

**ELECTRONIC**



**COST PROPOSAL**

**TOWN OF FEDERALSBURG, MD**  
**AMI WATER METER PROJECT**

Submission Deadline: April 1, 2022, by 2:00 PM

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# SECTION 1

## EXECUTIVE SUMMARY

## SECTION 1 – EXECUTIVE SUMMARY

Thank you for the opportunity to submit the following proposal for the Town of Federalsburg AMI project. Ferguson Waterworks (Ferguson) and our dedicated Meter & Automation team is uniquely qualified to deliver this project with distinct advantages for the Town of Federalsburg (Town). We are introducing a cellular Network as a Service (NaaS) approach that removes all local network infrastructure requirements and the associated risk and maintenance costs realized over the life of your AMI system. In addition, Ferguson has thoroughly reviewed all question/answer documents and have reflected our response to address the changes and requirements. Overall, Ferguson and our meter vendor partner, Badger Meter (Badger), certainly believe that our solution offers the perfect tools to meet the Town’s immediate and long-term goals.

Ferguson understands your project objectives as summarized below, and we have listed just a few of the many process improvements the Town will realize through our proposed AMI solution.

### Town of Federalsburg Project Objectives

Reduce Water Loss, Replace Old Meters	Reduce Read Labor Effort, Improve Planning	Improve Customer Service, Add Customer Portal	Improve Cash Flow, Reduce Long-Term Costs	Improve Water Conservation & Accountability
<ul style="list-style-type: none"> <li>• New water meters, with their optimum, factory-tested accuracy, will typically contribute a noticeable increase in revenue over the customer base. Many factors determine the overall gain but replacing mechanical meters with significant age and/or consumption tends to remedy a key water loss issue.</li> <li>• Smart meters will quickly identify potential leaks on the customer’s side and accurately measure consumption system-wide for better understanding of losses experienced through the town’s distribution mains.</li> <li>• Improve operational efficiency and reduce costs through reliable interval data from water meter reads for correct-sizing programs, prompt notification of leaks, tampering, and theft.</li> </ul>	<ul style="list-style-type: none"> <li>• Removing the tasks of walking the routes each read cycle, disputing high customer usage, and discovering issues 60-90 days late will create amazing efficiencies for the town’s utility staff. A significant shift from a reactive to proactive service platform will create more efficient work order management.</li> <li>• The reporting capabilities and constant automated monitoring of the distribution system with AMI will enable the town to easily support regulatory requirements.</li> <li>• The proposed cellular network solution is easily scalable, and the industry is pushing other sensors – pressure, acoustic leak detection, etc. – into a cellular communication format.</li> </ul>	<ul style="list-style-type: none"> <li>• As consumption billing becomes more-timely (monthly cycles), customer service can address billing questions much easier within a four-week window.</li> <li>• Customer service will have customer consumption data down to 15-minute intervals, so there will be minimal confrontation and much more awareness on how water is used and when it is used at each account.</li> <li>• The customer portal, EyeOnWater®, is included in the proposed Badger subscription.</li> <li>• Significantly enhance service by improved billing accuracy, increased customer response time, on-demand move-in / move-out remote meter reads, and proactively reaching out to customers when leak alerts or other conditions arise.</li> </ul>	<ul style="list-style-type: none"> <li>• Thanks to AMI, switching from quarterly to monthly billing will reduce past due balances. Starting collections earlier, with only one month’s balance outstanding, will reduce the town’s exposure.</li> <li>• Monthly billing is more desirable for landlord and tenant situations, and it may reduce the amount of deposit the town requires from tenants.</li> <li>• Detection of system leaks will be made easier through more-frequent utility and customer consumption review.</li> <li>• Monthly payments are more conducive to getting customers on automatic payments. ACH payments are usually quicker and cheaper for the utility to process, so they save money for both the utility and customer base.</li> </ul>	<ul style="list-style-type: none"> <li>• Launch of the customer portal, either during the project deployment or as a second phase to allow town staff to get use to managing the AMI system, will create the best communication platform for driving conservation awareness and letting customer see and trust their own usage behavior.</li> <li>• The portal will also provide customers with messages and timely utility information in the home and/or business, thereby empowering customers to control utility usage, cost, and advance the town’s “Green” Initiatives.</li> </ul>

- AMI System: **Badger ORION® Cellular Network as a Service (NaaS)**.
- Meter Data Management Software: **Badger BEACON® Advanced Metering Analytics (AMA)**, provided as a hosted, Software as a Service (SaaS).
- Customer Portal Software: **Badger EyeOnWater® Software**.
- AMI Module: **Badger ORION® LTE-M Cellular endpoint**.
- Water Meters:
  - Small Meters: **Badger Recordall® Disc Positive Displacement (5/8" x 3/4" – 1")**
  - Large Meters: **Badger E-Series® Ultrasonic (2" – 6")**
- Water Meter Registers: Choice of either Badger HR-E mechanical encoder register (8 moving dials) or the Badger HR-E LCD digital encoder register (LCD screen). Same price – functionality differences provided in Sections 2 and 7.
- All software integration fees from both **Badger** and **CUSI** are included.
- Installation of meters, AMI modules and composite lids, plus old meter salvage will be provided by **National Metering Services**, a national AMI installation firm based in Kearny, NJ with a satellite office in Hollywood, MD.

## *Project Proposal Snapshot*

It is important to note that all meters, registers, AMI modules, MDM software, customer portal software, and most ancillary devices as listed above, are developed, produced, and supplied by Badger Meter. This is important during the project deployment, and more so down the road, as both Ferguson and the Town can be assured of using Badger products that are built to work together, continuously upgraded and improved together, and operated under a consistent warranty and support platform. Just as it is critical to have one firm responsible for all aspects of the project (Ferguson), there is significant efficiency and peace of mind gained in partnering with a meter vendor that has such an extensive product line history and future R&D roadmap (Badger Meter).

Ferguson has included a blend of mechanical meters for residential accounts and solid-state ultrasonic meters for commercial and industrial accounts, so that the Town can benefit from the attributes each meter design offers. For the larger meters contributing the majority of utility revenue, you will find the **Badger E-Series®** to be a substantial upgrade for resolution and no appreciable loss

in accuracy over time. Badger Meter is the industry leader in this technology, and their ultrasonic meters add even more capabilities to what their cellular network, **Orion® Cellular**, their meter data management software, **BEACON® AMA**, and their customer portal software, **EyeOnWater®**, collectively will harness for your staff and your water customers.

As with most projects, having great meter products and a high-performing, low risk AMI system does not guarantee project success. The high-quality installation of those products; however, does ensure project success. This is why Ferguson uses a select group of regional and national installation partners to complete our proposals. For Federalsburg, we are excited to propose installation support from National Metering Services (NMS). NMS is a top-tier international meter installation and testing firm that will bring professionalism, data accuracy and automated tools to the project.

Above all, Ferguson Waterworks, Badger Meter, and National Metering Services appreciate the chance to show our capabilities, and we hope that we convey, through this proposal, the unique advantages that our cellular AMI system and our project approach will bring to the Town. Our goal is to exceed expectations – those of the selection committee, town leadership, and your water customers – for years to come.



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**Brandon Mathews**  
Area Sales Manager, Ferguson Meter & Automation

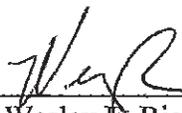
**SECRETARIAL CERTIFICATE  
OF  
AUTHORIZATION**

The undersigned Assistant Secretary of Ferguson Enterprises, LLC, a Virginia limited liability company (the "Company"), hereby certifies that: (i) certain of the Company's facilities in Pennsylvania, Maryland, Washington D.C., Virginia, Georgia, Florida, and Alabama are doing business as Ferguson Waterworks, and (ii) Brandon Mathews is an Area Sales Manager of Pennsylvania, Maryland, Washington D.C., Virginia, Georgia, Florida, and Alabama and (iii) that the resolutions adopted by the Company's Board of Directors effective July 31, 2021, duly authorize certain of the Company's officers, including the Assistant Secretary, to designate, and I hereby do so designate Brandon Mathews as an authorized representative of the Company to act for and on behalf of the Company to prepare and submit bids and proposals to the Company's customers, to enter into contracts, agreements or other documents, and to execute such documents and undertake all such acts as may be deemed in the best interest of the Company, including the execution of bonds and in doing so, to contractually bind the Company and to authorize others to execute documents on his behalf in the event he is unavailable to do so personally. Unless withdrawn sooner, this certification of authorization shall be effective until January 31, 2023.

Dated: 11/30/2021

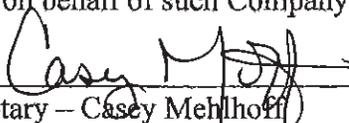


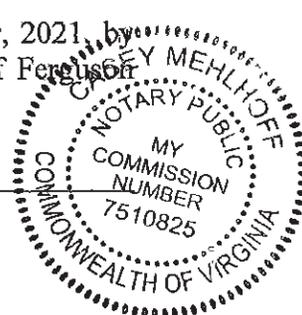
**FERGUSON ENTERPRISES, LLC.**

By:   
Wesley E. Rice, Assistant Secretary

Commonwealth of Virginia )  
City of Newport News )

Sworn to subscribed and acknowledged before me this 30<sup>th</sup> day of November, 2021, by Wesley E. Rice, personally known to me, in his capacity as Assistant Secretary of Ferguson Enterprises, LLC, a Virginia limited liability company, on behalf of such Company.

  
Notary - Casey Mehlhoff



My commission expires: 7/31/2022

# **SECTION 2**

## PROPOSED SOLUTION

## SECTION 2 – PROPOSED SOLUTION

### AMI COMMUNICATIONS AND EQUIPMENT

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#### CELLULAR NETWORK

There are many reasons why almost every meter technology vendor has followed Badger Meter in developing their own cellular radio endpoint, and we will highlight some of the drivers towards cellular AMI device communications in this response. For battery-operated measurement and control devices, i.e., meters, pressure sensors, remote valves and leak detection sensors deployed throughout a utility’s distribution system, operating through a two-way cellular network represents the most flexible, cost-effective, plug-and-play experience in the industry.

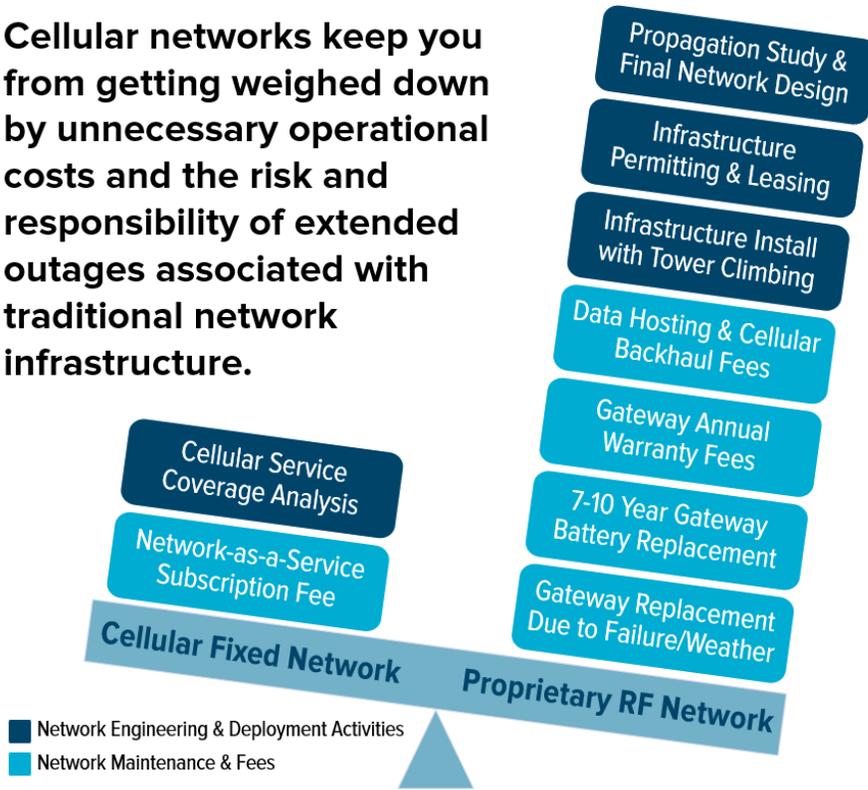
Cellular network solutions, also referred to as Network-as-a-Service (NaaS), have become a leading solution among utilities because **they leverage existing cellular networks to transmit data**. Once the server is set up and software integrated, all Ferguson and/or the utility needs to do is pair a meter with the ORION® Cellular radio endpoint, activate it using a simple field tool, and the data capture will immediately begin.

Cellular NaaS solutions are the **only option that gets a utility up and running at a flat cost with no additional fees or infrastructure-related issues** such as gateway power requirements or permit restrictions. **No added fees or maintenance costs** means utilities can predict what their overall operational costs will be without surprises. And with **no infrastructure to install**, project deployment can move quickly and efficiently through testing and meter/endpoint installation. This streamlined process results in cost savings and a quicker payback because your utility can start realizing the solution’s benefits right away.

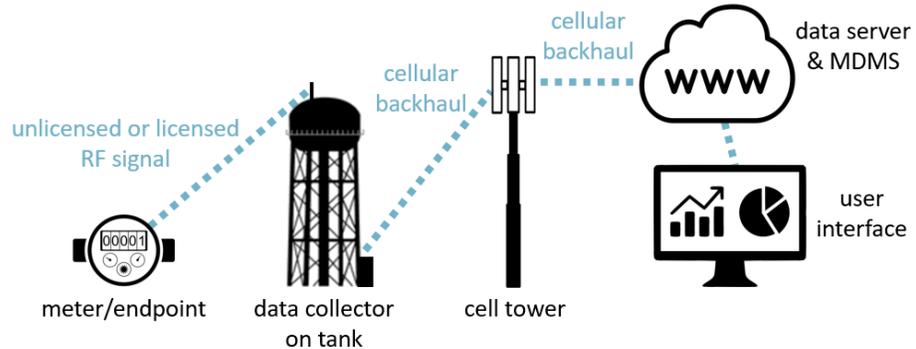
Another differentiator between traditional fixed and cellular networks is resilience, including uptime if a storm causes an outage. With a traditional fixed network, utilities either need to maintain or repair the outage themselves or wait for a third-party company to do so. Finding and contracting network support personnel to get the network outage restored can take weeks to get support on-site. For this reason, some vendors will propose a separate network maintenance contract to lessen some of the operational risk and lead times. But remember, lightning strikes and other force majeure events are typically not covered by infrastructure component manufacturer warranties.

In contrast, with cellular solutions, the **utility doesn’t have to worry about maintaining the network**. Cellular networks are one of the first services restored, if they go down at all, after a big storm or natural disaster to aid first response teams. In fact, cellular companies have many different strategies to address network outages including deployment of temporary infrastructure while permanent structures are repaired or replaced to ensure there is minimal lapse in connectivity.

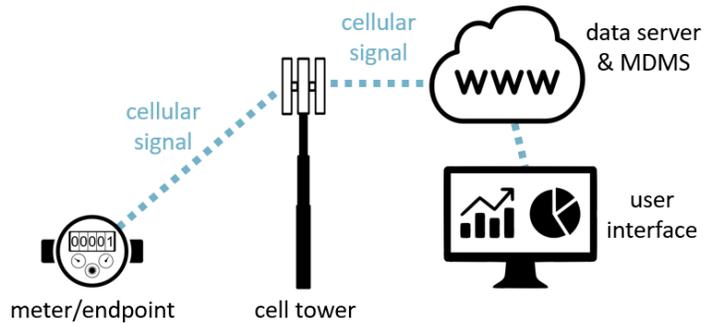
Cellular networks keep you from getting weighed down by unnecessary operational costs and the risk and responsibility of extended outages associated with traditional network infrastructure.



**Traditional Single Purpose Network**



**Cellular Network**



## CELLULAR ENDPOINT COMMUNICATIONS ARE NOT CELL PHONE CALLS



### CELLULAR PHONE CALL

Moves from cell tower to cell tower

Requires strong cellular connection for clear voice – “5 Bars”

Calls are often lengthy (minutes of connection time)

Uses mobile SIM card

### CELLULAR ENDPOINT COMMUNICATIONS

Connection to cell tower is stationary and constant meaning no “dropped calls”

Any connection strength will transmit data, like a text message

Transmitted data packets are small (micro-seconds of connection time)

Uses machine-to-machine SIM card that is more durable, can be remotely managed, supports data plan aggregation and may have a fixed IP address.



## WATER METERS & AMI MODULES

### METERS

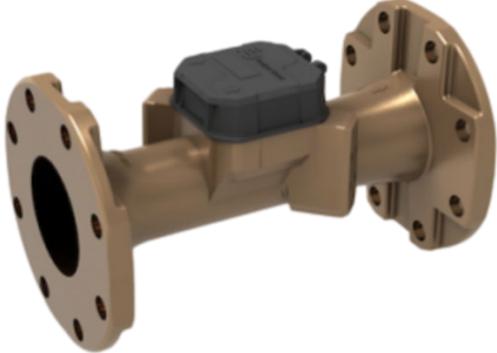
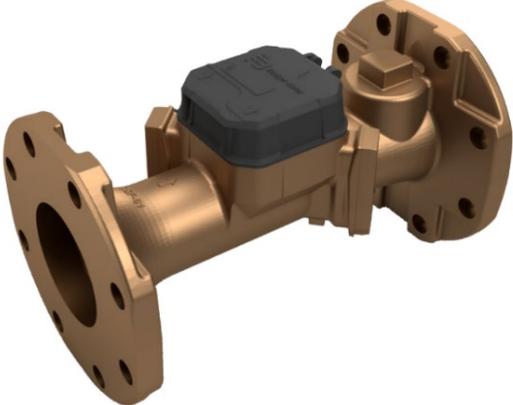
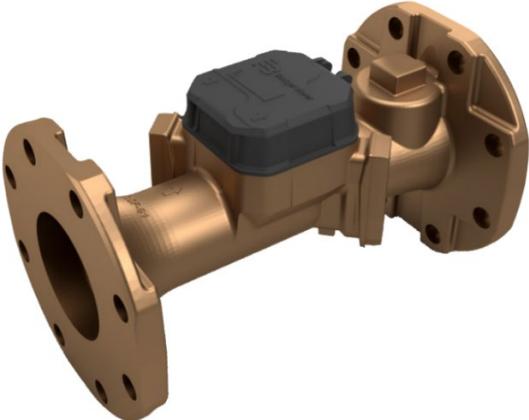
#### PROPOSED FOR SIZES 5/8" x 3/4" THROUGH 1"

The Recordall® Disc Series meters, mechanical positive displacement type, meet or exceed the most recent revision of AWWA Standard C700 and are available in a lead-free bronze alloy. The meters comply with the lead-free provisions of the Safe Drinking Water Act, are certified to NSF/ANSI Standards 61 and 372 and carry the NSF-61 mark on the housing. All components of the lead-free bronze alloy meter (housing, measuring element, seals, and so on) comprise the certified system.

#### PROPOSED FOR SIZES 2" THROUGH 6"

The E-Series® ultrasonic meters use solid-state technology in a compact, tamper protected, weatherproof and UV-resistant housing, suitable for commercial applications. Electronic metering provides information—such as rate of flow and status and alarm indication—and data not typically available through traditional, mechanical meters and registers. Electronic metering minimizes measurement errors due to sand, suspended particles, and pressure fluctuations. The meter’s open flow tube design prevents flow obstruction to reduce pressure loss, and they have greater turn-down ratio for extended flow ranges and increased revenue capture. The integrated registers are easy-to-read, 9-digit LCD displays, which present consumption, rate of flow, unit of measure, pressure, temperature, alarm conditions and current firmware version. They will transmit pressure alarm and pressure and temperature data through the ORION Cellular LTE-M endpoint.

SIZE	METER DESCRIPTION	IMAGE OF METER TYPE
5/8" x 3/4"	Recordall® Model 25 Bronze Recordall® Positive Displacement Nutating Disk Mechanical Meter, .5-25 gpm, 7 1/2" meter lay length.	
1"	Recordall® Model 55 Bronze Positive Displacement Nutating Disk Mechanical Meter, 1-55 gpm, 10 3/4" meter lay length.	

<p>2"</p>	<p>E-Series® Bronze Ultrasonic Meter, .5-160 gpm, 17" meter lay length. Register displays Consumption (up to nine digits), Rate of Flow, Alarms, and Unit of measure. Handles pressure up to 175 psi.</p>	
<p>3"</p>	<p>E-Series® Bronze Ultrasonic Meter, .37-560 gpm, 17" meter lay length. Register displays Consumption (up to nine digits), Rate of flow, Alarms, Pressure, Temperature, Firmware version, and unit of measure.</p>	
<p>4"</p>	<p>E-Series® Bronze Ultrasonic Meter, .75-1,100 gpm, 20" lay length. Register displays Consumption (up to nine digits), Rate of flow, Alarms, Pressure, Temperature, Firmware version, and unit of measure.</p>	
<p>6"</p>	<p>E-Series® Bronze Ultrasonic Meter, 1.1-2,000 gpm, 24" lay length. Register displays Consumption (up to nine digits), Rate of flow, Alarms, Pressure, Temperature, Firmware version, and unit of measure.</p>	

## ENCODER REGISTERS

Whether you choose the Badger 9-digit HR-E<sup>®</sup> LCD register (which we propose for the project) or the 8-dial HR-E mechanical encoder register, both are high-resolution encoders that will provide you with leak detection and other critical information through the reading system. The registers utilize industry standard communication protocols and do not require programming or setting adjustments during installation or after wire repair.

HR-E LCD REGISTER	HR-E MECHANICAL ENCODER REGISTER
<ul style="list-style-type: none"> <li>• Custom specification setup for utility.</li> <li>• Displays rate of flow.</li> <li>• 20-year sealed battery.</li> <li>• Electronic and visual icons for: Meter functioning correctly or meter alarm triggered such as temperature limits exceeded, magnetic tampering, register removal tampering, reverse flow, suspected leak, 30-day no usage, and end of battery life.</li> </ul>  <p>The image shows a grey, circular HR-E LCD register with its lid open. The lid has a barcode and the number 14412420. The register face has a small LCD screen displaying 'd 35' and 'HR/E LCD'.</p>	<ul style="list-style-type: none"> <li>• Non-contact encoding using light-emitting diode technology.</li> <li>• Uses power from cellular endpoint for read capture, so no internal battery.</li> </ul>  <p>The image shows a grey, circular HR-E mechanical encoder register with its lid open. The lid has a barcode and the number 14412420. The register face has eight dials, a red cross icon, and the text 'Badger Meter', '67250-001', '5/8, 3/4"', 'HR/E', 'MODEL 25', and '084'.</p>

## OPTIONAL SOLID-STATE ULTRASONIC SMALL METERS

Ferguson and Badger could provide pricing for residential ultrasonic meters, upon request.

SIZE	METER DESCRIPTION	IMAGE OF METER TYPE
5/8" X 3/4"	E-Series® Bronze Ultrasonic Meter, .05-25 gpm, 7 1/2" meter lay length. Register displays Consumption (up to nine digits), Rate of Flow, Alarms, and Unit of measure. Handles pressure up to 175 psi.	
1"	E-Series® Bronze Ultrasonic Meter, .25-55 gpm, 10 3/4" meter lay length.	

## CELLULAR ENDPOINTS

ORION® Cellular water endpoints are innovative, two-way endpoints for smart water applications. The endpoints utilize existing “Internet of Things” (IoT) cellular infrastructure to deliver meter data efficiently and securely to utility staff in a NaaS format. These endpoints communicate with the meter register every 15-minutes to capture read data and meter status and/or alert information. The endpoints then automatically broadcast the stored interval data through the cellular network to the BEACON® AMA headend software at predetermined intervals, typically four times per day. These cellular radio devices store forty-two days of 15-minute interval data. In addition to direct-wire register-to-endpoint configurations, endpoints can be cable connected to any Badger or compatible brand encoder register using an inline connector such as Nicor® or Twist Tight®, or they can be field-spliced using industry-approved gel-cap splice kits.



### ATTRIBUTES:

- Allows two-way, control and monitor communications.
- Captures read data at 15-minute intervals.
- Uploads data to server up to 4x daily.
- Installs through composite meter pit lid using threaded cap and lock nut kit.
- Receives firmware upgrades remotely.
- Triggers an alert for cut wire, encoder register read error, low battery and more.

## COMPUTER HARDWARE AND SOFTWARE

The Orion® Cellular AMI system only requires user interface hardware and software, apart from the hosted MDMS and Customer Portal software subscription, that the utility probably has in service or can easily acquire as needed. Desktop or laptop computers, tablets, and/or smartphones operating on recent versions of their operating system and internet browsers will perform well for monitoring and interfacing with the system. Ferguson can provide recommendations and sourcing for heavy-duty laptops and tablets, such as Panasonic Toughbook® or Dell Latitude Rugged Extreme products, should the utility decide to add these tools.

One unique tool that will be used to quickly activate ORION® Cellular endpoints during installation and conduct diagnostics is the Infrared (IR) Communication Device. These devices are included in our proposal.

Point this end toward the IR communication port of the meter or endpoint



Micro USB port for downloading files

### ABOUT THE IR COMMUNICATION DEVICE

- Features a micro-B USB port for extracting data files using an optional USB cable.
- Does not use a rechargeable battery, so field technicians won't have to worry about delays during recharging should a rechargeable battery die or begin to lose charging capacity. Instead, it uses inexpensive, easily replaceable CR2450 lithium "watch" batteries.
- Functions with Windows®10 devices.
- Acts as a USB IR passthrough device, meaning it functions the same as the laptop-based IR programmer (when connected with the USB cable).
- Stores log files from network sessions, which are downloaded using the micro-B USB port.

## MDMS SOFTWARE AND INTERFACING

### CLOUD-BASED METER DATA MANAGEMENT PLATFORM

The **BEACON® Advanced Metering Analytics (AMA)** software presents a simple, yet powerful solution to bring an amazing level of utility optimization data to an organized dashboard for more accurate and responsive decision making. Built-in infrastructure management services and a system design that keeps you in step with technology advancements, allows you to do what you do best—manage your water utility. Plus, built-in consumer engagement tools help enhance customer service, increase satisfaction, and reduce costs.



With tools beyond meter reading and network management, BEACON AMA software offers targeted Advanced Metering Analytics. BEACON AMA software puts interval meter data to work to increase efficiency in day-to-day utility operations and address demands for actionable intelligence.

- Problem solver – User intuitive data tools place the power of water consumption data at your fingertips, allowing you to rapidly respond to customer inquiries and quickly resolve — and even eliminate — many billing issues.
- Customized design – A customizable dashboard delivers information configured to each user’s security access level in a format matched to the utility’s individual requirements, providing data management integrity, security, and control.
- Works with you – Integration with utility systems—billing, work order, inventory, Customer Relationship Management (CRM) and Geographic Information Systems (GIS)—streamlines and improves utility operations without disrupting the current utility billing interface file transfer process.

- Find out fast – Alert conditions can be set to monitor and notify users of system exceptions, including continuous flow, for faster leak detection.
- Innovation at your service – Secure, hosted platform with automatic software upgrades ensures the latest technology and features are always available.

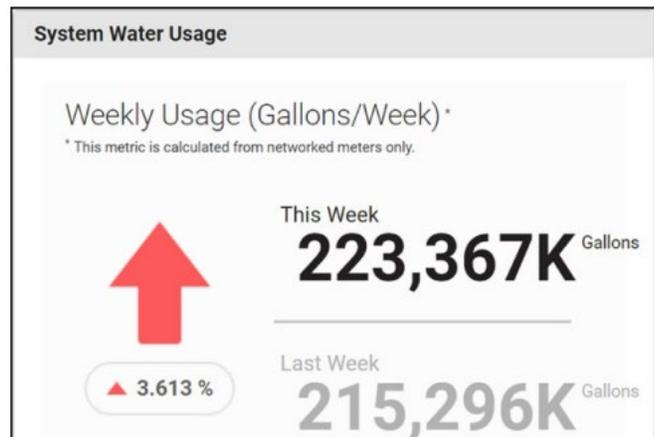
BEACON’s comprehensive “At a Glance” summary dashboard, or AAG, provides critical information with graphical elements to make quick understanding and sound decision-making the norm. The first time you access BEACON, the AAG opens in a default module layout. You can customize the layout to suit your needs, for example, positioning the modules that you use most frequently at the top of the page or removing modules that you do not use often. BEACON automatically remembers the new layout, so that the next time you login the AAG page will appear as you customized it. Here is a sampling of the dashboard widgets the AAG tab page presents:

### FLOW HEALTH



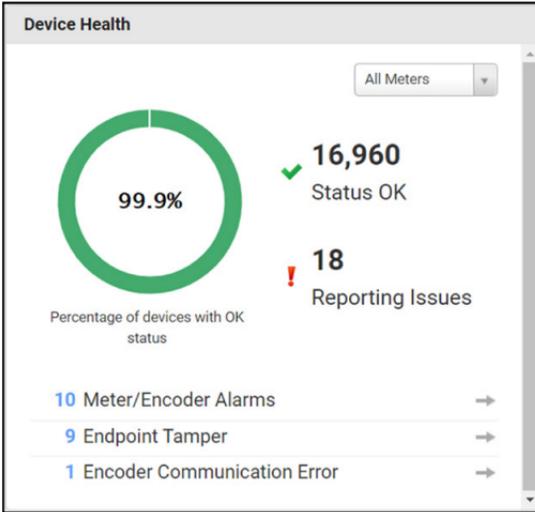
Provides an overview of the flow anomalies in your water system.

