May 22, 2013

Jeff Derouen
Executive Director
Public Service Commission
P.O. Box 615
Frankfort, KY 40602

Re: Request for Information- Funding for Radio Read Meters
Ref: PSC Case 2013-00043

Please find enclosed information requested and questions answered from Muhlenberg County Water District #1 regarding funding for Radio Read Meter funding.

Please feel free on contact me if you have any questions.

Sincerely,

Davey Douglas
Superintendent
(270) 608-5262

PUBLIC SERVICE COMMISSION
211 Sower Blvd.
P.O. Box 615
Frankfort, Kentucky 40602-0615

Funding for Radio-Read Meters

Muhlenberg County Water District #1
301 Dean Road
P.O. Box 348
Greenville, Kentucky 42345

May 22, 2013

INDEX

1. State whether MCWD #1 has advertised for bids for the 5,800 meters that it proposes to purchase.

   Yes...MCWD advertised for bids in the Leader News newspaper that was issued on April 30, 2013. Newspaper article with date included on following 2 pages.

This is to certify that this response on behalf of the utility is true and accurate to the best of my ability, knowledge, information, and belief .

5-28-13

5-28-13

Witness

is approximately 0.2 miles east of the State Route 602 junction with US 431 and located approximately 0.5 miles south of the Green River.

The proposed operation is located on the Central City East U.S.G.S. 7 ½ minute quadrangle map. The surface area is owned by Cyprus Creek Land Company, Western Land Company, LLC, and Rogers Brothers Coal Company. The operation will involve the use and maintenance of a haul road. The operation will affect an area within 100 feet of KY State Route 3038. The operation will not involve closure or relocation of this public road.

The application has been filed for public inspection at the Department for Natural Resources, Division of Mine Reclamation and Enforcement, Madisonville Regional Office, 625 Hospital Drive, Third Floor, Madisonville, KY 42431. Written comments, objections, or requests for a permit conference must be filed with the Director, Division of Mine Permits, No.2 Hudson Hollow Road, U.S. Highway 127 South, Frankfort, KY 40601. 5-7c

LEGAL NOTICES

COMMONWEALTH OF KENTUCKY
MUHLENBERG
CIRCUIT COURT
CIVIL ACTION NO.
10-CI-00178

JPMORGAN CHASE BANK, NATIONAL ASSOCIATION PLAINTIFF Vs.

NOTICE OF SALE

CAROLYN SIGERS, et al., DEFENDANTS

by virtue of a deed from P & P Properties of Muhlenberg County, LLC, dated May 05, 2004, filed May 18, 2004, recorded in Deed Book D502, Page 777, County Clerk's Office, Muhlenberg County, Kentucky.

Subject to all restrictions, conditions and covenants and to all legal highways and easements.

The above-described real estate is indivisible and cannot be divided without materially impairing its value and the value of Plaintiff's lien thereon and shall be sold as a whole, free and clear of the claims of the parties to this action and subject to easements, restrictions, and stipulations of record, any matters that would be disclosed by an accurate survey or inspection of the property, any current assessments for public improvements levied against the property.

Proceeds of the sale shall be paid as follows:

a. in satisfaction of the costs and expenses of this action incurred by the Master Commissioner;

b. to the full satisfaction of any liens for delinquent ad valorem taxes assessed against the real estate;

c. to satisfy the judgment lien of Plaintiff as set forth hereinabove;

d. the balance of the proceeds, if any, shall be held by the Master Commissioner pending further orders of this Court.

The Sale shall be for cash or on terms of ten percent (10%) down with thirty (30) days to pay the balance, and requiring that the purchaser shall give a bond, with good surety, for the purchase price, payable to the Master Commissioner bearing interest at twelve

P.O. Box 655, Central City, Kentucky 42330.

On April 25, 2013 the estate of Martha L. Covington, 501 Rogers Avenue, Greenville, Kentucky 42345 to Ella L. Mercer, Executrix, 358 Nebo Cemetery Road, Greenville, Kentucky 42345. Attorney representing estate: None.

LEGAL NOTICES

NOTICE TO TAKE BIDS

Notice is given that the Muhlenberg County Water District on Monday, May 13, 2013 at 4:00 p.m. prevailing central time at its office at 301 Dean Road, Greenville, Kentucky 42345 will receive bids for 5,800 Sensus iPERL Water Meters, or the equivalent, and 5,800 radio meter reader equipment (AMR's), or the equivalent, at the office of the Muhlenberg County Water District, 301 Dean Road, Greenville, Kentucky 42345.

The successful bidder will provide a unit price for 5,800 Sensus iPERL Water Meters and a separate unit price for 5,800 automated meter readers (AMR), radio meter reading equipment.

The bid shall specify the delivery time for delivery of same, warranties as to said equipment and all such bids shall be accordance with specifications which are available for inspection at the Muhlenberg County Water District Office at 301 Dean Road, Greenville, Kentucky 42345.

MUHLENBERG COUNTY WATER DISTRICT

4-30c

LEGAL NOTICES

42345, for the Following Bid Packages Only:
INSTALLATION of the HVAC SYSTEM (Phase 1)
MUHLENBERG COUNTY COURTHOUSE ANNEX - HVAC RENOVATION

A pre-bid conference is scheduled for April 30, 2013 at 2:00 p.m., the MUHLENBERG COUNTY COURTHOUSE ANNEX located at 109 East Main Cross Street, Greenville, KY. All bidders are urged to attend this meeting.

Proposals are to be submitted on the Contractors Standard Proposal Forms.

Please note the Phase 1 - Electrical has previously been Bid and Awarded.

All questions shall be directed, in writing to the Engineers or Owner, at their Contact Phone Numbers, listed above.
4-30c

LEGAL NOTICES

Notice of Intention to Mine

Pursuant to Application Number 889-7011 NW

In accordance with KRS 350.055, notice is hereby given that Armstrong Coal Company, Inc., 407 Brown Road, Madisonville, Kentucky 42431, has applied for a permit for a surface coal mining and reclamation operation affecting 105.0 acres

LEGAL NOTICES

By virtue of the Judgment and Order of Sale dated May 7, 2012, against Defendant, Carolyn Sigers, et al., there is due and owing to Plaintiff the principal sum of $52,484.72 with interest on the principal sum at the rate of 8.8% per annum from June 1, 2009 until paid, together with costs, other expenses, and attorney's fees as set forth therein. Pursuant to said Judgment and Order of Sale and the Order entered April 16, 2013 rescheduling the sale, I will offer for sale at the front door of the Muhlenberg County Courthouse, Greenville, Kentucky, to the highest bidder at public auction on the **9th day of May, 2013, at 9:00 a.m. (CST), prevailing time or immediately thereafter,** real estate located at Muhlenberg County, Kentucky, and more particularly described as follows:

Property Address: 106 Wilson Street, Greenville, KY 42345

Parcel No.: 109-02-10-021.000

Beginning at an iron pipe in the North line of Wilson Street, Agreed corner with Raymond Craig; thence with the line of Craig N 00-56 feet E 131.10 feet to an iron pin in the Craig line; thence N 86-22 E 0142.00 feet to the center of Caney Creek; 160.00 feet, more or less, to the line of Wilson Street; thence N 48-70 W 70.00 feet to the

LEGAL NOTICES

percent (12%) per annum until paid. Such bond shall have the force and effect of a judgment. In the event the Plaintiff is the successful bidder, it shall be entitled to a credit of its judgment against the purchase price and shall only be obligated by pay court costs, fees and costs of the Master Commissioner, and the real estate taxes due pursuant to this order. The purchaser shall pay the real estate taxes for the 2013 tax year and subsequent years.

Bidders will be prepared to comply with these terms.

Respectfully submitted,
This _____ day of April, 2013.

Al Miller,
Master Commissioner
428 North Second Street
Central City, Kentucky
42330
(270) 754-5249
5-7c

LEGAL NOTICES

The following estates have been probated and fiduciary appointments made in the Muhlenberg District Court. Creditors are notified that all claims against said estates must be filed within six (6) months from the date of appointment.

On April 22, 2013 the estate of Zelmodene Adams, 103 West Main Street, Powderly, Kentucky 42367 to Marilyn

2. a. State whether MCWD #1 has not advertised for bids for the proposed meters, state whether it intends to make newspaper advertisement for such bids

   MCWD #1 has advertised for bids as stated in response to Question #1 with attachment

   b. If yes, state when MCWD #1 intends to advertise for such bids.

   MCWD #1 advertised in the April 13, 2013 edition of the Leader News newspaper as stated in response to Question #1 with attachment.

This is to certify that this response on behalf of the utility is true and accurate to the best of my ability, knowledge information, and belief.

David Douglas 5-28-13

Witness 5-28-13

3. State whether KRS 424.260(1) applies to Muhlenberg District's proposed purchase of water meters. Explain your response and provide with the response all written opinions from Muhlenberg District's legal counsel on the applicability of KRS 424.260.

RESPONSE: Yes, KRS 424.260(1) applies to Muhlenberg District's proposed purchase of water meters. Muhlenberg District has complied with KRS 424.260(1). A copy of the May 15, 2013 Opinion Letter from Brent Yonts, who is the District's legal counsel, is attached. Also attached is the tear sheet, dated April 30, 2013, from the local newspaper as proof of advertisement.

WITNESS: Brent Yonts, Legal Counsel for Muhlenberg District

Law Office
BRENT YONTS
A Professional Service Corporation

OFFICE: 270-338-0816
FAX: 270-338-1639

Brent Yonts

P.O. BOX 370
114 MILL STREET
GREENVILLE, KY 42345

Daniel Sherman, Jr.

May 15, 2013

Muhlenberg County Water District
301 Dean Road
Greenville, KY 42345

Dear Sir/Madam:

I am writing you concerning your bidding for the 5,800 Sensus iPERL Water Meters, or the equivalent, and 5,800 radio meter reader equipment (AMR's). As you know, you have bids for the purchase of these. The only requirement was advertising for bids.

I have previously sent you the notice which I prepared for you to be published in the Leader-News. I enclose herewith a tear sheet, Page A-11, of the Leader-News dated April 30, 2013. The Leader-News is the largest newspaper publication in Muhlenberg County and is the newspaper for official publication in Muhlenberg County.

You have therefore complied with the requirements for bidding.

With this certification to you, and I presume now that as of the dictation of this letter that you need a special meeting, as advertised on May 13, 2013, at 4:00 P.M., to open bids and decide if you will award bids.

Please send a copy of my certification to the Public Service Commission and to Kentucky Rural Water, as well as Damon Talley.

Very truly yours,

BRENT YONTS, PSC

BY/jlp
KBA #79435

Enclosure

4. List the various types of water meters that MCWD #1 considered prior to selecting the iPerl meter as the replacement for its existing meters. For each meter listed, explain why that meter was deemed less suitable for MCWD #1's needs or plans.

   MCWD considered 3 other meters before choosing the iPerl and the following page outlines reasons The Sensus SR II, Ultrasonic Stainless Steel E Series Badger, and Ultrasonic Polymer E Series Badger were deemed less desirable in comparison to the iPerl.

This is to certify that this response on behalf of the utility is true and accurate to the best of my ability, knowledge, information, and belief.

5-28-13

5-28-13

Witness

4. The following outline compares what MCWD feels are the more important factors in determining what meter fits our needs best. Attached is all information gathered for comparison.

1. Sensus SR II
   A. Internal oscillating piston
   B. 150 psi until leakage or damage
   C. 2 watts of Radio Broadcast Power
   D. 20 year warranty
      -10 year full
      -10 year pro-rated

   E. Test flow accuracy
      -0.25 gpm low flow
      -20 gpm high flow

2. Ultrasonic Stainless Steel E Series Badger
   Ultrasonic Polymer E Series Badger
   (The only difference between these two is tube material running through meter)
   A. No internal moving parts
   B. 175 psi until leakage or damage
   C. 1 watt of Radio Broadcast Power
   D. 20 year warranty
      -10 year full
      -10 year pro-rated
      -According to HD Supply bid document Section 5, they are "sellers" only and any meter malfunction will have to be dealt with directly with the factory.

   E. Test flow accuracy
      -0.05 gpm low flow
      -25 gpm high flow

3. Sensus I-Pearl
   A. No Internal Moving Parts
   B. 200 psi until leakage or damage
   C. 2 watts of Radio Broadcast Power
   D. 20 year warranty
      -10 year full
      -10 year pro-rated

   E. Test flow Accuracy
      -0.03 gpm low flow
      -35 gpm high flow

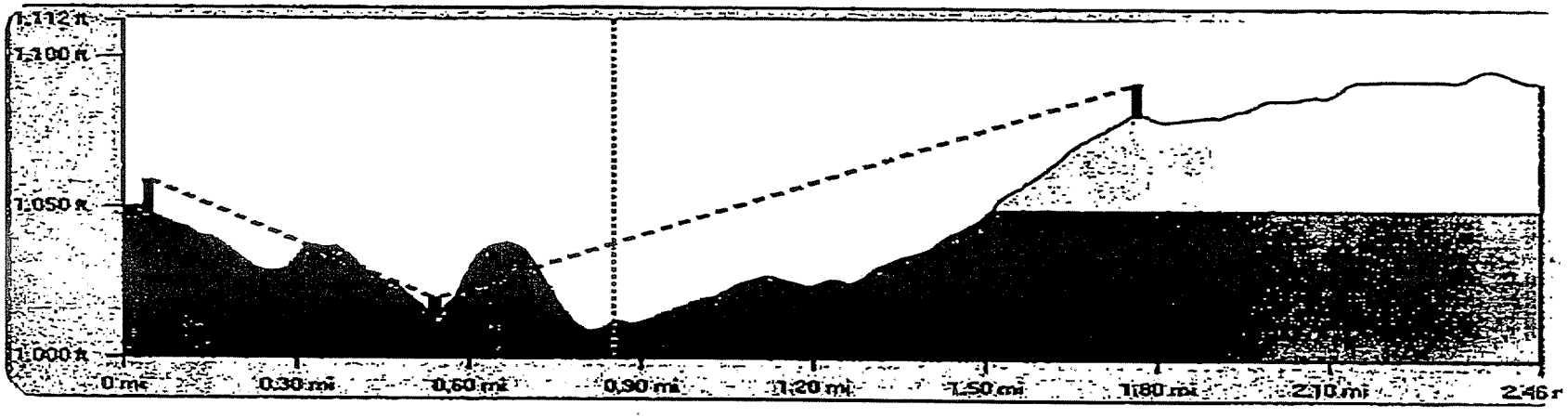
Badger Meter

Understanding RF Basics

Badger Meter Technology Solutions

Every drop counts.

