Badger Meter

Water Utility Solutions

Content

The company

An innovator in flow measurement and control products, Badger Meter serves water utilities, municipalities, commercial and industrial customers worldwide. Measuring water, oil, chemicals and other fluids, Badger Meter products are known for accuracy, long-lasting durability and for providing valuable and timely measurement data.
Founded in 1905, Badger Meter was a pioneer while developing and patenting the first frost-proof water meter that was designed for use in frigid northern climate. Today, the company has earned an international reputation as a leader in the development and manufacture of flow measurement solutions. Its products are used to measure and control the flow of liquids. It employs about 1600 people worldwide and achieves an annual turnover of approx. 425 million US dollars. Badger Meter is publicly held and its common stock trades on the New York Stock Exchange under the symbol “BMI”.

SMART WATER IS *BADGER METER*

Sales of water meters and related technologies and services for water applications constitute a majority of Badger Meter, Inc. sales. Residential and commercial water meters have generally been classified as either manually read meters or remotely read meters via radio technology. Drive-by systems, referred to as automatic meter reading (AMR) systems, have been the primary technology deployed by Badger Meter on the market.

The next generation of metering technology, Advanced Metering Analytics (AMA), incorporates both cellular and fixed network reading capabilities, along with a host of automated utility management tools to further increase utility productivity and revenue. Badger Meter's specific flow measurement and control technologies offer both customized and standard precision flow measurement solutions.

Quality is our tradition

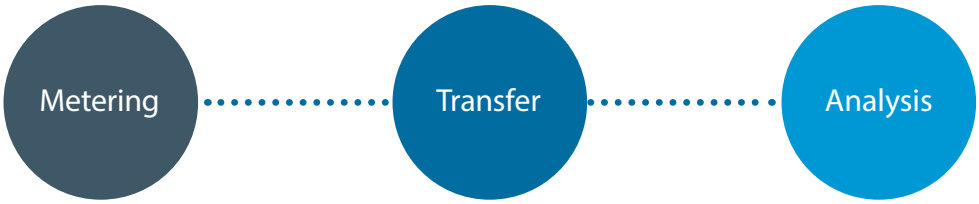
Our company has been successfully providing industry with flow meters for more than 115 years so we are always aware of the importance of quality in our products. However, quality is an on-going process which we, as a company, embrace every day. At Badger Meter, we consider quality in all aspects of our operation. It is the quality of our work, which you, as a customer, are entitled to expect from us. Quality begins with the individual, our employees, and requires a company philosophy which fits accordingly. Our quality should accompany you throughout the process: from inquiry, through order to product and service. No compromise in terms of quality.