### SYSTEM WATER USAGE



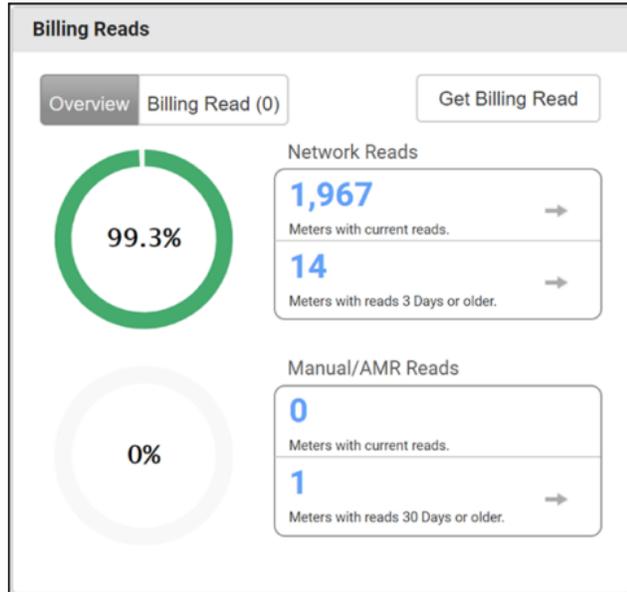
Compare this week’s overall Consumption with the previous week’s overall consumption data.

## DEVICE HEALTH



Provides a snapshot of the number and percentage of devices (endpoints, registers, and meters) reporting and their issue status.

## BILLING READS



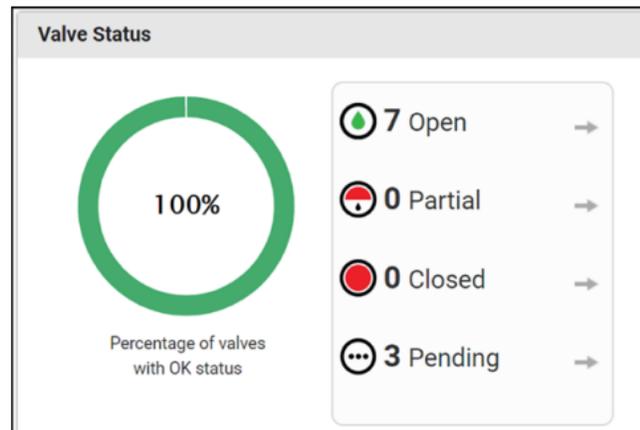
Processes read data captured by meters and creates a file that can be passed to your billing software, format depends on integration.

## COMMUNICATION HEALTH



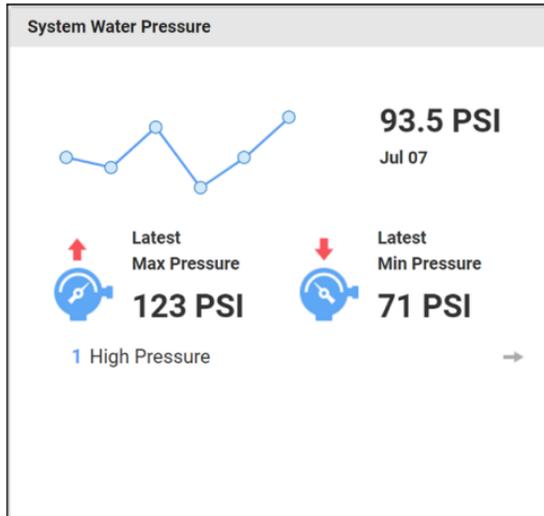
Provides a snapshot of endpoint communications.

## VALVE STATUS



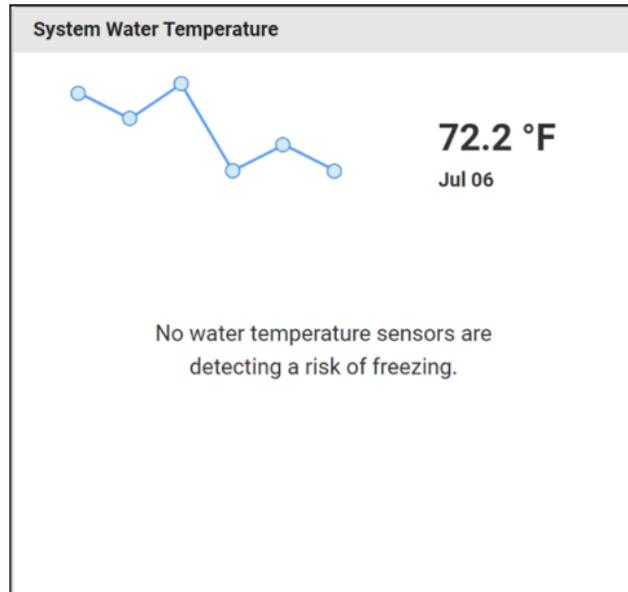
Displays current valve status for optional E-Series® Ultrasonic Plus meters deployed that feature an integrated remote disconnect valve.

## SYSTEM WATER PRESSURE



Displays the water pressure statistics of meters with sensors.

## SYSTEM WATER TEMPERATURE



Displays the water pressure statistics of compatible meters with integrated pressure sensors.

## WHAT'S NEW

**What's New**

06/24/2020  
**EyeOnWater® Mobile Apps are Now ADA Compliant!**  
EyeOnWater iOS and Android mobile applications are now available in Americans with Disability Act (ADA) compliant modes. Simply instruct your customers to enable the appropriate accessibility settings on their phones. When they open the EyeOnWater application, they will have access to full voice over, changed color schemes and fonts based on industry best practices for ADA compliance.  
View EyeOnWater Help for iOS and Android Accessibility instructions.

06/15/2020  
**ORION® Mobile Read How-To Videos**  
Two new How-To videos have been released for training on the BEACON AMA Mobile Solution. These brief videos provide a full, step-by-step overview for creating and completing assignments in

Displays announcements about recently released new features and system improvements.

## TOP ACCOUNTS BY USAGE

**Top Accounts By Usage (Weekly)**

Rank	Account	Gallons	Δ Rank
1	Mario Eichmann	90,151,481	▲ 1 →
2	Sanford Mayert	76,474,099	▼ 1 →
3	Shany Larson	12,566,000	▲ 7 →
4	Jaren Wuckert	10,511,000	▲ 3 →
5	Piper Gusikowski	9,767,314	▼ 1 →
6	Jessy Mills	9,384,000	▼ 3 →

Displays the top 25 accounts, ranked by weekly consumption.

## FAVORITE ACCOUNTS

Favorites		
★ Location	Meter ID	Gallons/wk
★ Althea's Media Production	M178568506	5,712,873 →
★ Zora's Computer Software	M041658365	428 →
★ Dedic's Real Estate	M741511625	80,932 →

Displays water usage for accounts selected as “favorites” that require special attention.

## TECHNICAL SUPPORT

**Technical Support**



**1-800-616-3837**  
Technical Support Number

**techsupport@badgermeter.com**  
Technical Support Email

[Connect Now →](#)  
Online Technical Support Connect

## EyeOnWater® CUSTOMER PORTAL SOFTWARE

The BEACON AMA software suite includes informative consumer outreach tools to improve customer service consisting of the EyeOnWater® consumer engagement website, smartphone mobile apps, and email or SMS text alerts, providing easy access to personal consumption data and alerts to potential leaks. With these tools, water consumers can view their usage activity, and gain greater understanding and control of what they use and the value you provide.



EyeOnWater® allows your end users to create a login ID for access to their account data, and in most cases involves no utility intervention. Just send them to <https://eyeonwater.com> to set up an EyeOnWater® login with their zip code and their provided BEACON Account ID, which may be different from the account billing ID depending on the billing vendor’s format.

If the BEACON Account IDs automatically change whenever there is an ownership or tenant change, then the EyeOnWater® accounts for the previous owner automatically lose access to water usage data when the new BEACON Account information is uploaded.



The Customer Portal Dashboard (above) has great functionality as summarized below:

1. The EyeOnWater Help page is an excellent resource and functions as a complete user manual available online.

2. The basic account details are listed at the top of the page. If the account has access to more than one meter, clicking on the drop-down arrow allows the user to toggle between the various meters.
3. The Leaks section of the page displays a leak if water is flowing through the meter nonstop for 24 hours. A Leak Alert can be set so EyeOnWater will send out an email or text message when a leak occurs.
4. This section of the EyeOnWater display provides a snapshot of this week's water use compared to the previous week. It also lists the average use per day over the last 30 days.
5. In the Your Meter section, see how often your meter is read, the last time it was read, the current reading and when the next reading is scheduled.
6. The consumption graph lets you see your water use for a period. Whenever you log in to EyeOnWater, the Consumption Graph defaults to displaying your daily water use.
7. It is possible to export the data shown in the consumption graph into a .csv file that can be opened in spreadsheet management software.

## CLOUD-BASED SOFTWARE SECURITY AND ACCESS

BEACON AMA is ISO 27001 certified, and SOC 2 examined for security, availability, and confidentiality.

BEACON AMA has been developed as a hosted software platform and is a cloud-based application accessed through a standard web browser. Internet access is required. User logins provide secure access. BEACON AMA supported web browsers include the latest and next previous major releases of Google® Chrome, Microsoft® Edge, Mozilla® Firefox®, Microsoft® Internet Explorer® (IE 11 only); and Apple® Safari®.

The EyeOnWater® consumer engagement website is a cloud-based application accessed through a standard web browser. Internet access is required. Water consumer user logins provide secure access to their information. Supported web browsers include the latest and next previous major releases of Google® Chrome, Microsoft® Edge, Mozilla® Firefox®, Microsoft® Internet Explorer® (IE 11 only); and Apple® Safari®.

EyeOnWater® smartphone applications require Android 6.0 or iOS 9.1 or later and can be downloaded from Google Play or the Apple Store.

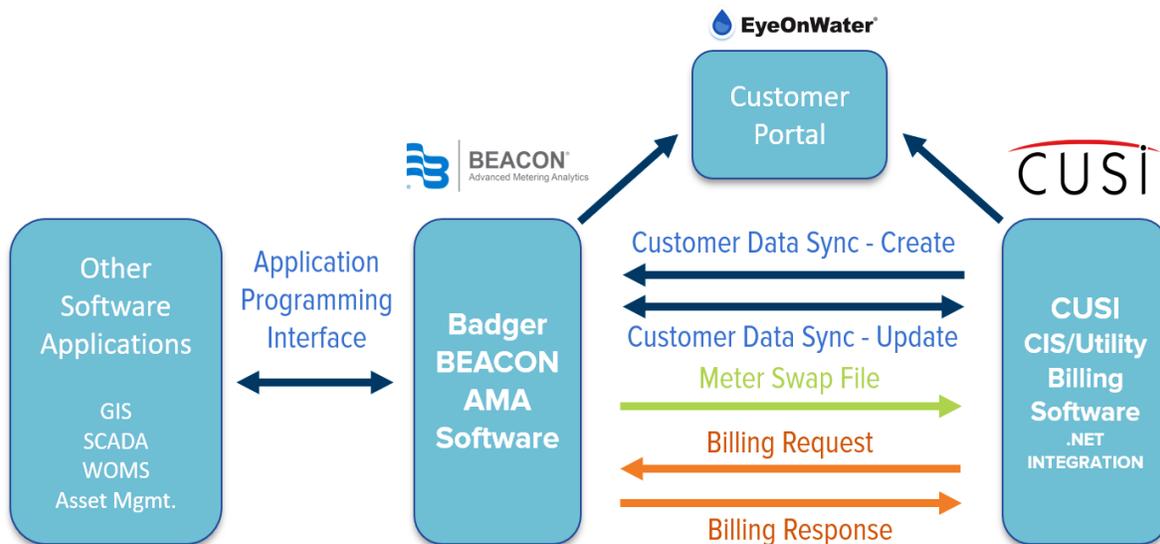
Scan this QR code for a link to Badger's YouTube overview video on the BEACON AMA platform.



## SOFTWARE INTEGRATION

With Ferguson as facilitator, the main integration work will occur between Badger Meter and Continental Utility Services. Full CIS Billing integration is included in our proposal. The Badger Data Exchange file structure processes information pertaining to:

- **Accounts – ID**, account holder name and contact information, billing address and so on.
- **Locations – ID**, service point address, geolocation data for the meter/service point and other details about the location such as number of occupants, evapotranspiration values, whether the location has a swimming pool and so on.
- **Service Points – ID** used to distinguish multiple hookups at a single location (for example, someplace with a meter for potable water and a different meter for irrigation), geolocation data (used for greater accuracy when there is more than one service point at a single location), route number and so on.
- **Meters –** Serial number, manufacturer, model, size, continuous flow/intermittent flow expected tag, unit of measure, resolution, installation date, removal date and so on.
- **Service Agreements – ID**, service start and end dates.
- **Endpoint Configurations –** Serial number, type, installation date and removal date.





## BEACON<sup>®</sup> AMA and Water Conservation

BEACON<sup>®</sup> AMA provides a wealth of powerful, yet easy-to-use water conservation tools, including:

- **Leak analytics**, as covered in the previous section, identify continuous flow conditions that represent potential leaks. When user-definable usage thresholds are crossed, the system can automatically notify you via email and text message. BEACON also lets you export contact information for notifying customers.
- **Reduction Goal** filters provide one-click access to accounts that have met or failed to meet mandated water use reduction goals.
- **Parity filters** for monitoring usage based on whether a premise has an odd or even numbered street address. Parity filters let you identify and notify customers who aren't in compliance with watering (irrigation) restriction rules, should they be activated.
- **High/Low Consumption filters** for counting and selecting meters whose usage falls above or below utility-defined thresholds of normal water use.
- **Diurnal (daytime) Demand** exports let you quickly identify daily peak water demand cycles. Tracking daily peak demand helps manage the cost of purchasing and moving water and wastewater.
- **District Metering Area (DMA)** support lets you monitor zonal usage across your water distribution network. The ability to compare usage between supply meters and demand meters lets you spot and quantify non-revenue water at its source.
- **EyeOnWater<sup>®</sup> iOS and Android smartphone apps**, along with the customer web portal, lets your customers monitor their water use and receive notice of potential leaks through the portal or via email and text messages.

# **SECTION 3**

## TRAINING, SERVICE, AND SUPPORT

## SECTION 3 – TRAINING, SERVICE, AND SUPPORT

### USER TRAINING

Ferguson will provide training to key stakeholders involved in the deployment and operation of the System that builds upon knowledge transferred from the Ferguson Project Team. Our team will provide weekly reporting on system health and key performance indicators along with any network mitigation required to ensure all endpoints are reporting as expected. The Town’s field staff, and installation subcontractor personnel will be taught (at a minimum): installation procedures for all system components, general head-end and meter data management system operating functions, accessing reports, viewing, and managing system diagnostics, and extracting billing information.

As part of our training approach, Ferguson will provide both onsite field training as well as direct virtual classroom training. Onsite training will include field training on programming equipment. Programming and field trouble shooting procedures will be included. Virtual classroom training will include system administrator training, best practices, general user training sessions plus any new system enhancements.

Guides/user manuals will be provided to the Town as appropriate. Ferguson breaks training up multiple times throughout the project deployment focusing on billing first and then moving into utilizing the system’s functions.

#### ONSITE TRAINING: “Getting Started with BEACON® AMA” Agenda:

Training Topic	Recommended Attendees
<b>Overview of ORION® Cellular Network as a Service (NaaS) Endpoint Installation</b> <ul style="list-style-type: none"> <li>• General explanation of BEACON and ORION Cellular NaaS endpoint system interaction</li> <li>• Learn proper endpoint installation and discuss its impact on system performance</li> <li>• Explore endpoint activation methods and best practices</li> </ul>	Billing Clerks Customer Service Reps Utility Managers Meter Readers Meter/Endpoint Installers
<b>BEACON Billing Cycle</b> <ul style="list-style-type: none"> <li>• Detailed run-through of the BEACON Billing Cycle</li> <li>• Importing a billing file (Data Sync)</li> <li>• Exporting readings back to billing</li> </ul>	Billing Clerks Customer Service Reps Utility Managers
<b>At a Glance Page Overview</b> <ul style="list-style-type: none"> <li>• Overview of the At a Glance page modules</li> <li>• Personalizing the page layout for User preferences</li> </ul>	Billing Clerks Customer Service Reps Utility Managers
<b>Monitor Page Overview</b> <ul style="list-style-type: none"> <li>• Explore the Monitor page functionality &amp; layout</li> <li>• Locating information using facets/filters and Search function</li> <li>• Viewing water usage graphs</li> </ul>	Billing Clerks Customer Service Reps Utility Managers

<ul style="list-style-type: none"> <li>Viewing meter service card data</li> <li>Exporting meter reads and data</li> </ul>	
<b>User Management</b> <ul style="list-style-type: none"> <li>Managing and maintaining BEACON User accounts</li> </ul>	Billing Clerks Customer Service Reps Utility Managers
<b>EyeOnWater Consumer Engagement</b> <ul style="list-style-type: none"> <li>Overview of the EyeOnWater consumer app &amp; portal</li> <li>Inviting Utility end consumers to set up an EyeOnWater account</li> <li>Managing EyeOnWater accounts</li> </ul>	Billing Clerks Customer Service Reps Utility Managers

## LIVE, FREE, ONLINE TRAINING SESSIONS

**BEACON® AMA Advanced Features: Beyond the Billing Cycle**

This session focuses on BEACON AMA Advanced functionality that was not covered in-depth during initial training sessions. Topics include Filters, Alerts, Tags, Notes, Analytics, Assets, and utilizing the Help page

[read less](#)

This training is offered several times. Select the date and time that works best for you.

Tue, Apr 12, 2022 11:00 AM - 12:30 PM EDT ▼

**REGISTER**

---

**BEACON® AMA Refresher - EyeOnWater® User Management**

This session covers managing the Utility's EyeOnWater users, including: enabling access to more than one Meter/Account; removing access to an account; and EOW analytics functions.

[read less](#)

This training is offered several times. Select the date and time that works best for you.

Thu, Apr 14, 2022 11:00 AM - 12:00 PM EDT ▼

**REGISTER**

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**BEACON® AMA Refresher - System Sync: Import Exceptions**

In this refresher we will focus on the System Sync process, specifically the exceptions, warnings, and errors, and how to troubleshoot file issues.

[read less](#)

This training is offered several times. Select the date and time that works best for you.

Thu, Apr 14, 2022 2:00 PM - 3:00 PM EDT ▼

**REGISTER**

## CUSTOMER PRODUCT TRAINING AT BADGER METER HEADQUARTERS

Typically, three sessions are held per year in Milwaukee, this training allows utilities to learn more about usage and optimization of Badger Meter hardware and software products, network with other utility product users and Badger Meter representatives, and learn in a hands-on group learning environment.

### Session Topics Include:

- BEACON® Software as a Service (SaaS)
- E-Series® Ultrasonic Meters and Ultrasonic Plus with Integrated Valve Meters
- Recordall® Disc, Turbo Series Meters, Compound Series and Fire Series Meters
- Badger Meter HR-E® LCD & HR-E High Resolution Encoders
- ORION® Cellular Network as a Service (NaaS) endpoints
- Mobile Meter Reading with ORION ME Migratable endpoints and AMR meter reading hardware devices
- Factory and Hydro Lab Tours
- Meter Testing Best Practices
- Field Troubleshooting Tips and Tricks

## ONGOING MAINTENANCE, SERVICE AND SUPPORT



- Our Meter and Automation associates are dedicated to understanding the latest products and services available, so they can recommend the system or tool best suited for your needs.
- As one of the nation's largest waterworks suppliers, our reputation is built on satisfying every fulfillment need, no matter the demand. Our Meter and Automation team provides meter testing services that ensure your system provides accurate real-time water use data.
- Ferguson Waterworks provides project management and installation services such as field mapping, instruction and testing for new water meter systems.
- Intelligent metering systems and cloud-based analytics software applications can provide unprecedented access to real-time information about consumption demand and system efficiency, which allows forward-thinking utilities to use predictive analysis to preemptively correct problems.
- Ferguson Waterworks has partnered with firms that specialize in waterworks project financing so we can help utilities explore creative funding options to drive higher returns and get more done.

# **SECTION 4**

## COST PROPOSAL PRICING

## SECTION 4 – COST PROPOSAL PRICING

### PRICING ASSUMPTIONS AND CLARIFICATIONS

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The town may find Ferguson’s meter install cost to be higher than other proposers, so let’s take a quick look at what is included in this unit pricing. We do not believe in surprises when it comes to adders or mystery fees associated with project pricing and active deployment invoicing.

#### Breakdown of the Meter installation Unit Cost:

- Meter Installation Labor – Davis-Bacon prevailing wage rates, also covers extended work hours if needed, including Saturdays and evenings.
- All transportation costs (fuel and insurance), installer uniforms, and tools and equipment required for meter installation by National Metering Services.
- Lodging and crew mobilization for the project from National Metering Services (NMS).
- Project Management fees for NMS.
- Up to three customer meter-swap notices via US mail – Initial, second and final. After final notice to schedule install, the town will need to assist as a Return to Utility (RTU) account. Costs covers printing and postage.
- Gaskets and ancillary items related to meter installation services.
- Swap out of all metal lids for composite lids supplied by Ferguson. NMS will store the metal lids that are removed from service at a location designated by the Town.
- Customer Portal – NMS will provide the town access to the cloud-based workorder management database so actual installation records, including photo’s, can be reviewed by staff as needed during the project. NMS will keep the portal active for a period of one (1) month after final completion of the project. Should the utility desire to continue to access hosted account data, NMS would be able to provide same under a separate hosting agreement.
- Installation Photos – Before, Reading (old meter), After (installation of New) and mounting of AMI module and composite lid – appended to database installation records in work order management system.
- Repair or replacement of plumbing damaged during the meter installation, such as any broken fittings, valves or piping that occurred during the meter replacement.
- Appointment scheduling and customer service.
- Data base creation and management of meter installation data. Data entry – All new meter information will be uploaded into our database for electronic transfer to the utility. The utility will be responsible for any WOMS interface charges from CUSI, if they fall outside the scope of our quoted, anticipated integration fees.
- Call Center Support – for appointment scheduling and confirmation.
- E-Appointments – Internet appointment scheduling tool for your residential customers that were not able to be swapped under the normal door-to-door install plan.

### Badger Meter will Invoice BEACON® AMA Managed Solution Subscription Fees Directly:

Ferguson will invoice all line items on the quote **EXCEPT** for the Managed Solution Subscription Fees, **which are invoiced by Badger Meter** and represent the payment model for cellular endpoint data usage, usually set as a monthly invoice. The subscription fees are based on the purchase and consumption of “Service Units” with each unit priced at \$0.85 for this project. An endpoint that is active in the system will usually consume one, but possibly more, Service Units each month, based on the established data interval for an endpoint and the number of call-ins to it. For easier comparison to other proposals with traditional single purpose RF networks, the Managed Solution Subscription is equivalent to network hosting fees. The estimated fees for the Town are calculated by multiplying the total AMI endpoints of 1,256, assuming they would all be active in the system, and multiplying them by the Service Unit price of \$0.85 and then multiplying by twelve to convert a monthly fee into an annual. Remember that there are no other operating costs – no cellular backhaul fee per data collector, no extended warranties on infrastructure, no additional hosting fees for a third-party customer portal, etc.

### Other Pricing Notes:

- In the event of a mathematical calculation error, unit prices will prevail.

# PRIMARY AMI SOLUTION PRICING SCHEDULE

Town of Federalsburg, MD

Water Meters and AMI Modules			
Description	Qty	Unit Cost	Extended Cost
AMI Module with Through-the-Lid Install Kit	1,256	\$ 141.00	\$ 177,096.00
5/8"x3/4" Recordall Disc Meter, HR-E LCD Register	1,197	\$ 135.00	\$ 161,595.00
1" Recordall Disc Meter, HR-E LCD Register	8	\$ 232.00	\$ 1,856.00
2" E-Series Ultrasonic Meter	45	\$ 873.00	\$ 39,285.00
3" E-Series Ultrasonic Meter	3	\$ 2,273.00	\$ 6,819.00
4" E-Series Ultrasonic Meter	1	\$ 2,760.00	\$ 2,760.00
6" E-Series Ultrasonic Meter	2	\$ 4,345.00	\$ 8,690.00
<b>Install:</b> 5/8"x3/4" Meter, Absolute Encoder, AMI Module	1,197	\$ 128.00	\$ 153,216.00
<b>Install:</b> 1" Meter, Absolute Encoder, AMI Module	8	\$ 128.00	\$ 1,024.00
<b>Install:</b> 2" Meter, Absolute Encoder, AMI Module	45	\$ 455.00	\$ 20,475.00
<b>Install:</b> 3" Meter, Absolute Encoder, AMI Module	3	\$ 975.00	\$ 2,925.00
<b>Install:</b> 4" Meter, Absolute Encoder, AMI Module	1	\$ 1,169.00	\$ 1,169.00
<b>Install:</b> 6" Meter, Absolute Encoder, AMI Module	2	\$ 1,819.00	\$ 3,638.00
<b>Salvage Credit:</b> 5/8"x3/4" Meter (bronze only)	1,197	\$ (3.50)	\$ (4,189.50)
<b>Salvage Credit:</b> 1" Meter (bronze only)	8	\$ (6.00)	\$ (48.00)
<b>Salvage Credit:</b> 2" Meter (bronze only)	45	\$ (15.00)	\$ (675.00)
<b>Salvage Credit:</b> 3" Meter (bronze only)	3	\$ (27.00)	\$ (81.00)
<b>Salvage Credit:</b> 4" Mete (bronze only)	1	\$ (32.00)	\$ (32.00)
<b>Salvage Credit:</b> 6" Meter (bronze only)	2	\$ (38.00)	\$ (76.00)
IR Communication Device for Cellular Endpoint Activation	3	\$ 172.00	\$ 516.00

Composite Meter Pit Lids			
Description	Qty	Unit Cost	Extended Cost
12.25" Composite Pit Lid with Badger Endpoint Mounting Hole - (5/8"x3/4" - 1" Meters)	1,205	\$ 29.00	\$ 34,945.00
Various Large Composite Pit Lid with Badger Endpoint Mounting Hole - (2" – 6" Meters)	51	\$ 283.00	\$ 14,433.00

Project Management & Training			
Description	Qty	Unit Cost	Extended Cost
Project Management & Training	1	\$ 13,282.00	\$ 13,282.00

**Hosted MDMS and Customer Portal**

Description	Qty	Unit Cost	Extended Cost
BEACON Activation/Engagement Fee (one time)	1	\$ 5,264.00	\$ 5,264.00
NaaS/SaaS Managed Solution Subscription (Hosting Fee) - Badger Meter will invoice the Town directly. See pricing assumptions and clarifications for more details regarding fee calculation. This estimate reflects the purchase of Service Units from Badger that will support the AMI system for the minimum <b>five-years (60-months)</b> , as requested by the Town.	60	\$ 1,067.60	\$ 64,056.00
Billing Integration Fee (one time, Badger & CUSI)	1	\$ 6,514.00	\$ 6,514.00
Performance and Payment Bond Fee	1	\$ 3,535.00	\$ 3,535.00

**Project Total Cost: \$ 717,991.50**

**Annual Maintenance (Years 6 - 15)**

Description	Qty	Unit Cost	Extended Cost
NaaS/SaaS Hosting Fee (Badger Meter will invoice utility directly, per month. See pricing assumptions and clarifications for more details regarding bill calculation. This is an estimate for the only annual costs, which cover cellular Network as a Service, Software as a Service (both the MDMS and the Customer Portal), Badger and Ferguson customer service and Badger product warranty support.	12	\$ 1,067.60	\$ 12,811.20

# SECTION 5

## PROJECT MANAGEMENT AND SCHEDULE

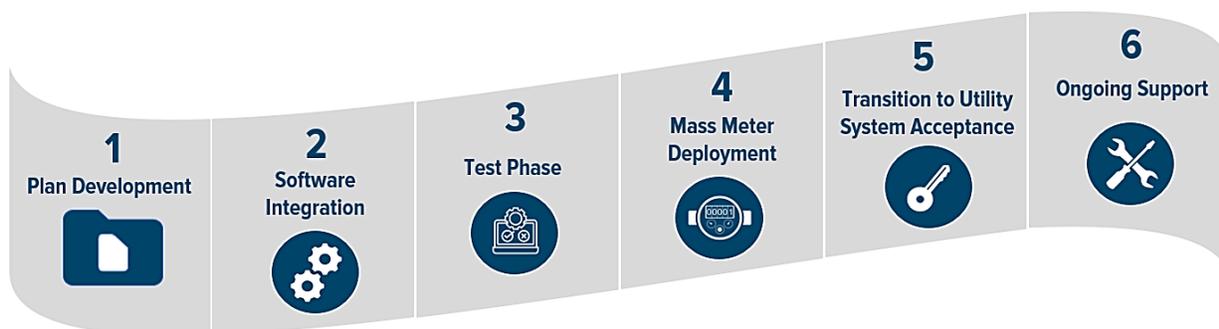
## SECTION 5 – PROJECT MANAGEMENT AND SCHEDULE

### FERGUSON’S PROJECT APPROACH

For our project engagement at Federalsburg, Ferguson and Badger will leverage the latest technology, advanced implementation tools, well-proven project management framework, risk mitigation plans, software and system testing, lessons from past implementations, and modern training methods that have helped our existing utility customers enjoy all the benefits of AMI. We will bring our project management best practices and adhere to a mutually agreed implementation plan, which can be modified and adjusted based on your requirements. With our experience and substantial resources, the Ferguson and Badger team is confident we can provide the appropriate structure, guidance, system integration, and training support required for success.

Our phased approach to deploying AMI projects follows a consistent path that allows thorough communications, documentation, and mutual accountability. Ferguson thrives in the role of prime contractor, for we are better positioned to control the quality and timing of project deliverables. This arrangement also gives the Town one single point of contact.