Signal Strength, Output Power and Path Loss



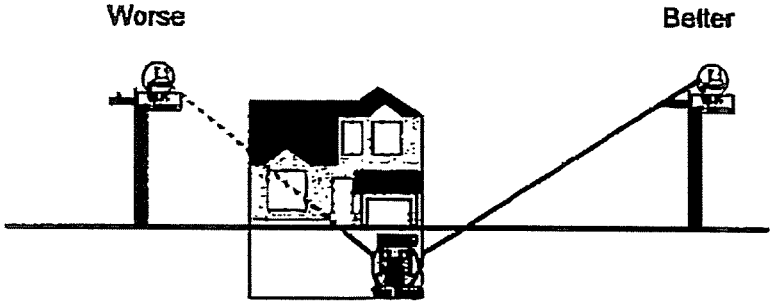
- Site selection for network infrastructure is critical for optimal system performance.
- Radio waves start out at a certain strength and lose their strength due to distance traveled and impediments (buildings or terrain) along the way.
- This is referred to as "Path Loss" or "Attenuation" and is measured in units called a decibels or dB
- Output power is typically measured in the unit of *Watts* ("W") but can also be measured in a unit known as "*dBm*" . **dBm** is the power ratio in decibels of the measured power referenced to one milliwatt (mW)

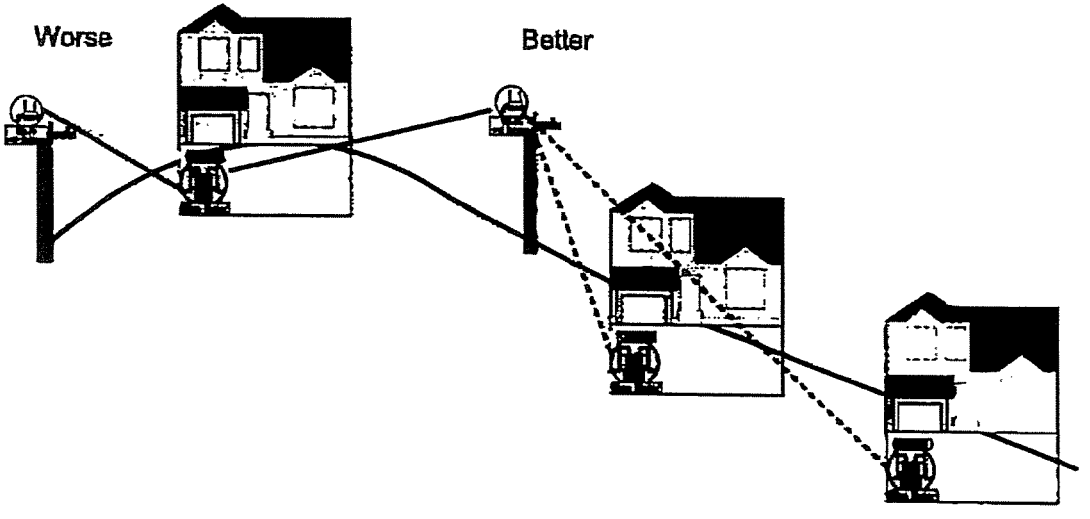
Signal Strength, Output Power and Path Loss

- A primary cause of path loss is associated with getting a signal out of a house. Here are a few common examples of typical RF loss with an indoor set application from a 1W ~ 30 dBM endpoint: (2W ~ 33 dBM)

Type	Loss	Output
Floor	-10 dB	+20 dBm
Interior Wall	-4.4 dB	+25.6 dBm
First Floor Ceiling	-6 dB	+24 dBm
Exterior Wall	-6 dB	+24 dBm
Window	-3 dB	+27 dBm
Solid Metal	-30 dB	0 dBm

Signal Strength, Output Power and Path Loss Examples





SPECIFICATIONS

BADGER METER® ORION® ME (MIGRATABLE ENDPOINT) AUTOMATED METER READING SYSTEM

PART I

1.0 GENERAL

Under this specification a single manufacturer shall supply all equipment necessary to furnish a fully automated meter reading system. While the primary function shall be to provide accurate and timely meter reading data for billing purposes, the system shall also furnish consumption and other pertinent metering exception data to facilitate enhanced operation and management of the total water distribution system, as described herein.

1.1 SYSTEM DESCRIPTION

The Badger Meter® ORION® ME Automated Meter Reading (AMR) System is a two-way bubble-up mobile RF reading system with the capabilities to automatically migrate to a high-powered fixed network following the installation of Network Gateway transceiver data collectors. The AMR system will utilize an FCC non-licensed radio frequency band to communicate meter-reading data, tamper conditions, leak detection, no-usage, and reverse flow (when using an absolute encoder) notification to a Badger Meter ORION mobile transceiver. In mobile mode, the endpoint will transmit both a current and snapped (midnight) reading to the mobile transceiver. The AMR system is comprised of a Badger Meter ORION endpoint located at the meter that transmits readings and exception information to the mobile transceiver when it is in the proximity range of the transmitted signal. The Badger Meter ORION endpoint also contains data profiling capabilities. The Badger Meter ORION endpoint will have sufficient memory to store over 90-days of hourly readings with exception condition information that can be downloaded via RF request and graphed in a profile analysis software program. The Badger Meter ORION system shall be able to process and maintain the information gathered from each endpoint in a database for billing purposes.

1.2 PERFORMANCE REQUIREMENTS

In combination with endpoints located at the meter, the AMR system must be capable of performing the following functions:

A. MOBILE METER READING - The endpoint shall bubble-up and transmit both a current (within the hour) and snapped (midnight) readings every five to six seconds when in mobile mode.

B. METER COMPATIBILITY - A Universal endpoint shall also be available fully programmed from the factory for connectivity to the Badger Meter RTR® and ADE®, Sensus® ECR II or ICE™ register, Neptune® ProRead®, ARB®-V encoder and E-coder®, Hersey® Translator and the Elster AMCo InVISION™ or Scancoder™. Connectivity to all encoders listed above must be done through a single endpoint that does not require field programming.

C. HIGH RESOLUTION (RTR Only) - To provide useful consumption data the AMR system shall have the capability to record usage through the meter to the closest one

(1) gallon or one tenth (1/10) cubic foot increment on residential sized meters, 5/8" through 1". For 1 ½" and 2" meters usage shall be recorded to the nearest ten (10) gallons or one (1) cubic foot. When used with an ADE, resolution in increased by a factor of ten.

D. LEAK DETECTION – To assist in the timely identification of potential leaks, the endpoint shall have an option to report information to the utility via the standard endpoint broadcast in regard to potential leaks.

E. CONSERVATION AND EFFICIENCY MONITORING – To assist in water conservation and to improve utility efficiency, an optional Badger Meter® ORION® monitor shall be available that allows customers to display their consumption reading for two separate, user-defined time intervals and tamper and leak indication data upon command on an Badger Meter ORION monitor.

F. DATA PROFILE – The proposed AMR system shall support an over-the-air data profile feature, with the capability to store over 90-days of consumption readings with metering exception information.

G. ACOUSTIC SYSTEM LEAK DETECTION – The proposed AMR system shall support the integration of ORION® Permalog+® AMR acoustic leak loggers for the leak monitoring of water system distribution mains. The AMR modules must be able to be wired from the factory to the Permalog+ acoustic leak loggers. This will support maintenance of the system and transmit the leak status of the logger through the AMR modules consumption field. The proposed system must also be able to read the AMR acoustic leak logger information with the system's standard mobile or hybrid network reading equipment.

H. MIGRATION – Through a software license, a single endpoint must be able to operate in high-powered fixed network mode and a lower powered mobile mode. The migration from mobile to fixed network and back must be done automatically without any needed programming at the endpoint. endpoint must automatically migrate from a fixed network mode back to mobile mode in the event of a network failure and back to fixed network once the network is back online.

1.3 COMMUNICATION PARAMETERS

The Badger Meter ORION AMR system is comprised of a radio frequency endpoint and transceiver. The endpoint and transceiver will operate as a non-licensed system in the 902 to 928 MHz utility frequency band. The endpoint shall operate at a nominal 916.45 MHz +/- 1 MHz, requiring only FCC certification under part 15, Subpart C and no customer license.

1.4 HARDWARE REQUIREMENTS

Badger Meter® ORION® Mobile Reading System

The Badger Meter ORION Reading System (ORS) shall consist of a Premium computer (with touch screen LCD, keypad, and transfer medium) and a transceiver. Capabilities include reading up to 5,000 meters per minute limited only by travel speed and meter installation density (reading meters at posted speed limit).

Route load/unload: Meter records can be transferred between the Badger Meter ORION Reading System and the utility's computer by use of USB memory stick, through a local Wi-Fi router or by directly networking the Badger Meter ORION Reading System laptop into the utilities network. These records can be transferred through the reading data management software.

Meter Reading: The meter endpoint sends data to the Badger Meter ORION Reading System including: ID number, meter reading, tampers, leak status and no usage alarm.

The Badger Meter ORION Reading System must be portable and adaptable to any vehicle with a 12VDC power outlet. In addition to reading, the Badger Meter ORION Reading System shall also serve as a data profile collection device.

The Badger Meter ORION Reading System shall be capable of reading any combination of Badger Meter ORION and RAMAR® endpoints when configured with the appropriate receiving devices. The Badger Meter ORION Reading System receives and reports the standard consumption message broadcast from the RAMAR endpoint, which is different than the data sent by the Badger Meter ORION endpoint.

Handheld Reading System

The Badger Meter® Trimble® Ranger™ reading system is comprised of a handheld data collector with an integrated or external transceiver board for reading radio frequency endpoints. The handheld operates on a Windows® Mobile platform for ease of use. The handheld is of a rugged design sealed to meet an IP67 waterproof rating of up to 3' submerged, operate in extreme temperature conditions (-5°F to 140°F / -20°C to 60°C), withstand drops of 4' to concrete, and contains a 53-key alphanumeric keypad with raised key for manual data entry. The handheld utilizes a powerful 6600 mAh field replaceable lithium-ion battery to prevent memory and to extend field life. The user is able to operate the handheld through either touch screen or keypad operation. The handheld contains a color touch screen display in landscape orientation with a 320 x 240 pixel resolution to provide information necessary for meter reading.

To meet the needs of different utilities, the handheld operator is able to select five fields from the reading data management software for display on the account records in the handheld. When reading AMR endpoints, handheld reading software provides operators with the ability to identify accounts with potential leak, no usage, reverse flow, tamper and readings that fall outside of the high / low parameters sent from the billing software.

The handheld system provides a flexible solution to read manual, touch or ORION RF endpoints broadcasting in the 902 – 928 MHz bandwidth.

The handheld has the option to load data either via flash disk or through a wireless communication protocol. A charger assembly allows up to 10 handhelds to be charged through one AC power supply to maintain the handheld batteries. A single charger will be provided for desk mount or wall mount applications.

The handheld is required to utilize an external Infrared data port and programming software that can be used to program ORION endpoints while in the field or in the office.

ORION Gateway transceiver

Badger Meter ORION Gateway transceiver allows a utility to move seamlessly from a walk-by or drive-by Badger Meter ORION solution into a high-powered fixed network system when the city deploys the ORION Gateway transceivers throughout the city. The Badger Meter ORION Gateway transceiver provides backhaul connectivity to GPRS cellular, Wi-Fi, or LAN networks. The Badger Meter ORION Gateway is a transceiver that can listen and store hourly metering data from up to 10,000 ORION endpoints as well as provide two-way communications/requests to the endpoints. The ORION endpoints can be programmed, time-synched or sent firmware upgrades via the ORION Gateway transceiver.

1.5 SOFTWARE REQUIREMENTS

Meter Reading Software

The Badger Meter ORION Reading System (ORS) shall be a Geographic Information System (GIS) based meter-reading system. The ORS shall use a GIS system for displaying meter reading information on a Map program, in conjunction with a Global Positioning System (GPS) to display the location of the vehicle reading the meters on the Map program. The laptop computer shall be equipped with touch screen functionality.

Leak detection shall be available with the ORS. The endpoint sends an alarm condition to the meter reading software when the meter is read. The system reports the leak condition when a one-hour (incremental encoder) or two-hour (absolute encoder) window of no usage is not found within a 24-hour time period. The system shall automatically reset when the next one or two-hour window of no usage is found. All tampers are reported as soon as the endpoint is unable to communicate with the encoder register.

Mobile Reading System shall include:

A. Ruggedized Panasonic® Toughbook® laptop computer

B. Touch screen with anti-glare display

C. GPS system for locating the reading vehicle

D. GIS database for meter reading

E. MAP based user interface

F. Unread meter list interface also available

G. Display of Potential Leak conditions

H. Spill-resistant keyboard, LCD and touch pad

I. Backup memory for previously read meters

Reading Data Management Software

Badger Meter® ReadCenter® reading data management software is based on a point and click Windows® operating system for interfacing with the utility billing software and managing the AMR system. The reading data management software provides flexibility to grow with the needs of the utility and supports manual reading, touch reading, mobile AMR and fixed network reading systems through a single software application. The reading data management software must be supplied out of the box with an SQL database, an internal custom report builder that does not require additional software or licenses to operate and the ability to accept multiple utility billing file formats.

Application/Database Server Specification (Customer Supplied)
ReadCenter Analytics Mobile application software and database server are installed on a customer supplied computer which must meet the appropriate requirements listed below, based on the data source (either A or B).

A. With SQL Server 2008 R2 Express (included on DVD, 10 GB maximum size)

Operating System	Windows XP – Professional, SP2 or SP3 (x86 only) Windows 7 – Professional, Ultimate or Enterprise (x86 or x64)
Processor	1.3 GHz or higher, x86 or x64, quad core, i5 or i7 recommended
RAM	8 GB minimum available
Hard Disk	100 GB available
Drives	16X DVD-ROM for software installation
Monitor	Supports 1280 x 768 resolution or greater; 17...19-inch screen recommended
Printer	Inkjet or laser, networked or local
Network Connectivity	1 GB NIC recommended
Internet Connectivity	Required for WebEx® technical support connection
Ports	USB for handheld

B. With SQL Server 2008 R2 - Standard or Enterprise (end user purchased and maintained)

Operating System	Windows Server 2008 R2 x64
Processor	2.46 GHz or higher, x86 or x64, quad core, i5 or i7 recommended
RAM	16 GB minimum available
Hard Disk	100 GB available
Drives	16X DVD-ROM for software installation
Monitor	Supports 1280 x 768 resolution or greater; 17...19-inch screen recommended
Printer	Inkjet or laser, networked or local
Network Connectivity	1 GB NIC recommended
Internet Connectivity	Required for WebEx® technical support connection
Ports	USB for handheld

Client Computer Specifications (Customer Supplied)
ReadCenter Analytics software supports up to 25 concurrent clients. Client PCs must meet the requirements in the table below.

Operating System	Windows XP – Professional, SP2 or SP3 (x86 only) Windows 7 – Professional, Ultimate or Enterprise (x86 or x64)
Processor	1.3 GHz or higher, x86 or x64, dual core, i5 or i7 recommended
RAM	4 GB minimum available
Hard Disk	20 GB available
Drives	16X DVD-ROM for software installation
Monitor	Supports 1280 x 768 resolution or greater; 17...19-inch screen recommended
Printer	Inkjet or laser, networked or local
Network Connectivity	1 GB NIC recommended
Internet Connectivity	Required for WebEx® technical support connection
Ports	USB for handheld

Backup Consideration
A means to back up Badger Meter® ReadCenter® data must be provided either through the network, Read/Write DVD or CD-ROM or other type of media provided by the utility.