BEACON® AMA

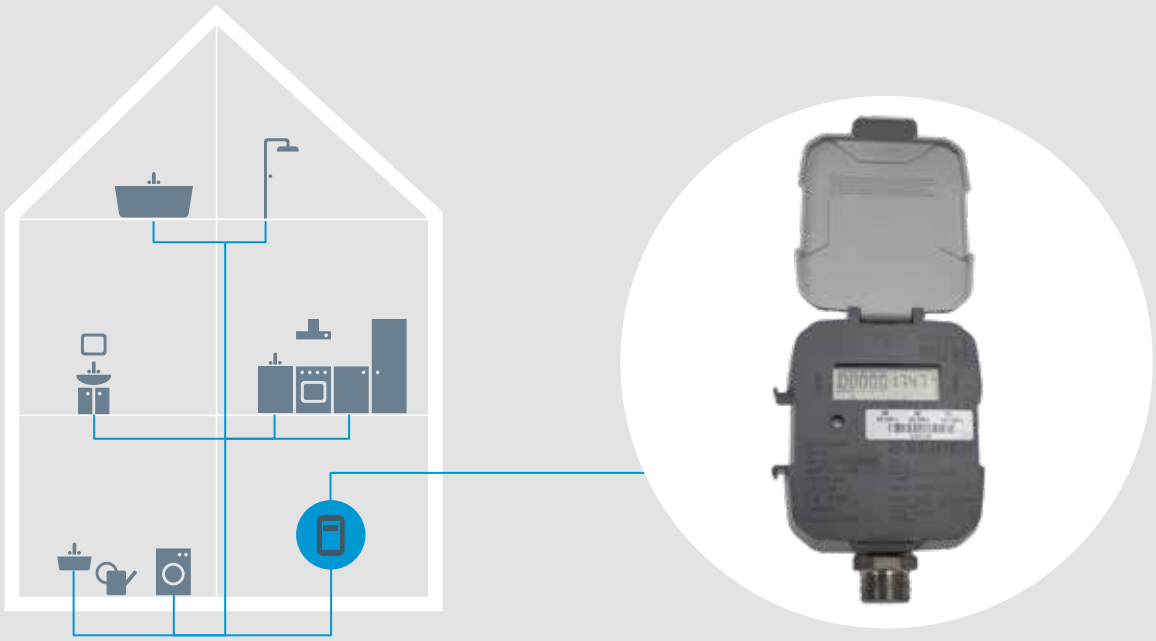
BEACON® Advanced Metering Analytics

The new generation of wireless data reading and data analysis in real time enables mobile and on-site reading of water consumption data by smartphone, tablet or notebook. BEACON® Advanced Metering Analytics (AMA) brings a new level of utility-optimizing information to light.

BEACON® AMA combines the power of the intuitive BEACON® AMA analytical software suite with proven ORION® AMI (Advanced Metering Infrastructure) technology to give you greater visibility and control over utility management.



Metering

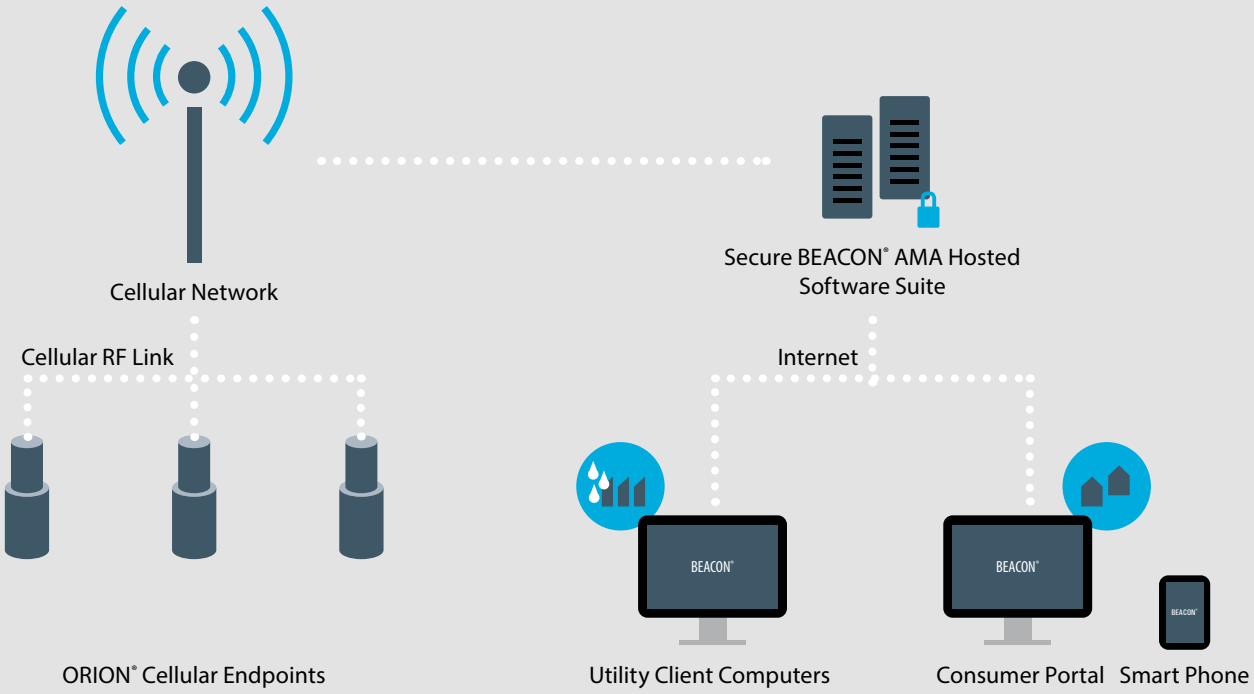


The ultrasonic water meter can measure the exact volume of water used. The meter has no moving parts which ensures accuracy during the meter's whole lifetime. Thanks to an internal battery, the meter can operate for 20 years.