### AMI PROJECT MILESTONES FOR FEDERALSBURG



### PHASE 1: PLAN DEVELOPMENT

This initial phase of the project is triggered by a formal notice of award for the project, and sets into motion collaborative activities between the Town, Ferguson, Badger, our meter install partner and other stakeholders as they relate to contract review, scope of work review, risk assessment, scheduling of a kickoff/preconstruction meeting (critical for formal introductions, project overview, understanding of expectations and rules of engagement, and development/review/approval of project control documents like the following:

- **COMMUNICATION PLAN**
  - Internal (Project team meeting format/frequency, roles/responsibilities/contact information, project dashboard, Microsoft Project® deployment schedule, managing project documents, etc.)
  - External – Public Outreach Plan for customers of Federalsburg – Ferguson will assist in outreach measures such as providing content for a dedicated informational project web page on [www.townoffederalsburg.org](http://www.townoffederalsburg.org), design of a

branded door hanger and/or postcard mailer, participation in a Town hall meeting or customer-facing video conference, etc.

- **SOFTWARE INTEGRATION PLAN**
  - Software application requirements, Badger BEACON AMA meter data management and analytics, Badger EyeOnWater® customer portal software and mobile app, Continental Utility Services CIS billing software, and any other pertinent application requiring integration.
  
- **ENDPOINT ACCEPTANCE PLAN**
  - This can also be called a route acceptance plan, where it details how the routes will be attacked by the meter installation crews and how the read-rate success for each route will be measured, among other details. A prerequisite for this is having a cellular signal coverage analysis conducted for all identified meter locations.
  
- **SYSTEM ACCEPTANCE PLAN**
  - This plan will be a high-level checklist of critical milestones, route acceptance status, how to handle remaining punch list items, completion of training requirements, and other tasks or events leading to project sign off and closure.

## PHASE 2 & 3: SOFTWARE INTEGRATION AND TESTING

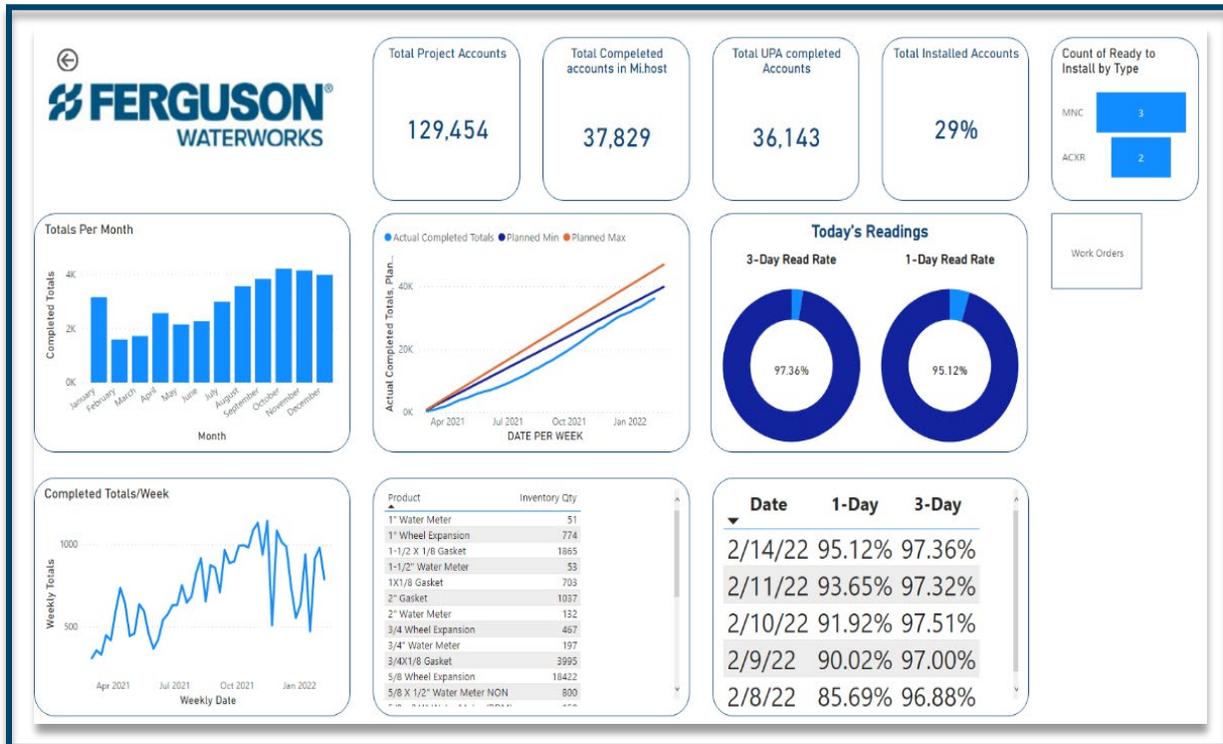
Based on the approved Integration Plan, the most critical phase involves the integration of all software applications and databases that are within the scope of work. Whether the integration involves flat file transfers or uses dynamic application programming interfaces (APIs), the project cannot move forward until the integrity of the meter data from the meter to a printed bill is tested and accurate. Please refer to a later reference in this section on Badger’s BEACON® AMA Onboarding process for other details related to CIS billing integration.

## PHASE 4: MASS METER DEPLOYMENT

Once the testing has been successfully completed on a small sampling of accounts, meter and endpoint installation can begin in earnest, ramping up to an aggressive pace that makes the most efficient use of our installation team and brings new meter accuracy and automated tools online as quickly as possible.

The endpoint acceptance plan will already be constructed and will dictate, with flexibility, such elements as route sequencing, blackout periods for billing, scenarios/conditions at an account that would cause Ferguson and our install partner to return a work order to the Town (“return to utility” or RTU) for either approval to handle any out-of-scope work or let the Town retain ownership of the issue, process for retaining/scraping old meters, inventory management process, and other details related to the product or the process. One powerful tool that Ferguson has created for communicating project progress, particularly during the mass meter install phase, is a dashboard of critical performance indicators that will be accessible to all stakeholders. From install production

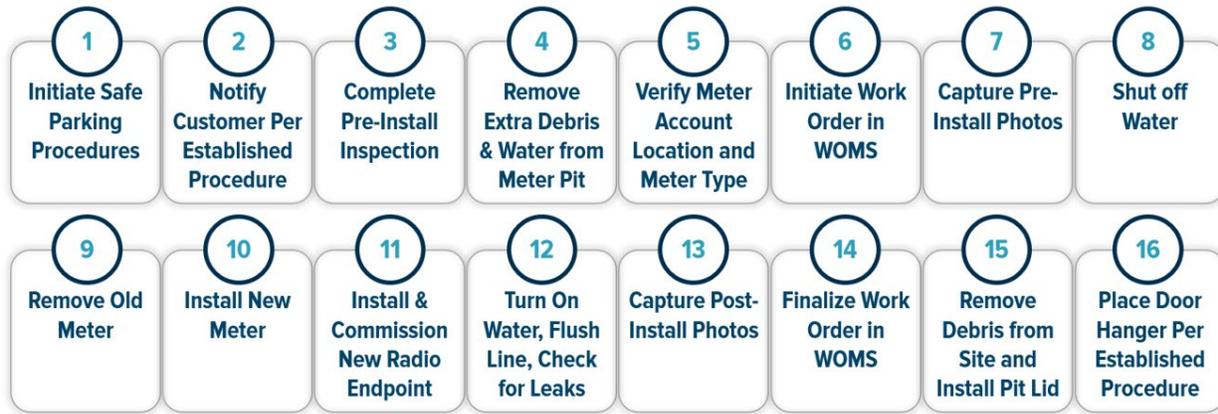
rates to inventory levels to quality audits and more, Ferguson and our partners will work to provide the Town with as much real-time project data as possible.



*Ferguson AMI Deployment Dashboard*

Ferguson maintains relationships with multiple regional and national meter installation firms so that we can align the right install subcontractor with the right project – through considering the project scope, project location, existing project obligations, results of Ferguson quality audits, financial standing, ability to implement automated work orders and inventory management tools, ability to maintain experienced crews with effective training plans and professional presentation, among some of the criteria. And once we have our install crews established, we will work with the Town to establish procedures for how installers will engage your customers and carry out the work. **Our typical meter-swap process involves the following sixteen steps:**





*Meter Swap/Install Process*

### National Metering Services is our proposed installation Partner

And for this AMI project, Ferguson has selected National Metering Services as our installer partner. National Metering Services, Inc., (NMS) provides meter installation services for both municipal and private utilities throughout the United States and recently, Europe. The projects they have provided services for are diverse in requirements and objectives. NMS has provided full turnkey packages, (supplying both product & services), labor only programs, provided customers with technical assistance in system selection and project planning, and specification development with owners and engineers.



While experienced in all utility meter types - water, gas and electric – early experience came from the AMR systems for water in the Northeast in the early 1980’s. This area of the country proved to be ideal training for installation crews and customer service staff at the firm. Due to the extreme weather conditions in the winter, 90% of utility meters are located inside the customer’s home to shelter the meter(s) from the effects of the cold. Because meters are located inside the homes, lock out conditions soon became realized when attempting to read meters by utilities. The results were lost revenue due to limited actual reads and estimated bills. Employees of NMS are experienced with dealing directly with customers, scheduling appointments, and providing a quality installation service.

### NATIONAL METERING SERVICES PROJECT TEAM:

**Project Coordinator** – The responsibilities of the Project Coordinator, is assigning tasks to office staff, monitoring the customer service unit’s interaction with customers, verifying work order information, supervising work order preparation & customer notices, scheduling of mailings, tracking progress of project by area or route, scheduling follow-up mailings, etc.

**Lead Technician** – The Lead Technician is responsible for all NMS interactions with Ferguson and the utility, managing material inventories, processing work to and from installers daily. They also represent NMS at progress meetings, assist Ferguson with customer concerns or callbacks, distribute appointments & schedules, forward completed work orders to the data processing center,

log accounts that could not be installed (locked gates & dogs), and keep daily time records of installers hours.

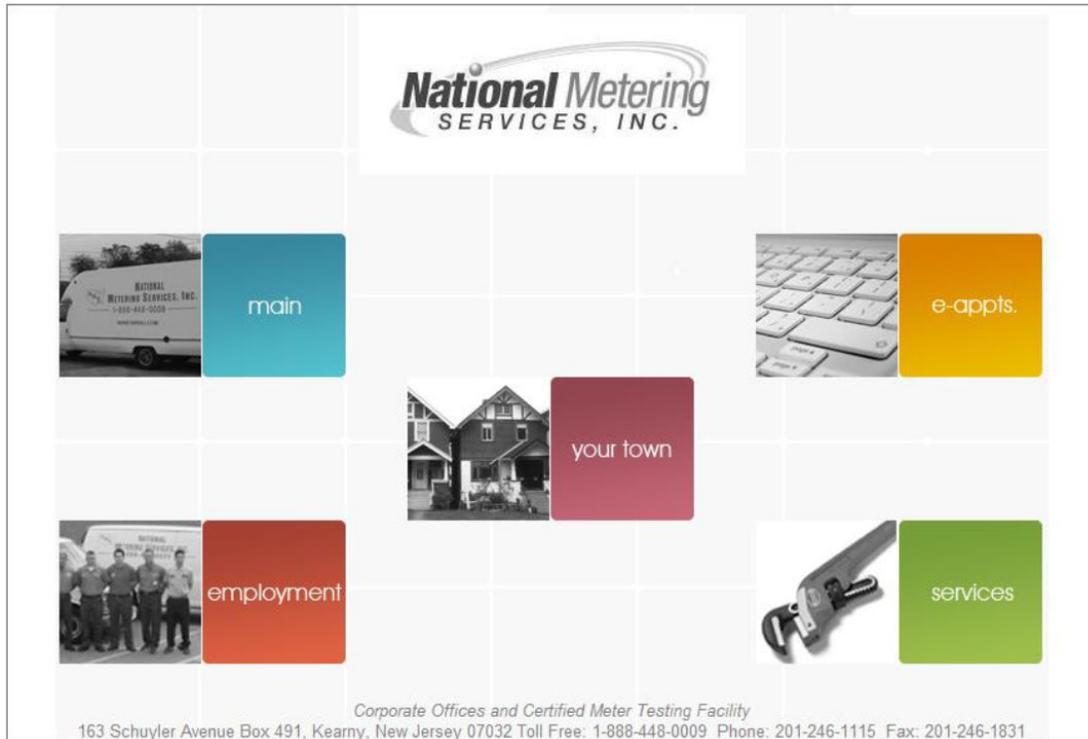
**Field Foreman** – The Field Foreman, is responsible for collection of old meters for scrap and/or testing, verifying exit readings of old meters, re-supply of equipment to installers in the field, assistance on difficult installations, surveys for large meter accounts, freezing service lines when shut down is not possible using existing valves, verify conditions when a unit cannot be installed as reported, and more activities as needed.

**Meter Installation Technician** – NMS Installation Technicians have several years of experience, as a result of very low employee turnover. Many of their Installers have been with the company over five years. The responsibilities of the Meter Installation Technicians are: providing meter installation service by appointment and by solicitation, logging pertinent data on installation order, final reading of meter and serial number confirmation, tagging removed meter with an address verification tag, testing of meter installation with manufacturers test equipment, checking for leaks after installation is complete, verifying service has been restored, updating account records if an account is missing or indicating why the unit cannot be installed as per request.

**Data Entry Clerk/Customer Service Representative** – This support role prepares customer notices & work orders from electronic data provided by the utility, processes completed work orders, processing incomplete work orders by identifying the problem or violation and entering the data into the new customer database, processing meter certification test results, if applicable, and entering results into a comprehensive report.

Customer service is responsible for scheduling appointments for customers, verifying appointments the day before the scheduled appointment by calling the customer, scheduling appointments through our internet service (E-Appointments), processing daily routes for installers by appointment, processing meter certification data, preparing customized project reports for the Utility relating to project status, un-metered accounts, remaining accounts, violations, theft of service, leaks etc.

Appointments will only come in to play on this project for all large meter swaps (typically commercial and industrial accounts that must plan for the outage) and for the few residential meters that are set in basements or in pits where NMS detects water use while they are at the account and are unable to contact the homeowner for permission to temporarily shut off service.



As part of the public outreach offering, NMS will create an additional program for your customers that includes:

- Contact information
- An FAQ's page.
- Samples of NMS installer vehicles and uniforms that your customers will see in the neighborhood.
- Reciprocal Links to the Utility's project webpage, Ferguson webpage and/or meter vendor's website.
- Internet Based Appointment Scheduling (E-Appointments).
- Toll Free numbers to NMS Customer Service Center.

With customer account information provided by the Utility, NMS will create a new customer database, for meter swap workorder creation. Customer data is scrubbed for accuracy and processed into their custom data management program, called Basic Accounting Billing utility (BABU). Once integrated into BABU, NMS staff create workorders, mailing list, customer notices and the meter installation database. NMS also utilizes the power of the BABU System to track inventory by size, type, application, new meter test data and stock quantities. This data will be provided by Ferguson once the meter materials are shipped from Badger Meter. All new meter information is scanned into the database for the appropriate account. Data is posted "live" as entered into the utility portal. Once in there, it can be reviewed individually as needed by Ferguson or town staff.

NMS Field Services records all new meter information at the installation location, out meter data and final meter reading. Field Services also confirms current Utility customer data, such as meter size, type and serial number while at the service address. Any discrepancies in the data such as mismatching meter numbers are logged on the work order and confirmed before being entered into the database. Items as identified are logged into a report and a copy forwarded to the Utility clarification or confirmation as required. Regular electronic updates will be available directly to the Utility on a daily basis through the utility portal.

## NMS APPROACH TO THE PROJECT:

All NMS personnel assigned to the project will wear a company uniform, have a picture ID and display a badge indicating the referenced project. All installers will be registered with the local Police Department prior to commencement of the project. As part of Ferguson’s project team kickoff, a list of personnel assigned to the project including the NMS chain of command with daytime telephone numbers will be included. NMS enforces strict discipline and good order among its employees. All employees always have a background check performed on them and a copy can be provided to the utility. Additionally, NMS employees are routinely tested for substance or alcohol abuse as allowed by law. NMS provides a safe and drug free workplace and enforces a zero-tolerance policy. NMS employees are screened for substance abuse at time of hire and then continually by lottery or reasonable inquiry. All NMS field Staff are OSHA 10 Certified and Confined Space Certified.

### [Mobile Workorder](#) |

<b>Customer Ref #:100</b>		<b>Active: Yes</b>		
Name: BARRERA, ALBA ELVIA		Addr: 805 ABETO CIR		
City,State Zip: EAGLE PASS, TX 78852		Route: 04   Book: 27		
Acct #: 27-4700-00		Parcel:	Class:	Status: <b>Active</b>
Meter#: 8666	Meter ID: 8666	Prev_MXU: TBL:	SWR:	00001.000
Meter Size: 5/8	Mk: SENSUS	Walk: 4700	Fire:	Serv Pt: W
Prev Read: 2922	Read Date:	Location:		
Set Date: 2002-09-19	Serv_Pt: W			
Checklist - <a href="#">history</a>				
Result: <b>DONE</b>		Install Date: 2015-02-04		
<b>Install</b>				
Old Meter #:		New Meter #:		
Out Read (HI):		New Register #:		
Out Read (LO):		MTU ID:		
Old Meter Size:		Meter Location:		
New Meter Size:		Set Read:		
Remarks:				
Pic Before:	Pic Reading:	Pic After:	Pic Module:	Pic House: 4479
				
2014:02:04 13:31:12	2014:02:04 13:31:18	2014:02:04 13:39:52	2014:02:04 13:40:07	2014:02:04 13:31:23
Repair Date: 0000-00-00	Tech ID: 776	Tech2 ID:	Time In:	Time Out:
Inf Card:		Parts:		

*Partial sample of the mobile work order system account data capture screen.*

## VEHICLE IDENTIFICATION

All NMS vehicles have company identification permanently displayed on their vehicles. All hired vehicles or privately owned vehicles used for the project will have appropriate signage identifying the vehicle as an NMS service vehicle with contact information clearly displayed. All vehicles owned or hired will be registered with the local Police Department and a detail of the service vehicle will be provided to the utility.



## WORKING HOURS

Work performed under this contract will be performed between 8:00 AM and 5:00 PM, Monday through Friday. Saturday schedules will be added as required and approved by the town. Customer service hours for NMS are Monday – Friday 8:00 AM to 5:00 PM. If installers are scheduled to work on a Saturday, customer service is staffed to support or assist the installers as needed. Areas of work and scheduled appointments are forwarded to the utility the day prior. This enables utility staff and local authorities to have knowledge of areas of operation, appointment request volume, and locations set for installer door-to-door interaction. Installations for industrial and commercial facilities will be scheduled at a time acceptable to the facility owner and, if applicable, tenant, so that scheduling does not interfere with normal operations.

## QUALIFICATIONS/TRAINING

A combination of classroom and field training is incorporated into NMS training methodologies to ensure their employees are capable of professional, quality work. Only employees of National Metering Services will be utilized on this project.

## SYSTEM INTEGRATION

NMS will utilize our computerized tracking system that coordinates scheduling with actual production totals and the monthly payment requests. This system will be fully integrated with all phases of scheduling, production, customer contact documentation, inspection, and accounting. It will be capable of providing Ferguson and the utility with electronic and hard copies of monthly production, performance status and problem account documentation.

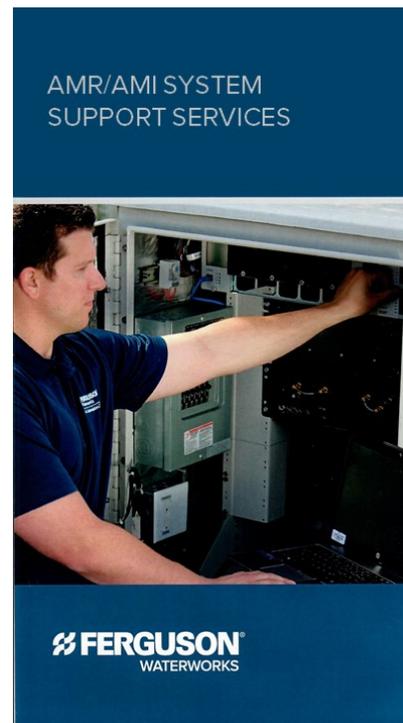
## PHASE 5: TRANSITION TO UTILITY

This phase of the project will feature focused training sessions, based on specific staff roles and responsibilities across customer service, billing, field services and others as appropriate. Route acceptance documents should be close to completion, apart from any remaining RTUs held by the Town and final work orders in process by Ferguson and our install partner that were initially held as an RTU, present a challenge in scheduling an appointment, or any other punch list items that require mitigation prior to full system acceptance.

## PHASE 6: ONGOING SUPPORT

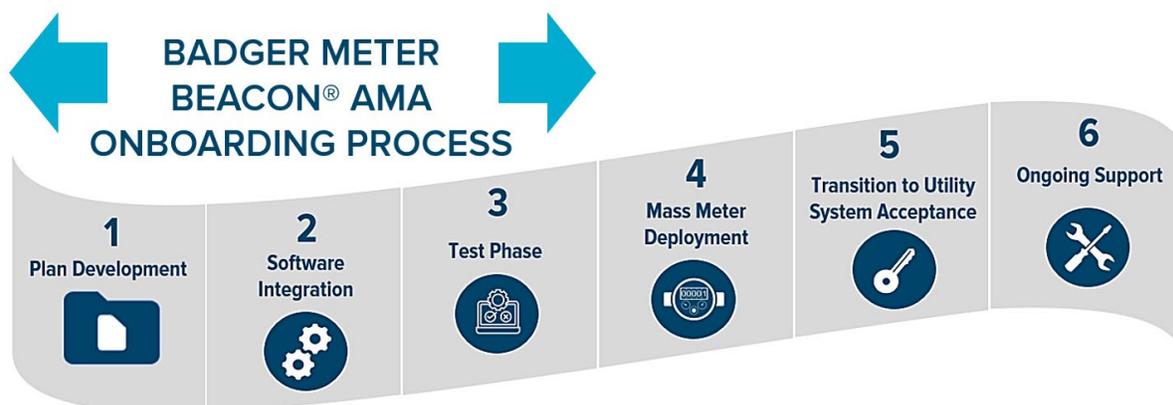
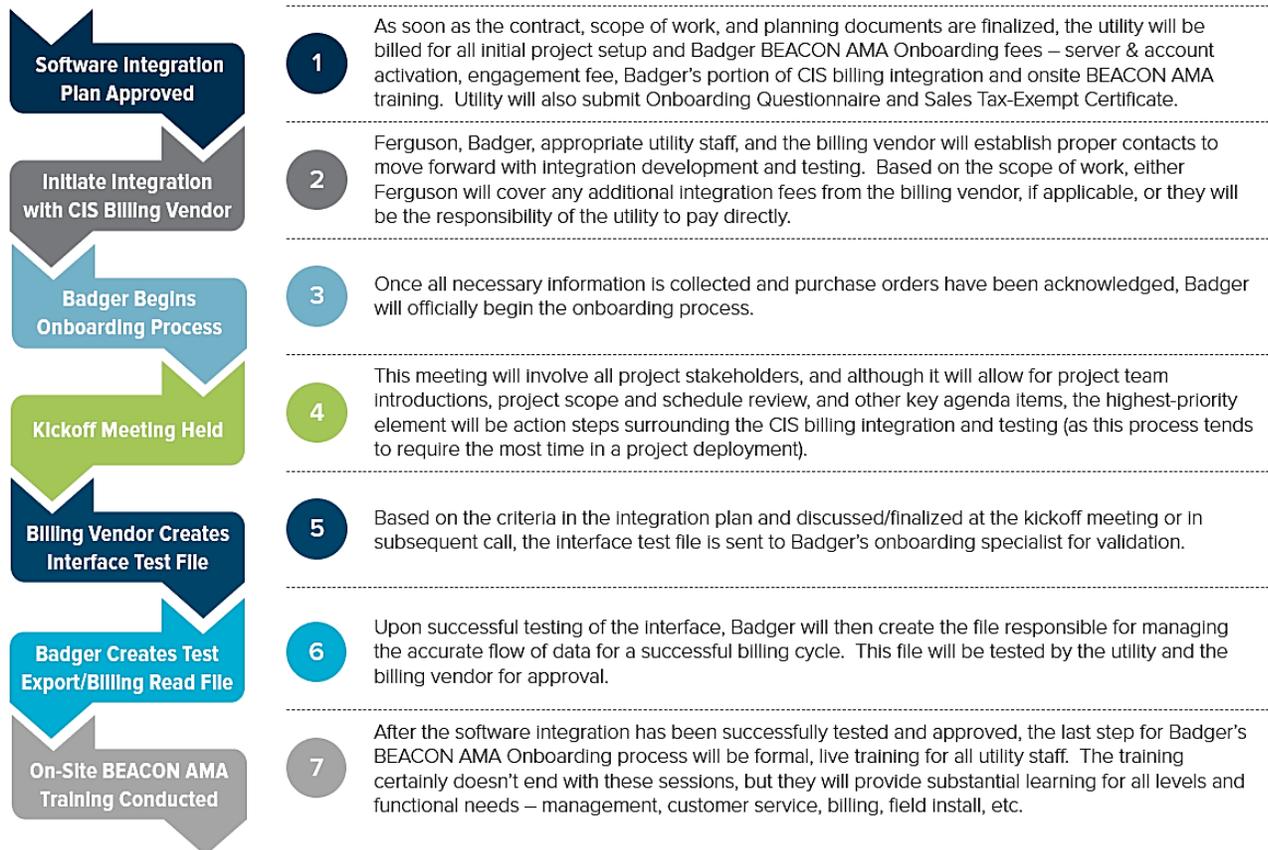
Ferguson and Badger will maintain service and support channels that include remote and on-site visits, depending on the specific issue or need. And both partnered firms utilize automated upgrade and issue resolution tracking applications so that needs beyond the project deployment don't fall through the cracks and are addressed promptly to maintain the highest read-rate success and user confidence.

AMI project lifecycles are like a marriage between a utility and solution provider, so make sure you select a partner that is built for amazing support over the long haul.



## BADGER METER BEACON® AMA ONBOARDING PROCESS

Ferguson is pleased to partner with Badger Meter, as we both strive to incorporate structure and abundant resources towards the management and support of a project. Badger has refined its onboarding process for new cellular AMI customers to ensure success, and we want to share the major elements below. Keep in mind that all these activities will be working concurrently through Ferguson’s project management approach.





## INSTALLATION AND IMPLEMENTATION OF ALL SYSTEM COMPONENTS

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The Badger BEACON® AMA Onboarding process will take care of account activation, hosted server setup with MDMS and Customer Portal software applications, and proper configuration of meter registers if deploying mechanical meters. Apart from National Metering services staff installing and activating each cellular AMI module paired to a meter, there is no additional installation and implementation of system components. No data collectors, no signal repeaters, and both Ferguson and the Town can avoid any concern with providing electrical power to network devices, dealing with easements, permits and other complexities that a fixed network can introduce.

## REMOVAL AND DISPOSITION OF EXISTING METERS

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Ferguson and National Metering Services will be responsible for properly removing and disposing of all old meters and touch-read pads removed from service during the meter swap process. A salvage credit for every removed bronze meter will be applied to the project billing. A breakdown of the credits is clearly provided in the pricing proposals.

Regarding metal pit lids that are being swapped out for new pre-drilled composite lids in our proposal, Ferguson and NMS will return metal lids to a common storage area, approved by the town. Composite (engineered plastic) lids are a requirement by Badger for optimum cellular radio transmission and are a best-practice for all radio-frequency AMI networks in a pit-set meter environment.

## YOUR PROJECT TEAM

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**Bob Johns – Local Municipal Sales**  
*Ferguson Waterworks*

Bob Johns started his career in well drilling in 1979, then became a License Water and Wastewater operator in 1988. Six years later, he joined the Maryland Rural Water staff as a Circuit Rider and later Program Specialist. Bob joined Ferguson in 2002 as an inside sales associate, finally transitioning his vast knowledge and experience into his current outside sales role. Bob also served as Branch Manager for Ferguson’s satellite waterworks branch which was based in Annapolis. Bob covers municipal sales for the Eastern Shore of Maryland, Southern Maryland, and Delaware; and supports a select few plants and contractors within the same footprint. Bob serves on the TRI CON Committee as the Pipe Tapping and Meter Madness Chair along with Exhibit Co-Chair. He is past President of Water and Waste Operators Association of Maryland, Delaware, and District of Columbia (WWOA), and is current Director-Elect for the Central Section of WWOA and Vice President for the Main Body of WWOA.

**Pat Burke – Municipal Sales Manager for VA, MD, DC & NC**  
*Ferguson Waterworks*

Pat Burke started his career with Ferguson in 2006, and quickly climbed to the position of Operations Manager, responsible for logistics across eight branch locations. His unique experience helped promote him to a municipal outside sales position in 2014, covering Northern Virginia, DC, and Maryland west of the Bay Bridge. In 2020, Pat assumed his current role and has taken a lead position for Ferguson nationally regarding a sales and support platform for large private water companies. Pat served on the Maryland Rural Water Board of Directors from 2014-2020, received the National Utility Contractor’s Association of Metro DC “Member of the Year” award, and was presented with a leadership award from the Heavy Contractor’s Association. Pat continues his significant involvement in the industry and speaks at many conferences across the region.

**Patrick Day – Sales Manager**  
*Ferguson Waterworks – Meter & Automation*

Patrick Day joined Ferguson’s Meter and Automation group in 2014, after an extensive career with an international manufacturer and distributor of building products and construction materials. Based in Atlanta, he brings a level of technical expertise to the Ferguson team in the areas of product development, marketing, and training. His focus is on the promotion, sales, and support of Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) solutions for municipalities and water authorities throughout the Southeast and Mid-Atlantic.