Support Consideration
Internet Capability for Technical Support WebEx® Connection

1.6 FCC REQUIREMENTS

The endpoints and transceiver shall be approved by the FCC under Part 15, Subpart C and shall not require the utility to obtain a license for the system.

1.7 INSTALLATION, TRAINING, TOOLS

The manufacturer's certified training personnel shall set-up and test the Badger Meter® ORION® Reading System and Badger Meter® ReadCenter® route management software at the utility location. Upon successful completion of the set-up, the manufacturer's certified training personnel shall provide a minimum of two (2) days training at the utility site on the operation and maintenance of the system. Training shall include training of field technicians on the installation of field endpoints. Initial configuration and initial test are the complete responsibility of the successful bidder. Follow up training will be available.

1.8 WARRANTY

All handheld and mobile reading equipment included with the Badger Meter® ORION® Reading System shall include an original manufacturer's warranty, along with a one-year hardware service contract on all hardware components of the system. Annual extended warranties are also available. Software supplied with the system shall be updated and maintained by the manufacturer for a period of one (1) year from the date of system purchase, for compatibility with all other components of the system. Annual software service agreements are also available.

The manufacturer shall also supply a system support diagnostic program to insure timely

response and assistance in the event of temporary system malfunction.

2.0 EXPERIENCE AND PRODUCT SUPPORT

Experience
Manufacturer shall supply references of five systems of similar size and installation type that have been sold, not trials or pilots. The manufacturer shall have a minimum of twenty years of product experience in the field of water AMR / AMI and should have sold a minimum of 5,000,000 AMR or AMI MIUs (touch-read not included) into water utilities over the past ten years.

Product Support
Manufacturer shall provide continued support of the AMR system after completion of training. Technical support shall be available 24 hours a day, 365 days a year.

SPECIFICATIONS

AMR METER MODULE REQUIREMENTS

PART II

2.1 GENERAL

The manufacturer shall provide various types of meter modules for specific application depending on the meter setting at the installation. All meter modules must be compatible with Part I of these specifications.

2.2 TYPES

A. BADGER METER® ORION® ENDPOINT – A single endpoint encapsulated in epoxy shall be required for submerged and non-submerged applications. The endpoint shall be factory connected to a Badger Meter® Recordall® Transmitter Register (RTR) or a Badger Meter® Absolute Digital Encoder® (ADE). The Badger Meter ORION endpoint shall be of a flexible design that allows for mounting the endpoint in through the lid, below the lid or in above ground remote applications.

B. INTEGRAL ENDPOINT – A single integral endpoint encapsulated in epoxy is available for mounting directly to the meter in any indoor, outdoor, or submerged pit environment. The integral endpoint must not have any exposed wires between the encoder register and the endpoint. As an option, the integral endpoint may be ordered with 3 feet of wire enclosed in the integral housing that may be removed by the customer at a later date to mount the endpoint away from the meter.

All Badger Meter® ORION® endpoints shall include a published 20-year pro-rated warranty to minimize the cost of ownership.

2.3 COMMUNICATION PARAMETERS

The endpoints shall be designed to operate in the unlicensed ISM band (902 – 928 MHz) using either frequency hopping or narrow band frequency modulation. A single transceiver shall be provided with a minimum -105 dBm sensitivity that can read either narrow band or frequency hopping modulation.

All endpoints shall require no customer license as specified in FCC Part 15, Subpart C.

2.4 REGISTRATION

All endpoints shall be connected to a Badger Meter® Recordall® endpoint Register (RTR®) or Badger Meter® Absolute Digital Encoder® endpoint Register (ADE) which shall provide for visual registration at the meter. The Badger Register shall function in temperature variations from 32°F (0°C) to 110°F (43°C). The signal transmission assembly shall induce no drag that could result in accelerated wear of the meter or cause under registration.

2.5 MODULE REQUIREMENTS

2.5.1 BADGER METER® ORION® Endpoint

The Badger Meter ORION endpoint shall be packaged in an enclosure constructed of high impact waterproof plastic and encapsulated in epoxy. The Badger Meter ORION endpoint enclosure shall be factory potted and wired to Badger's Register and can be stored or operated in temperatures ranging from -40° to 140°F. The Badger Meter ORION endpoint shall operate in atmospheres of 0% to 100% condensing humidity. A single Badger Meter ORION endpoint shall be designed for installation in either submerged or non-submerged applications to reduce inventory costs. Each Badger Meter ORION endpoint shall weigh a maximum of 18 oz. An optional integral endpoint that mounts directly to the meter and has no exposed wires shall also be available for submerged and non-submerged environments. The integral endpoint must not have any exposed wires between the encoder register and the endpoint. As an option, the integral endpoint may be ordered with 3 feet of wire enclosed in the integral housing that may be removed by the customer at a later date to mount the endpoint away from the meter.

The Universal endpoint shall also be available fully potted and programmed from the factory for connectivity to the Badger Meter ADE®, Sensus® ECR II or ICE™ register, Neptune® ProRead® and E-coder™, Hersey® Translator or the Elster AMCo® Scancoder™. Connectivity to all encoders listed above must be done through a single endpoint that does not require field programming.

2.5.2 Badger Meter® Recordall Transmitter Register

The Badger Recordall Transmitter Register (RTR) consists of a mechanical local register combined with electronic circuitry capable of producing a signal compatible with the Remote endpoint, the Integral endpoint, the Pit endpoint, or Integral Pit endpoint. The electronic circuitry shall contain a piezoelectric switch, which shall be covered by US Patent.

The Badger RTR is a water resistant endpoint constructed of a scratch resistant glass face, non-corrosive metal bottom, and non-gasketed permanent seal. The encoder shall have a plastic or bronze lid that covers the glass face for added protection with an optional serial number for identification. The electronic encoder register shall provide a digital output based on a piezoelectric solid-state switch with a digital output resolution of 1/10th of the register test circle.

The output of the electronic encoder register must have the characteristics of an open drain Field Effect Transistor (FET) and shall require no electrical contacts to stick, wear, or corrode.

The Badger RTR consists of a permanently sealed glass face and metal bottom to eliminate moisture, dirt, and other contaminates. The electronic encoder register must exceed all applicable requirements of the AWWA standards and C707 regarding moisture intrusion. The electronic encoder register offered must consist of a six-digit straight-reading mechanical odometer totalizer located in the six o'clock position, a 360° test circle with full-face sweep hand, and a flow finder to detect leaks. The Badger Meter® RTR® is enclosed in a self-contained plastic shroud assembly with either plastic or bronze lid and is magnetically coupled to the meter-measuring element.

The Badger RTR encoder should also provide an optional submersible connector for present and future connectivity. This plug-n-play connector will allow utilities to easily migrate to any current or future Badger Meter approved technology solution without having to splice wires.

The Badger RTR encoder, due to its simplicity in design, shall have been successfully life tested to accumulate 25 million gallons.

2.5.3 Badger® Absolute Digital Encoder

The Badger Absolute Digital Encoder (ADE®) consists of a mechanical local register combined with electronic circuitry to communicate an industry standard ASCII protocol that provides connectivity to the Remote Transmitter, the Integral Transmitter, Integral Pit Transmitter or the Pit Transmitter. The encoder shall utilize a state of the art frictionless form of Light Emitting Diode (LED) encoding technology to determine the rotational position of the number wheels. No slide wires, contacts or load fire spring mechanisms are allowed. The encoder LED technology shall incorporate features that eliminate dashed reading by providing the ability to read moving number wheels and number wheels that are in between digits.

The Badger ADE is a water-resistant encoder constructed of a scratch resistant glass face, non-corrosive metal bottom, and non-gasketed permanent seal. The encoder shall have a plastic or bronze lid that covers the glass face for added protection with an optional serial number for identification. The electronic encoder shall provide an industry standard ASCII protocol. The encoder shall be shipped from the manufacturer fully programmed with either a factory standard serial number or a customer specified serial number (up to ten digits in length) ready for installation into either a two-wire touch or three-wire AMR system.

The Badger ADE consists of a permanently sealed glass face and metal bottom to eliminate moisture, dirt, and other contaminates. The electronic encoder register must exceed all applicable requirements of the AWWA standards and C707 regarding moisture intrusion. The electronic encoder register offered must consist of a six-digit straight-reading mechanical odometer totalizer located in the twelve o'clock position, a 360° test circle with full-face sweep hand, and a flow finder to detect leaks. The Badger ADE is enclosed in a self-contained plastic shroud assembly with either plastic or bronze lid and is magnetically coupled to the meter-measuring element.

The Badger ADE encoder should also provide an optional submersible connector for present and future connectivity. This plug-n-play connector will allow utilities to easily migrate to any current or future Badger Meter approved technology solution without having to splice wires.

SYSTEM SPECIFICATION – BADGER METER® ADVANCED METERING ANALYTICS (AMA) SYSTEM | 2013

PROJECT SCOPE

Under this specification a single manufacturer shall supply all software, equipment, training and installation support necessary to furnish a fully automated fixed network meter reading management system. While a primary function shall be to provide accurate and timely meter reading data for billing purposes, the system shall also furnish hourly meter consumption information and meter based analytical alarms to facilitate enhanced utility operation and management of the total water distribution system, as described herein.

SYSTEM DESCRIPTION

The Fixed Network Advanced Metering Infrastructure (AMI) System will utilize Data Collection Units (DCU) to receive meter data sent from radio frequency Meter Interface Units (MIUs) located at each water meter. The MIUs must be able to operate both in a two-way high power fixed network mode with data being sent to the DCU and in a two-way mobile mode where data is being sent to a mobile receiver or handheld receiver via RF. MIUs must automatically migrate from mobile to fixed network mode without visiting each MIU. The AMI system will operate in a FCC- Protected band between 902-928 MHz under the FCC regulations. Data will be stored and forwarded, through the DCUs to the utility computer or a hosted website upon request. The DCU will utilize a Cellular, Wi-Fi, LAN or PoE network backhaul as a means of gathering the data into the Utility office computer or hosted system. The system must operate with true two-way capabilities from MIU to DCUs, and DCUs to Reading Data Management software.

The Reading Data Management software will provide metering data to the utility's billing system in a compatible file format. In addition, system information, and other service tools will be provided to assist the utility in serving their customers. The Reading Data Management software will also be used to monitor and control system performance, manage metering and other data, and to remotely reconfigure the DCUs as required.

The fixed network system of DCUs will be installed in a manner that optimizes the utility's existing radio frequency propagation factors, environmental settings, topography, and available infrastructure mounting locations. The use of "open" repeaters is not allowed in the system. Repeaters must be programmed to only relay information from assigned MIUs.

METER INTERFACE UNIT (MIU) PERFORMANCE REQUIREMENTS

CONFIGURATIONS – A single fully potted MIU will be available for both non-submersible (remote) or submersible (pit) applications. The MIU will be programmed from the factory and available pre-wired with either an incremental or absolute encoder register. The MIU will also be available in a MIU only configuration for field splicing

and with a submersible inline connector. MIU must be designed to be installed underneath a plastic or composite pit lid or through a standard 2" hole in a plastic or composite pit lid.

MIGRATION – A single MIU must be able to operate in high-powered fixed network mode and a lower powered mobile mode. The migration from mobile to fixed network and back must be done automatically without any needed programming. MIU must automatically migrate from a fixed network mode back to mobile mode in the event of a network failure and back to fixed network once the network is back online.

TRANSMISSION - The MIU radio frequency operation shall be a two-way frequency-hopping bubble-up fixed network transmission of the metering data a minimum of three times per day, requiring no auxiliary communication necessary to trigger the transmission of the data. No booster nodes can be used for the fixed network transmission. Each MIU transmission must consist of MIU serial number, the top of the hour meter reads (fixed network mode), current and synchronized clocked reading (mobile mode), leak status, wire tamper, no usage, reverse flow (encoder only), encoder error (encoder only) and low battery indicators. The MIUs transmit on a FCC- Protected band between 902-928 MHz under the FCC regulations. MIU must store a minimum of 90 days of time synchronized hourly reading data and are capable of recovering data via RF and IR link. In fixed network mode, the endpoint must be capable of being remotely programmed for reading intervals of 1 hour or 15 minutes.

ENVIRONMENTAL - The MIU must be able to withstand temperatures between -40° F and +140° F. To withstand the harsh environment, MIU electronics must be fully potted.

BATTERY LIFE - The MIU must have a calculated battery life of a minimum of 20 years in either standard fixed network mode or standard mobile mode.

PORTS – A MIU must be available to read two absolute or two incremental encoders.

WIRE TAMPER DETECTION - The MIU must utilize a three-wire conductor cable, allowing continuous monitoring of the integrity of its connection to the meter register. It will also denote tamper alert status within the MIU transmission signal if either a short or open-circuit condition is sensed in the three-wire connection.

LEAK DETECTION - The MIU will feature a potential leak detection algorithm, and will denote a leak alert in its transmission signal if a usage of the premise's water is detected each hour for the 24 consecutive hours prior to gathering each reading. The alert notification will automatically be cancelled upon passage of a one (incremental encoder) or two-hour (absolute encoder) period with no water consumption detected.

ACTIVATION - The MIU will be shipped in a dormant state and will be activated in the field by the first detection of water usage or via an infrared port through the use of a handheld computer. The MIU cannot require any special field programming for

activation when pre-wired to an encoder. The MIU will also have the ability to be turned off via its infrared connection.

FIXED NETWORK INTERVAL DATA – The MIU must have the ability to transmit the top of the hour meter readings at least three times per day.

IR PROGRAMMING - The MIU will have infrared communication connection to aide in installation, programming and diagnostics.

RF PROGRAMMING - The MIU will be capable of being programmed via RF to aide in installation, programming and diagnostics. RF programming will allow for the following: endpoint firmware upgrades and endpoint clock synchronization.

WARRANTY - The MIU warranty must be a minimum twenty years in length (ten years full + ten years pro-rated) and cover both the manufacture's MIU endpoint and connected (pre-wired) encoder.

METER COMPATIBILITY - A "Universal" MIU shall be available which is fully programmed and capable of being used in conjunction with the Badger Meter ADE®, Sensus® ECR II or ICE™ register, Neptune® ProRead®, ARB®-V and E-coder®, Hersey® Translator and the Elster AMCo InVISION™ or Scancoder™. Connectivity to all encoders listed above must be done through a single MIU that does not require field programming. A separate MIU shall be available for connectivity to incremental encoders.

HIGH RESOLUTION – When used with an incremental encoder, the MIU should provide useful consumption data to the AMI system by recording usage through the meter to the closest one (1) gallon or one tenth (1/10) cubic foot increment on residential sized meters, 5/8" through 1". For 1 ½" and 2" meters usage shall also be recorded to the nearest ten (10) gallons or one (1) cubic foot.

NETWORK INFRASTRUCTURE – DATA COLLECTION UNIT (DCU) PERFORMANCE REQUIREMENTS

COMMUNICATION – DCU must have two-way capabilities between the endpoint and the utility head end system software.

DCU CAPACITY - Each DCU must have the ability to receive and store 60-days of hourly interval metering data from up to 5,000 MIUs. Metering and exception data information will be stored in the DCUs non-volatile memory such that no data is lost in the event of a power interruption.