- Fast leak detection
- Revenue management
- Water conservation clarity
- Easier data collection for compliance reporting
- Customizable dashboards
- Ability to set unique alert conditions
- Consumer engagement tools (website and smart phone/tablet app)
- Automatic software upgrades and integration with your utility systems

BEACON® AMA

Data transfer and data collection



ORION® cellular endpoints

The ORION® cellular endpoint is an innovative, two-way water endpoint that utilizes existing cellular infrastructure to efficiently and securely deliver meter reading data to the utility via the reliable cellular network. When attached to a Badger Meter high resolution encoder, the ORION® cellular endpoint is compatible with all current Badger Meter electromagnetic flow meters, Recordall® nutating disc meters and E-Series® ultrasonic water meters.

Making Water Visible®

Analysis

With tools beyond meter reading and network management, BEACON® AMA software offers targeted Advanced Metering Analytics. In a secure hosted solution, the BEACON® AMA software suite delivers powerful, easy-to-use data tools for the utility, including a consumer engagement website and smart phone/tablet applications (apps), that provide water intelligence for utilities and their customers.

EyeOnWater

The consumer engagement website, EyeOnWater, gives utility customers access to their water usage profiles in easy-to-understand consumption graphs. The EyeOnWater app brings the power of EyeOnWater to your customer's smart phone or tablet. Alerts, notifications and water usage are conveniently and readily available anytime using a mobile device. The user interface can be customized according to customers' needs.

BEACON®
Advanced Metering Analytics

E-Series®

Ultrasonic water meter

CELLULAR ENDPOINT

Polymer version

With cellular endpoint

With integrated wired M-bus and wireless M-bus 868/434 MHz communication

Bronze alloy version

Each year, municipalities and utilities lose millions of gallons of water, and millions more in revenue, due to leaks and inaccurate, faulty equipment.
With the introduction of the E-Series® meter, Badger Meter succeeded in stopping huge losses of revenue.

Designed for water utility metering applications, the E-Series® meter features ultrasonic technology and electronic, solidstate construction. With no moving parts, the E-Series® water meter improves accuracy and reliability by virtually eliminating the mechanical wear that can shorten lifetime and produce erroneous results. In addition, an internal battery powers the meter for up to 20 years – an engineering feature that provides dependable service and safety. The E-Series® meter will undoubtedly replace conventional meters in most applications.

The meter is contained in a compact, totally encapsulated, weatherproof and UV-resistant housing and is best suited for both residential and commercial applications. An integrated temperature compensation improves the accuracy and measurement errors due to sand, suspended particles, air bubbles and pressure fluctuations are eliminated. Electronic metering provides information and data not typically available from traditional, mechanical meters and registers such as flow rate and reverse-flow indication. The meter offers various signal outputs.

The E-Series® is designed to comply with ANSI/AWWA standard C700, NSF/ANSI standard 61, annex G, OIML R49-1 and 4064-1. The E-Series® is ideal in any application requiring long-term measurement accuracy. The meter is used for measuring potable, cold water in residential, commercial and industrial services. It is an ideal metering solution for fresh water or irrigation water applications and less than optimum water conditions where small particulates might be present.

