

# Proven Water and Wastewater Solutions



**Control. Manage. Optimize.**



# Measurable Performance

Humans consume vast quantities of water and create an increasing amount of wastewater. This places greater emphasis on environmentally responsible water treatment and leveraging reclaimed resources. Wasting water poses sustainability challenges, depletes energy reserves, and undermines ecosystem health.

Water and wastewater treatment facilities have complex operational processes, which involve a wide range of flow measurement tasks. These applications demand the highest flow meter accuracy and reliability, as well as long-term stability and a low cost-of-ownership.

Badger Meter understands you cannot manage what you do not measure. A worldwide leader in flow metering technologies, we offer one of the broadest product portfolios for the water and wastewater industry. This includes respected brand names such as Dynasonics®, ModMAG®, Recordall®, Research Control® and more. From ultrasonic, electromagnetic, vortex and impeller meters to advanced control valves, our solutions will help you improve the efficiency and reliability of your operations.

## **Badger Meter offers solutions for:**

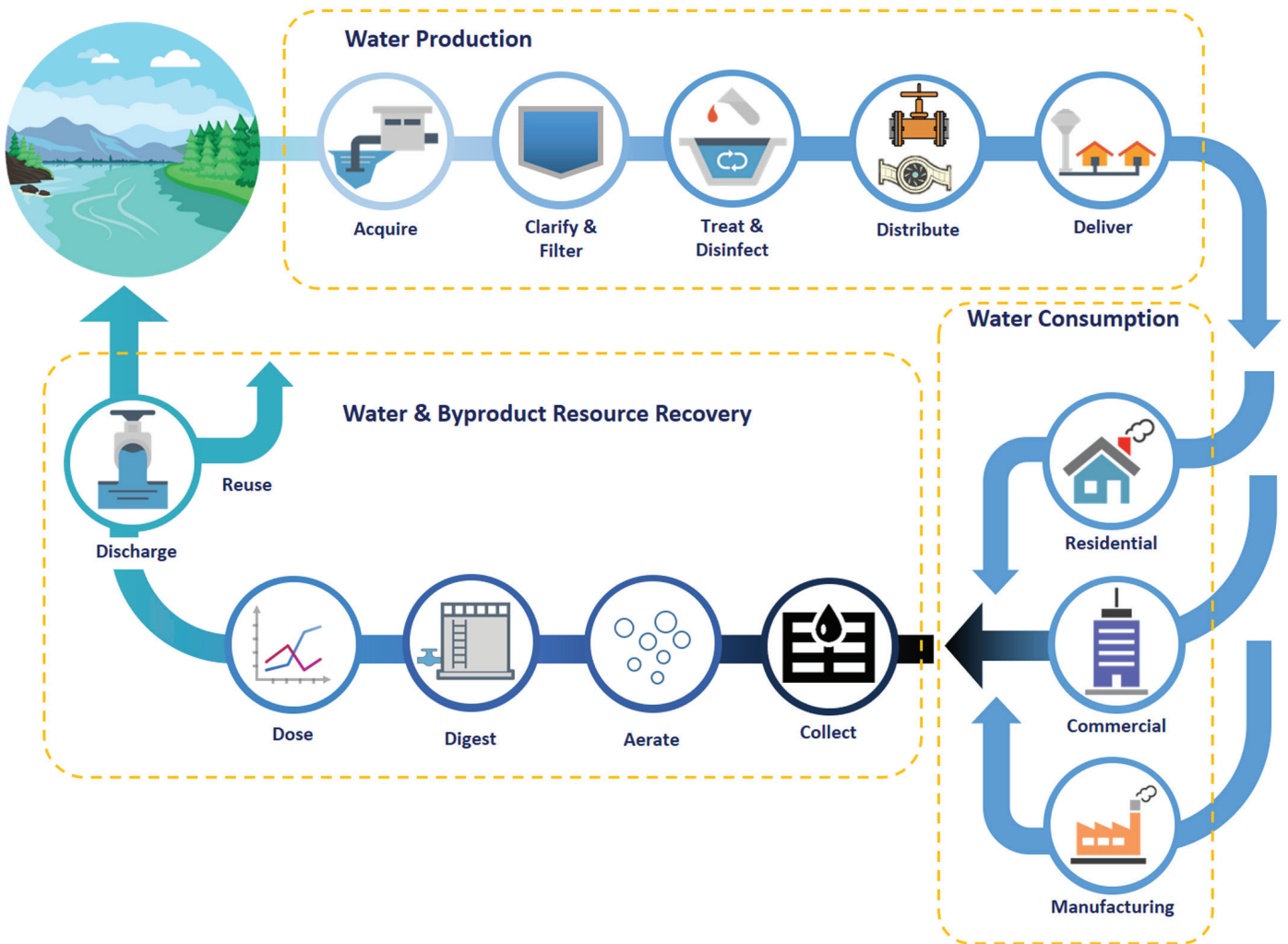
- Water consumption metering
- Influent & effluent water monitoring
- Discharge quantity monitoring
- Chemical treatment dosing
- Municipal network load monitoring
- Water system submetering
- Ground water consumption



