



# **Flowmeters: Problems and Solutions**

**March 28, 2018**

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## 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



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# Flowmeter Components

**Flow Sensor**

**Flow Transmitter**

**Compact Design**

- Flow Transmitter mounted to the sensor



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# 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



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# 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



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# 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



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# Ultrasonic Clamp-On – Pros & Cons

## Benefit(s):

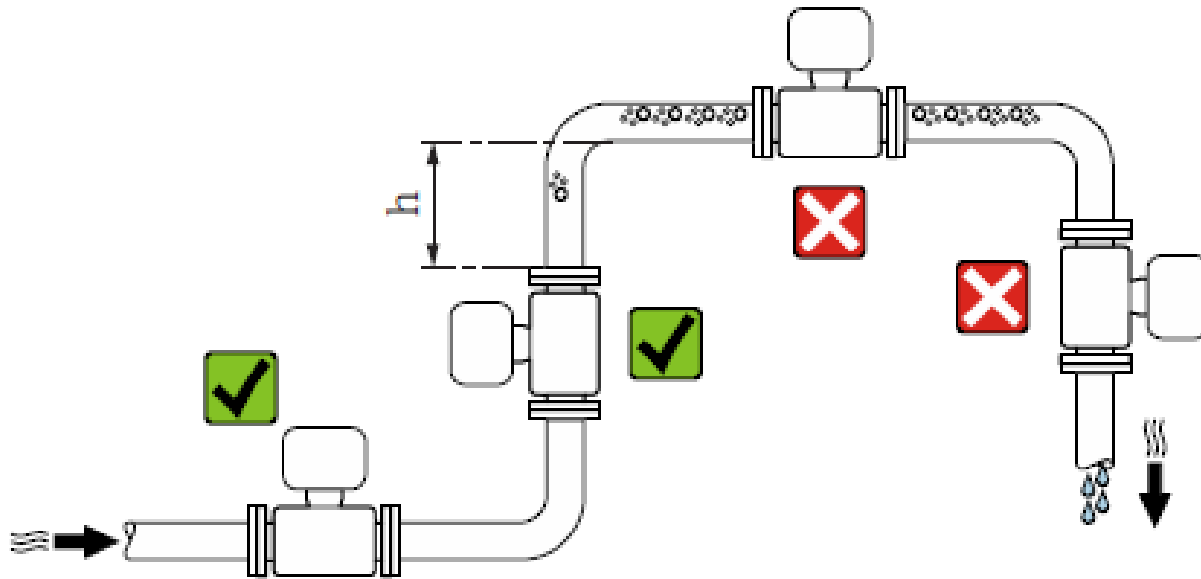
- Not Intrusive
- Low Installation Cost
- Same price small or large pipe
- Installs on all pipe materials
- Easy to remove
- No moving parts
- Long Life