SYSTEM DATA – The metering data stored at the DCU will include for each assigned MIU: serial number, the past 60 days of the hourly meter reads, leak status, wire tamper,

no usage, reverse flow (encoder only), encoder error (encoder only), RSSI and low battery indicators. The Reading Data Management software will continually optimize system performance and monitor system diagnostics by utilizing the data from the DCUs.

DATA SECURITY – The DCU must utilize a secure authentication algorithm and support the 128-bit Advanced Encryption Standard (AES-128) in order to protect the metering data. When a Wi-Fi backhaul is utilized, the DCU will support the following wireless security schemes: WEP 64/128, WPA-PSK, WPA2, WPA2-PSK.

NETWORK BACKHAUL - The DCUs will have multiple data backhaul options. The DCUs must have the ability to utilize Wi-Fi, Cellular (CDMA or GPRS) and/or direct LAN network connections for data backhaul options.

POWER - The DCUs will have multiple power options. The DCUs must have the ability to utilize standard 110V AC, solar, or PoE power options.

BACKUP POWER - The DCUs will have at a minimum a four hour battery backup integral to the unit.

ENVIRONMENTAL – The DCU must be able to withstand temperatures between -40° F and +140° F. The DCU must withstand 0% to 100% humidity with a rating of at least NEMA4X or IP66. The DCU must withstand a wind rating of at least 100 mph.

INSTALLATION – In order to ease the installation process, the DCU must weigh less than 25 lbs. The DCU must provide hardware to mount to poles in sizes ranging from 2 ½" to 18" in diameter.

WARRANTY - The DCUs will be warranted for a period of no less than one year.

MOBILE READING SYSTEM

The mobile reading system shall consist of a Premium computer (with touch screen LCD, keypad, and transfer medium) and a Transceiver. Capabilities include reading up to 5,000 meters per minute limited only by travel speed and meter installation density (reading meters at posted speed limit).

ROUTE LOAD/UNLOAD: Meter readings can be transferred between the mobile reading system and the utility's computer by use of USB memory stick or by directly networking the reading system laptop into the utilities system. These records can be transferred through the reading data management software onto the utility's billing system.

METER READING: The metering endpoints send data to the reading system including: ID number, meter reading, leak status, wire tamper, no usage, reverse flow (encoder only), encoder error (encoder only), RSSI and low battery indicators.

POWER: The reading system must be portable and adaptable to any vehicle with a 12VDC power outlet.

DATA PROFILE: In addition to reading, the mobile reading system shall also serve as an endpoint data profile collection device.

HANDHELD READING SYSTEM

The handheld reading system is comprised of a handheld data collector with an integrated or external receiver board for reading radio frequency transmitters. The handheld operates on a Windows® Mobile platform for ease of use. The handheld is of a rugged design sealed to meet an IP67 waterproof rating of up to 3' submerged, operate in extreme temperature conditions (-5°F to 140°F / -20°C to 60°C), withstand drops of 4' to concrete, and contains a minimum 53-key alphanumeric keypad with raised key for manual data entry. The handheld utilizes a powerful 6600 mAh field replaceable lithium-ion battery to prevent memory and to extend field life. The user is able to operate the handheld through either touch screen or keypad operation. The handheld contains a color touch screen display in landscape orientation with a minimum 4" display to provide information necessary for meter reading.

To meet the needs of different utilities, the handheld operator is able to select five fields from the reading data management software for display on the account records in the handheld. When reading metering endpoints, handheld reading software provides operators with the ability to identify accounts with potential leak, no usage, reverse flow, tamper and readings that fall outside of the high / low parameters sent from the billing software.

The handheld system provides a flexible solution to read manual, touch or Badger Meter ORION RF endpoints broadcasting in the 902 – 928 MHz bandwidth.

The handheld has the option to load data either via flash disk or through a wireless communication protocol. A single charger will be provided for desk mount or wall mount applications.

The handheld is required to utilize an external Infrared data port and programming software that can be used to program Badger Meter ORION endpoints while in the field or in the office.

DISTRIBUTION LEAK DETECTION

The system must offer an integrated acoustic leak monitoring system that monitors the distribution system for leaks.

FUNCTIONALITY – The standard AMI endpoint must be prewired to an acoustic leak detection sensor and magnetically attached to the valve keys of the distribution system water mains. System sensors located at or near the home are not acceptable.

READING DATA MANAGEMENT SOFTWARE - PERFORMANCE REQUIREMENTS

The Reading Data Management software will be a web or client-based network platform where any PC connected to the utility's network will be able to access the software via a standard web-browser or by loading a client-side application. This software will provide meter account data to the utility billing system, advanced metering analytics, data management and reporting functions, customer service reports, water use reports and charting/graphing capabilities. The software will include tools to perform system configuration tasks and troubleshooting to optimize performance and effectively manage system network assets. The Reading Data Management software will be capable of processing fixed network, drive-by, and walk-by and touch AMR reading capabilities, as well as manual reads.

The Reading Data Management software will request the metering data from the DCUs on a daily basis through an I.P. address, via a Wi-Fi, LAN or Cellular data network.

The Reading Data Management software will allow the customer system administrator to monitor system performance and to remotely reconfigure the MIU assignments of DCUs as required.

ADVANCED METERING ANALYTICS – The Reading Data Management software platform should be allow the utility to define metering or asset based exception analytics that affect utility operations such as:

Metering Based Configurations

- Hourly / Daily Consumption
- Consumption Percentages
- Exceptions (Continual Usage Leaks, Cut-Wire Tamper, No Usage, Reverse Flow, Encoder Error, Water Main Leaks)

Asset Based Configurations

- MIU and Network Operational Status

The Reading Data Management software should continually monitor data in real-time to alert utility personnel when an exception condition exists, thus allows the utility to make better and faster business decisions.

DATA IMPORT / EXPORT - The reading data management software will be able to import and export data to utility's billing in a compatible format utilizing a flexible interface.

REPORTING CAPABILITIES - Reports and tables generated by the software will have the ability to easily select and compile particular data for printing or exporting via csv format. The software will allow a utility to search the database to easily locate specific customer information and readings. Historic customer reading information will be converted to consumption and allow graphical presentation for printing or exporting via csv format. The software will also have a custom reporting capability, giving the utility a great deal of flexibility in managing and utilizing their meter data.

SOFTWARE / MIU INSTALLATION AND TRAINING

The manufacturer's certified training personnel shall install and test the Badger Meter® Reading Management Software at the utility location. Upon successful completion of the set-up, the manufacturer's certified training personnel shall provide a minimum of two (2) days training at the utility site on the operation and maintenance of the system. Training shall include training of field technicians on the installation of field MIUs as well as an overview of network infrastructure installation. Initial configuration and testing are the complete responsibility of the successful bidder. Follow up customized training will be available on a per diem basis. In order to expedite the resolution of software questions, the manufacturer must offer internet connectivity to the utility's computer so that the actual issue can be observed and corrected.

METERING PRODUCTS

The manufacturer must offer its own line of positive displacement disc meters for residential and commercial applications, as well as its own full line of large commercial meters which offer turbine, compound, and fire service meters. The manufacture must also offer static meters for both residential and commercial (battery powered and line powered) applications.

TECHNICAL SUPPORT

The manufacturer must have a staff of certified technical support personnel trained in all aspects of the metering, AMI and AMA software. Technical support must be available via the phone 24 hours / seven days per week. After hours return calls must be guaranteed within 30 minutes.

NETWORK INFRASTRUCTURE INSTALLATION AND TRAINING

The manufacturer will offer the utility assistance in the process of surveying, planning and training utility personnel for the installation of the network infrastructure. Furthermore, the manufacturer will offer turn-key installation services for the network infrastructure if so desired by the utility.

EXPERIENCE

The manufacturer shall have a minimum of twenty years of product experience in the field of water AMR / AMI and should have sold a minimum of 10,000,000 AMR or AMI MIUs (touch-read not included) into water utilities over the past fifteen years.

PRODUCT / SYSTEM SUPPORT

Manufacturer shall provide continued support of the AMI system after completion of training. Technical support shall be available 24 hours a day, 365 days a year with a minimum 30 minute response time.

ACRONYMS USED IN DOCUMENT

- AMA – Advanced Metering Analytics
- AMI – Advanced Metering Infrastructure
- AMR – Automatic Meter Reading
- MIU – Meter Interface Unit or Transmitter
- DCU – Data Collection Unit or Gateway Receiver
- FCC – Federal Communications Commission
- RF – Radio Frequency
- IR - Infrared
- Cellular (GPRS) – Cellular General Packet Radio Service
- Wi-Fi – Trade name for a popular wireless technology
- LAN – Local Area Network
- PoE – Power Over Ethernet
- BADGER®- Registered trademark of Badger Meter, Inc.
- RTR®– Recordall Transmitter Register
- ADE®– Absolute Digital Encoder
- SMS - Short Message Service

SPECIFICATIONS for 5/8", 5/8x3/4", 3/4", and 1" E-SERIES ULTRASONIC COLD WATER METERS

SECTION 1 – SCOPE

This specification covers E-Series Cold Water Ultrasonic Meters in sizes 5/8", 5/8x3/4", 3/4", and 1", and the materials and workmanship employed in their fabrication. The meter must utilize ultrasonic measurement technology and have no moving parts within the meter.

SECTION 2 – METER DESCRIPTION

The basis for measurement is the use of ultrasonic signals sent consecutively in forward and reverse directions of flow. Velocity is determined by measuring the time difference between the measurement in the forward and reverse direction. Flow totalization can then be calculated from the measured flow velocity using water temperature and pipe diameter. The meter is all electronic with totally potted circuitry, display and battery. There are no moving parts to wear or replace and no part of the meter is removable or serviceable.

SECTION 3 – AFFIDAVIT OF COMPLIANCE

The purchaser may require, in their supplemental specifications, an affidavit from the manufacturer or vendor that the meters furnished under the purchaser's order comply with all applicable requirements of this specification. Failure to meet any part of the specification shall be sufficient cause for rejection.

SECTION 4 – SIZE, CAPACITY, AND LENGTH

Along with the operating and physical characteristics, the nominal size, capacity ratings, related pressure loss limits, and length of the meters are those shown in Table 1 and 2. Meters supplied under this specification shall operate without leakage or damage at a working pressure of 175 psi.

SECTION 5 – METERING TUBE

The housing shall be made of 316-stainless steel and shall be designed so that at a working pressure of 175 psi, any distortion will not affect the accuracy of the meter. Metering tube shall not be repaired in any manner. The flow direction and meter size shall also be cast in the meter tube and the inlet and outlet shall have a common axis.

SECTION 6 – METERING INSERT

The ultrasonic metering insert shall be self-contained within the meter flow tube, seated, and not removable. The insert shall be secured to the main case, providing a method of minimizing turbulence and cleaning the reflectors, so that the accuracy of the meter will not be affected by any distortions of the case when operating at a pressure of 150 psi. The metering insert shall be made of engineered thermoplastic and stainless steel and the ultrasonic transducers shall be wetted components that extend through the meter tube and shall have a surface of stainless steel.

SECTION 7 – ELECTRONIC METER AND REGISTER

The electronic circuit shall be micro-processor based and include a non-replaceable battery, and non-volatile memory capable of storing all programmable data and accumulated data. The circuit shall control the ultrasonic transducers. No field programming or calibration shall be necessary. The entire meter circuit and related components shall be fully potted and sealed from water intrusion. No components shall require service or replacement over the life of the meter. For reliability, the use of inductive coil technology shall not be permitted with an electronic residential meter.

SECTION 8 – REGISTER BOXES

The name of the manufacturer shall be permanently molded and the serial number shall be imprinted on the lid of the register box. The lid and shroud components shall overlap to protect the lens. Register box enclosures and lids shall be made of engineering thermoplastic or other suitable synthetic polymer.

SECTION 9 – REGISTER/DISPLAY

9.1 The Register shall be encased in an integral non-corrosive plastic housing, with the electronics, display, and battery completely potted within. It must be permanently epoxy sealed to provide moisture resistance to flooded pit or submerged conditions. The permanent seal between the lens and non-corrosive plastic housing shall utilize an adhesive seal without the use of gaskets.

9.2 The Register shall be an integral part of the meter assembly. The register must be available as factory pre-wired to an endpoint, or factory pre-wired to an inline connector that can be used to connect to an endpoint.

9.3 The Register shall consist of an electronic local display combined with electronic circuitry to provide either a high resolution absolute encoder output or a digital electronic switch closure. This electronic register assembly shall transmit a signal through properly shielded (grounded) transmission wire for AMR connectivity.

9.3.1 The High Resolution Absolute Encoder Register option shall use an industry ASCII protocol. Capable of sending a 9-digit encoder output to the endpoint as well as extended status messages. Resolution being sent to the reading software is based on the output of the endpoint.

9.3.2 The Electronic Encoder Register option shall provide non-proprietary data to the endpoint representing accurate meter information, utilizing a digital switch closure. The minimum time the switch shall be closed is 10 milliseconds. The maximum time the switch shall be closed is 100 milliseconds. The EER shall operate with an open circuit input voltage up to 30 volts across the output wires.

9.4 The display shall be a straight reading, permanently sealed electronic LCD with digits 0.25 inches high. The display will contain 9 digits plus a decimal point and display consumption, units of measure, rate of flow and alarm information. The digital display shall provide a totalized consumption resolution to 0.01 gallons, 0.001 cubic feet, or 0.0001 cubic meters. The maximum indication on the dial and the minimum allowable capacity of the register shall comply with Table 3.

9.5 The size, model, and direction of flow through the meters shall be permanently visible on the topside of all meter displays. The units of registration, U.S. gallons, cubic feet, or meters cubed shall also be designated on the Register display. The enhanced resolution of the totalized flow display can be utilized as a flow indicator for leak detection.

9.6 The Register shall have a lid that covers the display face for added protection and optional identification of serial number.

SECTION 10 – REGISTRATION ACCURACY

Specified in Table 1, at any flow rate within normal test flow limits, the meter shall register not less than 98.5% and not more than 101.5% of the water actually passed through the meter. At the extended low test flow rate, the meter shall register not less than 97.0% and not more than 103.0% of the water actually passed through the meter

SECTION 11 – REJECTED METERS

The manufacturer shall repair or replace, at its option, without charge, all meters rejected for failure to comply with this specification.