Every drop counts.



# Smart Water Cycle



|  |  |  |   |
|--|--|--|---|
| <p><b>Water Use Accountability:</b><br/>We help customers measure their water usage. Measurements help customers determine where they can reduce costs, identify losses, and comply with water use restrictions.</p> | <p><b>Water Empowerment:</b><br/>We provide customers with IOT tools to empower them and their users to understand and manage water usage.</p> | <p><b>Water Quality:</b><br/>We provide equipment that helps customers test water and measure treatment chemicals.</p> | <p><b>Water Delivery:</b><br/>We provide equipment and services that allows customers to monitor water demand, isolate distribution network problems, and bill water users.</p> |
|--|--|--|---|

**You Can't Manage What You Don't Measure**

# Drinking Water Production & Distribution

Badger Meter understands the safety and variable demands your systems need to operate under. In addition to our residential and commercial AMI/AMA metering systems, we offer flow instrumentation for your water treatment and distribution needs.



## Acquire

### Manage ground or surface water intake for proper pump operation and downstream treatment:

- ModMAG Electromagnetic Flow Meters
- Dynasonics® TFX Clamp-on Ultrasonic Flow Meters
- Dynasonics IS-4000 and IS-6000 Open Channel Flow Meters
- Impeller 220 Insertion Flow Meters
- Vortex VN2000 Insertion Flow Meters
- Preso Venturi Flow Meters



## Clarify & Filter

### Monitor flow to adjust delivery of coagulants and polymers, and to ensure effective filtration backwash cycles:

- ModMAG Electromagnetic Flow Meters
- Dynasonics TFX Clamp-on Ultrasonic Flow Meters
- Impeller 220 Insertion Flow Meters
- Preso Venturi Flow Meters



## Treat & Disinfect

### Deliver the right dose treatment additives for disinfectant, pH adjustment, corrosion inhibitors:

- ModMAG Electromagnetic Flow Meters
- Dynasonics TFX Clamp-on Ultrasonic Flow Meters
- Impeller 220 Insertion Flow Meters
- RCV Kynar Valves for hypochlorite
- Coriolis RCT1000 Flow Meters



## Distribute

### Balance distribution loads and detect leaks by monitoring flow from SCADA and AMA/AMI systems with a single meter:

- ModMAG Electromagnetic Flow Meters
- Dynasonics TFX Clamp-on Ultrasonic Flow Meters



## Deliver

### Measure final delivery at residences, commercial enterprises, industrial sites, or transfer to another water authority and integrate with AMA/AMI systems:

- ModMAG Electromagnetic Flow Meters
- E-Series Ultrasonic Inline Flow Meters
- Recordall Compound Series Flow Meters
- Recordall Nutating Disc Flow Meters
- Vortex VN2000 Insertion Flow Meters for air scouring

# Collection & Recovery

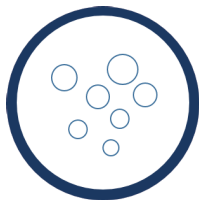
Whether it is purifying water for reuse or discharge, a variety of processes are involved in ensuring the quality and condition of the water before it leaves your facility.