**Dustin Julian – AMI Project Manager**  
*Ferguson Waterworks – Meter & Automation*

Dustin Julian started his career at Ferguson in early 2018 as an Integration Specialist within the meter & automation group. He has close to ten years of experience in the water industry, beginning as a meter installation superintendent with American Utility Contractors (AUC). He has a fantastic working knowledge of multiple brands of water meters and AMR/AMI technologies and has personally installed thousands of meters and devices. In his current role as AMI Project Manager, Dustin makes sure every project meets the expectations and measurable objectives established at kickoff. His main duties include:

- Coordination and facilitation of all project activities between the utility, meter and technology vendor and meter installation contractor.
- Oversight of final network design and installation, if required.
- Oversight of meter/endpoint installation and testing for proper data flow.
- Training of utility staff on all aspects of the project (customer service, billing, field, etc.)
- Oversight of the software integration between the meter data management software and the utility’s billing software vendor, plus any additional integrations with automated work order systems, GIS, asset management programs, etc.

Dustin holds the rank of Captain in the Tennessee State Guard and serves as his battalion’s Executive Officer. Additionally, Dustin is a licensed Instructor in First Aid/CPR/Search and Rescue and is a volunteer firefighter.

**Paul Fecht - Account Manager**  
*Badger Meter*

Paul Fecht has been an Account Manager for Badger Meter since 2004, calling on utility customers across the states of Virginia and Maryland including the District of Columbia. Paul has provided expertise and phenomenal support to utilities in the region taking advantage of the extensive product line from Badger Meter. Over the course of his career in the water industry, Paul has partnered with several utilities throughout the eastern United States, providing consultative services on product applications as well as AMR/AMI product selection.

Beyond Paul's sales role, he maintains memberships in several regional organizations including the Virginia American Water Works Association, Chesapeake Section American Water Works Association, Virginia Rural Water and Maryland Rural Water. And he currently holds the title of Trustee for the Virginia AWWA. Paul has a bachelor's degree in Marketing from Virginia Commonwealth University.

# **SECTION 6**

## QUALIFICATIONS AND EXPERIENCE

## SECTION 6 – QUALIFICATIONS AND EXPERIENCE

### HISTORY OF CONTRACTOR

#### ABOUT FERGUSON

Established in 1953 and headquartered in Newport News, Virginia, Ferguson opened with several locations dedicated to servicing smaller plumbing contractors. From this modest start, we raised the bar for industry standards as the top-rated and largest wholesale supplier of commercial and residential plumbing supplies in the U.S. However, our expertise goes beyond plumbing. We are a diverse distributor that spans multiple businesses including HVAC/R, waterworks and industrial. For nearly **70 years**, we've grown from a local plumbing distributor to a **\$23 billion company with more than 1,600 locations and over 31,000 associates** nationwide.



*Ferguson's new corporate campus in Newport News, VA*

On the Waterworks side, your servicing branch in **Salisbury represents just one of roughly 220 Ferguson Waterworks locations** across the nation. We are one of the largest suppliers of water, sewer and storm management products and services to multiple segments of the waterworks sector. We serve public and private water and sewer authorities, residential and commercial utility contractors, and treatment plant contractors.

#### METER AND AUTOMATION GROUP (MAG)

For added expertise around water meters and AMR/AMI technologies, **Ferguson has made a significant investment in creating the Meter and Automation Group**. This substantial investment of human and capital resources has a focus specifically on AMR and AMI project deployment and has allowed us to partner with five of the leading meter manufacturers across the country and claim a leadership position in the sales and service of automated metering and associated technology projects.

#### INDUSTRY LEADER IN AMR/AMI TECHNOLOGY



Dedicated Ferguson AMR/AMI sales, service, and support employees



More than two-million endpoints sold since the year 2000



In-house project management team delivers a variety of water meter installation, testing and system audit services



Project management services for subcontractor installation



Service and support through customized maintenance agreements plus Network as a Service and Metering as a Service models.

## LOCAL PRESENCE, NATIONAL CAPABILITY

Ferguson's branch network for waterworks materials is dedicated to commercial and municipal product and service support. This allows us to maintain additional stocking levels at our meter depots and local branches to ensure that utilities will never have to wait for materials, minimizing the inventory space and cost at the utility. Our well-trained staff will also be able to quickly respond to any issues as they arise, as the success of any AMI system is dependent on solid project experience and support.

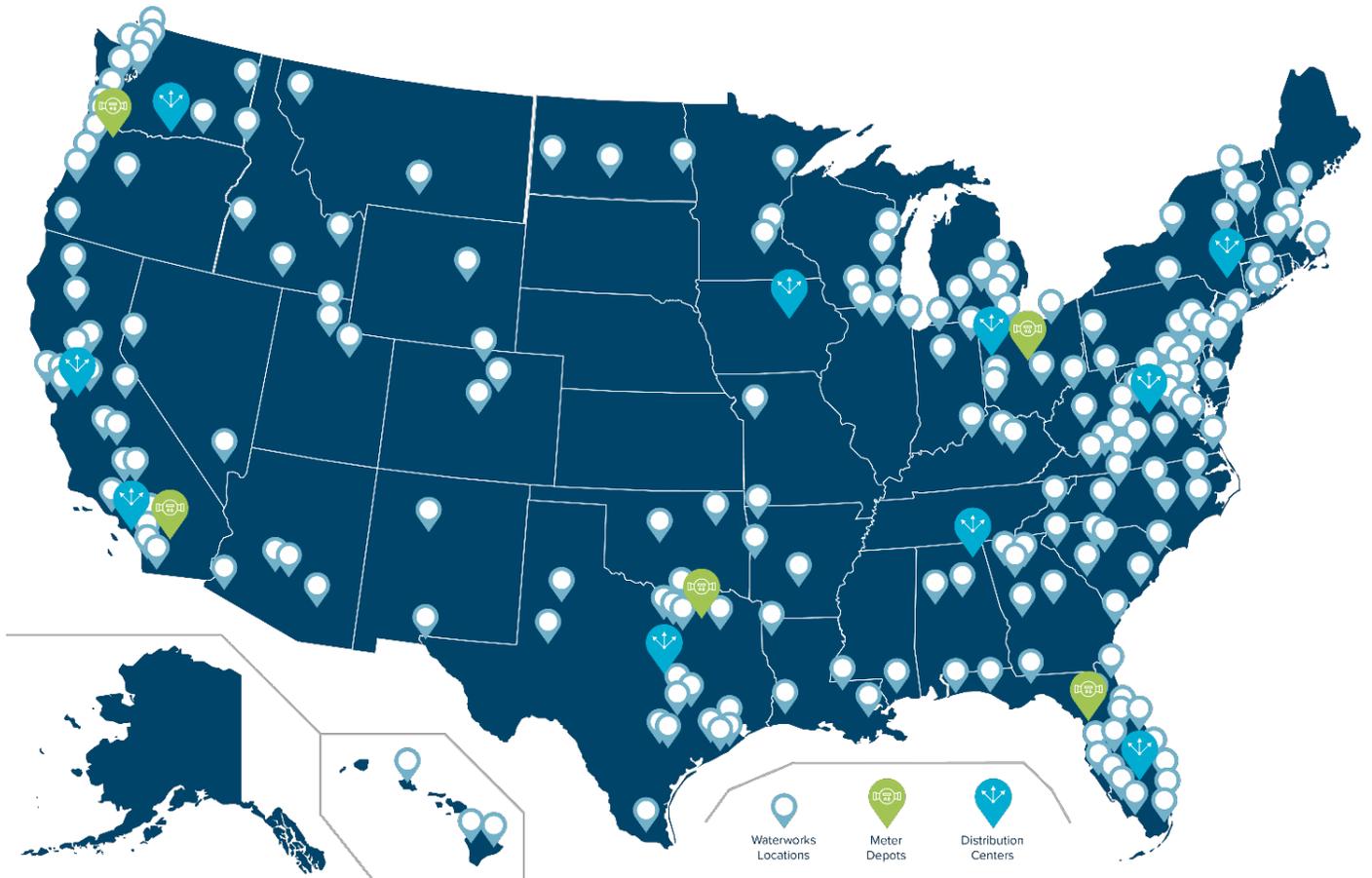
### LOCAL WATERWORKS BRANCHES

- **Ferguson Waterworks – Salisbury, MD**
  - Address: 28596 Naylor Mill Rd, Salisbury, MD 21801
  - Branch Details: Servicing Branch for the Federalsburg AMI Project.
- **Ferguson Waterworks – Upper Marlboro, MD**
  - Address: 8520 Pennsylvania Ave Service Road, Upper Marlboro, MD 20772
- **Ferguson Waterworks – Joppa, MD**
  - Address: 701 Pulaski Highway, Joppa, Maryland 21085
- **Ferguson Waterworks – Frederick, MD**
  - Address: 295 Interstate Circle, Frederick, MD 21704



*Ferguson Waterworks Branch in Salisbury, MD*

Ferguson has a vast nationwide network of distribution centers, which carry millions of dollars of tool and safety inventory. And our **220 Waterworks Locations and 5 Regional Meter Depots** allow us to maintain a dedicated metering inventory, ensuring our AMI customers have reliable access to the products and support they need.



*Map illustrates Ferguson's national support platform.*

## REFERENCES

As Ferguson and Badger Meter have just recently solidified a national, powerful partnership, there are no recent project deployments that feature both the Orion® Cellular AMI system from Badger and the quality project management and long-term system support from Ferguson. Therefore, we have included references for both the AMI system (deployed by other firms) and for Ferguson's project leadership as prime contractor using a previous meter vendor.

### Hooksett Village Water Precinct

7 Riverside St., Hooksett, NH 03106

AMI System Reference

**Contact:** Matt Norris, Assistant Superintendent

**Phone:** (603) 485-3392

**Project Description:** 1,800 accounts, Badger Orion® Cellular, ultrasonic meters, ongoing deployment.

### Cherry Valley & Rochdale Water District

148 Henshaw St., Leicester, MA 01524

AMI System Reference

**Contact:** Ben Morris, Superintendent

**Phone:** 508-892-9616

**Project Description:** 3,200 accounts, Badger Orion® Cellular, ultrasonic meters, ongoing deployment.

### Town of Groton

173 Main St., Groton, MA 01450

AMI System Reference

**Contact:** Tom Orcutt, Water Superintendent

**Phone:** (978) 448-1122

**Project Description:** 1,300 accounts, Badger Orion® Cellular, mechanical positive displacement meters, ongoing deployment.

### City of Fruitland

401 E. Main Street Fruitland, MD 21826

AMI System Reference

**Contact:** Mike Gibbons

**Phone:** (443) 869-0158

**Email:** mgibbons@cityoffruitland.com

**Project Description:** AMI Cellular, 3000 meters, Cellular meter converted long time Badger customer

### Town of Galena

101 S Main St, Galena, MD

AMI System Reference

**Contact:** Kathleen Billmire, Town Facilities

**Phone:** (410) 648-5151 (ext. 305)

**Project Description:** 345 accounts, Mueller Mi.Net AMI Network, ultrasonic meters.

### Shirley Water District

124 Ayer Rd., Shirley, MA 01464

Ferguson Reference

**Contact:** Brian Goodman, Manager

**Phone:** (978) 425-2245

**Project Description:** 1,200 accounts, Badger Orion® Cellular, ultrasonic meters.

### Halifax County Service Authority

2529 Houghton Ave., South Boston, VA 24592

Ferguson Reference

**Contact:** Mark Estes, Executive Director

**Phone:** (434) 575-4240 (ext. 23)

**Project Description:** 4,200 accounts, Mueller Mi.Net AMI Network, mechanical positive displacement meters.

### City of Emporia

1921 Sunnyside Road Emporia, VA 23847

Ferguson Reference

**Contact:** Melvin Prince, Director of Public Works

**Phone:** (434) 594-4067

**Project Description:** 3,200 accounts, Mueller Mi.Net AMI Network, ultrasonic meters.

## HISTORY OF MANUFACTURER

### ABOUT BADGER METER

For over a century, Badger has been a leader in flow measurement technology. **Founded in 1905** and headquartered in Milwaukee, Wisconsin, Badger now employs more than 1,800 people worldwide across its global network of manufacturing facilities, innovation centers, sales offices, and distribution warehouses. Our mission is to provide tools that help water utilities capture revenue, reduce costs, mitigate risk, improve customer satisfaction, enhance sustainability, and optimize assets. With end-to-end solutions ranging from mechanical, electronic, and electromagnetic flow meters to proven meter reading technologies and powerful analytics software, Badger is ideally positioned to be a key partner in helping public and private utilities and municipalities with their water management initiatives.



### Driving Enhancements in Smarter Measurement & Actionable Data → Enhanced Operational Efficiencies

<p><b>Static Metering</b></p> <ul style="list-style-type: none"> <li>• Smarter meters – flow, pressure, temperature, valves</li> <li>• 2<sup>nd</sup> generation platform releases started in 2020</li> <li>• Vertical integration of chip sets in order to control the evolution of smarter devices</li> <li>• Improved accuracies</li> </ul> <p><b>Innovation Centers:</b> Lulea, Sweden Milwaukee, WI, USA</p> 	<p><b>Water Quality</b></p> <ul style="list-style-type: none"> <li>• Low maintenance, reagent-less sensors</li> <li>• Advanced IoT edge computing detects events</li> <li>• 60+ parameters for water and gas</li> <li>• 20+ years of leadership in optical spectrometry, 30+ years in electrochemical</li> </ul> <p><b>Innovation Centers:</b> Vienna, Austria Philadelphia, PA, USA</p> 	<p><b>Cellular &amp; IoT</b></p> <ul style="list-style-type: none"> <li>• 5th generation endpoint released in 2021</li> <li>• 18-24 month iterative development cycles</li> <li>• Pioneer in market; first generation debut was 2014</li> <li>• Millions of cellular endpoints deployed</li> </ul> <p><b>Innovation Center:</b> Milwaukee, WI, USA</p> 	<p><b>Software &amp; Analytics</b></p> <ul style="list-style-type: none"> <li>• Cloud software for utility operations, sustainability</li> <li>• Holistic view of water systems</li> <li>• Real time detection of anomalies and events</li> <li>• Decision dashboards</li> <li>• Process automation</li> </ul> <p><b>Innovation Center:</b> Los Gatos, CA, USA</p> 
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## HISTORY OF SUBCONTRACTOR

### ABOUT NATIONAL METERING SERVICES, INC.

National Metering Services, Inc. (NMS) is one of the premier installation companies in the United States. Starting in the water meter installation business, NMS has grown to include gas and electric installations, as well as using the latest technologies in radio, cellular, AMR, AMI, and Wi-Fi devices.



Their goal is to deliver a professional and cost-effective installation service that will increase accountability, productivity, and efficiency for our customers. As a service company, NMS holds customer satisfaction as their highest priority.

National Metering Services Incorporated, is highly respected in the metering industry. Incorporated in 1995, they have and continue to provide quality service to all of their customers both large and small. NMS are experienced in multiple meter technologies used in residential, commercial, and industrial meter applications. **Principles having a combined industry experience of over 75 years in meter installations and customer service.**

NMS has supporting satellite offices in East Hanover, NJ, Metuchen, NJ, Cinnaminson, NJ, Merrick, NY, Clermont FL, Daytona Beach FL, Vero Beach FL. New York State Certified Meter Testing and Operations Facility is located in Nanuet, NY.

NMS's corporate office and certified meter testing and operations facility is located in Kearny, New Jersey.

- Certified Meter Testing
- Commercial and Residential
- Emergency Services
- Easy online appointment scheduling
- Courteous customer service and support staff
- All NMS Technicians are in uniform with ID, and operating company owned and labeled vehicles.



# **SECTION 7**

## PRODUCT SPECIFICATION SHEETS

**METERS**



**Badger Meter**

## Recordall® Disc Meters

Lead-Free Bronze Alloy, Sizes 5/8, 5/8 x 3/4, 3/4 & 1 inch  
NSF/ANSI Standards 61 and 372 Certified



**Model 25**—5/8 in., 5/8 x 3/4 in.



**Model 35**—3/4 in.



**Model 55**—1 in.



**Model 70**—1 in.

### DESCRIPTION

The Recordall Disc Series meters meet or exceed the most recent revision of AWWA Standard C700 and are available in a lead-free bronze alloy. The meters comply with the lead-free provisions of the Safe Drinking Water Act, are certified to NSF/ANSI Standards 61 and 372 (Trade Designations: M25-LL, M35-LL, M55-LL, M70-LL) and carry the NSF-61 mark on the housing. All components of the lead-free bronze alloy meter (housing, measuring element, seals, and so on) comprise the certified system.

**Applications:** For use in measurement of potable cold water in residential, commercial and industrial services where flow is in one direction only.

**Operation:** Water flows through the meter's strainer and into the measuring chamber where it causes the disc to nutate. The disc, which moves freely, nutates on its own ball, guided by a thrust roller. A drive magnet transmits the motion of the disc to a follower magnet located within the permanently sealed register. The follower magnet is connected to the register gear train. The gear train reduces the disc nutations into volume totalization units displayed on the register or encoder face.

**Operating Performance:** The Recordall Disc Series meters meet or exceed registration accuracy for the low flow rates (95%), normal operating flow rates ( $100 \pm 1.5\%$ ), and maximum continuous operation flow rates as specifically stated in AWWA Standard C700.

**Construction:** Recordall Disc meter construction, which complies with ANSI/AWWA standard C700, consists of three basic components: meter housing, measuring chamber and permanently sealed register or encoder. The meter is available in a lead-free bronze alloy with externally threaded spuds. A corrosion-resistant engineered polymer material is used for the measuring chamber.

**Magnetic Drive:** Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading or AMR/AMI meter reading options.

**Tamper-Proof Features:** Unauthorized removal of the register or encoder is inhibited by the option of a tamper detection seal wire screw, TORX® tamper-resistant seal screw or the proprietary tamper-resistant keyed seal screw. Each can be installed at the meter site or at the factory.

**Maintenance:** Badger Meter Recordall Disc Series meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location.

To simplify maintenance, the register, measuring chamber, and strainer can be replaced without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of parts among like-sized meters and meter models also minimizes spare parts inventory investment. The built-in strainer has an effective straining area of twice the inlet size.

**Connections:** Tailpieces/Unions for installations of meters on various pipe types and sizes, including misaligned pipes, are available as an option.

### Meter Spud and Connection Sizes

Model	Size Designation (in.)	×	"L" Laying Length (in.)	"B" Bore Dia. (in.)	Coupling Nut and Spud Thread (in.)	Tailpiece Pipe Thread (NPT) (in.)
25	5/8	×	7-1/2	5/8	3/4 (5/8)	1/2
	5/8 x 3/4	×	7-1/2	5/8, 3/4	1 (3/4)	3/4
35	3/4	×	7-1/2	3/4	1 (3/4)	3/4
	3/4	×	9	3/4	1 (3/4)	3/4
	3/4 x 1	×	9	3/4	1-1/4 (1)	1
55	1	×	10-3/4	1	1-1/4 (1)	1
70	1	×	10-3/4	1	1-1/4 (1)	1

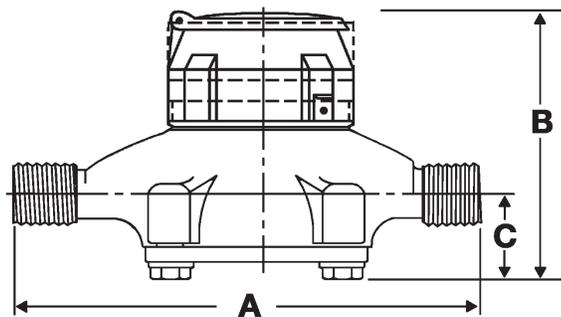
## SPECIFICATIONS

	<b>Model 25</b> <b>(5/8 in. &amp; 5/8 x 3/4 in.)</b>	<b>Model 35</b> <b>(3/4 in.)</b>	<b>Model 55</b> <b>(1 in.)</b>	<b>Model 70</b> <b>(1 in.)</b>
<b>Typical Operating Range</b> <b>(100% ±1.5%)</b>	0.5...25 gpm (0.11...5.7 m <sup>3</sup> /hr)	0.75...35 gpm (0.17...7.9 m <sup>3</sup> /hr)	1...55 gpm (0.23...12.5 m <sup>3</sup> /hr)	1.25...70 gpm (0.28...16 m <sup>3</sup> /hr)
<b>Low Flow</b>	0.25 gpm (0.057 m <sup>3</sup> /hr) Min. 98.5%	0.375 gpm (0.085 m <sup>3</sup> /hr) Min. 97%	0.5 gpm (0.11 m <sup>3</sup> /hr) Min. 95%	0.75 gpm (0.17 m <sup>3</sup> /hr) Min. 95%
<b>Maximum Continuous Operation</b>	15 gpm (3.4 m <sup>3</sup> /hr)	25 gpm (5.7 m <sup>3</sup> /hr)	40 gpm (9.1 m <sup>3</sup> /hr)	50 gpm (11.3 m <sup>3</sup> /hr)
<b>Pressure Loss at Maximum Continuous Operation</b>	<b>5/8 in. size:</b> 3.5 psi @ 15 gpm (0.24 bar @ 3.4 m <sup>3</sup> /hr) <b>5/8 x 3/4 in. size:</b> 2.8 psi @ 15 gpm (0.19 bar @ 3.4 m <sup>3</sup> /hr)	5 psi @ 25 gpm (0.37 bar @ 5.7 m <sup>3</sup> /hr)	3.4 psi @ 40 gpm (0.23 bar @ 9.1 m <sup>3</sup> /hr)	6.5 psi @ 50 gpm (0.45 bar @ 11.3 m <sup>3</sup> /hr)
<b>Maximum Operating Temperature</b>	80° F (26° C)			
<b>Maximum Operating Pressure</b>	150 psi (10 bar)			
<b>Measuring Element</b>	Nutating disc, positive displacement			
<b>Meter Connections</b>	<i>Available in NL bronze and engineered polymer to fit spud thread bore diameter sizes:</i>			
	<b>5/8 in. size:</b> 5/8 in. (DN 15 mm) <b>5/8 x 3/4 in. size:</b> 3/4 in. (DN 15 mm)	3/4 in. (DN 20 mm)	1 in. (DN 25 mm)	1 in. (DN 25 mm)

## MATERIALS

	<b>Model 25</b> <b>(5/8 in. &amp; 5/8 x 3/4 in.)</b>	<b>Model 35</b> <b>(3/4 in.)</b>	<b>Model 55</b> <b>(1 in.)</b>	<b>Model 70</b> <b>(1 in.)</b>
<b>Meter Housing</b>	Lead-free bronze alloy			
<b>Housing Bottom Plates</b>	Cast iron, lead-free bronze alloy, engineered polymer	Cast iron, lead-free bronze alloy		
<b>Measuring Chamber</b>	Engineered polymer			
<b>Disc</b>	Engineered polymer			
<b>Trim</b>	Stainless steel			
<b>Strainer</b>	Engineered polymer			
<b>Disc Spindle</b>	Stainless steel	Stainless steel	Engineered polymer	Stainless steel
<b>Magnet</b>	Ceramic	Ceramic	Ceramic	Ceramic
<b>Magnet Spindle</b>	Engineered polymer	Stainless steel	Engineered polymer	Stainless steel
<b>Register Lid and Shroud</b>	Engineered polymer, bronze			

## DIMENSIONS



Meter Size	Model	A Laying Length	B Height Reg.	C Centerline Base	Width	Approx. Shipping Weight
5/8 in. (15 mm)	25	7-1/2 in. (190 mm)	4-15/16 in. (125 mm)	1-11/16 in. (42 mm)	4-1/4 in. (108 mm)	4-1/2 lb (2 kg)
5/8 in. x 3/4 in. (15 mm)		7-1/2 in. (190 mm)	4-15/16 in. (125 mm)	1-11/16 in. (42 mm)	4-1/4 in. (108 mm)	4-1/2 lb (2 kg)
3/4 in. (20 mm)	35	7-1/2 in. (190 mm)	5-1/4 in. (133 mm)	1-5/8 in. (41 mm)	5 in. (127 mm)	5-1/2 lb (2.5 kg)
3/4 in. (20 mm)		9 in. (229 mm)	5-1/4 in. (133 mm)	1-5/8 in. (41 mm)	5 in. (127 mm)	5-3/4 lb (2.6 kg)
3/4 in. x 1 in. (20 mm)		9 in. (229 mm)	5-1/4 in. (133 mm)	1-5/8 in. (41 mm)	5 in. (127 mm)	6 lb (2.7 kg)
1 in. (25 mm)	55	10-3/4 in. (273 mm)	6 in. (152 mm)	2-1/32 in. (52 mm)	6-1/4 in. (159 mm)	8-3/4 lb (3.9 kg)
1 in. (25 mm)	70	10-3/4 in. (273 mm)	6-1/2 in. (165 mm)	2-5/16 in. (59 mm)	7-3/4 in. (197 mm)	11-1/2 lb (5.2 kg)

## REGISTERS / ENCODERS

### Standard—Sweep-Hand Registration

The standard register is a straight-reading, permanently sealed magnetic drive register. Dirt, moisture, tampering and lens fogging problems are eliminated. The register has a six-odometer wheel totalization display, 360° test circle with center sweep hand, and flow finder to detect leaks. Register gearing is made of self-lubricating engineered polymer, which minimizes friction and provides long life. The multi-position register simplifies meter installation and reading. The register capacity is 10,000,000 gallons (1,000,000 ft<sup>3</sup>, 100,000 m<sup>3</sup>).

A Model 25 register is used in the following example:



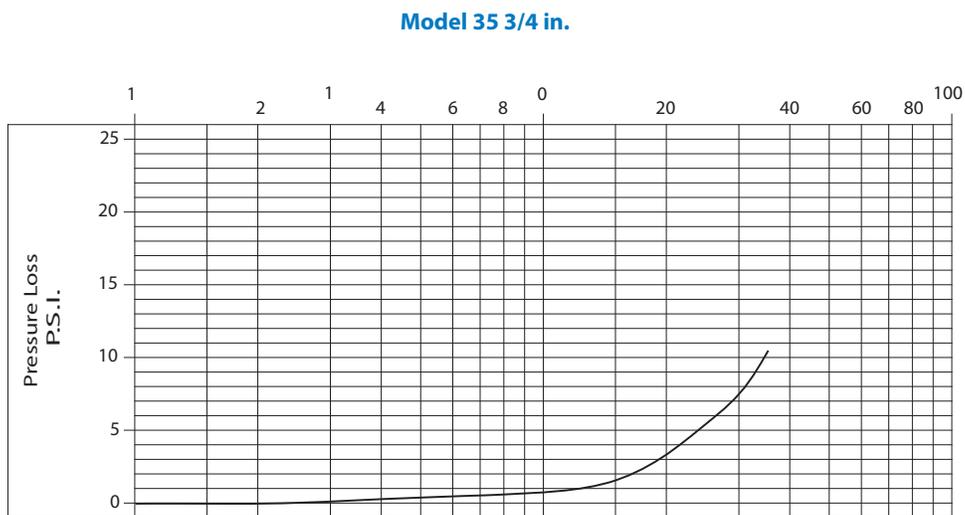
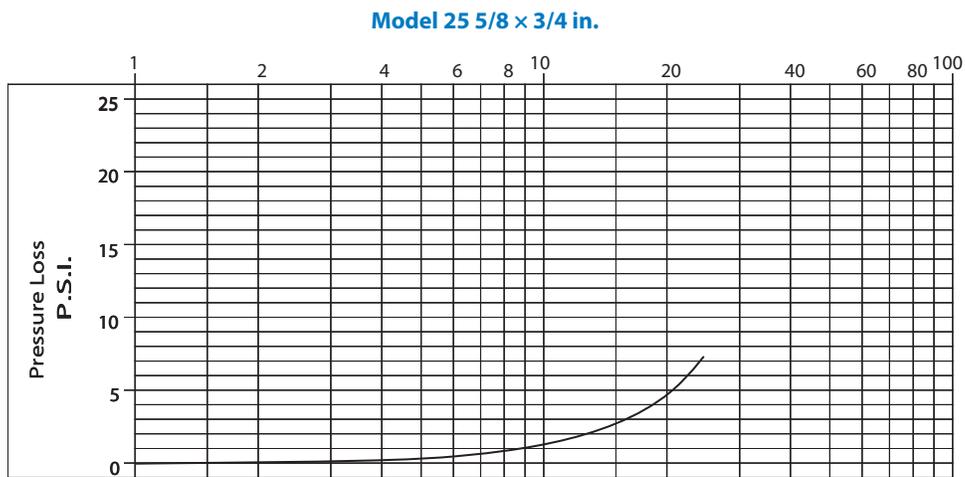
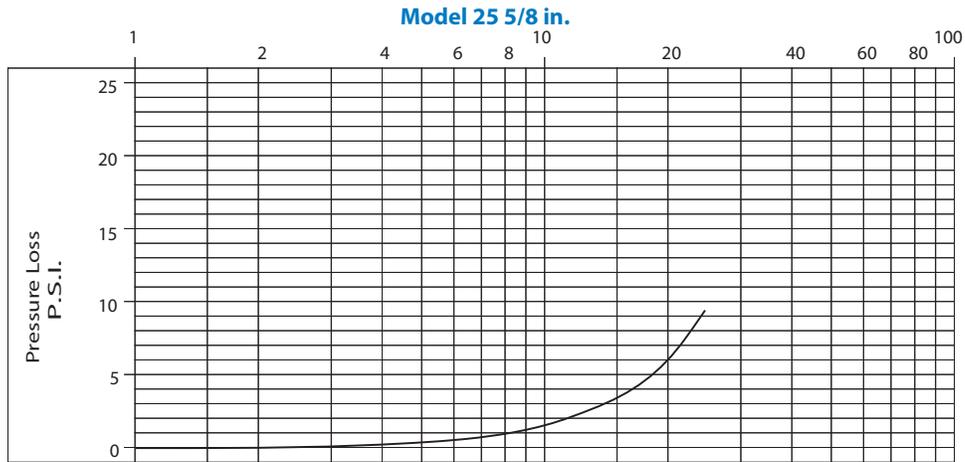
Model	Gallon	Cubic Feet	Cubic Meter
25 (5/8 in.)	10	1	0.1/0.01
25 (5/8 x 3/4 in.)	10	1	0.1/0.01
35	10	1	0.1
55	10	1	0.1
70	10	1	0.1

### Optional—Encoders for AMR/AMI Reading Solutions

AMR/AMI solutions are available for all Recordall Disc Series meters. All reading options can be removed from the meter without disrupting water service. Badger Meter encoders provide years of reliable, accurate readings for a variety of applications. See details at [www.badgermeter.com](http://www.badgermeter.com).