- No moving parts
- Reverse flow indication
- Simplified one-piece electronic meter
- Sealed for protection against tampering

E-Series®	
Size	Stainless steel model: ⅝", ¾", 1", 1¼", 1½" and 2"; polymer: ⅝" ¾", 1"; bronze alloy: 3" and 4"
Flow range	Stainless steel model: 0,4 – 600 l/min ; polymer version: 0,4 – 120 l/min; bronze alloy: 0,5 – 4163 l/min
Accuracy	Long-term sustained accuracy within ±1,5 %
Battery	20-year battery life
Protection class	IP 68
Display	Displays consumption, flow rate, flow direction and alarms
Approval	ANSI/AWWA standard C700, NSF/ANSI standard 61, annex G, OIML R49-1 and 4064-1

E-Series® Ultrasonic Flow Meters

Orion®

Cellular endpoint

4G/LTE

ORION®
CELLULAR

The BEACON® AMA solutions utilize our time-tested ORION® family of endpoints to capture interval meter reading data through cellular, fixed network, or mobile communication technologies.

ORION® Cellular:
Designed for maximum flexibility and rapid deployment, our water endpoint eliminates utility-owned infrastructure by utilizing existing cellular networks.

Orion®	
Broadcast network	LTE cellular network, with fallback to 4G where LTE is not available. Mobile backup frequency is FCC-regulated 902 – 928 MHz frequency hopping modulation
Communication type	Two-way
Application type	Control/Monitor
Reading interval type	15-minutes
Encoder compatibility	Absolute

ORION®
Cellular/Fixed Network Solutions

Encoders

High resolution encoders provide utilities with more than just a reading. Whether you choose the 9 digit LCD or the 8-dial HR-E® encoder, the high resolution encoded output provides leak detection and other critical information to help utilities manage their water.

High resolution encoders utilize the industry standard communication protocol, do not require programming or setting adjustments during installation or wire repair. And, through a unique sealing process that eliminates gaskets, Badger Meter encoders are built to withstand harsh environments including flooded pits. They are integrated in the E-Series® meters and can be mounted on the Recordall® meters.

HR-E® LCD
High Resolution LCD Encoder

Those encoders are fully electronic, solidstate, field programmable and utilize industry standard ASCII-communication protocol to provide high resolution encoded output.

Status indicators/alarms can also be sent as part of the encoded output to endpoints capable of receiving extended messages. In addition, the HR-E® LCD offers tamper resistant features such as encoder removal and magnetic tamper indicators to provide utilities with increased security.

HR-E®
High Resolution Encoder

The HR-E® 8-dial encoder utilizes a non-contact field-proven light emitting diode technology to provide a high resolution 8-digit reading while at the same time eliminating friction and wear of traditional mechanical encoders.

The HR-E® communicates using the industry standard ASCII-communication protocol to provide high resolution encoded output.

ModMAG® M5000

Battery-powered electromagnetic water meter

CELLULAR ENDPOINT

- M-Bus
- IrDA
- Modbus RTU

ModMAG® M5000 IP68Plus

The ModMAG® M5000 is a battery-powered electromagnetic flow meter with a very high accuracy even at very low flows. The excellent repeatability as well as the above-average battery life makes this water meter indispensable for the water market.

Typical applications are leak detection in water networks, water consumption measurements and irrigation plants. The meter is best suited for applications without a power supply where exact consumption or flow rates is required. Of course, the ModMAG® M5000 can also be used with an available power supply. The meter can be powered with main voltage and in case of a main failure it is powered by an internal battery. Important data are consequently saved.

The ModMAG® M5000 has been designed for very harsh environmental measurement conditions. The meter has no moving parts and can be used to measure water containing particles like sand or gravel. The ModMAG® M5000 is encased in an IP 67 housing (optional IP 68), which makes it a reliable meter even when submerged. The standard meter is equipped with an internal datalogger which can read-out via IrDA, M-Bus or with Modbus RTU protocol. The collected data can also be retrieved via radio frequency or GSM/GPRS. The data can thus be centrally compiled and evaluated.