**Collect**

## **Monitor flow customer discharge and lift stations:**

- ModMAG Electromagnetic Flow Meters
- Dynasonics TFX Clamp-on Ultrasonic Flow Meters
- Dynasonics IS-4000 and IS-6000 Open Channel Flow Meters



**Aerate**

## **Verify air or aerated water flow:**

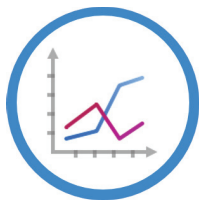
- Vortex VN2000 Insertion Flow Meters
- Preso® Gemini Differential Pressure Flow Meters
- DFX Doppler Flow Meters for aerated water



**Digest**

## **Measure biogas or sludge from digesters:**

- Preso Venturi Flow Meters
- Vortex VN2000 Insertion Flow Meters



**Dose**

## **Deliver the right dose treatment additives, such as hypochlorite, pH adjustment:**

- ModMAG Electromagnetic Flow Meters
- Coriolis RCT1000 Flow Meters
- RCV Kynar Valves



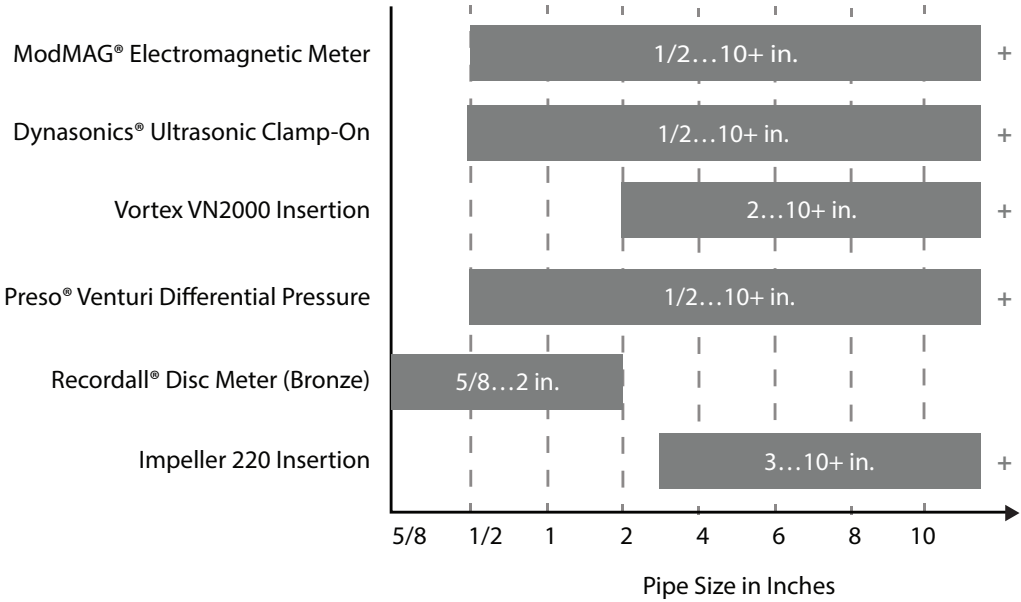
**Discharge/Reuse**

## **Monitor discharge for regulatory compliance or reuse:**

- ModMAG Electromagnetic Flow Meters
- Dynasonics TFX Clamp-on Ultrasonic Flow Meters
- Dynasonics iSonic 4000 Open Channel Flow Meters

# Choose Meter by Pipe Size

Knowing the pipe size, sometimes referred to as line size, of your flow measurement applications will help allow you to choose the ideal flow meter for each metering site within your operation.



Badger Meter Flow Instrumentation provides many useful solutions for water and wastewater treatment. From low flow measurement of chemical additives to the demands of digester gas service, our products are recognized for high accuracy, proven reliability, and a low cost-of-ownership.



**Electromagnetic Flow Meters**  
Water distribution, process water  
and wastewater applications



**Ultrasonic Flow Meters**  
Wide range of liquid and gas  
metering applications



**Vortex Flow Meters**  
Air and liquid  
insertion style



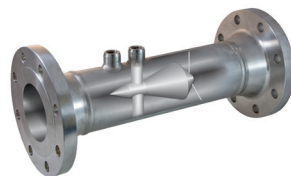
**Disc and Turbine Flow Meters**  
Residential and commercial  
water metering



**Impeller Flow Meters**  
Liquid measurement  
insertion style



**Differential Pressure Flow Meters**  
Wide range of liquid and gas  
metering applications



# ModMAG<sup>®</sup> Electromagnetic Flow Meters

Pictured to the right is one of two meters measuring 54 and 60 inches in diameter, designed for a project for the California Department of Water Resources (DWR). The project will increase their water distribution capacity and reliability, allowing them to meet expanding fresh water demands in several southern California counties. This picture was taken at a test facility in Utah, where the meters met accuracy standards set by the California DWR at flow ranges ranging from 4500 to 80,000 gallons per minute.