TABLE 1 - METER PERFORMANCE CHARACTERISTICS

Meter Size (Inches)	Required Safe Maximum Operating Capacity (GPM)	Maximum Pressure Loss At AWWA Safe Maximum Operating Capacity (PSI)	Recommended Maximum Rate For Continuous Operations (GPM)	Extended Low Flow (GPM)	Normal Test Flow Limits (GPM)
5/8"	25	4.3 @ 15 GPM	25	0.05	0.1...25
5/8"x3/4"	25	3 @ 15 GPM	25	0.05	0.1...25
3/4"	32	1.8 @ 15 GPM	32	0.05	0.1...32
1"	55	1.8 @ 25 GPM	55	0.25	0.4...55

TABLE 2 – DIMENSIONAL DESIGN LIMITS FOR METERS

Meter Size (Inches)	Meter Length Threaded Spud Ends (Inches)	Meter Spuds Nominal Thread Size (Inches)	Meter Housing Spuds Pitch Diameter (Inches)	
			Minimum	Maximum
5/8"	7-1/2"	3/4"	0.978	0.988
5/8"x3/4"	7-1/2"	1"	1.227	1.237
3/4"	7-1/2", 9"	1"	1.227	1.237
1"	10-3/4"	1-1/4"	1.563	1.573

TABLE 3 - MAXIMUM INDICATION ON INITIAL DIAL AND MINIMUM REGISTER CAPACITY

Meter Size (Inches)	Maximum Allowable Indication of Initial Dial			Minimum Allowable Capacity of Register (Millions)		
Local Register or Electronic Encoder Register	Cu. Ft.	Gallons	M^3	Cu. Ft.	Gallons	M^3
5/8"	0.001	0.01	0.0001	1,000,000	10,000,000	100,000
5/8"x3/4"	0.001	0.01	0.0001	1,000,000	10,000,000	100,000
3/4"	0.001	0.01	0.0001	1,000,000	10,000,000	100,000
1"	0.001	0.01	0.0001	1,000,000	10,000,000	100,000

TERMS AND CONDITIONS OF SALE ("Terms")

All references in this document to "Seller" shall include HD Supply, Inc. and / or any parent, subsidiary or affiliate of HD Supply, Inc. (including any division of the ding) whether or not performing any or all of the scope hereunder or specifically identified herein. All references to "Buyer" shall include all parent(s), subsidiaries and ates of the entity placing the order. Buyer and Seller may be referred to individually as a "Party" and collectively as "Parties".

All sales to Buyer are subject to these Terms, which shall prevail over any inconsistent terms of Buyer's purchase order or other documents. Additional or different id conditions in any way altering or modifying these Terms are expressly objected to and shall not be binding upon Seller unless specifically accepted in writing by Seller's authorized representative. No modification or alteration of these Terms shall result by Seller's shipment of goods following receipt of Buyer's purchase order, or other documents containing additional, conflicting or inconsistent terms. There are no terms, conditions, understandings, or agreements other than those stated herein, and all prior proposals and negotiations are merged herein. These Terms are binding on the Parties, their successors, and permitted assigns.

3. Prices on Seller website, catalogs or in Seller quotes are subject to change without notice, and all such prices expire and become invalid if not accepted within 10 calendar days from the date of issue, unless otherwise noted by Seller in writing. Price extensions if made are for Buyer's convenience only, and they, as well as any mathematical, stenographic or clerical errors, are not binding on Seller. Prices shown do not include any sales, excise, or other governmental tax or charge payable by Seller to any federal, state or local authority. Any taxes now or hereafter imposed upon sales or shipments will be added to the purchase price, and Buyer shall reimburse Seller for any such tax or provide Seller with an acceptable tax exemption certificate. All prices and other terms provided to Buyer shall be kept confidential except to the extent a Party is required by law to disclose the same.

4. Seller shall not be liable for delay or default in delivery resulting from any cause beyond Seller's reasonable control, including, but not limited to, governmental action, strikes or other labor troubles, fire, damage or destruction of goods, wars (declared or undeclared), acts of terrorism, manufacturers' shortages, availability or timeliness of transportation, materials, fuels, or supplies, and acts of God (each a "Force Majeure Event"). Upon the occurrence of a Force Majeure Event: (a) the time for Seller's performance shall be extended reasonably and the Parties shall adjust all affected dates accordingly; (b) the purchase price shall be adjusted for any increased costs to Seller resulting from such Force Majeure Event; and (c) Buyer shall not be entitled to any other remedy.

5. Seller is a reseller of goods only, and as such does not provide any warranty for the goods it supplies hereunder. Notwithstanding this As-Is limitation, Seller shall pass through to Buyer any transferable manufacturer's standard warranties with respect to goods purchased hereunder. BUYER AND PERSONS CLAIMING THROUGH BUYER SHALL SEEK RECOURSE EXCLUSIVELY FROM MANUFACTURERS IN CONNECTION WITH ANY DEFECTS IN OR FAILURES OF GOODS, AND THIS SHALL BE THE EXCLUSIVE RECOURSE OF BUYER AND PERSONS CLAIMING THROUGH BUYER FOR DEFECTIVE GOODS, WHETHER THE CLAIM OF BUYER OR THE PERSON CLAIMING THROUGH BUYER SHALL SOUND IN CONTRACT, TORT, STRICT LIABILITY, PURSUANT TO STATUTE, OR FOR NEGLIGENCE. BUYER SHALL PASS THESE TERMS TO SUBSEQUENT BUYERS AND USERS OF GOODS. SELLER EXCLUDES AND DISCLAIMS ALL OTHER EXPRESS AND IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SELLER ASSUMES NO RESPONSIBILITY WHATSOEVER FOR SELLER'S INTERPRETATION OF PLANS OR SPECIFICATIONS PROVIDED BY BUYER, AND BUYER'S ACCEPTANCE AND USE OF GOODS SUPPLIED HEREUNDER SHALL BE PREMISED ON FINAL APPROVAL BY BUYER OR BY BUYER'S RELIANCE ON ARCHITECTS, ENGINEERS, OR OTHER THIRD PARTIES RATHER THAN ON SELLER'S INTERPRETATION. TO THE EXTENT NOT PROHIBITED BY APPLICABLE LAW, IN NO EVENT, WHETHER IN CONTRACT, WARRANTY, INDEMNITY, TORT (INCLUDING, BUT NOT LIMITED TO, NEGLIGENCE), STRICT LIABILITY OR OTHERWISE, ARISING DIRECTLY OR INDIRECTLY OUT OF THE PERFORMANCE OR BREACH OF THESE TERMS, SHALL SELLER BE LIABLE FOR (a) ANY INCIDENTAL, INDIRECT, PUNITIVE, SPECIAL, CONSEQUENTIAL OR SIMILAR DAMAGES SUCH AS LOSS OF USE, LOST PROFITS, ATTORNEYS' FEES OR DELAY DAMAGES, EVEN IF SUCH DAMAGES WERE FORESEEABLE OR CAUSED BY SELLER'S BREACH OF THIS AGREEMENT, (b) ANY CLAIM THAT PROPERLY IS A CLAIM AGAINST THE MANUFACTURER, OR (c) ANY AMOUNT EXCEEDING THE AMOUNT PAID TO SELLER FOR GOODS FURNISHED TO BUYER WHICH ARE THE SUBJECT OF SUCH CLAIM(S). ALL CLAIMS MUST BE BROUGHT WITHIN ONE YEAR OF ACCRUAL OF A CAUSE OF ACTION.

6. Buyer shall indemnify, defend, and hold Seller its officers, directors, employees and agents harmless from any and all costs (including attorneys' and accountants' fe and expenses), liabilities and damages resulting from or related to any third party (including Buyer's employees) claim, complaint and/or judgment arising from Buyer's use ods furnished hereunder, as well as any negligent, intentional, or tortious act or omission of Buyer or any material breach by Buyer of these Terms.

7. When goods are delivered to Buyer in Seller's own vehicles, the F.O.B. point shall be Buyer's designated delivery site. In all other cases the F.O.B. point shall be Seller's store or warehouse and all responsibility and costs of shipping and delivery beyond the applicable F.O.B. point shall be borne by Buyer. Title and risk of loss shall pass to Buyer at the applicable F.O.B. point, which for goods not delivered in Seller's own vehicles shall be when Seller delivers the goods to the common carrier. All claims for shortage of goods or for loss or damage to goods as to which Seller has the risk of loss shall be waived unless Buyer, within 10 calendar days after receipt of the short or damaged shipment, gives Seller written notice fully describing the alleged shortage or damage. Partial shipments are permitted at Seller's discretion.

8. Any change in product specifications, quantities, destinations, shipping schedules, or any other aspect of the scope of goods must be agreed to in writing by Seller, and may result in a price and delivery adjustment by Seller. No credit for goods returned by Buyer shall be given without Seller's written authorization. All returns are subject to a restocking charge.

9. Unless otherwise agreed in writing, payment terms are net 30 days from delivery, payable in United States of America ("U.S.") dollars. Notwithstanding the foregoing, all orders are subject to Seller's continuing approval of Buyer's credit. If Buyer's credit is not approved or becomes unsatisfactory to Seller then Seller, in its sole discretion, may suspend or cancel performance, or require different payment terms, including but not limited to cash on delivery or in advance of shipment. In addition, Seller may in its discretion require an advance deposit of up to 100% of Seller's selling price for any specially manufactured goods ordered by Buyer hereunder. Payments due hereunder shall be made in the form of cash, check, or money order, or other tender approved in writing by Seller. Seller may, in its sole discretion, apply Buyer's payment against any open charges. Past due accounts bear interest at the lesser of 1.5% per month or the maximum rate permitted by applicable law, continuing after Seller obtains judgment against Buyer. Seller may exercise setoff or recoupment to apply to or satisfy Buyer's outstanding debt. Buyer shall have no right of setoff hereunder, the same being expressly waived hereby.

10. Buyer shall not export or re-export, directly or indirectly, all or any part of the goods or related technology obtained from Seller under these Terms except in accordance with applicable export laws and regulations of the U.S. Further, a Buyer that is a non-U.S. company or citizen shall similarly limit any export or re-export activity to that which would be deemed compliant with U.S. export laws and regulations if performed by a U.S. company or citizen.

11. Buyer shall pay Seller all costs and expenses of collection, suit, or other legal action brought as a result of the commercial relationship between them, including, but not limited to, all actual attorneys' and paralegals' fees, and collection costs, incurred pre-suit, through trial, on appeal, and in any administrative or bankruptcy proceedings. Any cause of action that Seller has against Buyer may be assigned without Buyer's consent to HD Supply, Inc. or to any affiliate, parent or subsidiary of HD Supply, Inc.

12. This Agreement, Buyer's account, and the business relationship between Buyer and Seller shall be governed by and construed in accordance with the laws of Georgia without regard to conflicts of laws rules, and specifically excluding the UN Convention on Contracts for the International Sale of Goods. The Parties agree that any legal action arising under or related to this Agreement shall be brought in Cobb County, Georgia, and any right to object to such venue or to assert the inconvenience of such forum is hereby waived.

13. If Buyer fails to comply with these Terms, Seller may terminate or restrict any order immediately upon notice to Buyer. Buyer certifies that it is solvent and that it will advise Seller immediately if it becomes insolvent. Buyer agrees to send Seller written notice of any changes in the form of ownership of Buyer's business within 5 days of such changes. Buyer and Seller are the only intended beneficiaries of this document, and there are no third party beneficiaries.

The invalidity or unenforceability of all or part of these Terms will not affect the validity or enforceability of the other terms. The parties agree to replace any void or them ble term with a new term that achieves substantially the same practical and economic effect and is valid and enforceable.

15. The following provisions shall survive termination, cancellation and completed performance of this Agreement as long as necessary to allow the aggrieved party to fully enforce such clauses: 5, 6, 9, 10, 11 and 12.

Badger Meter

E-Series® Ultrasonic Meter

Cold Water Engineered Polymer Meter, 5/8" x 3/4" and 3/4" NSF/ANSI Standard 61 Certified, Annex G

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 5/8" x 3/4" and 3/4" 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 a wired lead, 308 in-line connector or fully prewired to ORION® and GALAXY® AMR/AMI endpoints. It is also offered with the Itron® in-line connector, in-line connector with pit endpoint, or prewired to an Itron remote endpoint.

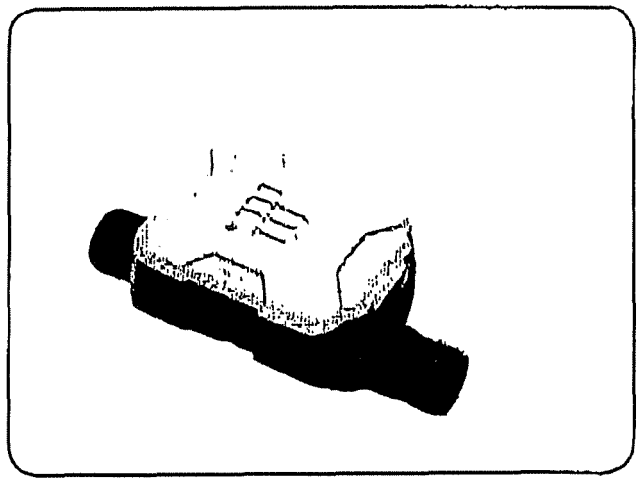
APPLICATIONS

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

The Ultrasonic meter complies with applicable portions of ANSI/AWWA Standard C700 and NSF/ANSI Standard 61, Annex G. There is currently no AWWA standard that specifically addresses ultrasonic meters for residential 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 display shows total volume and alarm conditions and can toggle to display rate of flow.



In the normal temperature range of 45...85° F (7...29° C), the Ultrasonic "new meter" consumption measurement is accurate to:

- ±1.5% over the normal flow range
- ±3.0% from the extended low flow range to the minimum flow value

CONSTRUCTION

E-Series Ultrasonic meters feature an engineered polymer, 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, 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 polymer 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 when the flow sensors are not fully submerged.