ModMAG® M5000	
Size	DN 15 – DN 600
Measuring range	0,03 – 10 m/s
Accuracy	Better than ±0,4 % of actual flow
Battery	Up to 20-year battery life
Protection class	IP 67 / IP 68
Display	LCD display
Interface	IrDA, M-Bus or Modbus RTU (RS 232, optional RS 485)
Approval	OIML R49-1 and MID MI-001

ModMAG®
Electromagnetic Flow Meters

ModMAG® M2000

The universal electromagnetic flow meter

CELLULAR ENDPOINT

- Modbus RTU (RS232, optional RS485)
- HART®
- M-Bus
- Profibus DP

ModMAG® M2000	
Size	DN 6 – DN 2000
Measuring range	0,03 – 12 m/s
Accuracy	±0,2 % of actual flow
Protection class	IP 67 / IP 68
Interface	Modbus RTU (RS232, optional RS485), HART®, M-Bus, Profibus DP
Approval	OIML R49-1 and MID MI-001

The ModMAG® M2000 is best suited for bidirectional flow measurement of fluids with a conductivity >5 µS/cm (> 20 µS/cm for demineralized water). ModMAG® M2000 shows a high accuracy, is easy to use and can be chosen for a large and flexible applications spectrum.

The backlit, four-line display shows all actual flow measuring data, daily and complete information, including alarm messages.

The ModMAG® M2000 has 4 programmable digital outputs, one digital input, analog output and different interfaces. Integrated system self check-up makes the putting into operation and the service easier. The back-up function enables to retrieve parameters while servicing the meter, without need for reprogramming the device – or to transfer parameters to another device.

Verification Device

The verification device enables the electromagnetic flow meters types ModMAG® M2000 and ModMAG® M5000 to be checked on site in regular time intervals at a low cost and without interruption of the process. All important parameters of the flow meter are measured, protocoled and evaluated.

ModMAG®
Electromagnetic Flow Meters

Flow and energy meters

Different measurement principles can be used for energy metering: ultrasonic, impeller or electromagnetic technology

TFX-5000

DXN

The DXN and TFX-5000 ultrasonic flow and energy meters type can be clamped-on outside of the pipe and do not contact the liquid. The energy flow meter measures energy usage in BTU, MBTU, MMBTU, tons, kJ, kW, kWh, MW and is ideal for retrofit liquid and HVAC applications.

Ultrasonic technology	
Size	DN 15 – DN 3000
Accuracy	±1 % of reading
Temperature	-40 °C to +120 °C

Dynasonics®
Ultrasonic Flow Meters

UHC100

Dynasonics®
Ultrasonic Flow Meters

The UHC100 has been designed to measure heating and cooling energy. It can be used with heating media (water) in centrally heated objects like residential houses or heat supply.

Ultrasonic technology	
Size	MID DN 15 – DN 100
Accuracy	Class 2 according to LST EN1434-1:2016.
Temperature	0 °C to +130 °C
Ambient temperature	+5 °C to +65 °C

380 Btu

Impeller
Data Industrial®

The impeller model 380 Btu is used for simple in-line operations. Type 380 Btu provides BACnet® MSTP and Modbus RTU protocols as standard. The chosen protocol can be user defined. Information such as flow rates, total range, energy, total flow, temperature 1, temperature 2 and Δt can all be transmitted on the RS 485.

Impeller technology	
Size	DN 20 – DN 50
Accuracy	±2 % of flow rate
Temperature	-6 °C to +127 °C
Ambient temperature	-20 °C to +65 °C

ModMAG® M1000 | ModMAG® M2000

The ModMAG® M1000 and ModMAG® M2000 electromagnetic flow meters are designed for water and wastewater applications. All necessary information such as flow rate, total flow rates, or even an alert can be read-our from backlit LCD display. Both models offer various inputs, outputs and interfaces.

Electromagnetic technology	
Size	DN 6 – DN 500 or DN 2000 (according to model)
Accuracy	±0,2 % or ±0,3 % of actual value (according to model)
Temperature	-20 °C to +60 °C

ModMAG®
Electromagnetic Flow Meters

Recordall®

Nutating disc meters

The Recordall® meters are an accurate, cost-effective solution for your residential metering needs.
The positive displacement meters utilize the industry-leading accuracy of nutating disc technology to drive revenue and reliability – as referenced by the Water Research Foundation.