## Downside:

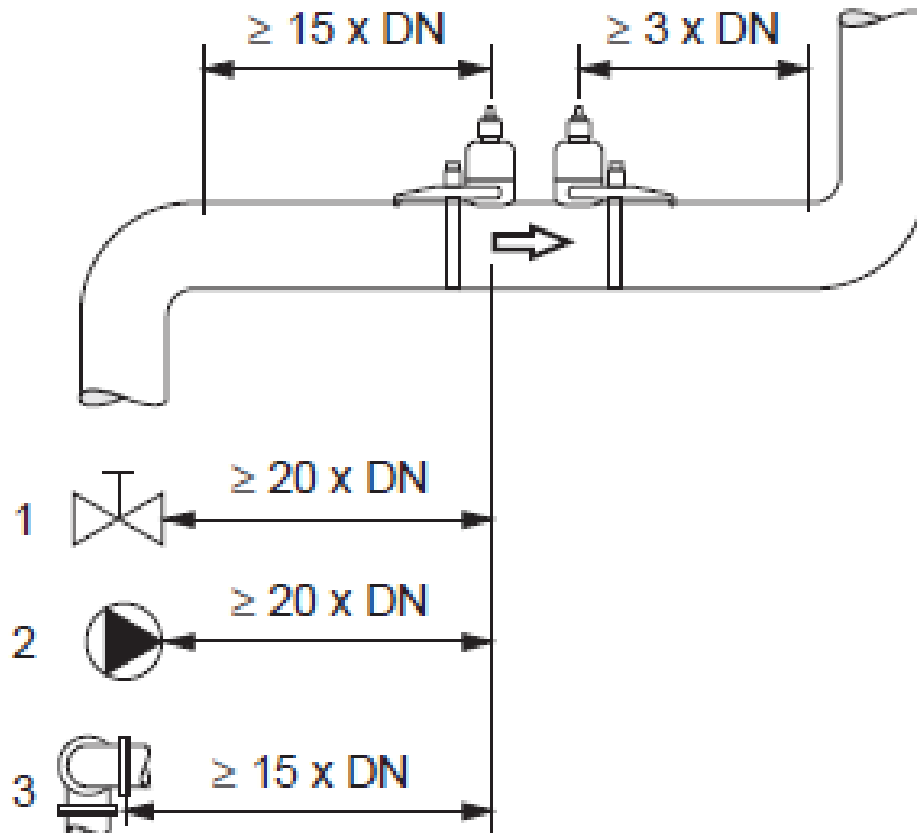
- Same price small or large pipe



# Installation Recommendations



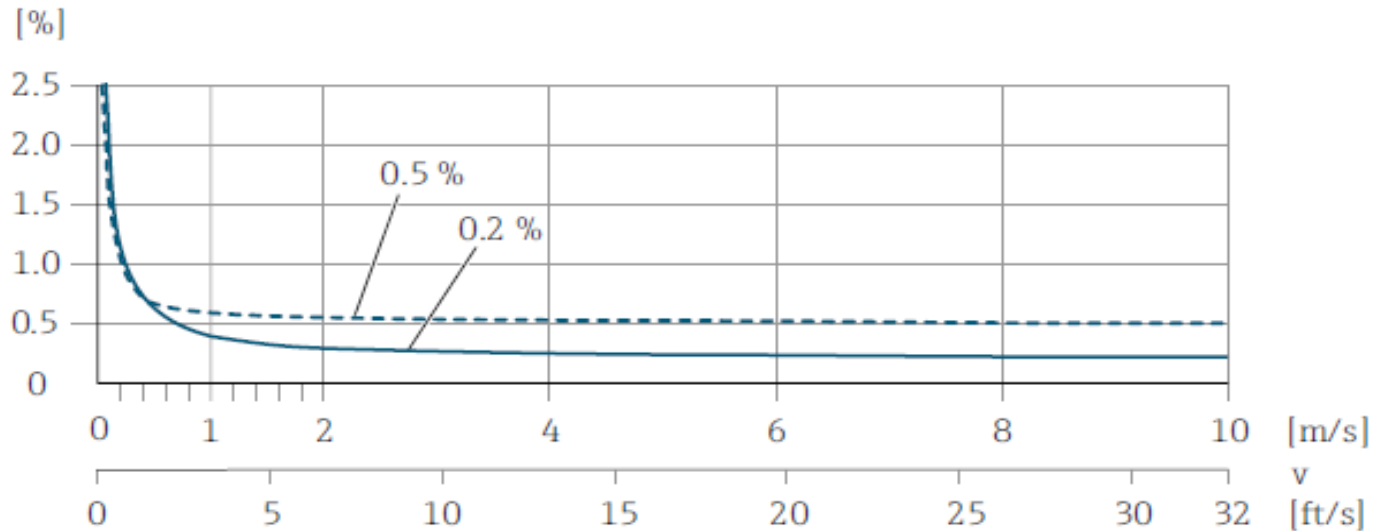
# Installation Recommendations



# 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

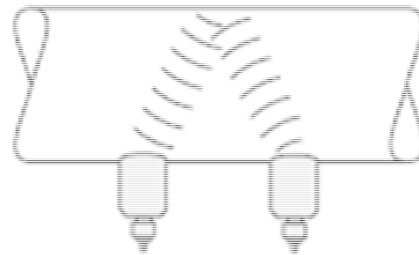
- **Submersed**
  - Replace any kind of flowmeter
- **Dirty**
  - Paddlewheel: Clean and re-install: Random/Recurring Problem
  - Magmeter electrodes don't sense the magnetic field, clean or replace flow sensor
- **Old Age!**