Whether it's improving accuracy for plant operation or custody transfer, or meeting the demands of challenging liquid conditions, Badger Meter electromagnetic meters deliver the performance and precision your critical flow measurement applications require.

## **ModMAG<sup>®</sup> Electromagnetic Flow Meters:**

- Non-intrusive, completely open flow tube design
- Pipe size: 1/4...54 in. (DN6...DN2000) standard, depending upon model; larger sizes available
- Accuracy: up to  $\pm 0.2\%$
- Corrosion-resistant liners for long life
- SCADA-ready outputs
- NSF approved

## **Models available include:**

- M1000 for basic general area environments with Ethernet
- M2000 for general area environments
- M3000 for Class 1, Div. 2 environments
- M4000 for Class 1, Div. 1 environments
- M5000 battery powered for locations without power



# Dynasonics® Ultrasonic Flow Meters

In all treatment processes, it is a must to know the plant influent rate and total quantity involved. After decades of service, when an original meter failed, a utility in the Midwest discovered that the meter was not easily accessible and would cost hundreds of thousands dollars to replace. By installing a TFX clamp-on ultrasonic flow meter after the initial bulk solid and grit removal, the installation costs were minimal, there was no head loss, and the system continued to operate during installation.

Dynasonics® clamp-on ultrasonic meters are designed for closed pipes and are non-intrusive. By propagating ultrasonic waves through the pipe wall and into the fluid, Dynasonics meters offer fast installation and setup—no need to cut into or drain piping. Some models also offer network connectivity.

## **TFX transit time ultrasonic flow meters for clean water and influent:**

- Pipe size: 1/2 in. (12 mm) and larger
- Accuracy: Up to  $\pm 0.5\% \pm 0.025$  ft/s (0.008 m/s)
- Variety of output options: 4...20 mA, frequency pulse, Modbus RTU, Ethernet/IP, Modbus TCP/IP, ORION® Cellular LTE endpoint

## **DFX Doppler ultrasonic flow meters for water with aeration:**

- Pipe size: 1/4 in. (6 mm) and larger
- Accuracy: up to  $\pm 1\%$  of full scale

## **DXN portable ultrasonic flow meters for troubleshooting flow meters and pump systems:**

- Pipe size: 1/2 in. (12 mm) and larger
- Accuracy:  $\pm 1\%$  of reading
- Full-color display, graphing capabilities, advanced touch-screen interface
- Internal data logging

## **IS-4000 open channel flow meters measure flow in flumes and weirs:**

- Channels less than 9.8 ft (3 m)
- Internal data logging

## **IS-6000 open channel area-velocity flow meters:**

- Open channel and partial pipes less than 32 ft (10 m)
- Internal data logging



- Well water
- Treatment plants
- Pump stations
- Distribution
- Lift stations
- Influent
- Effluent
- Reclaimed water
- Discharge