Recordall®	
Size	Bronze: ⅝"– 2"; plastic: ⅝", ¾", 1"
Measuring range	0,4 – 640 l/min
Accuracy	±1,5 % of actual flow
Performance standard	AWWA C 700 and C 710 standard
Certification	NSF/ANSI standards 61 and 372 certified
Approval	EU approval

Recordall®
Residential Mechanical Meters

Flow and level measurement in open channels

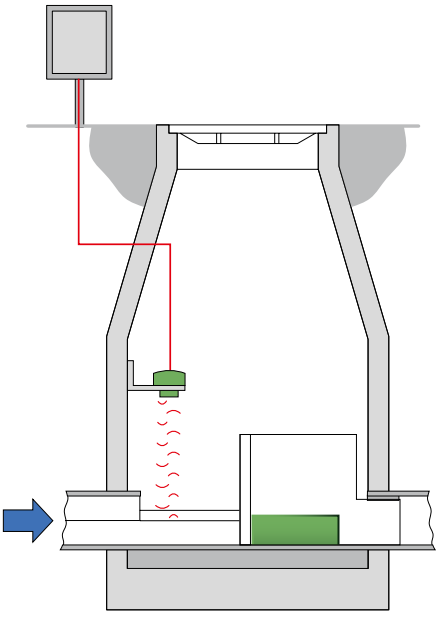
CELLULAR
ENDPOINT

- Flow / Quantity
- Level and volume measurement
- Data collection
- High accuracy

IS-4000

The IS-4000 is an intelligent and versatile ultrasonic meter/controller designed to measure level, volume and open channel flow. IS-4000's features allow accurate measurements in harsh environments. The IS-4000 uses the measured signals for control purposes and for recording to an internal datalogger.
In fresh and waste water applications, IS-4000 measures level and calculates flow rates in combination with flumes using one of its preprogrammed conversion formulas or a 35 point conversion table. Totalizer functionality is provided.

In combination with a Parshall flume or a manhole flume, the IS-4000 offers an economical metering system for flow measurement with Q/h relationship, excellent measuring results and an unbeatable price/performance ratio.



Dynasonics®
Ultrasonic Flow Meters

IS-6000

- Flow velocity profiling with multiple measurement points
- Bidirectional flow measurements
- Data logging with time/date stamp
- Rugged, aluminum enclosure for a long service life in harsh environments

The IS-6000 flow meter measures flow velocity and level to determine the flow rate and total volume passing through. Available with submersed pulse Doppler sensors, the IS-6000 is a versatile meter that eliminates the need for weirs or flumes.

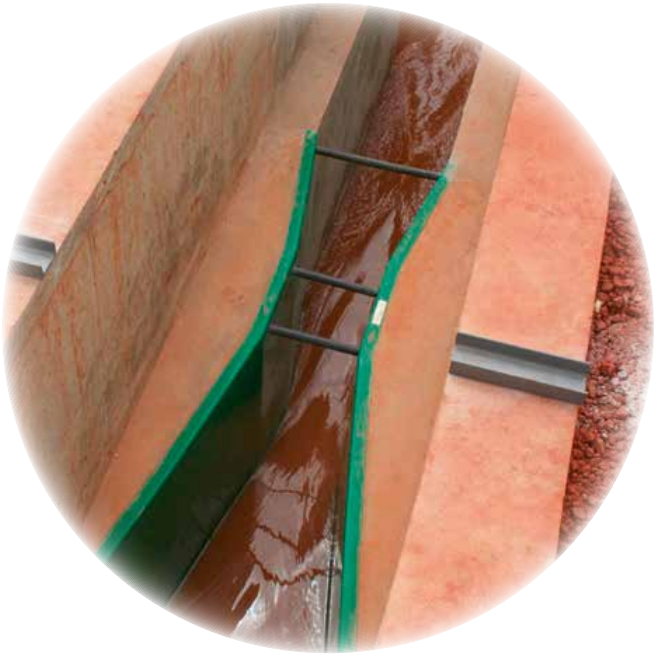
The IS-6000 calculate the flow rate in waste water, industrial discharge and aqueducts. The velocity of the water is measured by a submerged Doppler sensor with built-in level sensor or separate level sensor.