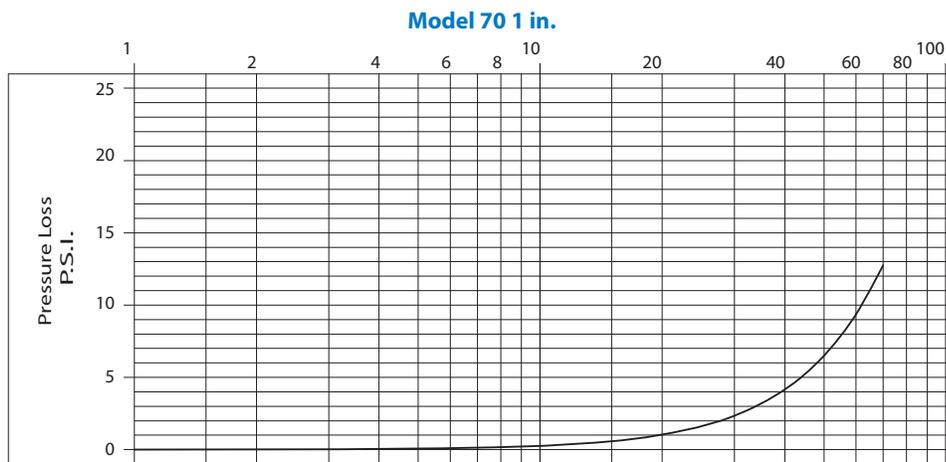
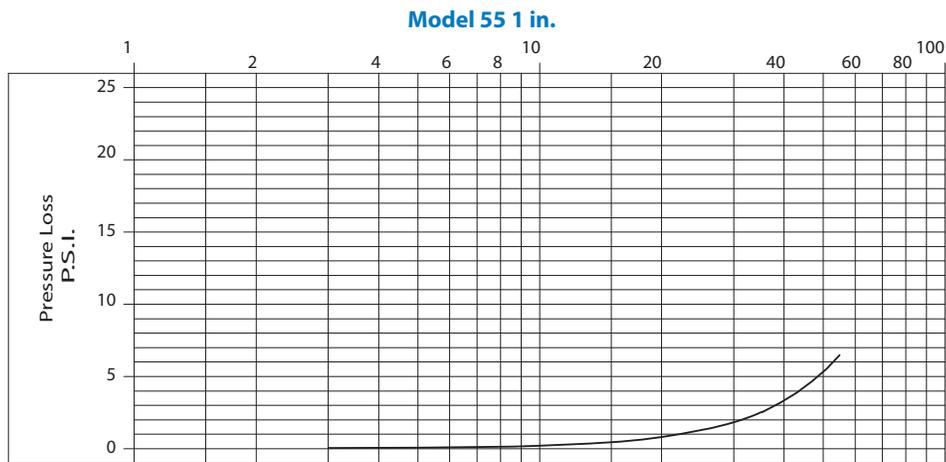
**PRESSURE LOSS CHARTS**

Rate of Flow in Gallons per Minute



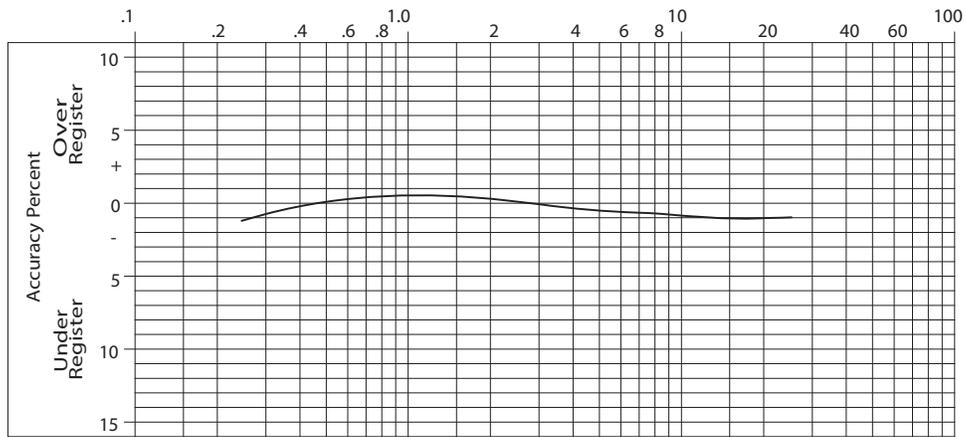
**PRESSURE LOSS CHARTS (CONTINUED)**

Rate of Flow in Gallons per Minute

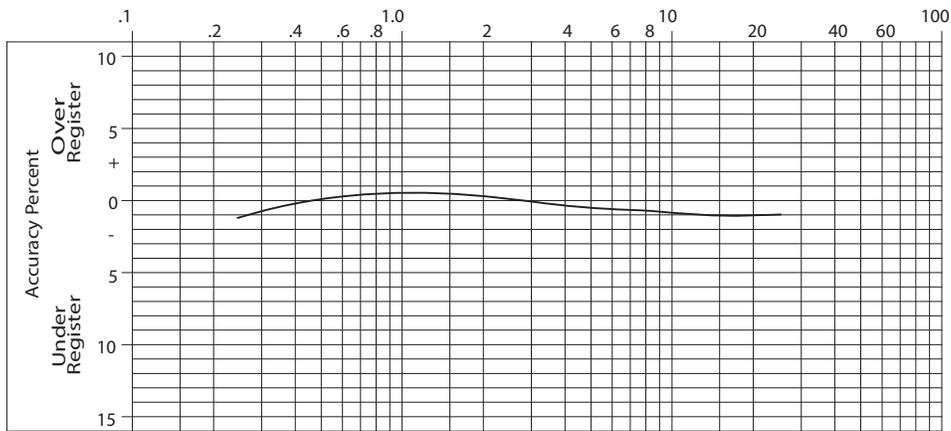


## ACCURACY CHARTS

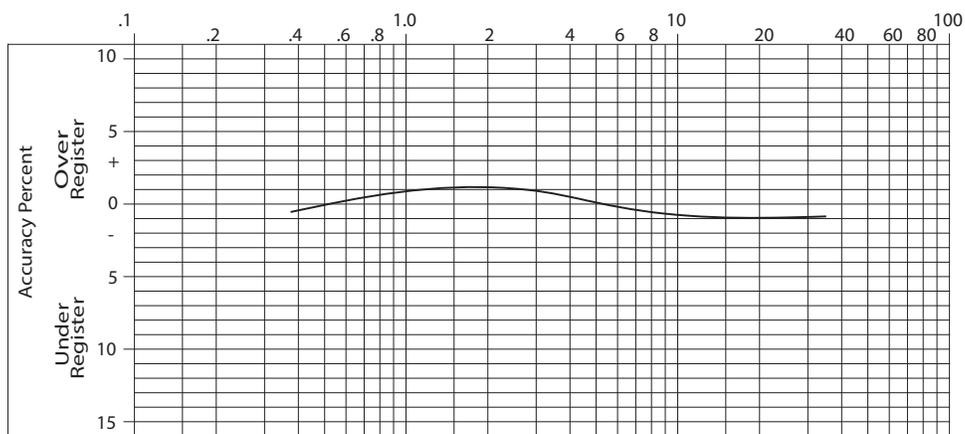
**Model 25 5/8 in.**



**Model 25 5/8 x 3/4 in.**

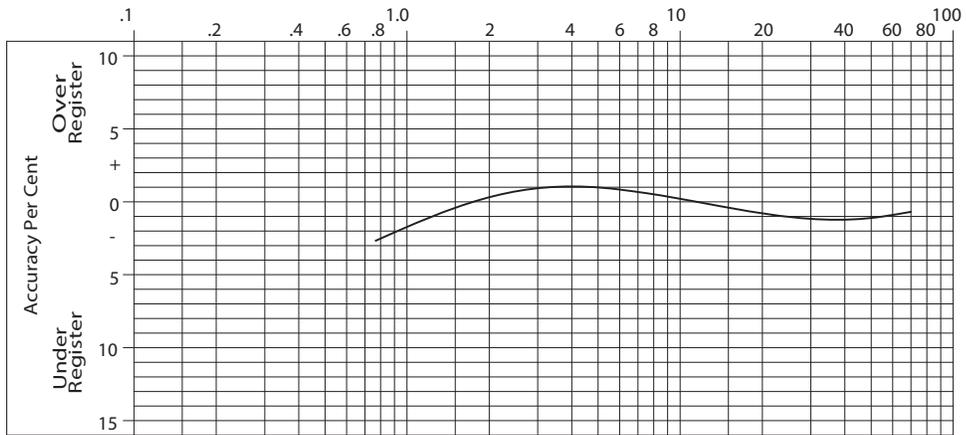


**Model 35 3/4 in.**

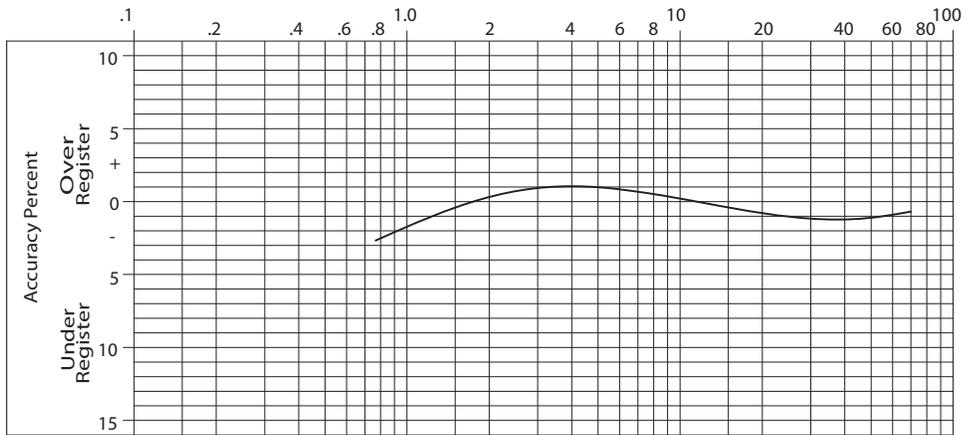


ACCURACY CHARTS (CONTINUED)

Model 55 1 in.



Model 70 1 in.





**Badger Meter**

## E-Series® Ultrasonic Meter

Cold Water Stainless Steel Meter, 1-1/2 and 2 inch

### DESCRIPTION

The E-Series® Ultrasonic meter uses solid-state technology in a compact, totally encapsulated, weatherproof, and UV-resistant housing, suitable for residential and commercial applications. Electronic metering provides information—such as rate of flow and reverse flow indication—and data not typically available through traditional, mechanical meters and registers. Electronic metering eliminates measurement errors due to sand, suspended particles and pressure fluctuations.

#### The Ultrasonic 1-1/2 and 2 inch meters feature:

- Minimum extended low-flow rate lower than typical positive displacement meters.
- Simplified one-piece electronic meter and register that are integral to the meter body and virtually maintenance free.
- Sealed, non-removable, tamper-protected meter and register.
- Easy-to-read, 9-digit LCD display presents consumption, rate of flow, reverse-flow indication, and alarms.
- High resolution industry standard ASCII encoder protocol.

The Ultrasonic meter is available with an in-line connector for easy connection and installation to AMR/AMI endpoints. It is also available with a flying lead for field splice connection.

### APPLICATIONS

Use the Ultrasonic meter for measuring potable cold water in residential, commercial and industrial services. The meter is also ideal for non-potable, reclaimed irrigation water applications or less than optimum water conditions where small particles exist.

E-Series Ultrasonic meters meet and exceed ANSI/AWWA C715 standards. The meters comply with the lead-free provisions of the Safe Drinking Water Act, are certified to NSF/ANSI Standards 61 and 372 and carry the NSF-61 mark on the housing.

### OPERATION & PERFORMANCE

As water flows into the measuring tube, ultrasonic signals are sent consecutively in forward and reverse directions of flow. Velocity is then determined by measuring the time difference between the measurement in the forward and reverse directions. Total volume is calculated from the measured flow velocity using water temperature and pipe diameter. The LCD display shows total volume and alarm conditions and can toggle to display rate of flow.



In the normal temperature range of 45...122° F (7...50° C), the Ultrasonic “new meter” consumption measurement is accurate to:

- $\pm 1.5\%$  over the normal flow range
- $\pm 3.0\%$  from the extended low flow range to the minimum flow value

### CONSTRUCTION

E-Series Ultrasonic meters feature a stainless steel, lead-free meter housing, an engineered polymer and stainless steel metering insert, a meter-control circuit board with associated wiring, LCD, and battery. Wetted elements are limited to the pressure vessel, the polymer/stainless steel metering insert and the transducers. The electronic components are housed and fully potted within a molded, engineered polymer enclosure, which is permanently attached to the meter housing. The transducers extend through the stainless steel housing and are sealed by O-rings.

The metering insert holds the stainless steel ultrasonic reflectors in the center of the flow area, enabling turbulence-free water flow through the tube and around the ultrasonic signal reflectors. The metering insert's patented design virtually eliminates chemical buildup on the reflectors, ensuring long-term metering accuracy.

### METER INSTALLATION

The meter is completely submersible and can be installed using horizontal or vertical piping, with flow in the up direction. The meter will not measure flow when an “empty pipe” condition is experienced. An empty pipe is defined as a condition that occurs when the flow sensors are not fully submerged.

## SPECIFICATIONS

E-Series Ultrasonic Meter Size	1-1/2 in. (40 mm)	2 in. (50 mm)
<b>Normal Test Flow Limits</b>	1.25...100 gpm (0.28...22.7 m <sup>3</sup> /hr)	1.5...160 gpm (0.34...36.3 m <sup>3</sup> /hr)
<b>Minimum Test Flow Limits</b>	0.40 gpm (0.09 m <sup>3</sup> /hr)	0.50 gpm (0.11 m <sup>3</sup> /hr)
<b>Safe Maximum Operating Condition (SMOC)</b>	100 gpm (22.7 m <sup>3</sup> /hr)	160 gpm (36.3 m <sup>3</sup> /hr)
<b>Typical Pressure Loss</b>	3.8 psi (0.26 bar)	5.2 psi (0.36 bar)
<b>Reverse Flow – Maximum Rate</b>	12 gpm (2.73 m <sup>3</sup> /hr)	18 gpm (4.09 m <sup>3</sup> /hr)
<b>Operating Performance</b>	In the normal temperature range of 45...122° F (7...50° C), new meter consumption measurement is accurate to: <ul style="list-style-type: none"> <li>• ±1.5% over the normal flow range</li> <li>• ±3.0% from the extended low flow range to the minimum flow value</li> </ul>	
<b>Storage Temperature</b>	– 40...140° F (– 40...60° C)	
<b>Maximum Ambient Storage (Storage for One Hour)</b>	150° F (66° C)	
<b>Measured-Fluid Temperature Range</b>	34...140° F (1...60° C)	
<b>Humidity</b>	0...100% condensing; meter is capable of operating in fully submerged environments	
<b>Maximum Operating Pressure of Meter Housing</b>	175 psi (12 bar)	
<b>Register Type</b>	Straight reading, permanently sealed electronic LCD; digits are 0.28 in. (7 mm) high	
<b>Register Display</b>	<ul style="list-style-type: none"> <li>• Consumption (up to nine digits)</li> <li>• Rate of flow</li> <li>• Alarms</li> <li>• Unit of measure factory programmed for gallons, cubic feet and cubic meters</li> </ul>	
<b>Register Capacity</b>	<ul style="list-style-type: none"> <li>• 100,000,000 gallons</li> <li>• 10,000,000 cubic feet</li> <li>• 1,000,000 cubic meters</li> </ul>	
<b>Totalization Display Resolution</b>	<ul style="list-style-type: none"> <li>• Gallons: 0.X</li> <li>• Cubic feet: 0.XX</li> <li>• Cubic meters: 0.XXX</li> </ul>	
<b>Battery</b>	3.6-volt lithium thionyl chloride; battery is fully encapsulated within the register housing and is not replaceable; 20-year battery life	

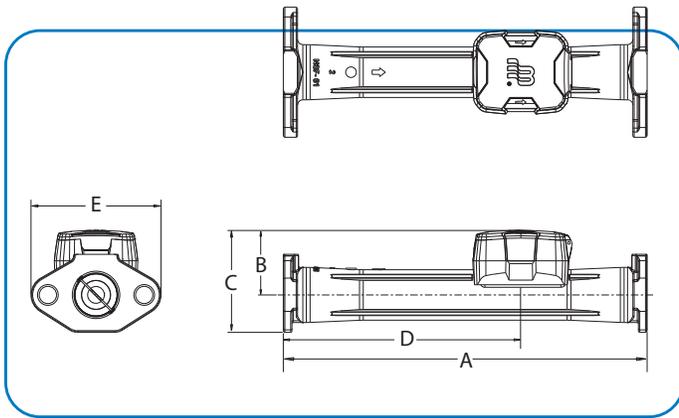
## MATERIALS

<b>Meter Housing</b>	316 stainless steel
<b>Measuring Element</b>	Pair of ultrasonic sensors located in the flow tube
<b>Register Housing &amp; Lid</b>	Engineered polymer
<b>Metering Insert</b>	Engineered polymer & stainless steel
<b>Transducers</b>	Piezo-ceramic device with wetted surface of stainless CrNiMo

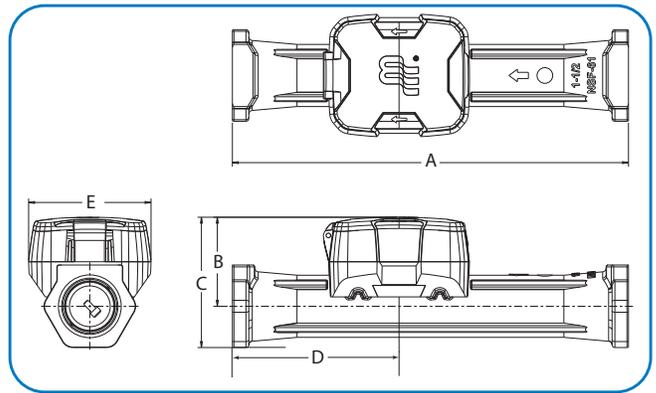
## PHYSICAL DIMENSIONS

E-Series Ultrasonic Meter Size	1-1/2 in. (40 mm)	1-1/2 in. (40 mm)	2 in. (50 mm)	2 in. (50 mm)
<b>Housing</b>	<b>Elliptical</b>	<b>HEX</b>	<b>Elliptical</b>	<b>HEX</b>
<b>Size Designation X Lay Length</b>	1-1/2 x 13 in. (38 x 330 mm)	1-1/2 x 12.62 in. (38 x 321 mm)	2 x 17 in. (51 x 432 mm)	2 x 15.25 in. (51 x 387 mm)
<b>Weight (without AMR)</b>	8.2 lb (3.7 kg)	6.5 lb (2.9 kg)	11.9 lb (5.4 kg)	8.9 lb (4.0 kg)
<i>See illustration below for Measurement Designations.</i>				
<b>Length (A)</b>	13 in. (330 mm)	12.62 in. (321 mm)	17 in. (432 mm)	15.25 in. (387 mm)
<b>Height (B)</b>	2.80 in. (71 mm)	2.84 in. (72 mm)	3.01 in. (77 mm)	3.06 in. (78 mm)
<b>Height (C)</b>	4.55 in. (116 mm)	4.15 in. (105 mm)	4.76 in. (121 mm)	4.68 in. (119 mm)
<b>Length (D)</b>	7.10 in. (180 mm)	5.31 in. (135 mm)	11.10 in. (282 mm)	5.05 in. (128 mm)
<b>Width (E)</b>	5.50 in. (140 mm)	3.90 in. (99 mm)	6.08 in. (154 mm)	3.90 in. (99 mm)
<b>Bore Size</b>	1-1/2 in. (40 mm)	1-1/2 in. (40 mm)	2 in. (51 mm)	2 in. (51 mm)
<b>Two-Bolt Elliptical Flange (AWWA)</b>	1-1/2 in. (40 mm)	—	2 in. (51 mm)	—
<b>Bolt Hole Diameter</b>	0.69 in. (17.53 mm)	—	0.81 in. (20.57 mm)	—
<b>Companion Flange</b>	1-1/2 in. (40 mm)	—	2 in. (51 mm)	—
<b>Internal Thread Size</b>	—	1-1/2 in. NPT	—	2 in. NPT

### Elliptical Measurement Designations

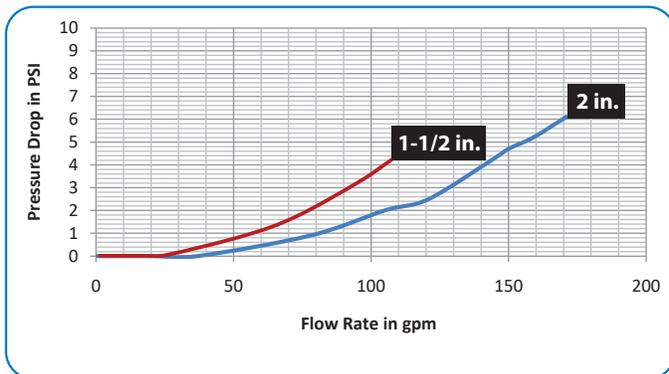


### HEX Measurement Designations



## PRESSURE LOSS CHART

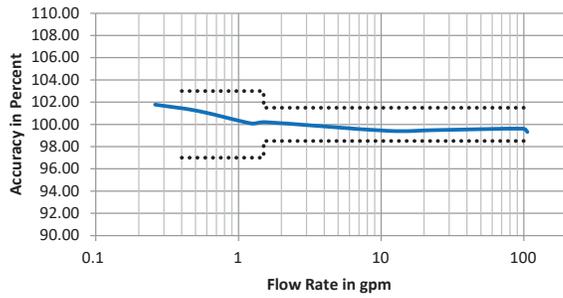
Flow rate in Gallons Per Minute (gpm)



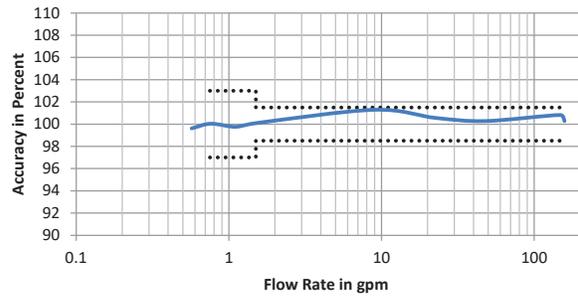
## ACCURACY CHARTS

Rate of Flow in gallons per minute (gpm)

1-1/2 in. Meter



2 in. Meter



## SMART WATER IS BADGER METER

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### DESCRIPTION

The next generation E-Series® G2 Ultrasonic meter uses solid-state technology in a compact, tamper protected, weatherproof and UV-resistant housing, suitable for commercial applications. Electronic metering provides information—such as rate of flow and status and alarm indication—and data not typically available through traditional, mechanical meters and registers. Electronic metering minimizes measurement errors due to sand, suspended particles and pressure fluctuations.

#### Ultrasonic 3, 4, 6 and 8 inch Meter Features

- Open flow tube design prevents flow obstruction to reduce pressure loss
- Greater turn-down ratio for extended flow ranges and increased revenue
- Easy-to-read, 9-digit LCD display, which presents consumption, rate of flow, unit of measure, pressure, temperature, alarm conditions and firmware version
- Pressure alarm and pressure and temperature data reported through ORION Cellular LTE-M/LTE endpoints and BEACON®
- Field programmable registration and reporting features
- Meter designed for replaceable electronics
- Single and dual outputs include high resolution industry standard ASCII encoder protocol, scaled/unscaled and 4-20 mA

The meter is available with an inline connector for easy connection and installation to ORION endpoints. It is also available with a flying lead for field splice connection.

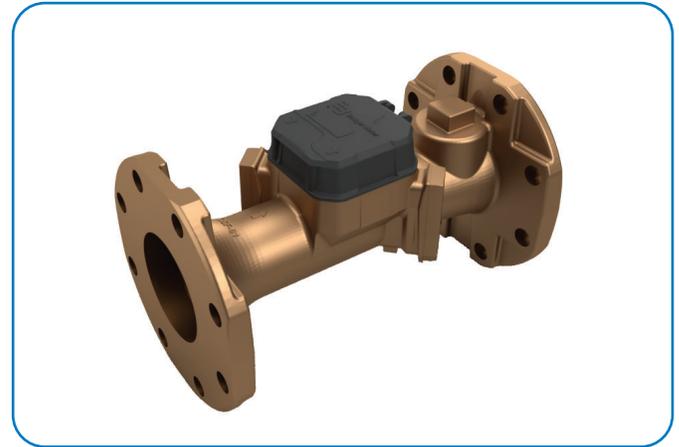
### APPLICATIONS

Use the E-Series Ultrasonic meter for measuring potable cold water in commercial and industrial services. The meter is also ideal for non-potable, reclaimed irrigation water applications or less than optimum water conditions where small particles exist.

E-Series Ultrasonic meters meet and exceed AWWA C715 and the most recent revision of AWWA C750 Standards. The lead-free bronze alloy meters comply with the lead-free provisions of the Safe Drinking Water Act and NSF/ANSI/CAN Standards 61 and 372. E-Series Ultrasonic meters also conform to UL 327B and FM 1044 for fire service applications.

### OPERATION & PERFORMANCE

As water flows into the measuring tube, ultrasonic signals are sent consecutively in forward and reverse directions of flow. Velocity is then determined by measuring the time difference between the measurement in the forward and reverse directions. Total volume is calculated from the measured flow velocity using water temperature and pipe diameter. The LCD shows total volume, unit of measure, rate of flow, pressure, temperature, firmware and



alarm conditions (reverse-flow, no usage, empty pipe, exceeding max flow, suspected leak, pressure, temperature, end of life and measurement error).

In normal temperature range of 45...122° F (7...50° C), the Ultrasonic “new meter” consumption measurement is accurate to:

- $\pm 1.5\%$  over the normal flow range
- $\pm 3.0\%$  from the extended low flow range to the minimum flow value

### CONSTRUCTION

The E-Series Ultrasonic meter features lead-free bronze alloy meter housing, ultrasonic transducers, a meter-control circuit board with associated wiring, LCD and battery. Wetted elements are limited to the pressure vessel and transducers. The electronic components are housed and fully potted within a molded, engineered polymer enclosure, which is attached to the meter housing. The transducers extend through the housing and are sealed by O-rings, enabling turbulence-free water flow through the tube. The open flow tube design prevents obstruction of flow to reduce pressure loss and provide long-term accuracy.

### METER INSTALLATION

For long-term performance the meter is weatherproof, UV-resistant, fully submersible and can be installed using horizontal or vertical piping. The registration electronics and battery are encapsulated to withstand harsh environments and protect the electronics in flooded or submerged pit applications. The meter will not measure flow when an “empty pipe” condition is experienced. An empty pipe is defined as a condition that occurs when the flow sensors are not fully submerged.



