged if submersed. Not repairable.

- **Dirty**
  - Paddlewheel locks up
  - Magmeter electrodes don’t sense the magnetic field

- **Air in Pipe**
  - What is the cause of the entrained air?
  - Verify air release valve functionality
Flowmeter Solutions

• Submersed
  – Replace any kind of flowmeter

• Dirty
  – Paddlewheel: Clean and re-install: Random/Recurring Problem
  – Magmeter electrodes don’t sense the magnetic field, clean or replace flow sensor

• Old Age!
Flowmeter Solutions

- Install Ultrasonic Clamp-on Flowmeter
  - Will fit in most typical installation
  - Leave existing magmeter in place.
  - Install new clamp-on flowmeter nearby within the upstream and downstream straight pipe requirements.
  - The transmitter will prompt for the pipe size, material, liner to determine how far apart the sensors have to be.
Paddlewheel and Ultrasound Clampon
Magmeter
Magmeter – Flanged and Insertion
Ultrasonic Clampon
Takeaways

• Flowmeters Serve Multiple Purpose
• Correct Technology and Proper Installation avoids Random Issues
• Easy Installation Can Be Done With the Use of Non-Intrusive Technologies Such as Ultrasonic Clampon.
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