IS-6000	
Size	DN100 – DN600
Flow range	±5,3 m/s bidirectional
Accuracy	±2 % of reading
Protection class	IP 68, IP 67
Interface	Modbus TCP Ethernet, RJ45, Modbus RTU RS-485
Display	4 lines, 20 characters

Dynasonics®
Ultrasonic Flow Meters

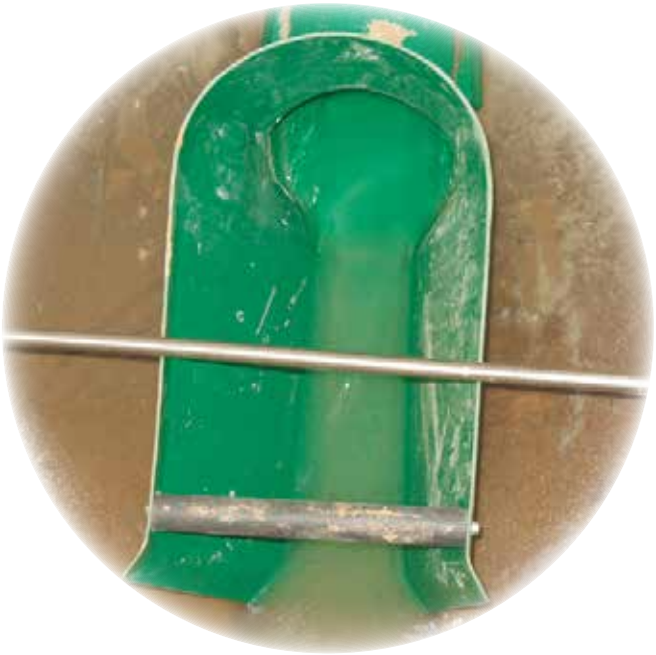
Parshall flume

The Parshall flume is one of a large class of open channel primary elements known as critical flow venturi flumes. A distinguishing characteristic of the Parshall flume is the downward sloping invert of the throat.
The Parshall flume is recommended for those applications in which moderate concentrations of sand, grit or other heavy solids exist and fluid velocities entering the flume are subcritical.
The flumes are available for channel width of 75 to 915 mm.



Manhole flume

The manhole flume is a low head loss, self-cleaning flow measurement device especially designed to easily fit into standard manholes.
Selection of a manhole flume is dependent on manhole pipe size. Flumes are available for pipe sizes 100, 150, 200, 250 and 300 mm (4“, 6“, 8“, 10“ and 12“) to accommodate a large percentage of metering applications.



Control valves for reverse osmosis plants

Installation example in a plant of Ultura GmbH

The physical osmosis effect is a matter of partial pressure balance between two differently concentrated liquids which are separated by a semipermeable membrane. Due to this, molecules pass through the membrane until the partial pressure becomes identical on both sides. In nature, this effect is the basis of cell metabolism. In technology, this effect is most often used for the purification of water.

To accomplish this, we use the principle of reverse osmosis. If pressure on the contaminated liquid is increased over its "natural" osmotic pressure, the molecules reverse.

The contaminated medium is thereby more highly concentrated, while the amount on the "clean side" is raised. This pressure is usually generated by a pump. Badger Meter designed a special valve for the pressure regulation in reverse osmosis plants to precisely control this pressure. One of the challenges during the development of this valve was to ensure the long-term chemical resistance to the concentrated liquid. Control valves for reverse osmosis are available in the following sizes: 1", 3/4", ½", 3/8" and ¼" and with Cv values from 6,0 up to 1,8 E-6. The main application field for these types of valves is for seawater desalination on ships and also the cleaning of sewage water.

RCV
Research Control® | ReCo® Valves

Badger Meter

SMART WATER IS BADGER METER

www. badgermeter.com

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