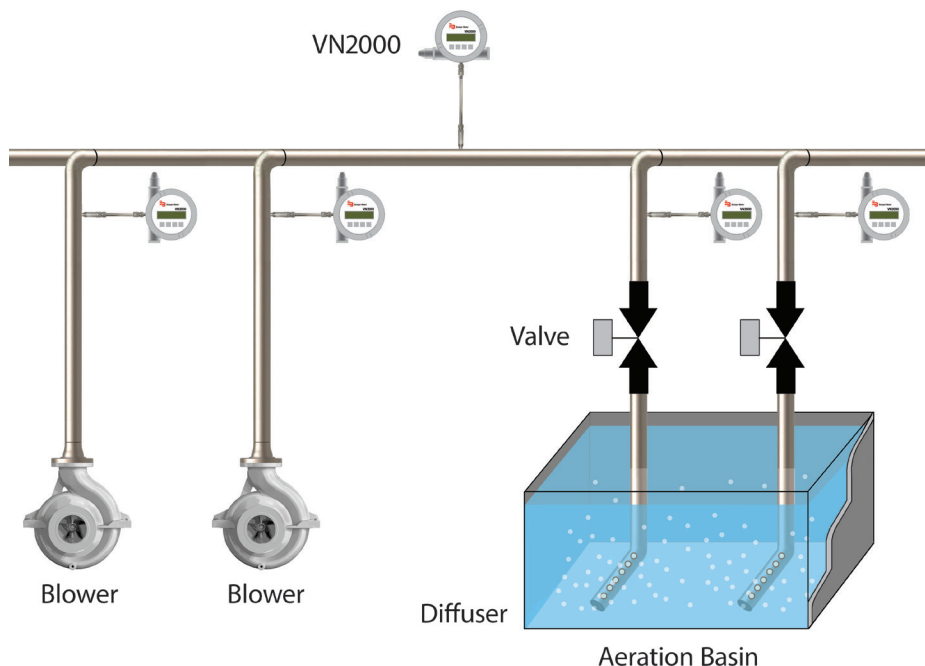
# Vortex Flow Meters

When aeration lines are plugged, it can take several hours before the changes in the dissolved oxygen levels can be detected. A utility in the southeastern U.S. wanted to install flow meters to detect drops in air flow—before decreases in the dissolved oxygen (DO) levels were detectable. The utility was also concerned because the air service lines can develop condensation during periods of high humidity. The VN2000 insertion vortex flow meter was the best solution for both issues.

Vortex flow meters are ideal for accurately measuring wet gases and compressed air as well as steam. And the VN2000 flow meter is not susceptible to damage or inaccurate readings due to condensation like many other flow meter technologies. In addition, the insertion style of the VN2000 reduces installation costs on large pipes compared to inline meters. With no moving parts, vortex flow meters are virtually maintenance free once installed.

## **VN2000 insertion vortex flow meter for compressed air, steam, liquid:**

- Accuracy: up to  $\pm 1\%$  of reading
- Operating pressure: up to 1000 psig (68.9 barg)
- Operating temperature: up to 400° F (204° C)
- Operational temperature measurement



- Aeration
- Well stations



# Research Control® Valves & Positioners

A municipal agency in Alameda County, California needed to eliminate pathogens during water treatment using sodium hypochlorite. Since sodium hypochlorite is a very corrosive chemical, the utility needed to find a dosing solution that could withstand the corrosion.

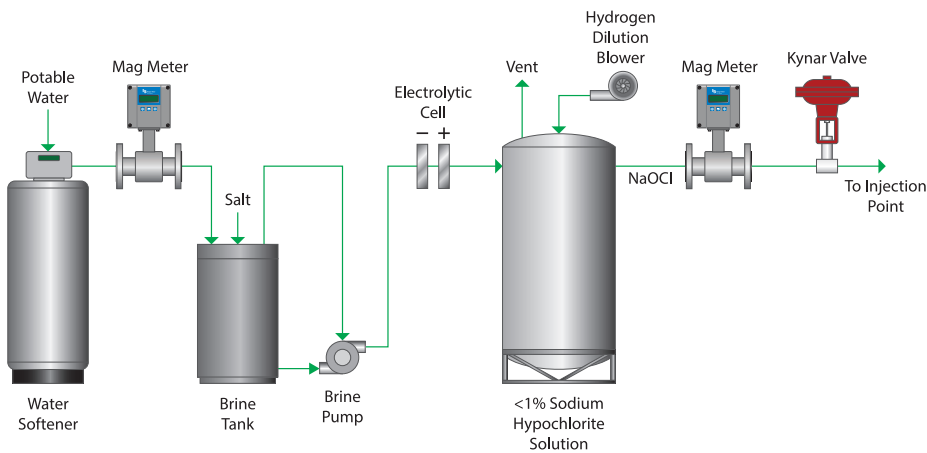
The utility installed a gravity-fed system using a Kynar Research Control® Valve to control the chemical dosing. Kynar is impervious to corrosion and the valve is able to automatically compensate for line pressure changes that occur as the level in the chemical tank falls. The Kynar Research Control Valve allows the utility to dispense an accurate dosage, resulting in controlled raw material costs and regulation compliance. Maintenance and downtime are minimal due to the high chemical resistance of Kynar.

## Kynar Control Valve:

- Pipe size: 1/4 in., 1/2 in., 3/4 in. and 1 in.
- Kynar trim CV: 0.05...6.0
- NPT or wafer style connections
- Teflon CV rings or REK packing

## Custom Engineered Valve Solutions:

- Pipe size: 1/4...2 inch globe and angle valves
- CV: 0.0000018...54
- Wide variety of alloys, trims and options



- Disinfection
- Corrosion control

# Preso<sup>®</sup> Differential Pressure Flow Meters

Venturi differential pressure flow meters have long been a staple in water and wastewater applications. The Venturi profile results in lower pressure drops than orifice plates and allows most debris to pass through, making it suitable for slurries and dirty liquids.