## SPECIFICATIONS

E-Series G2 Ultrasonic Meter Size	3 in.		4 in.		6 in.		8 in.
	3 × 12 in. (76 × 305 mm)	3 × 17 in. (76 × 432 mm)	4 × 14 in. (102 × 356 mm)	4 × 20 in. (102 × 508 mm)	6 × 18 in. (152 × 457 mm)	6 × 24 in. (152 × 610 mm)	8 × 20 in. (203 × 508 mm)
<b>Normal Test Flow Limits</b>	0.75...560 gpm		1.5...1100 gpm		2.2...2000 gpm		4...3500 gpm
<b>Minimum Test Flow Limits</b>	0.37 gpm		0.75 gpm		1.1 gpm		2.0 gpm
<b>Safe Maximum Operating Condition (SMOC)</b>	560 gpm		1100 gpm		2000 gpm		3500 gpm
<b>Typical Pressure Loss</b>	2.6 psi @ 350 gpm		2.1 psi @ 630 gpm		1.5 psi @ 1400 gpm	1.8 psi @ 1400 gpm	2.4 psi @ 2800 gpm
<b>Totalization Display Resolution</b>	3 inch and 4 inch meters <ul style="list-style-type: none"> <li>Gallons: 0.1</li> <li>Cubic feet: 0.01</li> <li>Cubic meters: 0.001</li> </ul>				6 inch and 8 inch meters <ul style="list-style-type: none"> <li>Gallons: 1.0</li> <li>Cubic feet: 0.1</li> <li>Cubic meters: 0.01</li> </ul>		
<b>Operating Performance</b>	In normal temperature range of 45...122° F (7...50° C), new meter consumption measurement is accurate to: <ul style="list-style-type: none"> <li>100% ±1.5% over the normal test flow limits</li> <li>100% ±3.0% for the minimum test flow limits</li> </ul>						
<b>Storage Temperature</b>	- 40...140° F (- 40...60° C)						
<b>Maximum Ambient Storage (Storage for One Hour)</b>	150° F (66° C)						
<b>Measured Fluid Temperature Range</b>	34...140° F (1...60° C) .						
<b>Humidity</b>	0...100% condensing; meter is capable of operating in fully submerged environments						
<b>Maximum Working Pressure of Meter Housing</b>	175 psi (12 bar)						
<b>Maximum Operating Pressure of Pressure Sensor</b>	150 psi (10 bar)						
<b>Pressure Sensor Accuracy</b>	±2% of full scale pressure, up to 150 psi (10 bar)						
<b>Register Type</b>	Straight reading, permanently sealed electronic LCD; digits are 0.28 in. (7 mm) high						
<b>Register Display</b>	<ul style="list-style-type: none"> <li>Consumption (up to nine digits)</li> <li>Rate of flow</li> <li>Alarms</li> <li>Pressure</li> </ul>				<ul style="list-style-type: none"> <li>Temperature</li> <li>Firmware version</li> <li>Unit of measure factory programmed for gallons, cubic feet and cubic meters</li> </ul>		
<b>Scaled/Unscaled Output*</b>	Solid-state relay with 4-20mA output; open drain MOSFET with encoder output						
Max. Voltage	30V DC						
Current	100 mA						
Pulse Width	50 ms (programmable 30...100 ms)						
<b>Analog 4-20 mA Output*</b>	Two-wire/passive						
Input Voltage Range	9...50V DC supply						
Current	4...20 mA						
Max. Load Resistance (Ohms)	50 Ohms + 50 Ohms (supply voltage - 9V)						
<b>Battery</b>	3.6-volt lithium thionyl chloride; battery is fully encapsulated within the register housing and is not replaceable; 10-year battery life						

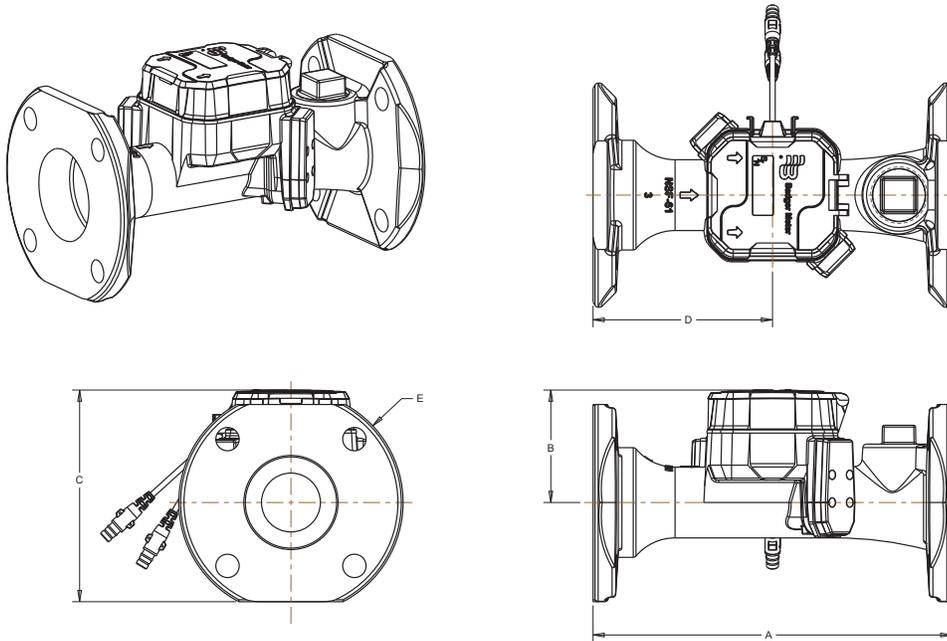
**NOTE:** See Pressure Loss Chart on [page 4](#) for typical pressure loss over complete UL 327B flow range.

\* Applicable to meters with dual output options

**PHYSICAL DIMENSIONS**

E-Series G2 Ultrasonic Meter Size	3 in.		4 in.		6 in.		8 in.
	Round	Round	Round	Round	Round	Round	Round
<b>Size Designation X Lay Length</b>	3 × 12 in. (76 × 305 mm)	3 × 17 in. (76 × 432 mm)	4 × 14 in. (102 × 356 mm)	4 × 20 in. (102 × 508 mm)	6 × 18 in. (152 × 457 mm)	6 × 24 in. (152 × 610 mm)	8 × 20 in. (203 × 508 mm)
<b>Weight (without AMR)</b>	26 lb (11.8 kg)	28.5 lb (12.9 kg)	38 lb (17.2 kg)	42 lb (19.1 kg)	59 lb (26.8 kg)	66 lb (29.9 kg)	96 lb (43.5 kg)
<i>See illustration below for Measurement Designations</i>							
<b>Length (A)</b>	12 in. (305 mm)	17 in. (432 mm)	14 in. (356 mm)	20 in. (508 mm)	18 in. (457 mm)	24 in. (610 mm)	20 in. (508 mm)
<b>Height (B)</b>	3.76 in. (95 mm)	3.76 in. (95 mm)	3.99 in. (101 mm)	3.99 in. (101 mm)	5.15 in. (131 mm)	5.15 in. (131 mm)	6.49 in. (165 mm)
<b>Height (C)</b>	7.08 in. (180 mm)	7.08 in. (180 mm)	8.5 in. (216 mm)	8.5 in. (216 mm)	10.36 in. (263 mm)	10.36 in. (263 mm)	13.05 in. (331 mm)
<b>Height with Lifting Ring</b>	NA	NA	NA	NA	12.96 in. (329 mm)	12.96 in. (329 mm)	15.65 in. (398 mm)
<b>Length (D)</b>	6 in. (152 mm)	8.5 in. (216 mm)	7 in. (178 mm)	10 in. (254 mm)	8 in. (203 mm)	8 in. (203 mm)	9 in. (229 mm)
<b>Width (E)</b>	7.5 in. (191 mm)	7.5 in. (191 mm)	9 in. (229 mm)	9 in. (229 mm)	11 in. (279 mm)	11 in. (279 mm)	13.50 in. (343 mm)
<b>Number of Bolts</b>	4	4	8	8	8	8	8
<b>Bolt Hole Diameter</b>	0.781 in. (19.84 mm)						
<b>Companion Flange</b>	3 in. (76 mm)	3 in. (76 mm)	4 in. (102 mm)	4 in. (102 mm)	6 in. (152 mm)	6 in. (152 mm)	8 in. (203 mm)
<b>NPT Test Port</b>	1.5 in. (38 mm)	1.5 in. (38 mm)	2 in. (51 mm)	2 in. (51 mm)	2 in. (51 mm)	2 in. (51 mm)	2 in. (51 mm)

**Measurement Designations**



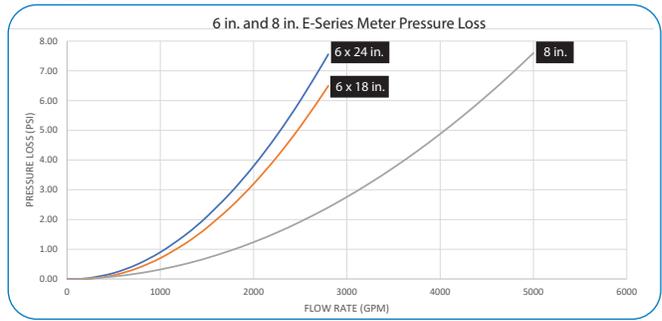
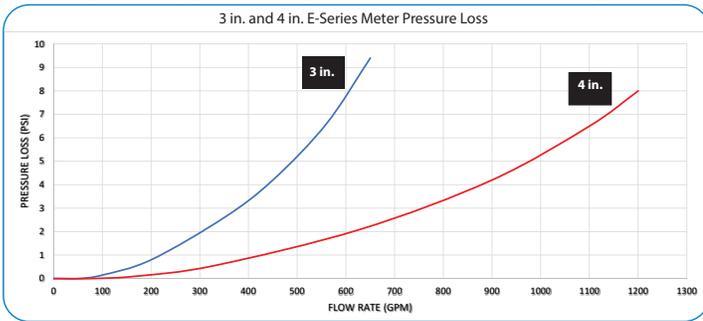
*Drawings illustrate the 3 inch meter*

**MATERIALS**

<b>Meter Housing</b>	Lead-free bronze alloy
<b>Measuring Section</b>	Ultrasonic sensors located in the flow tube
<b>Register Housing &amp; Lid</b>	Engineered polymer
<b>Transducer Port Covers 3 in., 4 in.</b>	Lead-free bronze alloy
<b>Transducer Port Covers 6 in., 8 in.</b>	Engineered polymer

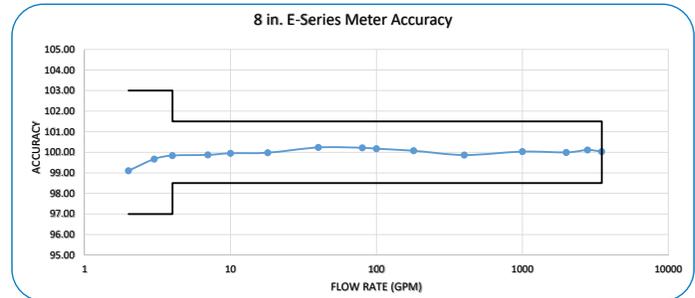
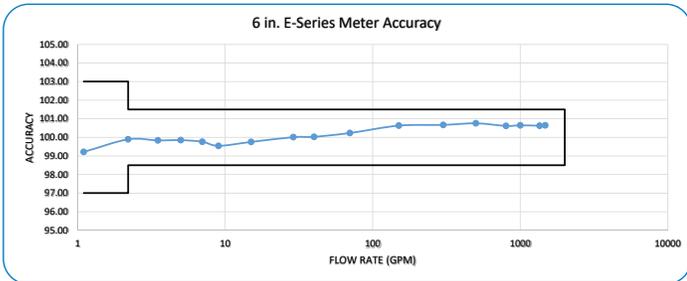
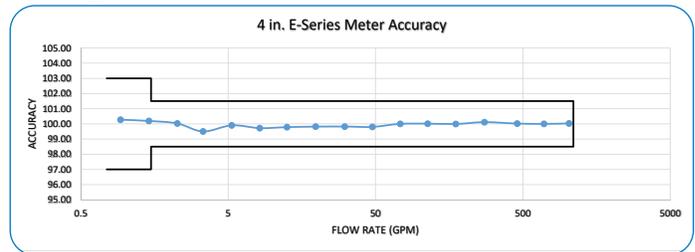
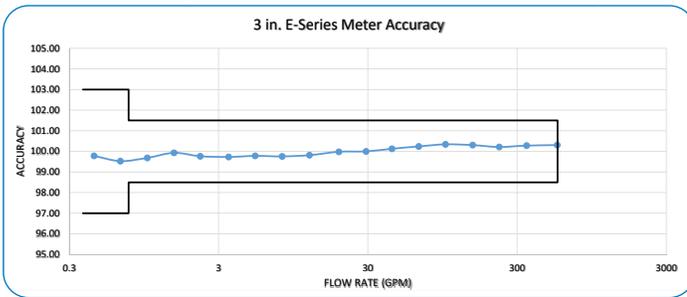
## PRESSURE LOSS CHARTS

Charts represent typical meter performance. Rate of flow in gallons per minute (gpm).



## ACCURACY CHARTS

Charts represent typical meter performance. Rate of flow in gallons per minute (gpm).



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**ENDPOINT**

## DESCRIPTION

ORION<sup>®</sup> Cellular water endpoints are innovative, two-way endpoints for smart water applications. The endpoints utilize existing IoT (Internet of Things) cellular infrastructure to efficiently and securely deliver meter reading data to the utility in a Network as a Service (NaaS) approach. Leveraging existing cellular infrastructure, the NaaS solution offers all the performance benefits of AMI, while eliminating network-related maintenance and technology concerns and enhancing deployment flexibility.

Cellular endpoints are members of the time-tested ORION family of products from Badger Meter, designed for maximum flexibility. Since 2002, the ORION product family has provided comprehensive Advanced Metering Analytics (AMA) for interval meter reading and data capture using both one-way and two-way communications.

## FUNCTIONALITY

**Operation:** ORION Cellular water endpoints communicate with the encoder and capture 15-minute interval read data and meter status information. The endpoints then automatically broadcast the information, including endpoint status information, via the cellular network to BEACON<sup>®</sup> AMA. ORION NaaS is powered by the proven ORION system for interval data capture and two-way communication. The solution employs cellular endpoints which, as they leverage the public cellular network and require no proprietary gateways to operate, dramatically reduce infrastructure requirements compared to a traditional fixed network. This speeds installations and simplifies expansion as a system evolves.

The endpoints are designed to call in four times each workday and feature a configurable schedule that enables utility customers to select call-in times that best support their processes.

**Activation:** ORION Cellular water endpoints are shipped in an inactive, non-transmitting state. The Badger Meter IR Communication Device can be used to activate the endpoints and verify the encoder connection. Successful endpoint function can be confirmed through a web app demonstrating that communication has been verified to both the encoder and the network.

Alternatively, the endpoints offer a Smart Activation feature. After installation, the endpoints begin broadcasting data when the encoder senses the first usage of water. No field programming or special tools are required.

**Broadcast Mode:** ORION Cellular water endpoints broadcast fixed network reading data through the secure cellular network within the service area.

Specific configurations also transmit a radio frequency (RF) message to facilitate troubleshooting in the field. See "[Configurations](#)" on page 2.

**Data Storage:** The endpoints store 42 days of 15-minute data.



ORION Cellular LTE-M endpoint (pictured)

**Output Message:** ORION Cellular water endpoints broadcast a unique serial number, meter reading data, and applicable status indicators. As an advanced data security measure, each message is securely transported to the BEACON AMA software only via private network and never over the public internet.

## APPLICATION

**Configurations:** ORION Cellular water endpoints are multi-purpose endpoints that can be deployed in indoor, outdoor and pit (non-metal pit lid) applications. The electronics and battery assembly are fully encapsulated in epoxy for environmental integrity. The endpoint is available with a connector assembly for ease of installation.

**Meter Compatibility:** When attached to a Badger Meter High Resolution Encoder, the ORION Cellular water endpoint is compatible with all current Badger Meter Recordall<sup>®</sup> Disc, Turbo Series, Compound Series, Combo Series and Fire Service meters and assemblies, and with E-Series G2<sup>®</sup> Ultrasonic, E-Series<sup>®</sup> Ultrasonic, E-Series<sup>®</sup> Ultrasonic Plus, and ModMAG<sup>®</sup> electromagnetic flow meters.

**Encoder Compatibility:** The ORION Cellular water endpoint is suitable for use with a Badger Meter High Resolution Encoder as well as the following Badger Meter approved three-wire encoder registers that have a manufacture date within 10 years of the current date as long as the encoder has three wires connected to it and is programmed into the three-wire output mode for AMR/AMI: Honeywell<sup>®</sup> (Elster) ScanCoder<sup>®</sup> encoder with Sensus<sup>®</sup> protocol module and evoQ4 meter (encoder output); Master Meter<sup>®</sup> Octave<sup>®</sup> Ultrasonic meter encoder output; Metron-Farnier Hawkeye; Mueller Systems 420 Solid State Register (SSR) LCD; Neptune<sup>®</sup> ProRead, E-Coder<sup>®</sup>, ARB-V<sup>®</sup>, and ProCoder; and Sensus iPerl<sup>®</sup>.

## SPECIFICATIONS

<b>Dimensions</b>	5.125 in. (130 mm) (H) 1.75 in. (44 mm) Diameter at top 2.625 in. (W) x 2.875 in. (D) at base (67 mm (W) x 73 mm (D) at base)
<b>Broadcast Network</b>	Primary LTE-M cellular network, NB-IoT (Narrow Band-Internet of Things)  RF message frequency is FCC-regulated 902...928 MHz frequency hopping modulation (for troubleshooting)
<b>Operating Temperature Range</b>	
<ul style="list-style-type: none"> <li>Storage, Meter Reading and RF Message (for troubleshooting)</li> <li>Cellular Communications</li> </ul>	-40...60° C (-40...140° F)  -20...60° C (-4...140° F)
<b>Humidity</b>	0%...100% condensing
<b>Battery</b>	One (1) lithium thionyl chloride D cell (nonreplaceable)

**Construction:** All ORION Cellular water endpoints are housed in an engineered polymer enclosure with an ORION RF board, battery and antenna. For long-term performance, the enclosure is fully potted to withstand harsh environments and to protect the electronics in flooded or submerged pit applications.

**Wire Connections:** ORION Cellular water endpoints are available with in-line connectors (Twist Tight® or Nicor®) for easy installation and connection to compatible encoders/meters. The endpoints are also available with flying leads for field splice connections. Other wire connection configurations may be available upon request.

## FEATURES

**License Requirements:** ORION Cellular water endpoints comply with Part 15, Part 22, Part 24, and Part 27 of the FCC Rules. No license is required by the utility to operate an ORION meter reading system. This device complies with Industry Canada license-exempt RSS standard(s).

**Transportation:** **WARNING:** The operation of transmitters and receivers on airlines is strictly prohibited by the Federal Aviation Administration. As such, the shipping of radios and endpoints via air is prohibited. Please follow all Badger Meter return and/or shipping procedures to prevent exposure to liability.

**Warning:** To reduce the possibility of electrical fire and shock hazards, never connect the cable from the endpoint to any electrical supply source. The endpoint cable provides SELV low voltage limited energy power to the load and should only be connected to passive elements of a water meter register.

**Caution:** Endpoint batteries are *not* replaceable. Users should make no attempt to replace the batteries. Changes or modifications to the equipment that are not expressly approved by Badger Meter could void the user's authority to operate the equipment.

<b>Smart City Ready</b>	Future-proof technology
<b>Communication Type</b>	Two-way
<b>Application Type</b>	Control/Monitor
<b>Endpoint Communication</b>	Configurable call-in schedule, up to four times each workday
<b>Reading Interval Type</b>	15-minute
<b>Encoder Compatibility</b>	Absolute
<b>Fixed Network Reading</b>	✓
<b>Cut-Wire Indication</b>	✓
<b>Encoder Error</b>	✓
<b>Low Battery Indication</b>	✓
<b>Remote Clock Synchronization</b>	✓
<b>Firmware Upgrades</b>	✓

## CONFIGURATIONS

Endpoint	Notes
ORION Cellular LTE-M	Includes RF and IR messages for troubleshooting
ORION Cellular LTE-MS	Secondary carrier; includes RF and IR messages for troubleshooting
ORION Cellular C	Includes RF and IR messages for troubleshooting
ORION Cellular HLA	Includes IR message for troubleshooting

**NOTE:** For the ORION Cellular LTE-MP endpoint, see the *ORION Cellular LTE-MP Endpoint product data sheet*, available at [www.badgermeter.com](http://www.badgermeter.com).

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# REGISTERS



Badger Meter

## HR-E<sup>®</sup> LCD 4-20 Encoder

### DESCRIPTION

The High Resolution 4-20 encoder (HR-E LCD 4-20) is a fully electronic, solid-state encoder with no moving parts. It is designed for use with all current Badger Meter<sup>®</sup> Recordall<sup>®</sup> Disc Series, Turbo Series, Compound Series, Combo Series and Fire Service meters and assemblies. These solid-state units produce a standard encoded output as well as a 4-20 mA DC output signal through a dual output wire design. The HR-E LCD 4-20 encoder provides connectivity with Badger Meter ORION<sup>®</sup> AMR/AMI endpoints and other AMR/AMI technology solutions approved by Badger Meter.

**NOTE:** For more detailed information, see the user manual, *High Resolution LCD Encoders*, available at [www.badgermeter.com](http://www.badgermeter.com).

**Field Programmable:** The HR-E LCD 4-20 encoder comes standard as factory programmed, with the option for field programming the unit of measure, meter type, meter model, digit resolution from the encoder, billing units, rate-of-flow time and units, and the analog output. Programming is performed through the IR port via a computer using the Programmer software, version 2.0.0 or greater.

**Output Resolution:** Standard encoded output is 9 digits. The 4-20 signal from the encoder is proportional to the flow of fluid passing through the meter. Power for the 4-20 output signal device can be obtained from a 9...50V DC control loop. The default 20 mA setting of the signal is defined in the resolution chart.

**Status Indicators:** Icons on the encoder face indicate encoder status and alarm conditions. Status indicators are sent as part of the encoder extended message to AMR/AMI systems such as ORION Cellular, Fixed Network and Migratable endpoints that are capable of receiving an extended message. The details can also be read through an IR interface.

**Mounting:** The fully potted encoder assembly has a bayonet mount compatible with all Recordall Disc, Turbo Series, Compound Series, Combo Series and Fire Series meters and assemblies. The bayonet mount positions the encoder in any of four orientations for visual reading convenience. The encoder can be removed from the meter without disrupting water service.

**Magnetic Drive Communication:** The encoder detects movement of the wet side meter magnet with magnetic sensors to provide reliable and dependable meter monitoring.

**Tamper-resistant Features:** Unauthorized removal of the encoder is inhibited by a tamper-resistant Torx seal screw. Torx seal screws are provided as standard accessories. Optional proprietary tamper-proof screws are also available.

In addition, the encoder is resistant to magnetic tampering. The encoder detects an attempted tamper—as well as encoder removal—and displays a tamper alarm in either situation. Approved endpoints capable of receiving the alarms, such as ORION Cellular, Fixed Network and Migratable endpoints, can then report the tamper condition to the meter reading software.



**Construction:** The housing of the HR-E LCD 4-20 encoder is constructed of an engineered polymer enclosure and a polycarbonate lens. For long-term performance, the enclosure is fully encapsulated, weatherproof, and UV-resistant to withstand harsh environments and to protect the electronics in flooded or submerged pit applications. A patented epoxy potting comprises the encoder bottom. Due to this unique sealing, the HR-E LCD 4-20 exceeds all applicable requirements of AWWA Standard C707.

**Wire Connections:** The encoder is available with dual output wire connections. The encoder side wire is available with an in-line connector for easy connection to AMR/AMI endpoints, or a flying lead for field splice connection. The 4-20 side is available with a flying lead for easy connection in the field.

**Operating Characteristics:** The encoder is shipped in storage mode so a meter status alarm is not triggered. In storage mode, the meter model screen is displayed. Upon sensing two revolutions of the meter magnet, the encoder goes into normal operation mode. The display then automatically toggles between these four modes:

- 9-digit consumption displays for 45 seconds.
- 6-digit consumption (segmented leak detector in this mode) displays for 5 seconds.
- Rate of flow displays for 5 seconds.
- Meter model displays for 5 seconds.

## SPECIFICATIONS

<b>Encoder Type</b>	Permanently sealed, electronic LCD absolute encoder with analog output and field-programmable option
<b>Encoder Display</b>	Status indicators, unit of measure, billing units, automatic toggle between 9-digit and 6-digit consumption (segmented leak detector in this mode), rate of flow, meter model
<b>Unit of Measure</b>	U.S. gallons, Imperial gallons, cubic feet, cubic meters and liters
<b>Flow Rate</b>	Seconds, minutes, and hours
<b>Numerals</b>	7 mm (0.28 in.) high
<b>Weight</b>	11 ounces
<b>Humidity</b>	0...100% condensing
<b>Temperature</b>	Storage: -40...140° F (-40...60° C) Max. ambient for 1 hr: 150° F (66° C) Electronics & Display: 14...140° F (-10...60° C)
<b>Status Indicators</b>	Electronic and visual icons for: meter functioning correctly, meter alarm (indicates temperature limits exceeded, magnetic tamper or encoder removal), reverse flow, suspected leak, 30-day no usage, end of battery life
<b>Encoder Output</b>	Industry standard ASCII format Three-wire synchronous for AMR/AMI solutions Red = clock/power; Black = ground; Green = data
<b>Analog Output</b>	Two-wire/passive
<b>Input Voltage Range</b>	9...50V DC supply
<b>Current</b>	4...20 mA
<b>Max. Load Resistance (Ohms)</b>	50 Ohms + 50 Ohms (supply voltage - 9V)
<b>Battery</b>	Lithium thionyl chloride AA cell, fully encapsulated within encoder housing
<b>Battery Life</b>	20 years (calculated)

## DIMENSIONAL DRAWINGS

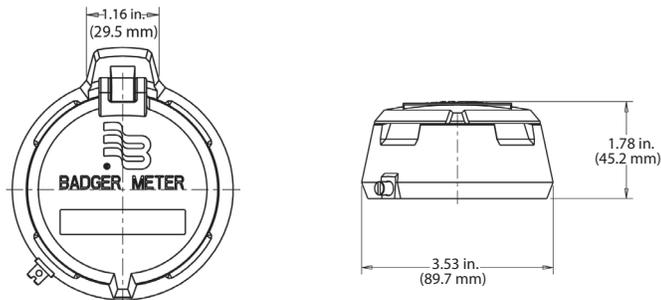


Figure 1: Top view

Figure 2: Front view

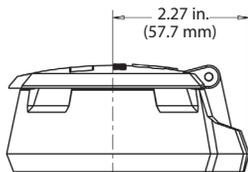


Figure 3: Left side view

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## MEASUREMENT RESOLUTION

The HR-E LCD 4-20 default output resolutions are as noted below.

Recordall Disc Series	Size (in.)	Encoder Output			Analog Output
		9-dial (gal)	9-dial (ft³)	9-dial (m³)	20 mA Set point (gpm)
LP	5/8, 5/8 x 3/4	0.01	0.001	0.0001	20
M25	5/8, 5/8 x 3/4	0.01	0.001	0.0001	25
M35	3/4	0.01	0.001	0.0001	35
M40	1	0.01	0.001	0.0001	40
M55	1	0.01	0.001	0.0001	55
M70	1	0.01	0.001	0.0001	70
M120	1-1/2	0.1	0.01	0.001	120
M170	2	0.1	0.01	0.001	170

Recordall Turbo Series	Size (in.)	Encoder Output			Analog Output
		9-dial (gal)	9-dial (ft³)	9-dial (m³)	20 mA Set point (gpm)
T160	1-1/2	0.1	0.01	0.001	200
T200	2	0.1	0.01	0.001	310
T450	3	0.1	0.01	0.001	550
T1000	4	0.1	0.01	0.001	1250
T2000	6	1	0.1	0.01	2500
T3500	8	1	0.1	0.01	4500
T5500	10	1	0.1	0.01	7000
T6200	12	10	1	0.01	8800
T6600	16	10	1	0.01	13200
T10000	20	10	1	0.01	19800

Recordall Compound Series	Size (in.)	Encoder Output			Analog Output
		9-dial (gal)	9-dial (ft³)	9-dial (m³)	20 mA Set point (gpm)
High Side T200	2.	0.1	0.01	0.001	200
Low Side M25	2.	0.01	0.001	0.0001	25
High Side T450	3	0.1	0.01	0.001	450
Low Side M25	3	0.01	0.001	0.0001	25
High Side T1000	4	0.1	0.01	0.001	1000
Low side M35	4	0.01	0.001	0.0001	35
High Side T2000	6	1	0.1	0.01	2000
Low Side M35	6	0.01	0.001	0.0001	35
High Side T3500	8	1	0.1	0.01	—
Low side M120	8	0.1	0.01	0.001	—

**NOTE:** For Fire Service Meters and Assemblies, please refer to appropriate Disc and TSM information provided above.



DESCRIPTION

Applications: The High Resolution Encoder (HR-E) is designed for use with all current Recordall® Disc, Turbo, Compound, Combo and Fire Series meters and assemblies. The HR-E provides connectivity with Badger Meter ORION® and GALAXY® AMR/AMI endpoints, BadgerTouch® modules and other AMR/AMI technology solutions approved by Badger Meter.

Electronic Resolution: Encoder output from the HR-E includes eight-dial resolution to AMR/AMI endpoints and the option of four, five, six, seven or eight-dial resolution for touch applications. Refer to tables on the next page for details.

Mounting: The HR-E in its shroud assembly uses a bayonet mount compatible with all Recordall Disc, Turbo, Compound and Fire Series meters and assemblies. The bayonet mount allows positioning of the register in any of four orientations for visual reading convenience. The HR-E can be removed from the meter without disrupting water service.

Magnetic Drive: A direct-drive, high-strength magnetic coupling, through the meter body to the wetted magnet, provides reliable and dependable register coupling.

Local Indication: The HR-E face features an eight-dial mechanical odometer wheel stack and a flow finder with a calibrated test circle.

Tamper-Resistant Features: Unauthorized removal of the HR-E is inhibited by the option of a tamper detection seal wire screw, tamper-resistant TORX® seal screw, or the proprietary tamper-resistant keyed seal screw. Each can be installed at the meter site or at the factory.

Construction: The housing of the HR-E is constructed of a strengthened glass lens top and a corrosion-resistant metal bottom. Internal construction materials are thermoplastic for long life and high reliability. The encoder gearing is self-lubricating thermoplastic to minimize friction and provide long, reliable life. The shroud assembly is thermoplastic.

Temperature: The operating range of the HR-E is -40...140° F (-40...60° C). The water meter should not be subjected to temperatures below freezing.

Sealing: The HR-E encoder is permanently sealed to eliminate the intrusion of moisture, dirt or other contaminants. The HR-E achieves true water resistance due the unique adhesive technology used to seal the glass dome to the corrosion-resistant metal bottom. Due to this sealing process, the HR-E exceeds all applicable requirements of AWWA Standard C707. With leak rates less than 10-6 cc/sec, as tested by a helium mass spectrometer, the HR-E is suitable for installation in all environments, including meter pits subject to continuous submergence.

Electrical: The electronic circuitry is designed to provide immunity to electrical surges and transients per IEC 1000-4-2, IEC 1000-4-4. Operation of the HR-E is dependent on the wire length limitations of connected AMR/AMI equipment.