# 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



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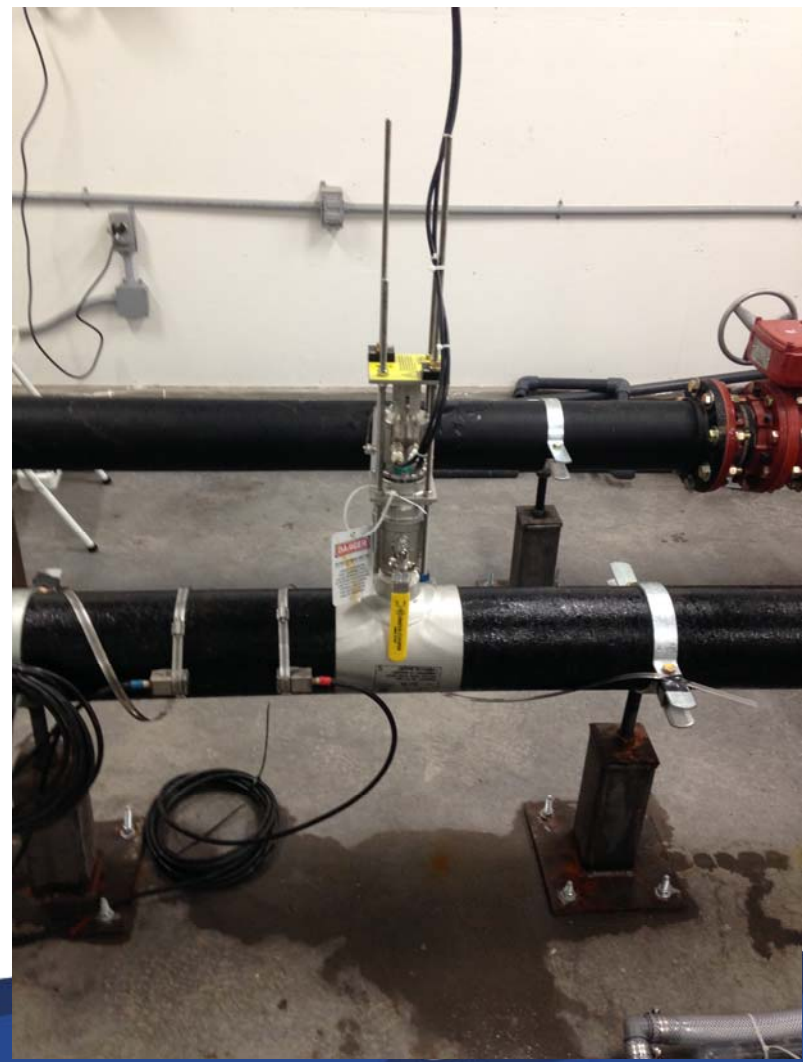
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# Magmeter



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# Magmeter – Flanged and Insertion



# Ultrasonic Clampon



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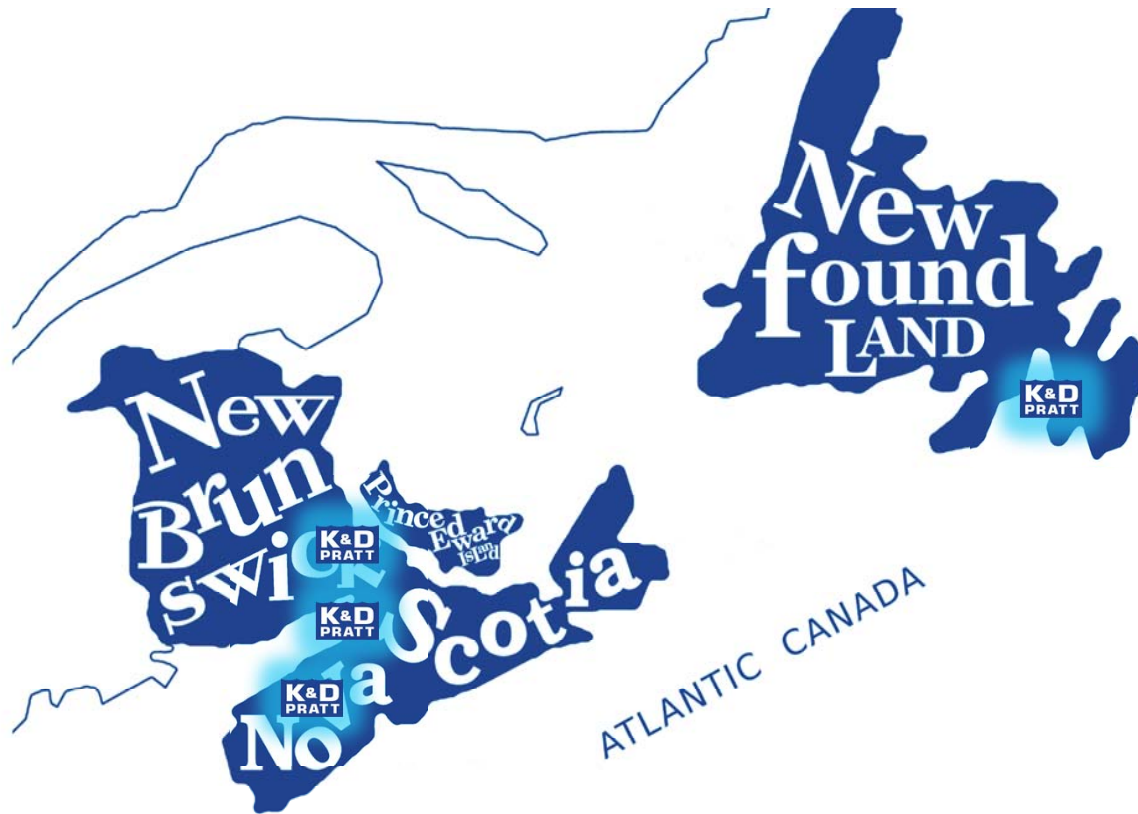


# Takeaways

- **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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