SPECIFICATIONS

E-Series Ultrasonic Meter Size	5/8" x 3/4" (15 mm)	3/4" (20 mm)
Operating Range	0.1...25 gpm	0.1...32 gpm
Extended Low-Flow Rate	0.05 gpm	0.05 gpm
Maximum Continuous Operation	25 gpm	32 gpm
Pressure Loss	2.3 psi at 15 gpm	2.0 psi at 15 gpm
Reverse Flow - Maximum Rate	4.0 gpm	4.0 gpm
Operating Performance	In the normal temperature range of 45...85° F (7...29° C), new meter consumption measurement is accurate to: • ±1.5% over the normal flow range • ±3.0% from the extended low flow range to the minimum flow value	
Storage Temperature	-40...140° F (-40...60° C)	
Maximum Ambient Storage (Storage for One Hour)	150° F (72° C)	
Measured-Fluid Temperature Range	34...140° F (1°...60° C)	
Humidity	0...100% condensing; meter is capable of operating in fully submerged environments	
Maximum Operating Pressure of Meter Housing	175 psi (12 bar)	
Register Type	Straight reading, permanently sealed electronic LCD; digits are 0.28" (7 mm) high	
Register Display	• Consumption (up to nine digits) • Rate of flow • Alarms • Unit of measure factory programmed for gallons, cubic feet and cubic meters	
Register Capacity	• 10,000,000 gallons • 1,000,000 cubic feet • 100,000 cubic meters	
Totalization Display Resolution	• Gallons: 0.XX • Cubic feet: 0.XXX • Cubic meters: 0.XXXX	
Battery	3.6-volt lithium thionyl chloride; battery is fully encapsulated within the register housing and is not replaceable; 20-year battery life	

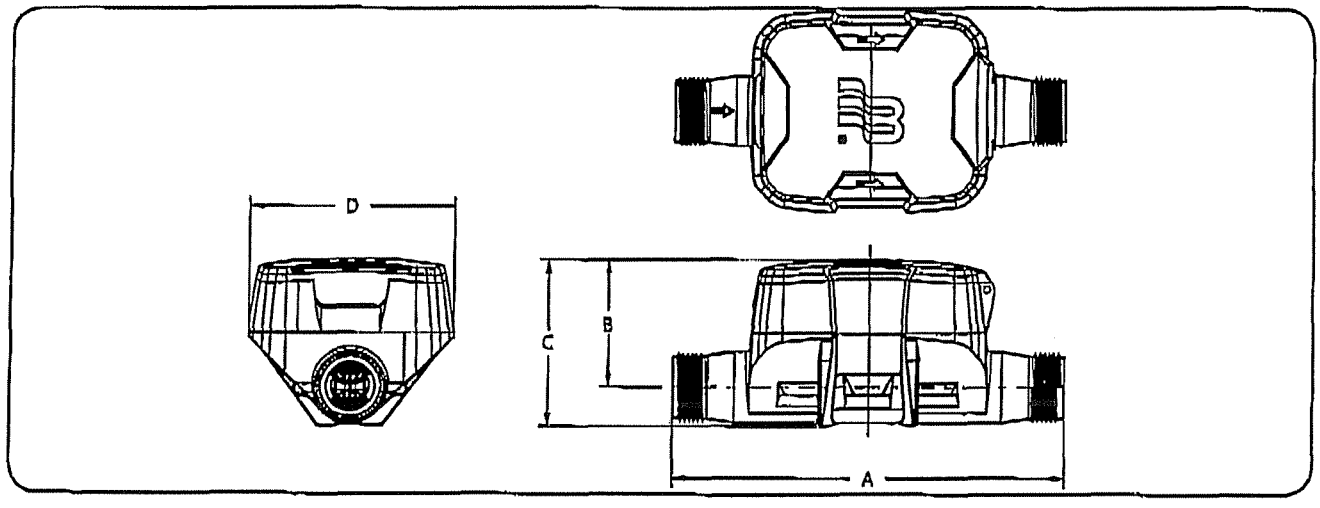
MATERIALS

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

PHYSICAL DIMENSIONS

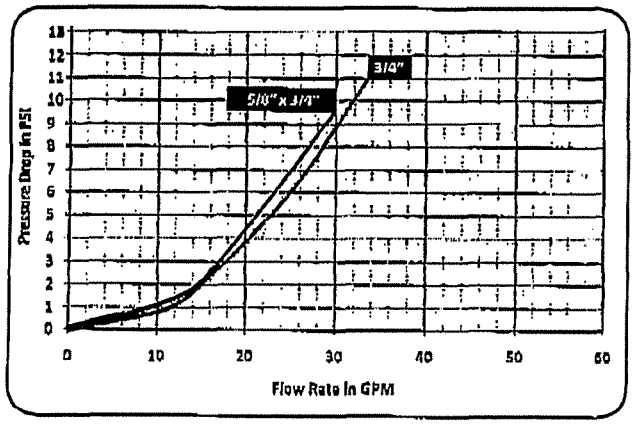
E-Series Ultrasonic Meter Size	5/8" x 3/4" (15 mm)	3/4" (20 mm)
Size Designation X Lay Length	5/8" x 3/4" x 7-1/2"	3/4" x 7-1/2" or 3/4" x 9"
Weight (without AMR)	1.58 lb	3/4" x 7-1/2" : 1.58 lb 3/4" x 9" : 1.64 lb
See illustration below for Measurement Designations.		
Length (A)	7.5"	7.5" or 8.85"
Height (B)	2.46"	2.46"
Height (C)	3.23"	3.23"
Width (D)	3.90"	3.90"
Bore Size	3/4"	3/4"
Coupling Nut & Spud Thread	1" x 11-1/2 NPSM	1" x 11-1/2 NPSM
Tailpiece Pipe Thread (NPT)	3/4"	3/4"
Service Pipe Thread (NPT)	3/4"	3/4"

Measurement Designations



PRESSURE LOSS CHART

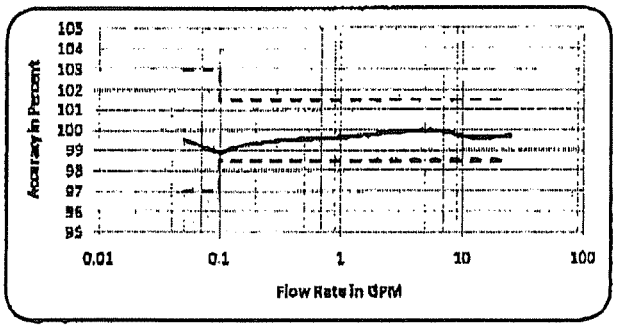
Rate of Flow in Gallons per Minute (gpm)



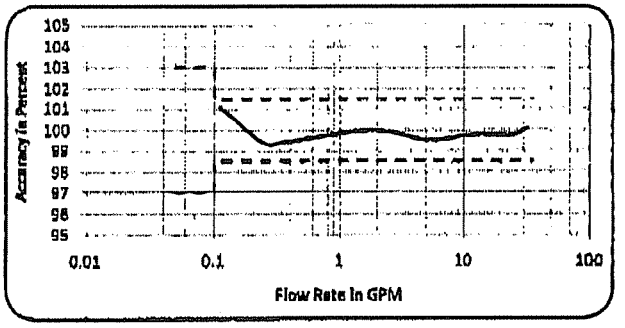
ACCURACY CHARTS

Rate of Flow in Gallons per Minute (gpm)

5/8" x 3/4" Meter



3/4" Meter



www.badgermeter.com

The Americas | Badger Meter | 4545 West Brown Deer Rd | PO Box 245036 | Milwaukee, WI 53224-9536 | 800-876-3837 | 414-355-0400
México | Badger Meter de las Americas, S.A. de C.V. | Pedro Luis Ogazón N°32 | Esq. Angelina N°24 | Colonia Guadalupe Inn | CP 01050 | México, DF | México | +52-55-5662-0882
Europe, Middle East and Africa | Badger Meter Europa GmbH | Nurtinger Str 76 | 72639 Neuffen | Germany | +49 7025 9208 0
Czech Republic | Badger Meter Czech Republic s.r.o. | Mařikova 2082/28 | 621 00 Brno, Czech Republic | +420-5-41420411
Slovakia | Badger Meter Slovakia s.r.o. | Račianska 109/B | 831 02 Bratislava, Slovakia | +421-2-44 63 83 01
Asia Pacific | Badger Meter | 80 Marine Parade Rd | 21-04 Parkway Parade | Singapore 449269 | +65-63464836
China | Badger Meter | 7-1202 | 99 Hangzhong Road | Minhang District | Shanghai | China 201101 | +86-21-5763 5412

Legacy Document Number ESM-T-12-EN

Badger Meter

E-Series® Ultrasonic Meter

Cold Water Stainless Steel Meter, 5/8", 5/8" x 3/4", 3/4" and 1" NSF/ANSI Standard 61 Certified, Annex G

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.

Offered in four sizes and lay lengths, the Ultrasonic meter features:

- 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.
- Digital or industry standard encoder protocol.

The Ultrasonic meter is available with a wired lead, 308 in-line connector or fully prewired to ORION® and GALAXY® AMR/AMI endpoints. It is also offered with the Itron® in-line connector, in-line connector with pit endpoint, or prewired to an Itron remote endpoint.

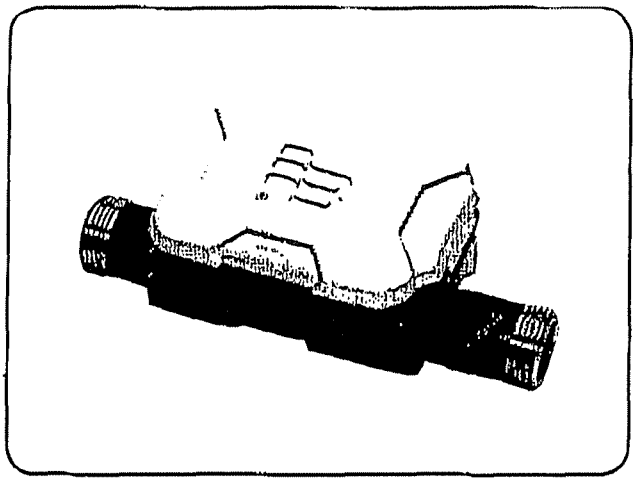
APPLICATIONS

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.

The Ultrasonic meter complies with applicable portions of ANSI/AWWA Standard C700 and NSF/ANSI Standard 61, Annex G. There is currently no AWWA standard that specifically addresses ultrasonic meters for residential 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 display shows total volume and alarm conditions and can toggle to display rate of flow.



In the normal temperature range of 45...85° F (7...29° C), the Ultrasonic "new meter" consumption measurement is accurate to:

- ±1.5% over the normal flow range
- ±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, 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 when the flow sensors are not fully submerged.

SPECIFICATIONS

E-Series Ultrasonic Meter Size	5/8" (15 mm)	5/8" x 3/4" (15 mm)	3/4" (20 mm)	1" (25 mm)
Operating Range	0.1...25 gpm	0.1...25 gpm	0.1...32 gpm	0.4...55 gpm
Extended Low-Flow Rate	0.05 gpm	0.05 gpm	0.05 gpm	0.25 gpm
Maximum Continuous Operation	25 gpm	25 gpm	32 gpm	55 gpm
Pressure Loss	4.3 psi at 15 gpm	2.3 psi at 15 gpm	2.0 psi at 15 gpm	1.8 psi at 25 gpm
Reverse Flow - Maximum Rate	4.0 gpm	4.0 gpm	4.0 gpm	9.0 gpm
Operating Performance	In the normal temperature range of 45...85° F (7...29° C), new meter consumption measurement is accurate to: • ±1.5% over the normal flow range • ±3.0% from the extended low flow range to the minimum flow value			
Storage Temperature	-40...140° F (-40...60° C)			
Maximum Ambient Storage (Storage for One Hour)	150° F (72° C)			
Measured-Fluid Temperature Range	34...140° F (1°...60° C)			
Humidity	0...100% condensing; meter is capable of operating in fully submerged environments			
Maximum Operating Pressure of Meter Housing	175 psi (12 bar)			
Register Type	Straight reading, permanently sealed electronic LCD; digits are 0.28" (7 mm) high			
Register Display	• Consumption (up to nine digits) • Rate of flow • Alarms • Unit of measure factory programmed for gallons, cubic feet and cubic meters			
Register Capacity	• 10,000,000 gallons • 1,000,000 cubic feet • 100,000 cubic meters			
Totalization Display Resolution	• Gallons: 0.XX • Cubic feet: 0.XXX • Cubic meters: 0.XXXX			
Battery	3.6-volt lithium thionyl chloride; battery is fully encapsulated within the register housing and is not replaceable; 20-year battery life			

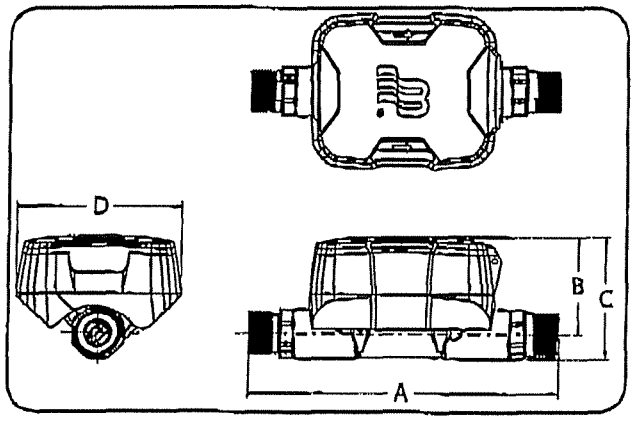
MATERIALS

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

PHYSICAL DIMENSIONS

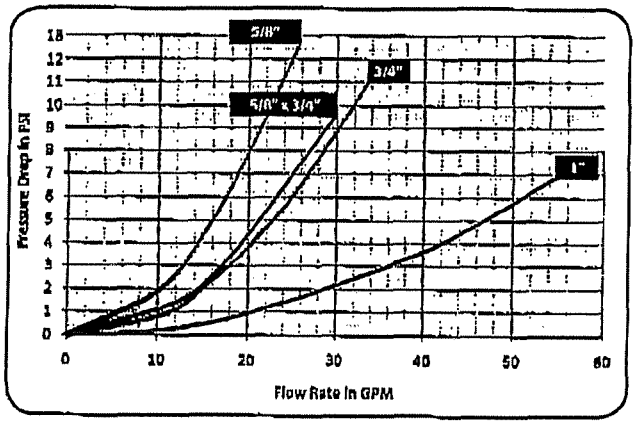
E-Series Ultrasonic Meter Size	5/8" (15 mm)	5/8" x 3/4" (15 mm)	3/4" (20 mm)	1" (25 mm)
Size Designation X Lay Length	5/8" x 7-1/2"	5/8" x 3/4" x 7-1/2"	3/4" x 7-1/2" or 3/4" x 9"	1" x 10-3/4"
Weight (without AMR)	2.2 lb	2.1 lb	3/4" x 7-1/2" : 2.1 lb 3/4" x 9" : 2.4 lb	3.1 lb
See illustration below for Measurement Designations.				
Length (A)	7.5"	7.5"	7.5" or 8.98"	10.745"
Height (B)	2.404"	2.404"	2.404"	2.529"
Height (C)	3.014"	3.014"	3.094"	3.359"
Width (D)	3.898"	3.898"	3.898"	3.898"
Bore Size	5/8"	3/4"	3/4"	1"
Coupling Nut & Spud Thread	3/4" x 14 NPSM	1" x 11-1/2 NPSM	1" x 11-1/2 NPSM	1-1/4" x 11-1/2 NPSM
Tailpiece Pipe Thread (NPT)	1/2"	3/4"	3/4"	1"
Service Pipe Thread (NPT)	3/4"	3/4"	3/4"	1"

Measurement Designations



PRESSURE LOSS CHART

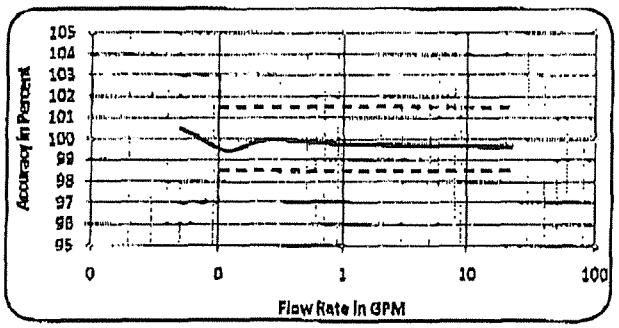
Rate of Flow in Gallons per Minute (gpm)