For improved performance in tight spaces, the fully developed symmetrical flow profile of Preso<sup>®</sup> cone meters allows the meters to achieve the same accuracy as a classical Venturi without the straight pipe runs. Additionally, the self-cleaning, cone shaped element is suitable for wet gases.

## Model SSL Venturi Classical (Hershel):

- ASME and ISO standard
- Accuracy  $\pm 0.75\%$  of reading uncalibrated,  $\pm 0.5\%$  of reading calibrated
- Pressure loss 6% maximum
- Pipe sizes 1/2...60 in.
- Upstream straight pipe run 4...5 diameters after single elbow
- Stainless steel 316/316L

## Model LPL Low Pressure Loss Venturi (Short):

- Accuracy  $\pm 3.0\ldots 5.0\%$  of reading uncalibrated,  $\pm 0.5\%$  of reading calibrated
- Pressure loss 3% maximum
- Pipe sizes 1/2...60 in.
- Upstream straight pipe run 4...5 diameters after single elbow
- Stainless steel 316/316L

## Cone:

- Accuracy  $\pm 0.5\%$  of reading
- Pipe sizes 1/2...24 in.
- Pipe sizes 1/2...60 in.
- Upstream straight pipe run 0...1 diameters after single elbow
- Wide turndown
- Stainless steel 316/316L



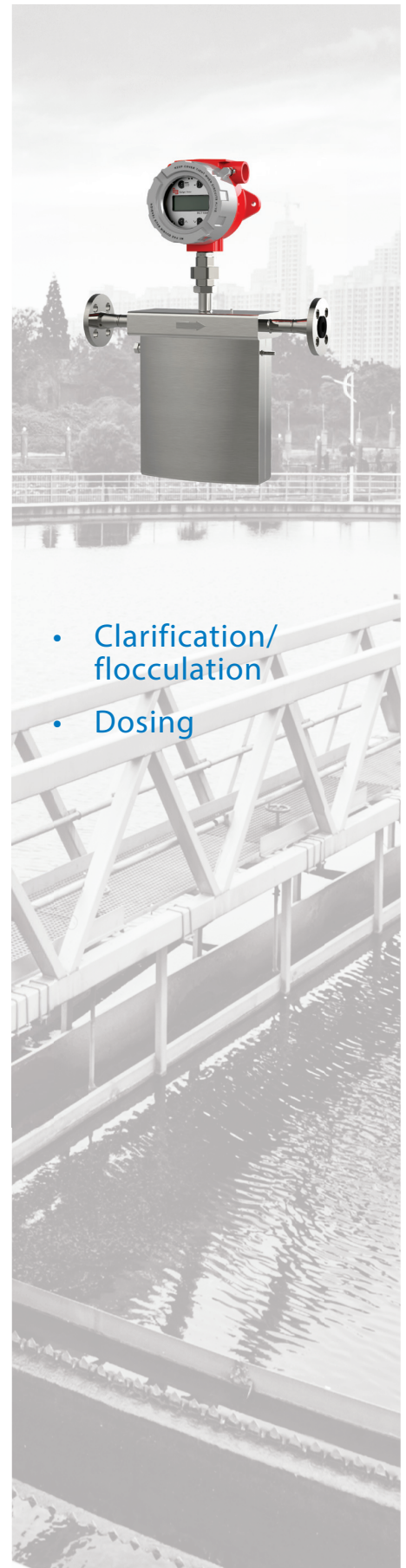
- Well water
- Treatment plants
- Pump stations
- Distribution
- Lift stations
- Influent
- Effluent
- Reclaimed water
- Discharge
- Aeration

# Coriolis Mass Flow Meters

Precise measurement of polymers and other additives ensures water quality while controlling costs. Coriolis mass flow meters provide the best accuracy regardless of temperature or pressure conditions. Badger Meter RCT1000 Coriolis meters simultaneously measure mass flow and density with no straight pipe run requirements.