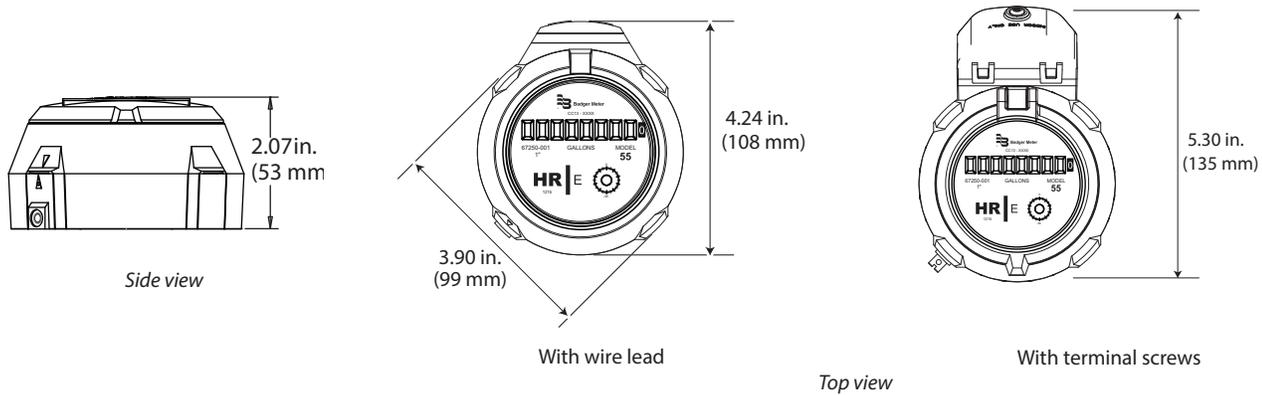
SPECIFICATIONS

Table with 2 columns: Specification Name and Description. Rows include Encoder Type, Unit of Measure, Number Wheels, Test Circle, Weight, Humidity, Temperature, Signal Output, Visual Resolution, Electronic Resolution, Signal Type, and Power Source.

Operating Characteristics: The reading obtained by an AMR/AMI device is sensed directly from the position of the encoder's odometer using internal LED light paths to determine the exact position of each number wheel. This technology eliminates electromechanical contacts that could wear out, and provides greater long-term performance.

Wire Connections: The HR-E is available with an in-line connector for easy connection and installation to AMR/AMI endpoints. It is also available with a flying lead for a field splice connection or fully prewired to an AMR/AMI endpoint. A terminal screw version of the HR-E is also available. This version features a tamper-resistant cap over the three-wire terminals. The HR-E with terminal screws is designed for indoor installations in protected environments such as residential basements.

## DIMENSIONAL DRAWINGS



## MEASUREMENT RESOLUTION

The minimum electronic resolution of the HR-E is as noted below (8-Dial Reading). To verify the correct resolution for your application, contact Badger Meter Customer Service.

Recordall Disc Series	Size (in.)	8-Dial Resolution (gal)	8-Dial Resolution (ft³)	8-Dial Resolution (m³)
M25/MLP	5/8	0.1	0.01	0.001
M25/MLP	3/4	0.1	0.01	0.001
M35	3/4	0.1	0.01	0.001
M40	1	0.1	0.01	0.001
M55	1	0.1	0.01	0.001
M70	1	0.1	0.01	0.001
M120	1-1/2	1	0.1	0.01
M170	2	1	0.1	0.01

Fire Service Series	8-Dial Resolution (gal)	8-Dial Resolution (ft³)	8-Dial Resolution (m³)
3 in.	1	0.1	0.01
4 in.	1	0.1	0.01
6 in.	10	1	0.1
8 in.	10	1	0.1
10 in.	10	1	0.1

Recordall Turbo Series	Size (in.)	8-Dial Resolution (gal)	8-Dial Resolution (ft³)	8-Dial Resolution (m³)
T160	1-1/2	1	0.1	0.01
T200	2	1	0.1	0.01
T450	3	1	0.1	0.01
T1000	4	1	0.1	0.01
T2000	6	10	1	0.1
T3500	8	10	1	0.1
T5500	10	10	1	0.1
T6200	12	100	10	0.1
T6600	16	100	10	1
T10000	20	100	100	1

Recordall Compound Series	Size (in.)	8-Dial Resolution (gal)	8-Dial Resolution (ft³)	8-Dial Resolution (m³)
High Side T200	2	1	0.1	0.01
Low Side M25	2	0.1	0.01	0.001
High Side T450	3	1	0.1	0.01
Low Side M25	3	0.1	0.01	0.001
High Side T1000	4	1	0.1	0.01
Low Side M35	4	0.1	0.01	0.001
High Side T2000	6	10	1	0.1
Low Side M35	6	0.1	0.01	0.001

Resolution stated as individual high and low readings.

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**SOFTWARE**



**Badger Meter**

# BEACON® Advanced Metering Analytics

With ORION® Network as a Service (NaaS)

## OVERVIEW

The BEACON® Advanced Metering Analytics (AMA) Solution with ORION® Network as a Service (NaaS) presents a simple, yet powerful solution to bring a new level of utility optimizing information to light.

The solution combines our intuitive BEACON AMA Software as a Service (SaaS) with a NaaS approach using proven ORION Cellular endpoints to deliver greater visibility and control over utility management.

Built-in infrastructure management services and a system design that keeps you in step with technology advancements, allows you to do what you do best—manage your water utility. Plus, built-in consumer engagement tools help enhance customer service, increase satisfaction and reduce costs.

## SOFTWARE APPLICATIONS

### BEACON Advanced Metering Analytics (AMA)

With tools beyond meter reading and network management, BEACON AMA software offers targeted Advanced Metering Analytics. BEACON AMA software puts interval meter data to work to increase efficiency in day-to-day utility operations and address demands for actionable intelligence.

- **Problem solver** – User intuitive data tools place the power of water consumption data at your fingertips, allowing you to rapidly respond to customer inquiries and quickly resolve—and even eliminate—many billing issues.
- **Customized design** – A customizable dashboard delivers information configured to user security access level in a format matched to the utility’s individual requirements, providing data management integrity, security and control.
- **Works with you** – Integration with utility systems—billing, work order, inventory, Customer Relationship Management (CRM) and Geographic Information Systems (GIS)—streamlines and improves utility operations without disrupting the current utility billing interface file transfer process.
- **Find out fast** – Alert conditions can be set to monitor and notify users of system exceptions, including continuous flow, for faster leak detection.
- **Innovation at your service** – Secure, hosted platform with automatic software upgrades ensures the latest technology and features are always available.

### EyeOnWater®

The BEACON AMA software suite includes informative consumer outreach tools to improve customer service consisting of the EyeOnWater consumer engagement website, smartphone mobile apps, and email or SMS text alerts, providing easy access to personal consumption data and alerts to potential leaks. With these tools, water consumers are able to view their usage activity, and gain greater understanding and control of what they use and the value you provide.

BEA-DS-00554-EN-10 (August 2020)



## HARDWARE

ORION NaaS is powered by the proven ORION system for interval data capture and two-way communication. The solution employs cellular endpoints which, as they leverage the public cellular network and require no proprietary gateways to operate, dramatically reduce infrastructure requirements compared to a traditional fixed network. This speeds installations and simplifies expansion as a system evolves.

- **High resolution data** – ORION Cellular endpoints are programmed to automatically broadcast 15-minute meter reading and event data to the BEACON software up to four (4) times per day. The high resolution data helps identify potential customer-side leaks and other anomalies in water use, and provides the utility with a potent tool to enhance its customer service.
- **Two-way communication** – BEACON AMA software communicates with ORION Cellular endpoints to accomplish a number of system tasks, including requesting additional information from the endpoint and synchronizing the internal endpoint clock. If needed, the ORION two-way system architecture sends upgrades to the endpoint firmware over the air via the network, utilizing the powerful BEACON AMA software suite.
- **Data integrity** – Each message from the ORION Cellular endpoint is securely transported to the BEACON AMA software only via private network and never over the public internet.

## SECURITY

BEACON AMA is ISO 27001 certified and SOC 2 examined for security, availability and confidentiality.

## TECHNICAL SUPPORT AND TRAINING

Configured for the utility, safe and secure BEACON AMA SaaS provides utilities with regular software updates, long-term support and maintenance. Comprehensive BEACON AMA training courses are available for online or on-site delivery at the time of system deployment. To maintain best practices, a library of online resources and options for group web-based training and support are also available. Once deployed, our technical support specialists can be contacted by phone, email and web to provide ongoing, customer-friendly support. Customized one-on-one training is available (fee applies) to further enhance user expertise.

Additionally, Badger Meter offers extended customized training to further enhance user expertise.

## TECHNICAL REQUIREMENTS

### BEACON AMA

Developed as a hosted software platform, BEACON AMA is a cloud-based application accessed through a standard web browser. Internet access is required. User logins provide secure access.

BEACON AMA supported web browsers include the latest and next previous major releases of Google® Chrome, Microsoft® Edge, Mozilla® Firefox®, Microsoft® Internet Explorer® (IE 11 only); and Apple® Safari®.

### EyeOnWater Consumer Engagement

The EyeOnWater consumer engagement website is a cloud-based application accessed through a standard web browser. Internet access is required. Water consumer user logins provide secure access to their information.

Supported web browsers include the latest and next previous major releases of Google® Chrome, Microsoft® Edge, Mozilla® Firefox®, Microsoft® Internet Explorer® (IE 11 only); and Apple® Safari®.

EyeOnWater smartphone applications require Android 6.0 or iOS 9.1 or later, and can be downloaded from Google Play or the Apple Store.

## SMART WATER IS BADGER METER

BEACON and ORION are registered trademarks of Badger Meter, Inc. Other trademarks appearing in this document are the property of their respective entities.

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# SECTION 8

## MANUFACTURER'S WARRANTY



**Badger Meter**

# Lead-Free Bronze Disc Meters

## PRODUCTS COVERED

This warranty shall apply to all Recordall® Lead-Free Bronze Disc Meters, models 25 through 170, when used to measure potable water, including the registers used with these meters (collectively “Product”) sold on or after January 25, 2019. This warranty is extended only to utilities, municipalities, other commercial users and authorized Badger Meter, Inc. distributors, hereafter referred to as “Customer” and does NOT apply to consumers or any person or entity who is not an original customer of Badger Meter or its authorized distributors.

## MATERIALS AND WORKMANSHIP

Badger Meter warrants Product to be free from defects in materials and workmanship appearing within the following time frames and those listed in the table below:

### Housings

Twenty-five (25) years and six (6) months after shipment from Badger Meter.

### Local Registers Supplied with the Meters Listed Herein

Twenty-five (25) years and six (6) months after shipment from Badger Meter.

	<b>AWWA New Meter Accuracy</b>	<b>AWWA Repaired Meter Accuracy (AWWA M6 Manual)</b>	<b>Badger Meter Extended Low Flow Meter Accuracy</b>
<b>Recordall Meter Model, Size</b>	<i>The meter product will meet or exceed new meter accuracy standards set forth in AWWA Standard C700 for the following periods:</i>	<i>The meter product will meet or exceed repaired meter accuracy standards set forth in AWWA Manual M-6, Chapter 5, Table 5.3 for the following periods:</i>	<i>Badger Meter further warrants the meter product to meet or exceed the following extended low flow accuracies in excess of AWWA standard:</i>
<b>Model 25, 5/8 in. and 5/8 x 3/4 in.</b>	Five (5) years from date of shipment or registration of 750,000 gallons, whichever occurs first.	Fifteen (15) years from date of shipment or registration of 2,500,000 gallons, whichever occurs first, with a 25 gpm safe maximum operating capacity and a 15 gpm maximum rate for continuous operation.	Badger Meter warrants Product low flow accuracy of 98.5% at a rate of 1/4 gpm and low flow accuracy of 95.0% at a rate of 1/8 gpm for five (5) years from date of shipment or registration of 675,000 gallons, whichever occurs first.
<b>Model 35, 3/4 in.</b>	Five (5) years from date of shipment or registration of 750,000 gallons, whichever occurs first.	Fifteen (15) years from date of shipment or registration of 2,500,000 gallons, whichever occurs first, with a 35 gpm safe maximum operating capacity and a 25 gpm maximum rate for continuous operation.	Badger Meter warrants Product low flow accuracy of 97% at a rate of 3/8 gpm for five (5) years from date of shipment or registration of 675,000 gallons, whichever occurs first.
<b>Model 55, 1 in.</b>	Five (5) years from date of shipment or registration of 1,000,000 gallons, whichever occurs first.	Fifteen (15) years from date of shipment or registration of 3,000,000 gallons, whichever occurs first, with a 55 gpm safe maximum operating capacity and a 40 gpm maximum rate for continuous operation.	Badger Meter warrants Product low flow accuracy of 95% at a rate of 1/2 gpm for three (3) years from date of shipment or registration of 575,000 gallons, whichever occurs first.
<b>Model 70, 1 in.</b>	Five (5) years from date of shipment or registration of 1,100,000 gallons, whichever occurs first.	Fifteen (15) years from date of shipment or registration of 3,250,000 gallons, whichever occurs first, with a 70 gpm safe maximum operating capacity and a 50 gpm maximum rate for continuous operation.	Badger Meter warrants Product low flow accuracy of 95% at a rate of 3/4 gpm for three (3) years from date of shipment or registration of 1,100,000 gallons, whichever occurs first.
<b>Model 120, 1-1/2 in.</b>	Two (2) years from date of shipment or registration of 1,600,000 gallons, whichever occurs first.	Fifteen (15) years from date of shipment or registration of 5,600,000 gallons, whichever occurs first, with a 120 gpm safe maximum operating capacity and a 80 gpm maximum rate for continuous operation.	Badger Meter warrants Product low flow accuracy of 95% at a rate of 1-1/4 gpm for two (2) years from date of shipment or registration of 1,440,000 gallons, whichever occurs first.
<b>Model 170, 2 in.</b>	Two (2) years from date of shipment or registration of 2,100,000 gallons, whichever occurs first.	Fifteen (15) years from date of shipment or registration of 10,400,000 gallons, whichever occurs first, with a 170 gpm safe maximum operating capacity and a 100 gpm maximum rate for continuous operation.	Badger Meter warrants Product low flow accuracy of 95% at a rate of 1-1/2 gpm for two (2) years from date of shipment or registration of 1,890,000 gallons, whichever occurs first.

## PRODUCT RETURNS

Any Product proved to the satisfaction of Badger Meter to have failed the foregoing warranties will, at the option of Badger Meter, be repaired or replaced without charge to the Customer. Any eligible Product repaired or replaced by Badger Meter will retain the original Product's warranty based on the original Product purchase date, at Badger Meter's sole discretion. The Badger Meter obligation hereunder shall be limited to such repair and replacement and shall be conditioned upon Badger Meter receiving written notice of any alleged defect within ten (10) days after its discovery. This exclusive remedy shall not be deemed to have failed its essential purpose so long as Badger Meter is willing and able to replace defective products or issue a credit to purchaser within a reasonable time of proof to Badger Meter that a defect is involved. Product returns must be shipped by the Customer prepaid F.O.B. to the nearest Badger Meter factory or distribution center. The Customer shall be responsible for all direct and indirect costs associated with removing the original Product and reinstalling the repaired or replacement Product.

## LIMITS OF LIABILITY

This warranty shall not apply to Product repaired or altered by parties other than Badger Meter. The foregoing warranty applies only to the extent that the Product is installed, serviced and operated strictly in accordance with AWWA Standard C700 and AWWA M6 Manual, as applicable. The warranty shall not apply and shall be void with respect to Product exposed to conditions other than those detailed in the Badger Meter Product technical and/or operational literature, or which have been exposed to adverse installation conditions, damaged by any water conditions and/or water quality, including but not limited to foreign matter in the water such as dirt, sand, minerals, debris, deposits, biofilms, extreme corrosivity, or other impurities, or which have been subject to passage of high-speed air slugs, vandalism, negligence, accident, acts of God, alteration, improper installation, operation or repair, or other circumstances which are beyond the reasonable control of Badger Meter. With respect to Product not manufactured by Badger Meter, the warranty obligations of Badger Meter shall in all respects conform and be limited to the warranty extended to Badger Meter by the supplier.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (except warranties of Title).

Any description of Product, whether in writing or made orally by Badger Meter or its agents, specifications, samples, models, bulletins, drawings, diagrams, engineering sheets, or similar materials used in connection with any Customer's order are for the sole purpose of identifying Product and shall not be construed as an express warranty. Any suggestions by Badger Meter or its agents regarding use, application or suitability of Product shall not be construed as an express warranty unless confirmed to be such in writing by Badger Meter.

## Exclusion of Consequential Damages and Disclaimer of Other Liability

Badger Meter liability with respect to breaches of the foregoing warranty shall be limited as stated therein. Badger Meter liability shall in no event exceed the contract price.

BADGER METER SHALL NOT BE SUBJECT TO AND DISCLAIMS:

- (1) ANY OTHER OBLIGATIONS OR LIABILITIES ARISING OUT OF BREACH OF CONTRACT OR OF WARRANTY
- (2) ANY OBLIGATIONS WHATSOEVER ARISING FROM TORT CLAIMS (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR ARISING UNDER OTHER THEORIES OF LAW WITH RESPECT TO PRODUCTS SOLD OR SERVICES RENDERED BY BADGER METER, OR ANY UNDERTAKINGS, ACTS OR OMISSIONS RELATING THERETO, AND
- (3) ALL CONSEQUENTIAL, INCIDENTAL AND CONTINGENT DAMAGES WHATSOEVER.

## Making Water Visible®

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[www.badgermeter.com](http://www.badgermeter.com)

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Legacy Document Number: RD-W-4-AWWA-EM



**Badger Meter**

## E-Series G2® Ultrasonic Meter

Lead-Free Bronze Alloy Meters, 3, 4, 6, 8 inch

### PRODUCTS

This warranty shall apply to all Badger Meter E-Series G2® Ultrasonic lead-free meters, sizes 3 inch, 4 inch, 6 inch and 8 inch, when used to measure potable cold water, and the internal encoder and battery used with these meters (collectively "Product"), sold on or after December 15, 2021. This warranty is not transferable and is extended only to utilities, municipalities, other commercial users and authorized distributors, hereafter referred to as "Customer" and does NOT apply to consumers or any person or entity who is not an original customer of Badger Meter or its authorized distributors.

### MATERIALS AND WORKMANSHIP

Badger Meter, Inc. ("Badger Meter") warrants Product to be free from defects in materials and workmanship appearing within the following time frames.

#### Housing

Ten (10) years and six (6) months after shipment from Badger Meter.

#### Electronics (Battery, Registration, Transducer)

Ten (10) years and six (6) months after shipment from Badger Meter.

#### Pressure Sensor

Five (5) years and six (6) months after shipment from Badger Meter.

### METER ACCURACY

The Product will meet or exceed all applicable specifications outlined in AWWA Standard C715 in addition to meeting meter accuracy of  $\pm 1.5\%$  for the published ranges set forth in Badger Meter's current published product data sheet for ten (10) years from the date of shipment from Badger Meter.

### EXTENDED LOW-FLOW METER ACCURACY

Badger Meter further warrants the Product will meet extended minimum test flow accuracy of  $\pm 3\%$  for the published ranges set forth in Badger Meter's current published data sheet for ten (10) years from date of shipment from Badger Meter.

### PRODUCT RETURNS

Any Product proved to the satisfaction of Badger Meter to have failed the foregoing warranties will, at the option of Badger Meter, be repaired or replaced without charge to the Customer. Any eligible Product repaired or replaced by Badger Meter will retain the original Product's warranty based on the original Product purchase date, at Badger Meter's sole discretion. The Badger Meter obligation hereunder shall be limited to such repair and replacement and shall be conditioned upon Badger Meter receiving written notice of any alleged defect within ten (10) days after its discovery. This exclusive remedy shall not be deemed to have failed its essential purpose so long as Badger Meter is willing and able to replace defective products or issue a credit to purchaser within a reasonable time of proof to Badger Meter that a defect is involved. Product returns must be shipped by the Customer prepaid F.O.B. to the nearest Badger Meter factory or distribution center. The Customer shall be responsible for all direct and indirect costs associated with removing the original Product and reinstalling the repaired or replacement Product.

### LIMITS OF LIABILITY

This warranty shall not apply to Product repaired or altered by parties other than Badger Meter, or read by equipment not explicitly approved or licensed by Badger Meter. The foregoing warranty applies only to the extent that the Product is installed, serviced and operated strictly in accordance with AWWA Standard C715 and AWWA M6 Manual, as applicable. The warranty shall not apply and shall be void with respect to Product exposed to conditions other than those detailed in the Badger Meter Product technical and/or operational literature, or which, as determined at Badger Meter's sole discretion, have affected the ability of the Product to perform, including, but not limited to: exposure to adverse installation conditions; misuse; vandalism; negligence; accident; acts of God; alteration; improper installation, operation or repair; damage from passage of high-speed air slugs; damage by water quality conditions, including but not limited to: aggressive water, foreign matter, biofilms, or extreme corrosivity; damage caused by actions not in accordance with the intended use; or other circumstances which are beyond the reasonable control of Badger Meter, as determined at Badger Meter's sole discretion. With respect to product not manufactured by Badger Meter, the warranty obligations of Badger Meter shall in all respects conform and be limited to the warranty extended to Badger Meter by the supplier of product.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (except warranties of Title).

Any description of Product, whether in writing or made orally by Badger Meter or its agents, specifications, samples, models, bulletins, drawings, diagrams, engineering sheets, or similar materials used in connection with any Customer's order are for the sole purpose of identifying Product and shall not be construed as an express warranty. Any suggestions by Badger Meter or its agents regarding use, application or suitability of Product shall not be construed as an express warranty unless confirmed to be such in writing by Badger Meter.

### **Exclusion of Consequential Damages and Disclaimer of Other Liability**

Badger Meter liability with respect to breaches of the foregoing warranty shall be limited as stated therein. Badger Meter liability shall in no event exceed the contract price. BADGER METER SHALL NOT BE SUBJECT TO AND DISCLAIMS: (1) ANY OTHER OBLIGATIONS OR LIABILITIES ARISING OUT OF BREACH OF CONTRACT OR OF WARRANTY (2) ANY OBLIGATIONS WHATSOEVER ARISING FROM TORT CLAIMS (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR ARISING UNDER OTHER THEORIES OF LAW WITH RESPECT TO PRODUCTS SOLD OR SERVICES RENDERED BY BADGER METER, OR ANY UNDERTAKINGS, ACTS OR OMISSIONS RELATING THERETO, AND (3) ALL CONSEQUENTIAL, INCIDENTAL AND CONTINGENT DAMAGES WHATSOEVER.

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**Badger Meter**

## E-Series® Ultrasonic Meter

Cold Water Stainless Steel Lead-Free Meters, 1-1/2, 2 in.

### PRODUCTS

This warranty shall apply to all Badger Meter E-Series® Ultrasonic lead-free meters, sizes 1-1/2 in. and 2 in., when used to measure potable water and the internal register/encoder and battery used with these meters (collectively "Product"), sold on or after June 3, 2020. This warranty is not transferable and is extended only to utilities, municipalities, other commercial users and authorized distributors, hereafter referred to as "Customer" and does NOT apply to consumers or any person or entity who is not an original customer of Badger Meter or its authorized distributors.

### MATERIALS AND WORKMANSHIP

Badger Meter, Inc. ("Badger Meter") warrants Product to be free from defects in materials and workmanship appearing within the following time frames.

#### **Lead-Free Housings**

Ten (10) years and six (6) months after shipment from Badger Meter.

#### **Electronics, Battery, Transducers, and Register/Encoder Supplied with the Meters Listed Herein**

Ten (10) years and six (6) months after shipment from Badger Meter.

### METER ACCURACY

The Product will meet or exceed all applicable specifications outlined in AWWA Standard C715 in addition to meeting meter accuracy of  $\pm 1.5\%$  for the published ranges set forth in Badger Meter's current published product data sheet for ten (10) years from the date of shipment from Badger Meter.

### EXTENDED LOW-FLOW METER ACCURACY

Badger Meter further warrants the Product will meet extended minimum test flow accuracy of  $\pm 3\%$  for the published ranges set forth in Badger Meter's current published product data sheet for ten (10) years from the date of shipment from Badger Meter.

### PRODUCT RETURNS

Any Product proved to the satisfaction of Badger Meter to have failed the foregoing warranties will, at the option of Badger Meter, be repaired or replaced without charge to the Customer. Any eligible Product repaired or replaced by Badger Meter will retain the original Product's warranty based on the original Product purchase date, at Badger Meter's sole discretion. The Badger Meter obligation hereunder shall be limited to such repair and replacement and shall be conditioned upon Badger Meter receiving written notice of any alleged defect within ten (10) days after its discovery. This exclusive remedy shall not be deemed to have failed its essential purpose so long as Badger Meter is willing and able to replace defective products or issue a credit to purchaser within a reasonable time of proof to Badger Meter that a defect is involved. Product returns must be shipped by the Customer prepaid F.O.B. to the nearest Badger Meter factory or distribution center. The Customer shall be responsible for all direct and indirect costs associated with removing the original Product and reinstalling the repaired or replacement Product.

### LIMITS OF LIABILITY

This warranty shall not apply to Product repaired or altered by parties other than Badger Meter, or read by equipment not explicitly approved or licensed by Badger Meter. The foregoing warranty applies only to the extent that the Product is installed, serviced and operated strictly in accordance with AWWA Standard C715 and AWWA M6 Manual, as applicable. The warranty shall not apply and shall be void with respect to Product exposed to conditions other than those detailed in the Badger Meter Product technical and/or operational literature, or which, as determined at Badger Meter's sole discretion, have affected the ability of the Product to perform, including, but not limited to: exposure to adverse installation conditions; misuse; vandalism; negligence; accident; acts of God; alteration; improper installation, operation or repair; damage from passage of high-speed air slugs; damage by water quality conditions, including but not limited to: aggressive water, foreign matter, biofilms, or extreme corrosivity; damage caused by actions not in accordance with the intended use; or other circumstances which are beyond the reasonable control of Badger Meter, as determined at Badger Meter's sole discretion. With respect to product not manufactured by Badger Meter, the warranty obligations of Badger Meter shall in all respects conform and be limited to the warranty extended to Badger Meter by the supplier of product.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (except warranties of Title).

Any description of Product, whether in writing or made orally by Badger Meter or its agents, specifications, samples, models, bulletins, drawings, diagrams, engineering sheets, or similar materials used in connection with any Customer's order are for the sole purpose of identifying Product and shall not be construed as an express warranty. Any suggestions by Badger Meter or its agents regarding use, application or suitability of Product shall not be construed as an express warranty unless confirmed to be such in writing by Badger Meter.

### **Exclusion of Consequential Damages and Disclaimer of Other Liability**

Badger Meter liability with respect to breaches of the foregoing warranty shall be limited as stated therein. Badger Meter liability shall in no event exceed the contract price. BADGER METER SHALL NOT BE SUBJECT TO AND DISCLAIMS: (1) ANY OTHER OBLIGATIONS OR LIABILITIES ARISING OUT OF BREACH OF CONTRACT OR OF WARRANTY (2) ANY OBLIGATIONS WHATSOEVER ARISING FROM TORT CLAIMS (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR ARISING UNDER OTHER THEORIES OF LAW WITH RESPECT TO PRODUCTS SOLD OR SERVICES RENDERED BY BADGER METER, OR ANY UNDERTAKINGS, ACTS OR OMISSIONS RELATING THERETO, AND (3) ALL CONSEQUENTIAL, INCIDENTAL AND CONTINGENT DAMAGES WHATSOEVER.

## **SMART WATER IS BADGER METER**

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**Badger Meter**

**HR-E<sup>®</sup> LCD**

**High Resolution LCD Encoder**

## PRODUCTS COVERED

This Badger Meter warranty shall apply to the High Resolution LCD encoder (HR-E LCD) ("Product"), sold on or after June 23, 2021. The warranty is extended only to utilities, municipalities, or other commercial users, and authorized Badger Meter, Inc. (Badger Meter<sup>®</sup>) distributors, hereinafter referred to as "Customer," and does NOT apply to consumers or any person or entity who is not an original customer of Badger Meter or its authorized distributors.

## MATERIALS AND WORKMANSHIP

Badger Meter warrants the Product to be free from defects in materials and workmanship appearing within twenty (20) years and six (6) months, prorated, after shipment from Badger Meter.

This warranty is prorated as follows: For the first ten (10) years of the warranty the Product is replaced at no charge, and the warranty is prorated at price discounts during the last ten (10) years of the warranty.

Specifically, Badger Meter will repair or replace, at its discretion, a non-performing Product at no cost during the first ten (10) years of the warranty and at prorated price discounts during the last ten (10) years of the warranty. Badger Meter will apply these prorated price discounts to the Product list prices in effect at the time of Product return and according to the following prorated price discount schedule:

- Years 11 through 12—75% discount
- Years 13 through 15—50% discount
- Year 16—40% discount
- Year 17—30% discount
- Year 18—20% discount
- Years 19 through 20—10% discount

Replacement Products are warranted for and under the balance of the original applicable Product warranty.

## PRODUCT RETURNS

Product failures must be proven and verified to the satisfaction of Badger Meter. The Badger Meter obligation hereunder shall be limited to such repair and replacement and shall be conditioned upon Badger Meter receiving written notice of any asserted defect within 10 (ten) days after its discovery. If the defect arises and a valid claim is received within the Warranty Period, at its option, Badger Meter will either (1) exchange the Product with a new, used or refurbished Product that is at least functionally equivalent to the original Product, or (2) refund the purchase price of the Product.

Product returns must be shipped by the Customer prepaid F.O.B. to the nearest Badger Meter factory or distribution center. The Customer shall be responsible for all direct and indirect costs

associated with removing the original Product and reinstalling the repaired or replacement Product. A replacement Product assumes the remaining warranty of the original Product, or ninety (90) days from the date of replacement, whichever provides longer coverage.

## LIMITS OF LIABILITY

This warranty shall not apply to any Product repaired or altered by any party other than Badger Meter. The foregoing warranty applies only to the extent that the Product is installed, serviced and operated strictly in accordance with Badger Meter instructions. The warranty shall not apply and shall be void with respect to a Product exposed to conditions other than those detailed in applicable technical literature, or which have been subject to vandalism, negligence, accident, acts of God, improper installation, operation or repair, alteration, or other circumstances which are beyond the reasonable control of Badger Meter.