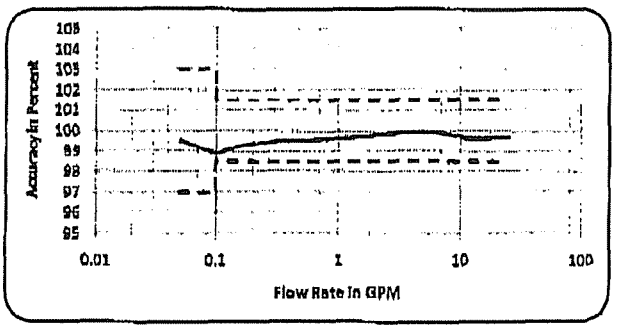
ACCURACY CHARTS

Rate of Flow in Gallons per Minute (gpm)

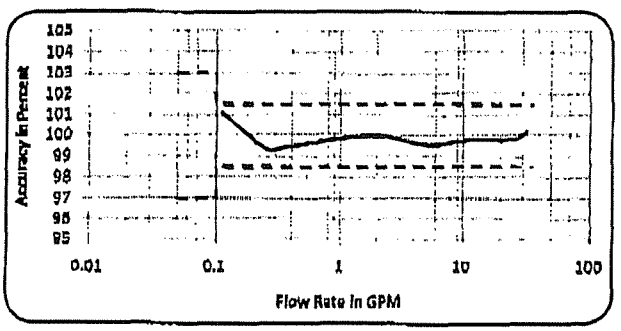
5/8" Meter



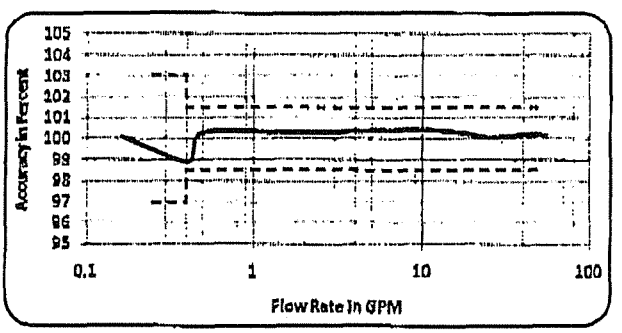
5/8" x 3/4" Meter



3/4" Meter



1" Meter



www.badgermeter.com

The Americas | Badger Meter | 4545 West Brown Deer Rd | PO Box 245036 | Milwaukee, WI 53224-9536 | 800-876-3837 | 414-355-0400
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Europe, Middle East and Africa | Badger Meter Europa GmbH | Nurtinger Str 76 | 72639 Neuffen | Germany | +49 7025-9208-0
Czech Republic | Badger Meter Czech Republic s.r.o. | Melkovo 2087/26 | 621 00 Brno, Czech Republic | +420-5-61420411
Slovakia | Badger Meter Slovakia s.r.o. | Racianska 109/B | 831 02 Bratislava, Slovakia | +421-2-44 63 83 01
Asia Pacific | Badger Meter | 80 Marine Parade Rd | 21-04 Parkway Parade | Singapore 449269 | +65-6346 4836
China | Badger Meter | Rm 501, N° 11 Longyuu Apartment | N° 180 Longjin Rd, Jiuting Songjiang District | Shanghai, China | 201615 | +86-21-5763 5412

DS-W-SR2-00-00-0612-02-A

SR II® Low Lead Meters

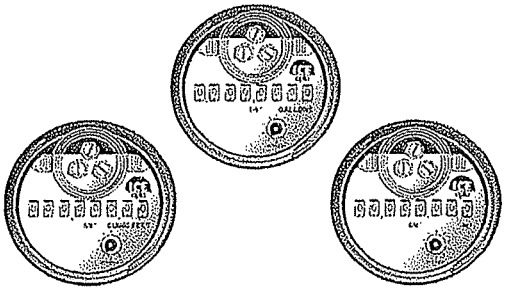
Displacement Type Magnetic Drive Cold Water Meters

Attn: John

Description

5/8" (DN 15mm), 3/4" (DN 20mm) and 1" (DN 25mm) Sizes

Measurement of cold water where flow is in one direction only; in residential, commercial and industrial services.



5/8" AMR / AMI System Dials Shown

Features

CONFORMANCE TO STANDARDS

Sensus SRII Low Lead Water Meters meet the requirements of NSF Standard 61 Annex F and G and comply with ANSI/AWWA Standard C700-latest revision. Each meter is tested to insure compliance with AWWA standards.

CONSTRUCTION

Sensus SR II Low Lead Water Meters consist of three basic components: maincase; measuring chamber; and sealed register. Maincases are made of Bismuth BiAlloy CDA89836 or EnviroBrass™ II C89520 with externally-threaded spuds. Registers are housed in a bonnet of synthetic polymer. Measuring chambers are of Rocksyn®, a corrosionresistant, tailored thermoplastic material formulated for long-term performance and especially suitable for aggressive water conditions. Maincase bottom plates are available in Bismuth BiAlloy, EnviroBrass II or, if frost protection is desired, in cast iron or synthetic polymer.

SEALED REGISTER

Hermetically sealed, proven magnetic drive design eliminates dirt and moisture contamination, tampering and lens fogging problems. Standard register includes a straight-reading, odometertype totalization display, a 360° test circle with center sweep hand, and a low flow (leak) detector. Gears are selflubricating, molded plastic for long life and minimum friction.

No change gears are required for accuracy calibration. Encodertype remote reading systems are available for all SR II Low Lead Water Meters. (See other side of sheet for additional information.)

TAMPERPROOF FEATURES

A unique locking system prevents customer removal of the register to obtain free water. The register can only be removed by breaking the register bonnet.

MAGNETIC DRIVE

The SR II Low Lead features a hydrodynamically cushioned design that eliminates premature wear of components. The meter utilizes a patented positive, rellable drive coupling. The highstrength magnets used will eliminate "drive slip" in normal use and also provide adequate strength to drive remote register units.

OPERATION

Water flows through the meter's strainer and into the measuring chamber where it drives the piston. The hydrodynamically balanced piston oscillates around a central hub, guided by the division plate.

A drive magnet transmits the motion of the piston to a driven magnet located within the hermetically sealed register. The driven magnet is connected to the register gear train. It reduces the piston oscillations into volume totalization units displayed on the register dial face.

MAINTENANCE

Sensus SR II Low Lead Water Meters are engineered to provide long-term value and virtually maintenance-free operation. Simplicity of design allows interchangeability of parts of like-size meters, reduced parts inventory requirements, and ease of maintenance. The register can be removed without relieving the water pressure or removing the maincase from the installation.

CONNECTIONS

Tailpieces/Unions for installing the meters on a variety of pipe types and sizes are available.

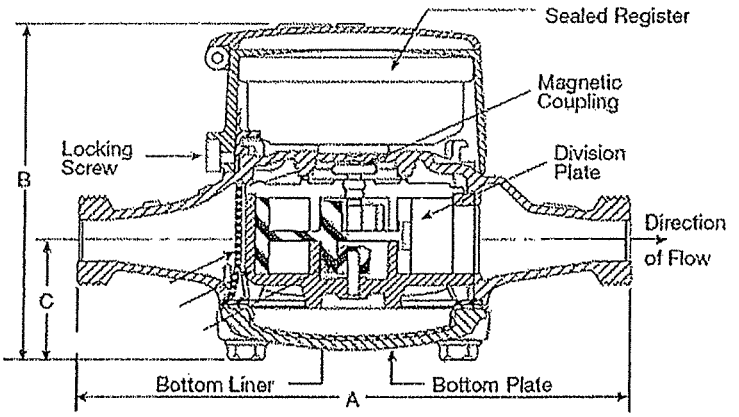
AMR / AMI SYSTEMS

Meters and encoders are compatible with current Sensus AMR/AMI systems.

GUARANTEE

Sensus SR II Water Meters are backed by "The Sensus Guarantee." Ask your Sensus representative for details or see Bulletin G-500.

SENSUS



DIMENSIONS AND NET WEIGHTS

Meter Size	A	B (Direct Read Register)	C	Width	Net Weight[1]
5/8" (DN 15mm)	7-1/2" (190mm)	5.0" (127mm)	1-3/4" (44mm)	3-7/8" (98mm)	4.3 lb. (1.97 kg)
5/8" x 3/4" (DN 15mm X 33mm)	7-1/2" (190mm)	5.0" (127mm)	1-3/4" (44mm)	3-7/8" (98mm)	4.4 lb. (2.00 kg)
3/4" (DN 20mm)	9" (229mm)	5-1/2" (140mm)	2-3/16" (56mm)	4-1/2" (114mm)	6.4 lb. (2.90 kg)
3/4" x 1" (DN 20mm x 42mm)	9" (229mm)	5-1/2" (140mm)	2-3/16" (56mm)	4-1/2" (114mm)	6.6 lb. (2.99 kg)
3/4" Short (DN 20mm)	7-1/2" (190mm)	5-1/2" (140mm)	2-3/16" (56mm)	4-1/2" (114mm)	6.2 lb. (2.81 kg)
1" (DN 25mm)	10-3/4" (273mm)	6-9/16" (167mm)	2-7/16" (62mm)	6-1/2" (165mm)	11.9 lb. (5.4 kg)

SPECIFICATIONS

SERVICE	Measurement of potable and reclaim water.
NORMAL OPERATING FLOW RANGE[1] (100%–91.5%)	5/8" (DN 15mm) size: 1 to 20 gpm (0.25 to 4.5 m³/hr) 3/4" (DN 20mm) size: 2 to 30 gpm (0.45 to 7.0 m³/hr) 1" (DN 25mm) size: 3 to 50 gpm (0.7 to 11.0 m³/hr)
LOW FLOW REGISTRATION (95%–101.5%)	5/8" size: 1/4 gpm (0.06 m³/hr) 3/4" size: 1/2 gpm (0.10 m³/hr) 1" size: 3/4 gpm (0.15 m³/hr)
MAXIMUM PRESSURE LOSS	5/8" size: 7.0 psi at 20 gpm (0.5 bar at 4.5 m³/hr) 3/4" size: 9.0 psi at 30 gpm (0.6 bar at 7.0 m³/hr) 1" size: 7.3 psi at 50 gpm (0.5 bar at 11.0 m³/hr)
MAXIMUM OPERATING PRESSURE	150 psi (10.0 bar)
MEASURING ELEMENT	Oscillating piston
REGISTER[3]	Straight reading, hermetically sealed, magnetic drive. Remote reading unit optional.
STANDARD METER REGISTRATION[2]	10 gallons, 1 cubic foot, or 0.01 m³/ or 0.1 m³/sweep hand revolution. 10,000,000 gallons, 1,000,000 cubic feet or 100,000 m³ capacity 8 odometer wheels

METER CONNECTIONS[2]	5/8" (DN 15mm) size: 3/4" (26.44mm) threads 5/8" x 3/4" (DN 15mm x 33mm) size: 1" (33.25mm) threads 3/4" (DN 20mm) size: 1" (33.25mm) threads 3/4" x 1" (DN 20mm x 42mm) size: 1-1/4" (41.9mm) threads 1" (DN 25mm) size: 1-1/4" (41.9mm) threads (All threads are straight pipe, external type, conforming to ANSI B1.20.1 or ISO R228, if specified.)
MATERIALS	Maincase: Bismuth BiAlloy CDA89836 or EnviroBrass II C89520 Register box: Synthetic polymer Measuring chamber: Rocksyn® Bottom plate: Bismuth BiAlloy CDA89836 Magnets: Plasticized material Casing bolts: Stainless steel Strainer: Synthetic polymer

1 Maximum rates listed are for intermittent flow only. Maximum continuous flow rates as specified by AWWA are:
5/8" (DN 15mm)—10 gpm (2.3 m³/hr)
3/4" (DN 20mm)—15 gpm (3.4 m³/hr)
1" (DN 25mm)—25 gpm (5.7 m³/hr)

2 Unless otherwise noted, 5/8" size and 5/8" x 3/4" characteristics are identical. 5/8" x 3/4" designates 5/8" with 3/4" connection thread). Metric designation is the normal bore x the outside diameter.

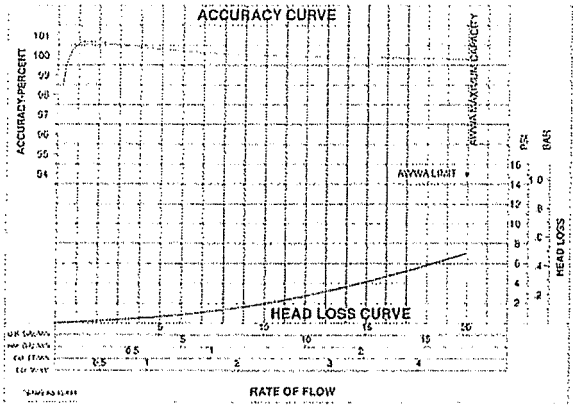
3 See ICE-Opto Register Datasheet or Electronic Register Datasheet for details specifications.

sensus

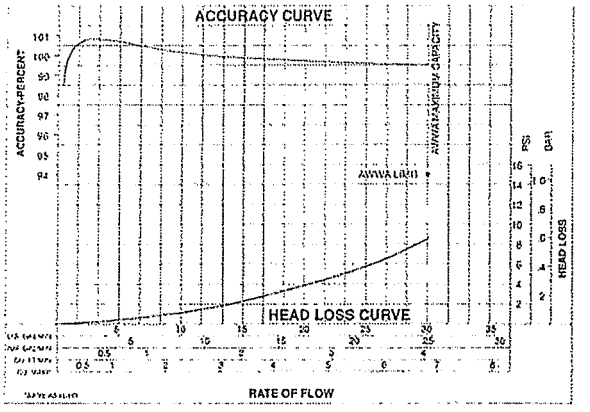
TYPICAL PERFORMANCE CURVES

SR II Meter

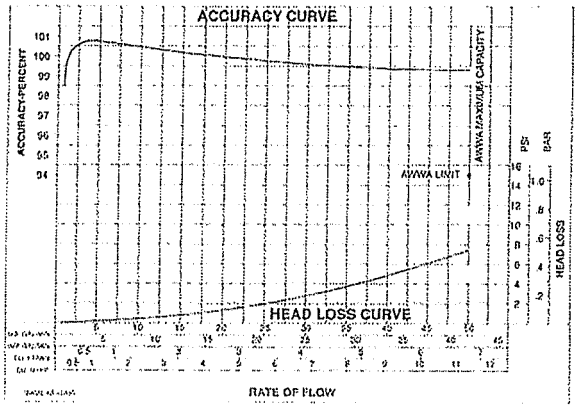
5/8" and 5/8" x 3/4" SR II Meter
UA-5833



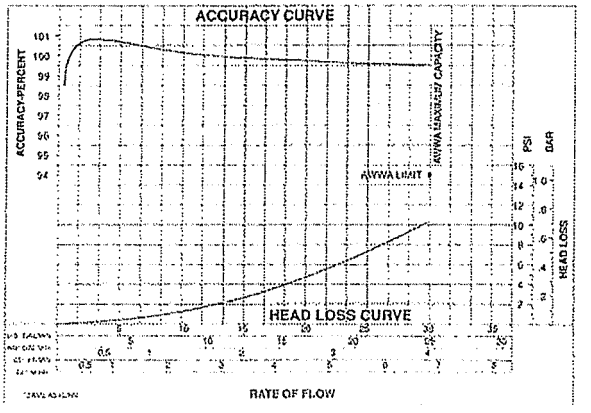
3/4" and 3/4" x 1" SR II Meter
UA-5834



1" SR II Meter
UA-5835



3/4" SR II Meter 7-1/2" Laying Length
UA-5838



8601 Six Forks Road, Suite 700
Raleigh, NC 27615
1-800-638-3748
www.sensus.com/water

SENSUS

5. Provide the minutes of each meeting of MCWD #1's Board of Commissioners in which the selection of replacement meters was discussed.