## RCT1000 Coriolis mass flow and density meter:

- Accuracy: up to  $\pm 0.1\%$  of reading
- Pipe sizes: 1/4...3 in.
- Stainless steel 316L



- Clarification/  
floculation
- Dosing

# Data Industrial® Impeller Flow Meters

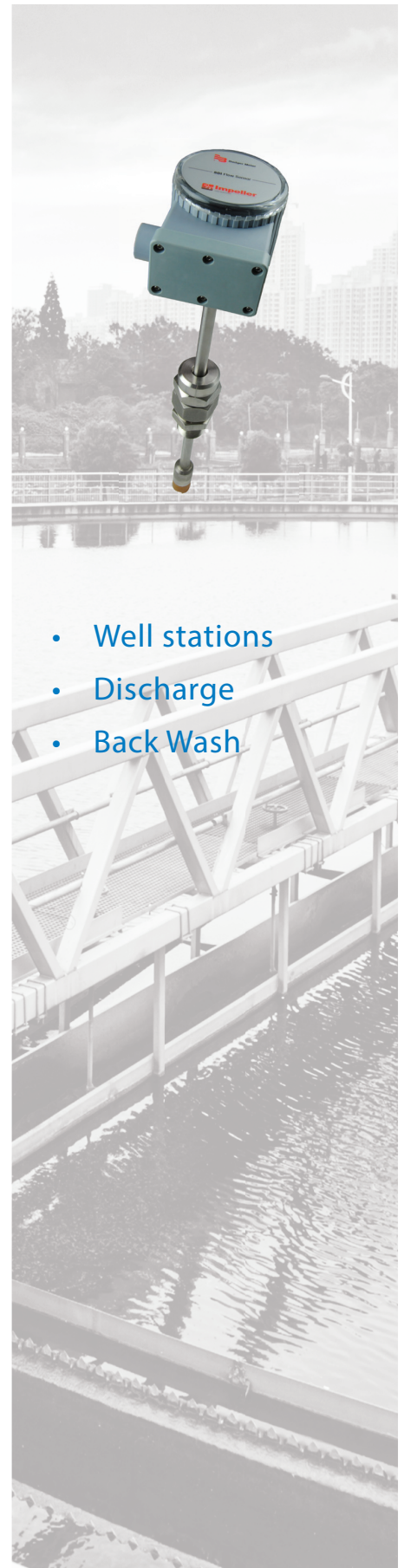
When you need to measure water catchment or discharge in pipes, Impeller insertion flow sensors offer economical solutions. With a long stem, Impeller SDI Series meters are well suited to large pipes up to 36 inches and include electronics with a variety of output options. Impeller 200 Series sensors are low profile insertion sensors with options for intrinsically safe or designed for locations that are subject to flooding. Connect Impeller 200 Series sensors to a flow monitor such as a Badger Meter FC-5000.

## Impeller SDI Series:

- Pipe sizes 1-1/2...36 in
- Accuracy  $\pm 1.0\%$  of reading
- Single or bidirectional
- Direct insert or hot tap options
- Stainless steel or brass<sup>1</sup>
- Battery power optional

## Impeller 220 Series Direct Insert and 226 Series Hot Tap:

- Pipe sizes 3...36 in.
- Accuracy  $\pm 1.0\%$  of full scale
- Stainless steel or brass<sup>1</sup>
- Connect to FC-5000 for pulse, 4-20 mA or Modbus RTU



- Well stations
- Discharge
- Back Wash

<sup>1</sup> Brass used in Impeller sensors is not low lead brass for drinking water

# Badger Meter Innovation Center

The 20,000-square-foot Innovation Center features 10 labs where engineers and scientists simulate unpredictable field conditions during the development and testing processes. The Hydro Lab is the largest testing area and focal point, featuring 21 stainless steel tanks with capacities between 12 and 12,000 gallons and a 125,000-gallon reservoir. In addition, because electronics play an important role in the company's automated meter reading system portfolio, transmitters, receivers and radios are developed and tested in the Electronics Lab.

Every product released since the Innovation Center opened in 1999 has undergone rigorous testing and improvement processes there. A few examples include E-Series® Meters, Recordall® Compound Series Meters, Recordall® Fire Service Meters and components of the company's Advanced Metering Analytics (AMA) solution for water and gas utilities.



# Badger Meter Customer Experience Center

Completed in 2016, our interactive Customer Experience Center (CEC) shows customers how our products are made and tested and demonstrates why they are the best in the market. The CEC includes the largest indoor flow meter testing facility in North America, as well as training and conference room space.



# Control. Manage. Optimize.

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