With respect to products not manufactured by Badger Meter, the warranty obligations of Badger Meter shall in all respects conform and be limited to the warranty extended to Badger Meter by the supplier.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (except warranties of title).

Any description of a Product, whether in writing or made orally by Badger Meter or its agents, specifications, samples, models, bulletins, drawings, diagrams, engineering sheets or similar materials used in connection with any Customer's order are for the sole purpose of identifying the Product and shall not be construed as an express warranty. Any suggestions by Badger Meter or its agents regarding use, application or suitability of the Product shall not be construed as an express warranty unless confirmed to be such, in writing, by Badger Meter.

## EXCLUSION OF CONSEQUENTIAL DAMAGES AND DISCLAIMER OF OTHER LIABILITY

Badger Meter liability with respect to breaches of the foregoing warranty shall be limited as stated herein. Badger Meter liability shall in no event exceed the contract price. BADGER METER SHALL NOT BE SUBJECT TO AND DISCLAIMS: (1) ANY OTHER OBLIGATIONS OR LIABILITIES ARISING OUT OF BREACH OF CONTRACT OR OF WARRANTY, (2) ANY OBLIGATIONS WHATSOEVER ARISING FROM TORT CLAIMS (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR ARISING UNDER OTHER THEORIES OF LAW WITH RESPECT TO PRODUCTS SOLD OR SERVICES RENDERED BY BADGER METER, OR ANY UNDERTAKINGS, ACTS OR OMISSIONS RELATING THERETO, AND (3) ALL CONSEQUENTIAL, INCIDENTAL AND CONTINGENT DAMAGES WHATSOEVER.



**Badger Meter**

**HR-E®**

**High Resolution Encoder**

## PRODUCTS COVERED

This Badger Meter warranty shall apply to the High Resolution Encoder (HR-E®) ("Product"), sold on or after June 18, 2021. This warranty is not transferable and is extended only to utilities, municipalities, other commercial users and authorized distributors, hereafter referred to as "Customer" and does NOT apply to consumers or any person or entity who is not an original customer of Badger Meter or its authorized distributors.

## MATERIALS AND WORKMANSHIP

Badger Meter warrants the Product to be free from defects in materials and workmanship appearing within twenty (20) years and six (6) months after shipment from Badger Meter.

This warranty is prorated as follows: For the first ten (10) years of the warranty the Product is replaced at no charge, and the warranty is prorated at price discounts during the last ten (10) years of the warranty.

Specifically, Badger Meter will repair or replace, at its discretion, a non-performing Product at no cost during the first ten (10) years of the warranty and at prorated price discounts during the last ten (10) years of the warranty. Badger Meter will apply these prorated price discounts to the Product list prices in effect at the time of Product return and according to the following prorated price discount schedule:

- Years 11 through 12—75% discount
- Years 13 through 15—50% discount
- Year 16—40% discount
- Year 17—30% discount
- Year 18—20% discount
- Years 19 through 20—10% discount

Replacement Products are warranted for and under the balance of the original applicable Product warranty.

## PRODUCT RETURNS

Any Product proved to the satisfaction of Badger Meter to have failed the foregoing warranties will, at the option of Badger Meter, be repaired or replaced without charge to the Customer. The Badger Meter obligation hereunder shall be limited to such repair and replacement and shall be conditioned upon Badger Meter receiving written notice of any alleged defect within ten (10) days after its discovery. This exclusive remedy shall not be deemed to have failed its essential purpose so long as Badger Meter is willing and able to replace defective products or issue a credit to purchaser within a reasonable time of proof to Badger Meter that a defect is involved. Product returns must be shipped by the Customer prepaid F.O.B. to the nearest Badger Meter factory or

distribution center. The Customer shall be responsible for all direct and indirect costs associated with removing the original Product and reinstalling the repaired or replacement Product.

## LIMITS OF LIABILITY

This warranty shall not apply to Product repaired or altered by parties other than Badger Meter. The foregoing warranty applies only to the extent that the Product is installed, serviced and operated strictly in accordance with Badger Meter instructions. The warranty shall not apply and shall be void with respect to Product exposed to conditions other than those detailed in the Badger Meter Product technical literature or which have been subject to vandalism, negligence, accident, acts of God, alteration, improper installation, operation or repair, or other circumstances which are beyond the reasonable control of Badger Meter. With respect to Product not manufactured by Badger Meter, the warranty obligations of Badger Meter shall in all respects conform and be limited to the warranty extended to Badger Meter by the supplier.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE **(except warranties of Title).**

Any description of Product, whether in writing or made orally by Badger Meter or its agents, specifications, samples, models, bulletins, drawings, diagrams, engineering sheets or similar materials used in connection with any Customer's order are for the sole purpose of identifying Product and shall not be construed as an express warranty. Any suggestions by Badger Meter or its agents regarding use, application or suitability of Product shall not be construed as an express warranty unless confirmed to be such in writing by Badger Meter.

## Exclusion of Consequential Damages and Disclaimer of Other Liability

Badger Meter liability with respect to breaches of the foregoing warranty shall be limited as stated therein. Badger Meter liability shall in no event exceed the contract price. BADGER METER SHALL NOT BE SUBJECT TO AND DISCLAIMS: (1) ANY OTHER OBLIGATIONS OR LIABILITIES ARISING OUT OF BREACH OF CONTRACT OR OF WARRANTY (2) ANY OBLIGATIONS WHATSOEVER ARISING FROM TORT CLAIMS (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR ARISING UNDER OTHER THEORIES OF LAW WITH RESPECT TO PRODUCTS SOLD OR SERVICES RENDERED BY BADGER METER, OR ANY UNDERTAKINGS, ACTS OR OMISSIONS RELATING THERETO, AND (3) ALL CONSEQUENTIAL, INCIDENTAL AND CONTINGENT DAMAGES WHATSOEVER.



**Badger Meter**

# ORION® Cellular Water Endpoints

Network as a Service (NaaS)

## PRODUCTS

This warranty shall apply to Badger Meter ORION® Cellular water endpoints, including the ORION Cellular LTE-M, LTE-MS, C and HLA water endpoints sold on or after August 4, 2021.

This warranty is not transferable and is extended only to utilities, municipalities and authorized distributors selling to utilities and municipalities within the United States or Canada, hereafter referred to as "Customer" and does NOT apply to consumers or any person or entity who is not an original Customer of Badger Meter or its authorized distributors.

## MATERIAL AND WORKMANSHIP

Badger Meter warrants all ORION Cellular water endpoints, including battery (configured to the standard mode of operation set by the factory at time of shipment), hereafter referred to as "Product(s)" as listed below, to be free from defects in material and workmanship for the time period stated.

ORION Water Endpoints	20 years and 6 months after shipment
-----------------------	--------------------------------------

Products are warranted to be free from defects in material and workmanship for twenty (20) years and six (6) months after shipment from Badger Meter. Badger Meter will repair or replace, at its discretion, a non-performing Product at no cost during the first ten (10) years, and at a prorated price during the last ten (10) years of the warranty. Badger Meter will apply these prorated price discounts to the Product list prices at the time of Product return and according to the following prorated price discount schedule:

Year	Discount %	Year	Discount %
11	70	16	45
12	65	17	40
13	60	18	35
14	55	19	30
15	50	20	25
		>20	0

Replacement Products are warranted for and under the balance of the original applicable Product warranty.

## GUARANTEE OF NETWORK PERFORMANCE

If the communication network that supports any ORION Cellular water endpoint in the Customer's meter service area ("Network") explicitly and publicly discontinues operation during the Product warranty time period stated herein, thereby rendering any endpoint unable to successfully transmit meter reading data ("Shut Down"), then for each Shut Down endpoint, as confirmed in writing by the Network operator and verified in writing by Badger Meter, Badger Meter will provide the following guarantee in exchange for applicable fees and minimum purchase commitments as described in the most current BEACON® AMA Solution with ORION NaaS Pricing Terms and Conditions document from Badger Meter.

Badger Meter will supply a replacement endpoint that is supported by the most current technology readily available for full-scale use in the Customer's meter service area affected by Shut Downs ("Replacement endpoints") at no charge to the Customer for such Replacement endpoints during the first ten (10) years of the Product warranty time period, and according to the prorated price discount schedule

stated herein, during the last ten (10) years of the Product warranty time period. Replacement endpoints are warranted for and under the balance of the original applicable endpoint warranty.

The Customer shall be responsible for all other direct and indirect costs associated with the Replacement endpoints, including but not limited to costs associated with installation and maintenance. If the Customer agrees to pay for shipping and the most current Badger Meter published disposal fee per Replacement endpoint, Badger Meter will properly dispose of returned Shut Down endpoints.

## PRODUCT RETURNS

Product failures must be proven and verified to the satisfaction of Badger Meter. The Badger Meter obligation hereunder shall be limited to such repair and replacement and shall be conditioned upon Badger Meter receiving written notice of any asserted defect within 10 (ten) days after its discovery. This exclusive remedy shall not be deemed to have failed its essential purpose so long as Badger Meter is willing and able to replace the defective Product for the Customer within a reasonable time, after receipt of proof that a defect is involved. Product returns must be shipped by the Customer prepaid F.O.B. to the nearest Badger Meter factory or distribution center. The Customer shall be responsible for all direct and indirect costs associated with removing the Product and reinstalling the repaired or replacement Product.

## LIMITS OF LIABILITY

This warranty shall not apply to any Product repaired or altered by any Party other than Badger Meter. The foregoing warranty applies only to the extent that the Product is installed, serviced and operated strictly in accordance with Badger Meter instructions. The warranty shall not apply and shall be void with respect to Products exposed to conditions other than those detailed in Product technical literature or which have been subject to vandalism, negligence, accident, acts of God, improper installation, operation or repair, alteration or other circumstances which are beyond the reasonable control of Badger Meter. With respect to products not manufactured by Badger Meter, the warranty obligations of Badger Meter shall in all respects conform and be limited to the warranty extended to Badger Meter by the supplier.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (except warranties of Title).

Any description of the Product, whether in writing or made orally by Badger Meter or its agents, specifications, samples, models, bulletins, drawings, diagrams, engineering sheets or similar materials used in connection with any Customer's order are for the sole purpose of identifying the Product and shall not be construed as an express warranty. Any suggestions by Badger Meter or its agents regarding use, application or suitability of the Product shall not be construed as an express warranty unless confirmed to be such, in writing, by Badger Meter.

### **Exclusion of Consequential Damages and Disclaimer of Other Liability**

The liability of Badger Meter with respect to breaches of the foregoing warranty shall be limited as stated herein. Badger Meter liability shall in no event exceed the contract price. BADGER METER SHALL NOT BE SUBJECT TO AND DISCLAIMS: (1) ANY OTHER OBLIGATIONS OR LIABILITIES ARISING OUT OF BREACH OF CONTRACT OR OF WARRANTY, (2) ANY OBLIGATIONS WHATSOEVER ARISING FROM TORT CLAIMS (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR ARISING UNDER OTHER THEORIES OF LAW WITH RESPECT TO PRODUCTS SOLD OR SERVICES RENDERED BY BADGER METER, OR ANY UNDERTAKINGS, ACTS OR OMISSIONS RELATING THERETO, AND (3) ALL CONSEQUENTIAL, INCIDENTAL AND CONTINGENT DAMAGES WHATSOEVER.

### **SMART WATER IS BADGER METER**

ORION is a registered trademark of Badger Meter, Inc. Other trademarks appearing in this document are the property of their respective entities. Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding contractual obligation exists. © 2021 Badger Meter, Inc. All rights reserved.

# APPENDICES

**CERTIFICATE OF INSURANCE  
AND LICENCES AND GOOD  
STANDING CERTIFICATE**



# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)  
04/29/2021

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

<b>PRODUCER</b> Willis Towers Watson Northeast, Inc. c/o 26 Century Blvd P.O. Box 305191 Nashville, TN 372305191 USA	<b>CONTACT NAME:</b> Willis Towers Watson Certificate Center <b>PHONE (A/C, No, Ext):</b> 1-877-945-7378 <b>E-MAIL ADDRESS:</b> certificates@willis.com	<b>FAX (A/C, No):</b> 1-888-467-2378
	<b>INSURER(S) AFFORDING COVERAGE</b>	
<b>INSURED</b> Ferguson Enterprises, LLC and Subsidiaries (See Attached Named Insured Schedule) 12500 Jefferson Avenue Newport News, VA 23602	<b>INSURER A:</b> ACE American Insurance Company	<b>NAIC #</b> 22667
	<b>INSURER B:</b> Indemnity Insurance Company of North Ameri	43575
	<b>INSURER C:</b> ACE Fire Underwriters Insurance Company	20702
	<b>INSURER D:</b>	
	<b>INSURER E:</b>	
	<b>INSURER F:</b>	

**COVERAGES**

CERTIFICATE NUMBER: W20766400

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

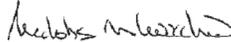
INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input checked="" type="checkbox"/> LOC <input type="checkbox"/> OTHER:			HDO G72497466	05/01/2021	05/01/2022	EACH OCCURRENCE \$ 5,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 5,000,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 5,000,000 GENERAL AGGREGATE \$ 10,000,000 PRODUCTS - COMP/OP AGG \$ 10,000,000
A	<b>AUTOMOBILE LIABILITY</b> <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input checked="" type="checkbox"/> Self-Insured <input type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY <input checked="" type="checkbox"/> Physical Damage			ISA H25550018	05/01/2021	05/01/2022	COMBINED SINGLE LIMIT (Ea accident) \$ 5,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
	<input type="checkbox"/> UMBRELLA LIAB <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> DED <input type="checkbox"/> RETENTION \$						<input type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS-MADE EACH OCCURRENCE \$ AGGREGATE \$
B	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b> ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N No	N/A	WLR C67806943	05/01/2021	05/01/2022	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTHER E.L. EACH ACCIDENT \$ 2,000,000 E.L. DISEASE - EA EMPLOYEE \$ 2,000,000 E.L. DISEASE - POLICY LIMIT \$ 2,000,000
A	<b>Workers' Compensation &amp; Employers Liability - AZ/CA/MA Per Statute</b>			WLR C67806980	05/01/2021	05/01/2022	E.L. Each Accident \$2,000,000 E.L. Disease - Pol Lmt \$2,000,000 E.L. Disease-Each Emp \$2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Workers Compensation Policy WLR C67806943 provides coverage for AK, AL, AR, CO, CT, DC, DE, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, MT, NC, NE, NH, NJ, NM, NV, NY, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WV.

SEE ATTACHED

**CERTIFICATE HOLDER****CANCELLATION**

Evidence of Coverage	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE 

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**ADDITIONAL REMARKS SCHEDULE**

<b>AGENCY</b> Willis Towers Watson Northeast, Inc.		<b>NAMED INSURED</b> Ferguson Enterprises, LLC and Subsidiaries (See Attached Named Insured Schedule)	
<b>POLICY NUMBER</b> See Page 1		12500 Jefferson Avenue Newport News, VA 23602	
<b>CARRIER</b> See Page 1	<b>NAIC CODE</b> See Page 1	<b>EFFECTIVE DATE:</b> See Page 1	

**ADDITIONAL REMARKS**

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,  
**FORM NUMBER:** 25 **FORM TITLE:** Certificate of Liability Insurance

**INSURER AFFORDING COVERAGE:** ACE Fire Underwriters Insurance Company **NAIC#:** 20702  
**POLICY NUMBER:** RWC C67807029 **EFF DATE:** 05/01/2021 **EXP DATE:** 05/01/2022

TYPE OF INSURANCE:	LIMIT DESCRIPTION:	LIMIT AMOUNT:
Workers' Compensation & Employers Liability - WI	E.L. Each Accident	\$2,000,000
Per Statute	E.L. Disease -Pol Lmt	\$2,000,000
	E.L. Disease-Each Emp	\$2,000,000



FERGUSON ENTERPRISES, LLC  
ACTIVE DBA SUBSIDIARY LIST

<b>PAGE 2 - DBA &amp; SUBSIDIARY LIST</b>	
<u>Entity Name</u>	<u>Entity Name</u>
North Point Plumbing Supply, LLC	Wolseley de Puerto Rico, Inc.
Orange County Plumbing Group, LLC	Wolseley Financial Services
Palm Designs LLC	Wolseley Industrial Group
PCS Industries	Wolseley Integrated de Mexico S.A. de C.V.
PL Sourcing	Wolseley Investments North America, Inc.
Plumb Source	Wolseley Investments, Inc.
Plumbing Décor	Wolseley NA Construction Services, LLC
Plumbing Holdings Corp.	Wolseley NA Finance, Inc.
Pollardwater	Wolseley Staffing de Mexico S.A. de C.V.
Powell Pipe & Supply Co.	WPCC Forwarding
Power Equipment Direct Inc.	Wright Plumbing Supply
Process Instruments & Controls, LLC (effective 9/9/2019)	
Professional's Bath Source	
PV Sullivan Supply	
Ramapo Wholesalers	
RB Huntington Realty, LLC	
Rencor Controls (effective 3/16/2020)	
Robertson Supply (effective 11/19/2018)	
Rocky Hollow Realty, LLC	
Renwes Sales	
Redlon & Johnson	
Reese Kitchen, Bath & Lighting Gallery	
S.W. Anderson Sales Corporation (effective 11/11/2019)	
Safe Step Walk in Tub, LLC (effective 7/31/2018)	
SG Supply Co.	
Ship-Pac	
Signature Hardware	
SimplyPlumbing, LLC	
SOS Sales	
Southampton Realty Corp.	
Stock Loan Services, LLC	
Supply.com	
Tarpon Wholesale Supplies	
The Davidson Group	
The Plumbing Source	
The Stock Market	
Tinkar Realty, LLC	
TotalFab, LLC	
TPW Kitchen & Bath	
Wallwork (effective 12/10/2018)	
Wanlyn Realty Corp.	
Waterworks Industries	
Webb Distributors	
Western Air Supply	
Westfield Lighting	
Wholesale Group	
Wholesale Group Operations, Inc.	
Wolseley (Barbados) Ltd	

90 Salisbury

# State of Maryland License

**22866994**

22280975

18230512



FERGUSON ENTERPRISES OF VIRGINIA LLC  
FERGUSON WATERWORKS #1883  
P O BOX 2778  
ATTN TAX BL  
NEWPORTS NEWS VA 23609-0778

FERGUSON ENTERPRISES OF VIRGINIA LLC  
FERGUSON WATERWORKS #1883  
28596 NAYLOR MILL ROAD  
SALISBURY MD 21801

# 21

CODE	UNIT	TYPE OF LICENSE	NO OF LIC	COST
71	751	TRADER'S LICENSE	1	800.00
01	035	CHAIN STORE	1	96.43

DATE OF ISSUE  
MO DAY YR  
06/28/2021

MONTHS PAID  
12

ISSUING FEES	4.00		
TOTAL	900.43	AMOUNT PAID	900.43

**THIS LICENSE MUST BE PUBLICLY DISPLAYED  
AND EXPIRES ON **APRIL 30, 2022****

ISSUED BY

James B. McAllister, Clerk of Circuit Court  
P.O. BOX 198  
SALISBURY, MARYLAND 21803-0198 (410)543-1427

RGD

The information below is for the Clerk's Office use only, customers can disregard.

These barcodes are for use with the new Cashiering System. When your site is upgraded, you will be given instructions for their use.

These barcodes must be scanned in order for RCS:

Scan this one first



\*22\$107\$122280975\$122866994\*

Scan this one second



\*896.43\$M0.00\$M0.00\$M4.00\*

***STATE OF MARYLAND***  
***Department of Assessments and Taxation***

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I, MICHAEL L. HIGGS OF THE STATE DEPARTMENT OF ASSESSMENTS AND TAXATION OF THE STATE OF MARYLAND, DO HEREBY CERTIFY THAT THE DEPARTMENT, BY LAWS OF THE STATE, IS THE CUSTODIAN OF THE RECORDS OF THIS STATE RELATING TO LIMITED LIABILITY COMPANIES , OR THE RIGHTS OF LIMITED LIABILITY COMPANIES TO TRANSACT BUSINESS IN THIS STATE, AND THAT I AM THE PROPER OFFICER TO EXECUTE THIS CERTIFICATE.

I FURTHER CERTIFY THAT FERGUSON ENTERPRISES OF VIRGINIA, LLC A/K/A FERGUSON ENTERPRISES, LLC (Z19586502) , REGISTERED APRIL 12, 2019, IS A LIMITED LIABILITY COMPANY EXISTING UNDER AND BY VIRTUE OF THE LAWS OF THE STATE OF VIRGINIA, AND THAT THE LIMITED LIABILITY COMPANY IS AT THE TIME OF THIS CERTIFICATE IN GOOD STANDING TO TRANSACT BUSINESS.

IN WITNESS WHEREOF, I HAVE HEREUNTO SUBSCRIBED MY SIGNATURE AND AFFIXED THE SEAL OF THE STATE DEPARTMENT OF ASSESSMENTS AND TAXATION OF MARYLAND AT BALTIMORE ON THIS JANUARY 02, 2020.



Michael L. Higgs  
Director



*301 West Preston Street, Baltimore, Maryland 21201*  
*Telephone Baltimore Metro (410) 767-1340 / Outside Baltimore Metro (888) 246-5941*  
*MRS (Maryland Relay Service) (800) 735-2258 TT/Voice*

Online Certificate Authentication Code: bn8N2FZfpkC4U76g8cgytg  
To verify the Authentication Code, visit <http://dat.maryland.gov/verify>

# **QUALIFICATIONS AND FINANCIALS**

## FINANCIALS AND QUALIFICATION STATEMENT



Established in 1953 and headquartered in Newport News, Virginia, Ferguson opened with several locations dedicated to servicing smaller plumbing contractors. From this modest start, we raised the bar for industry standards as the top-rated and largest wholesale supplier of commercial and residential plumbing supplies in the U.S. However, our expertise goes beyond plumbing. We are a diverse distributor that spans multiple businesses including HVAC/R, waterworks and industrial. For nearly 70 years, we have grown from a local plumbing distributor to a \$23 Billion dollar company with more than 1,600 locations and over 31,000 associates nationwide. We pride ourselves on delivering world-class service to our customers, and they know that “Consider it done.” is more than just a tagline. It is a cultural belief that is demonstrated every day through exceptional customer service, product selection and industry knowledge.

For added expertise around water meters and AMR/AMI technologies, Ferguson has made a significant investment in creating the Meter and Automation Group. This substantial investment of human and capital resources with a focus specifically on AMR/AMI has allowed us to partner with top meter manufacturers in the country. Ferguson can leverage its branch network and municipal sales focus to bring unprecedented support. With almost 70 years of industry experience, Ferguson Waterworks is one of the largest suppliers of water, sewer and storm management products and services to multiple segments of the waterworks sector.

### EQUAL EMPLOYMENT OPPORTUNITY

Ferguson complies with equal opportunity and is strongly committed to providing equal employment opportunity to all associates and all applicants for employment. Additionally, Ferguson (including subsidiaries) expects all associates to comply with all local, state, and federal laws and regulations related to the utilization of Small, Minority, Women, Veteran/Service Disable, Disadvantaged business enterprises. For additional information please visit [Supplier Diversity and Vendor Partnerships or Ferguson’s Distributor Alliance Program](#).

### WE ARE COMMITTED TO

- Developing a diverse workforce and an inclusive working environment everywhere Ferguson has a presence.
- Merit-based people decisions within our organization. Creating an environment free from discrimination and harassment, where all are treated with dignity and respect.
- Encouraging our associates to reach their full potential irrespective of race, color, religion, gender, age, sexual orientation, marital status, disability, or any other characteristic that makes them unique.
- Seeking the competitive advantage of diverse perspectives reflected in our current and future customers and our communities.
- Diversity of thought - letting go of "one right way" in favor of a culture where we learn from each other.

### FINANCIALS

#### FERGUSON’S FEDERAL TAX ID

54-1211771

#### FERGUSON’S D-U-N-S NUMBER

00-895-5171



### MAIN COPORATE SITE

Ferguson’s earnings statements are located in Ferguson PLC’s Annual Report at [www.fergusonplc.com](http://www.fergusonplc.com). Key sections include our businesses, investors, financial details, media, and sustainability. There is also information on our strategy and links to our business unit websites.

## VERIFICATION OF CURRENT BONDING CAPACITY

Maximum amount of bond authorized to issue: \$50,000,000 Single \$200,000,000 Aggregate.

## SURETY COMPANY – MAIN COMPANY

- Agent's Name: Jordan Ezekiel
- Company Name: Federal Insurance Company
- Address: 202B Hall's Mill Road, Whitehouse Station, NJ 08889
- Company File Number: NAIC #20281
- Rating (as listed in Best's Key Guide): A++
- Financial Size category (as listed in Best's Key Guide): XV

## LOCAL COMPANY

- Agent's Name: Pablo Rios, Jr.
- Company Name: Willis Towers Watson Northeast, Inc.
- Address: 100 Matsonford Road, Radnor, PA 19087

## CERTIFICATE OF INSURANCE DOCUMENTATION

For evidence of coverage, please refer to the *Certificate of Insurance* enclosed.

## GENERAL LIABILITY

- Provider: ACE American Insurance Company
- Policy #: HDO G72497466      05/01/2021- 05/01/2022

## WORKERS COMPENSATION

- Provider: Indemnity Insurance Company of North America
- Policy #: WLR C67806943      05/01/2021- 05/01/2022

## BANK REFERENCE

Bank of America Acct: 3752290835 for all inquiries please visit [www.bankvod.com](http://www.bankvod.com) | DUNS #00-895-5171

### **BANK REFERENCE - Bank of America**

Credit inquiries on commercial banking accounts are handled through Capital Confirmation, Inc. For questions about the website please call 1-866-325-7201.

Information Provided: (on deposit accounts) open date, type of account and average "collected" balance. Limited loan information can also be provided if specifically requested.

Requests are processed within three business days of receipt.  
Mail Requests will not be accepted.  
Fee: \$15 – no invoice option

To request bank reference, go to [www.confirmation.com](http://www.confirmation.com) and follow the prompts. You will need the following information:

**Authorized Signer:** Brenda Crowder  
**Tax ID:** 54-1211771  
**Currency:** USD only  
**Account:** 3752290385

# **EXCEPTIONS AND GENERAL ASSUMPTIONS**

## CLARIFICATIONS AND EXCEPTIONS

### LEGAL ASSUMPTIONS AND CLARIFICATIONS

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Ferguson take's exception to the extent a product warranty is implied from the Proposer. All materials are covered by manufacturer warranties and Ferguson will coordinate warranty service under the manufacturer's warranty. Ferguson only warrants the workmanship of meter installation to the extent applicable to its scope, and this is typically for one-year after system acceptance.

### INSURANCE ASSUMPTIONS AND CLARIFICATIONS

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From the initial Statement of Qualifications Document - Insurance Requirements (P.15)

- X c. – replace “may arise from or in connection with” with “may be caused by” to avoid ambiguity.
- XI a. – strike the last sentence “Additionally, all firms shall provide a detailed certificate that indicates they carry Pollution Liability Insurance in the amount of no less than \$2,000,000 of coverage.” This should not apply to the scope of work for this AMI deployment.

**PROJECT FUNDING  
OPTIONS THROUGH  
FERGUSON'S PARTNER -  
HOLMAN CAPITAL**

## Financial Benefit Analysis Questionnaire

**Customer Name:** \_\_\_\_\_

### Current Metering System

Meter Technology Deployed: Touch/Manual, AMR, AMI	
Number of Meters in System	
Average Age of Meters	
Number of Staff Required to Read and Bill	
Average Staff Pay (Including Overhead and Benefits)	
Number of Vehicles Related to Meter Reading	
Annual Cost to Own and Operate (1) Service Vehicle	
*Annual Fixed Water/Sewer Revenues (See Definition Below)	
**Annual Variable Water/Sewer Revenues (See Definition Below)	
Annual Operating Expenses	

### Estimated Cost Reductions with Automation (AMI)

Estimated Staff (Reading and Billing) Available to Re-deploy	
Estimated Number of Vehicles Available to Re-deploy	

**Definitions:**

\* **Fixed Revenue:** revenues collected from customers based off the flat fee established per meter size

\*\* **Variable Revenue:** revenues collected once customers use more water than established flat rate

# Infrastructure Financing Solutions

Holman Capital Corporation provides quick and simple financing solutions to fund all of your infrastructure needs. Our extended financing terms create affordable payments to fund water treatment plants, port improvements, pipelines, solid waste facilities and much more. Our flexible financing solutions provide 100% project funding and are secured by your agency's revenues. We provide competitive interest rates and eliminate costly delays associated with state loan programs to save you time and money.

## The Holman Capital Advantage

- Public Finance Expertise
- Preserve Cash
- Extended Financing Terms
- Customized Payments
- Simplified Documentation
- Competitive Financing Rates
- Avoid Project Delays
- 100% Project Funding
- Early Buyout Options
- Quick Funding



## Security

Holman Capital Corporation will secure its interest in the project financing with a pledge of your agency's legally available revenue stream. Below are some sample revenues streams to choose from:

- Enterprise Funds
- Water Rights
- Property Taxes
- Sales Taxes
- Federal Funding
- Property Assessments

## Public Agency Projects

- Capital Equipment
- AMI/AMR Projects
- Water Storage Tanks
- Pipelines
- Waste Water Treatment Plants
- Landfills
- Electricity Plants
- Energy Conservation Projects
- Renewable Energy Projects
- Administrative Facilities
- Land Acquisition

## Reliable Partnership

Holman Capital Corporation is committed to providing you with the capital to expand and modernize your enterprise. Our seasoned team of finance professionals will identify your needs and goals and structure the right solution for you in a timely manner.

## Contact Us

To learn more about our financing solutions, contact:

[www.HolmanCapital.com](http://www.HolmanCapital.com)

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