The discussion of replacement of meters was discussed at the January 23, 2012 meeting. The minutes of the meeting are attached on following page.

This is to certify that this response on behalf of the utility is true and accurate to the best of my ability, knowledge, information, and belief.

5-28-13

5-28-13

Witness

MINUTES OF THE JANUARY 23, 2012 MEETING

The January meeting of the Muhlenberg County Water District was opened January 23, 2012 by Bobby Mayhugh, Chairman.

Shawn Noffsinger made a motion to approve the minutes of the November 28, 2011 meeting. Gene Kimmel 2nd the motion. Said motion carried.

Gene Kimmel made a motion to approve the adjustments and bills for payment with no additions. Shawn Noffsinger 2nd the motion. Said motion carried.

Brent Yonts was not present at the meeting. Brent did send a termination letter to Vickie Mefford dated January 24, 2012 stating that because of the District's policy, her employment is being terminated because it has been at least 12 months and no statement has been provided by the doctor. A copy of the letter is attached for future reference.

There was discussion on adding birthdays as a holiday for the employees. If it falls on a Saturday or Sunday it can be taken on a Friday or Monday, unless it might cause a hardship. Shawn Noffsinger made a motion to make birthdays a holiday for the employees. Gene Kimmel 2nd the motion. Said motion carried.

The rate increase has been filed with Public Service Commission. It has been run in the paper and hopefully it will be in effect in the April billing cycle.

There was discussion on the replacement of meters. The District feels replacing meters with the surcharge money we receive with the rate increase, we will pick up a lot of revenue. There are a lot of low flowing meters in ground.

There was discussion on selling of surplus items to buy a new lawn mower and a new truck. Shawn Noffsinger made a motion to sell this item and purchase new ones. Bobby Mayhugh 2nd the motion. Said motion carried. The surplus items are as follows:

1. 42" John Deere 110 Lawn Mower
2. 72" Excel Hustler 305D Lawn Mower
3. Clark Fork Lift 2000 Lbs Capacity
4. 1999 Ford Ranger V6, 147206 Miles
5. 2002 S-10 V-6 209716 Miles

Keith Peterson wanted to thank the Commissioners, Harold, Davey and Kenny for the leave of absence to get his benefits, and to return to his job. He is very grateful.

Bobby Mayhugh made a motion to adjourn. Shawn Noffsinger 2nd the motion. Said motion carried.

Respectfully submitted,

Ronda Hearld

Ronda Hearld, Recording Secretary

Bobby Mayhugh, Chairman

Gene Kimmel, Treasurer

6. Provide the minutes of each meeting of MCWD #1's Board of Commissioners in which the proposed loan agreement was discussed or voted upon.

The discussion of the proposed loan agreement was discussed at the November 28, 2011 meeting, The December 10, 2012 meeting, and the January 28,2013 meeting. The minutes of the meetings are attached on the following pages.

This is to certify that this response on behalf of the utility is true and accurate to the best of my ability, Knowledge, information, and belief.

5-28-13

5-28-13

Witness

MINUTES OF THE NOVEMBER 28, 2011 MEETING

The November meeting of the Muhlenberg County Water District was opened November 28, 2011 by Bobby Mayhugh, Chairman.

Gene Kimmel made a motion to approve the minutes of the October 24, 2011 meeting. Shawn Noffsinger 2nd the motion. Said motion carried.

Shawn Noffsinger made a motion to approve the adjustments and bills for payment with no additions. Gene Kimmel 2nd the motion. Said motion carried.

Brent Yonts stated that we had no litigation.

There was discussion on the approval for our rate increase and redoing our tanks. The base rate on the new rate increase will go from $20.07 to $22.51 with a $1.91 surcharge. It will take approximately 1 million to redo our tanks. Shawn Noffsinger made a motion to do the rate increase first, and then move toward the tank project. Gene Kimmel 2nd the motion. Said motion carried.

There was also discussion on purchasing drive by meters. If the District had these type meters they could read all of the meters in one day and could help on the water loss. The $1.91 surcharge on the new rate increase for 10 years will go for the purchase of these meters. Bobby Mayhugh made a motion to purchase the drive by meters in the future when the funds are available. Shawn Noffsinger 2nd the motion. Said motion carried.

It was discussed that the District should check with the PADD office to see if there is any funding available for meters.

Davey Douglas stated that the Old Greenville Log and Lumber has been purchased, and will be developed. This area will require new meters.

Bobby Mayhugh made a motion to approve the line extension on Douglas Road. Shawn Noffsinger 2nd the motion. Said motion carried.

Bobby Mayhugh made a motion to authorize the General Manager, Harold Wester, or the Superintendent, Davey Douglas, to work with PSC to let the public aware of our rate increase.

Bobby Mayhugh made a motion to give the employee's a Christmas bonus. Shawn Noffsisnger 2nd the motion. Said motion carried.

Respectfully submitted

Ronda Hearld

Ronda Hearld, Recording Secretary

Bobby Mayhugh, Chairman

Gene Kimmel

Gene Kimmel, Treasurer

MINUTES OF THE DECEMBER 10 2012 MEETING

There was a special call meeting of the Muhlenberg County Water District and was opened December 10, 2012 by Bobby Mayhugh, Chairman.

Denver Blain of C. I. Thornburg was at the meeting to demonstrate radio read meters. He explained that the meters were 100% accurate, they are guaranteed for 20 years, and are sealed with no way for water to get inside. The meters that we remove and replace with the radio read meters we would sell for scrap. The price for the new meters is $1,247,000.00. This price includes everything and the quote is good until January 31, 2013. There was discussion that these meters should help the District on water loss. The Superintendent will check with PSC to make sure we do not have to bid this purchase of meters. Also we will send letters to the financial institutions with our terms. Based on PSC's reply on the biding process Bobby Mayhugh made a motion to accept the bid from C.I. Thornburg. Shawn Noffsinger 2nd the motion. Said motion carried. A copy of the bid is attached for future reference.

Joe Ford attended the meeting to discuss our radios. We are having a lot of interference and he stated that we need to purchase another frequency. He indicated that he would need to do something to the radios in the trucks.

The District needed to pass a Resolution of the Muhlenberg County Water District approving and authorizing an amended assistance agreement with the Kentucky Rural Water Finance Corporation for the purpose of amending loans to the District. Bobby Mayhugh made a motion to pass the Resolution. Gene Kimmel 2nd the motion. Said motion carried.

The District needed to pass the Memorandum of Agreement between Kentucky Infrastructure Authority and the Muhlenberg County Water District authorizing certain projects for local administration through Coal Severance Tax Allocation Grant Program. Bobby Mayhugh made a motion to pass this Agreement. Shawn Noffsinger 2nd the motion. Said motion carried.

There was discussion that we were still supplying water to Greenville.

Bobby Mayhugh gave the commissioners copies from the 2009 edition of the Laws Affecting Public Utilities in The Commonwealth of Kentucky concerning the commissioners. A copy is attached.

Respectfully submitted,

Ronda Hearld

Ronda Hearld, Recording Secretary

Bobby Mayhugh, Chairman

Gene Kimmel

Gene Kimmel, Treasurer

MINUTES OF THE JANUARY 28, 2013 MEETING

The January meeting of the Muhlenberg County Water District was opened January 28, 2013 by Bobby Mayhugh, Chairman.

Gene Kimmel made a motion to approve the minutes of the November 26, 2012 meeting. Shawn Noffsinger 2nd the motion. Said motion carried.

Shawn Noffsinger made a motion to approve the minutes of the December 10, 2012 special call meeting. Gene Kimmel 2nd the motion. Said motion carried.

Shawn Noffsinger made a motion to approve the bills and adjustments for payment with no additions. Gene Kimmel 2nd the motion. Said motion carried.

Brent Yonts stated there was no litigation to discuss.

Shawn Noffsinger made a motion to approve the holidays for 2013. Gene Kimmel 2nd the motion. Said motion carried. A copy of the holidays is attached for future reference.

The District needed to pass a Resolution with the District approving and authorizing an amended assistance agreement with the Kentucky Rural Finance Corporation for the purpose of Amending Loans to the District. Gene Kimmel made a motion to pass the Resolution. Shawn Noffsinger 2nd the motion. Said motion carried.

The District needed to pass a Resolution with the District approving and authorizing an assistance agreement with the Kentucky Rural Water Finance Corporation for the purpose of financing a construction project (radio read meters)for the District.

Davey Douglas stated that all ten tanks have been disinfected.

Bobby Mayhugh made a motion to adjourn. Shawn Noffsinger 2nd the motion. Said motion carried.

Respectfully submitted,

Ronda Hearld

Ronda Hearld, Recording Secretary

Bobby Mayhugh, Chairman

Gene Kimmel, Treasurer

7. In case No. 2011-00233, the Commission authorized Graves County Water District's purchase of iPerl Meters but required it to file with the Commission a written plan for a sampling testing program to test the proposed metering equipment after its deployment to ensure it is operating within acceptable limits and is accurately registering water usage. State whether MCWD #1 has developed a plan for testing the iPerl water meters that it intends to purchase. If yes, provide a copy of such a plan.

Yes, MCWD #1 has implemented a 10 year change out plan after installation of iPerl meters and is as follows.....Years 1 through 5 MCWD #1 will randomly select, pull, and test 100 meters per year. Years 6 through 10 MCWD #1 will begin testing 1000 meters per year. These will be selected according to routes and the order in which the iPerl meters were installed. MCWD #1 has chosen this plan in order to avoid having all meters due for changeout in the same year after the 10 year test requirement period.

This is to certify that this response on behalf of the utility is true and accurate to the best of my ability, knowledge, information, and belief.

David Dougla 5-28-13

5-28-13

Witness

8. Refer to 807 KAR 5:066, Section 15(2), which requires that all water meters be tested for accuracy prior to being placed in service.

a. Describe how MCWD #1 intends to comply with this regulation upon its proposed purchase of the iPerl meters.

MCWD #1 shall comply with the above referenced regulation by utilizing the manufacturer's Provided certified test tag (fig 1) detailing the accuracy of each meter at each AWWA standard flow rate. It is our understanding that this practice is utilized by all other PSC regulated districts for all manufacturers and forms of meters for newly purchased items. Any meter removed from service for standard testing procedures or for customer complaints will be tested by MCWD #1 in accordance with the AWWA table for positive displacement meters.

b. If MCWD #1 intends to rely upon another entity to test the purchased meters, identify the entity that will perform the testing and state whether the Commission has approved that entity for testing water meters.

Purchased meters will be tested by Sensus Metering Systems as the manufacturer of new meters. As stated above any new meter is supplied with a test & accuracy card and any meter removed from use will be tested by MCWD #1's certified test bench.

c. Describe the testing methods and procedures that will be employed to test the meters that MCWD #1 proposed to purchase. This description should include, but not be limited to, the type of testing apparatus, the flow rates and test quantities used for each flow rate, and the location of the testing facility.

MCWD #1 utilizes our own 12 meter test bench with 10 gallon and 100 gallon tanks for residential meter testing. The testing facility is located at our water office at 301 Dean Road Greenville, KY 42345. We follow AWWA standard flow rates & test quantities for testing 5/8" X ¾" meters. Low flow testing is perfomed at ¼ gpm for 10 gallons, medium flow is tested at 5gpm for 10 gallons and the high flow test is at 15gpm for 100 gallons of consumption. iPerl meters will be tested at these same AWWA specified flow rates and test quantities.

d. State whether the testing methods and procedures that will be employed to test the meters that MCWD #1 proposes to purchase comply with

(1) 807 KAR 5:066;
(2) American Water Works Association, Water Meters Selection, Installation, Testing and Maintenance (AWWA Manual M6 Mar. 30, 2013.)

The proposed iPerl does not comply and exceeds any listed flow and test quantity rate listed by 807 KAR 5:066 and the AWWA M6 manual table.

e. If MCWD #1 intends the rely upon the proposed meter manufacturer's testing results to comply with 807 KAR 5:066, Section 15(2), provide:

(1) The name address, telephone number, and electronic mail address of the manufacturer Representatives with whom MCWD #1 has dealt and who has furnished the meter testing information to MCWD #1

(2) All documents related to meter testing, include testing results and literature, and the manufacturer has provided to MCWD #1.

Manufacturer's contact information for test data:
Sensus Metering System
Connie Hancheck
Connie.hancheck@sensus.com

Sample file Information:

Sensus Metering Systems
450 N Gallatin Ave
Uniontown, PA 15401-0487
(Tel) 724-430-4074
(fax) 724-439-7861

CI Thornberg Company Inc.
740 Enterprise Dr
Lexington, KY 40510

We hereby certify the attached accuracy performance data, listed by Sensus meter serial numbers, represents the actual test results for water meters.

All meters are built to AWWA Standards.

The Sensus Part Number is: I5S1GGXX

MTR 5/8-3/4 IPERL 100G 7.5"LL
5WHL 4A 6'TRPL CBL 2-WIRE
SMART MODE

The meters were shipped on Order No. 217567
Line No. 012

Sensus Serial Number: 74955977 to 74958676

Manufacture Date: 8/24/2012

Meter Quantity : 2700

Heidi Ritenour
Engineering Support Service

3/20/2013 at 11:22 AM

Sensus Metering Systems

Page: 1

Sensus Test Data Build
Sensus Meter Flow Data

Serial No.	Low 0.11 GPM	Mid 10 GPM	Hi 35 GPM
74955977	99.5	100.2	99.9
74955978	99.5	100.2	99.9
74955979	99.5	100.3	99.9
74955980	99.5	100.2	99.9
74955981	99.5	99.9	99.9
74955982	99.5	100.2	99.9
74955983	99.5	100.3	99.9
74955984	99.5	100.5	99.9
74955985	99.5	99.7	99.9
74955986	99.5	100.4	99.9
74955987	99.5	100.1	99.9
74955988	99.5	99.9	99.9
74955989	99.5	99.1	99.9
74955990	99.5	99.3	99.9
74955991	99.5	99.3	99.9
74955992	99.5	99.6	99.9
74955993	99.5	99.1	99.9
74955994	99.5	99.0	99.9

74955995	99.5	99.0	99.9
74955996	99.5	99.5	99.9
74955997	99.5	99.4	99.9
74955998	99.5	99.0	99.9
74955999	99.5	100.1	99.9
74956000	99.5	99.7	99.9
74956001	99.5	99.0	99.9
74956002	99.5	99.7	99.9
74956003	99.5	99.9	99.9
74956004	99.5	100.4	99.9

This is to certify that this response on behalf of the utility is true and accurate to the best of my ability, knowledge, information, and belief.

5-28-13

5-28-13

Witness