FERGUSON
WATERWORKS

Request for Proposal (RFP) Submittal

NATIONAL COOPERATIVE PURCHASING ALLIANCE (NCPA)

Water Metering, Monitoring, Devices and Related Services - RFP: 40-20

Submission Due Date: November 19, 2020 by 2:00 PM CST

Zeb Wright
Ferguson Waterworks – Meter & Automation
T: (214) 690- 3604
E: Zeb.Wright@ferguson.com
Address: 2650 S.Pipeline Rd, Euless, TX 76040

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TAB 1 – MASTER AGREEMENT / SIGNATURE FORM

Tab 1 – Master Agreement
General Terms and Conditions

- Customer Support
  - The vendor shall provide timely and accurate technical advice and sales support. The vendor shall respond to such requests within one (1) working day after receipt of the request.

- Disclosures
  - Respondent affirms that he/she has not given, offered to give, nor intends to give at any time hereafter any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor or service to a public servant in connection with this contract.
  - The respondent affirms that, to the best of his/her knowledge, the offer has been arrived at independently, and is submitted without collusion with anyone to obtain information or gain any favoritism that would in any way limit competition or give an unfair advantage over other vendors in the award of this contract.

- Renewal of Contract
  - Unless otherwise stated, all contracts are for a period of one (1) year with an option to renew annually for an additional Four (4) years if agreed to by Region 14 ESC and the vendor.

- Funding Out Clause
  - Any/all contracts exceeding one (1) year shall include a standard "funding out" clause. A contract for the acquisition, including lease, of real or personal property is a commitment of the entity's current revenue only, provided the contract contains either or both of the following provisions:
  - Retains to the entity the continuing right to terminate the contract at the expiration of each budget period during the term of the contract and is conditioned on a best efforts attempt by the entity to obtain appropriate funds for payment of the contract.

- Shipments (if applicable)
  - The awarded vendor shall ship ordered products within the written estimate of delivery time by the vendor to the entity after the receipt of the order unless modified. If a product cannot be shipped within that time, the awarded vendor shall notify the entity placing the order as to why the product has not shipped and shall provide an estimated shipping date. At this point the participating entity may cancel the order if estimated shipping time is not acceptable. All deliveries shall be freight prepaid, F.O.B. destination.

- Tax Exempt Status

- Since this is a national contract, knowing the tax laws in each state is the sole responsibility of the vendor.

- Payments
  - The entity using the contract will make payments directly to the awarded vendor or their affiliates as long as written request and approval by NCPA is provided to the awarded vendor.

- Adding authorized distributors/dealers
  - Awarded vendors may submit a list of distributors/partners/resellers to sell under their contract throughout the life of the contract. Vendor must receive written approval from NCPA before such distributors/partners/resellers considered authorized.
  - Purchase orders and payment can only be made to awarded vendor or distributors/business partners/resellers previously approved by NCPA.
  - Pricing provided to members by added distributors or dealers must also be less than or equal to the pricing offered by the awarded contract holder.
  - All distributors/partners/resellers are required to abide by the Terms and Conditions of the vendor's agreement with NCPA.

- Pricing
  - <u>All pricing submitted to shall include, as a cost of sale to the awarded vendor, the administrative fee to be remitted to NCPA by the awarded vendor.</u> It is the awarded vendor's responsibility to keep all pricing up to date and on file with NCPA. For those pricing requiring annual or periodic pricing updates, awarded vendors are expected to provide these changes as submitted.
  - All deliveries shall be freight prepaid, F.O.B. destination and shall be included in all pricing offered unless otherwise clearly stated in writing

- Warranty
  - Proposals should address each of the following:
    - Applicable warranty and/or guarantees of equipment and installations including any conditions and response time for repair and/or replacement of any components during the warranty period.
    - Availability of replacement parts
    - Life expectancy of equipment under normal use
    - Detailed information as to proposed return policy on all equipment
  - All supplies, equipment and services shall include manufacturer's minimum standard warranty and one (1) year labor warranty unless otherwise agreed to in writing.

- Audit rights
  - Vendor shall, at Vendor's sole expense, maintain appropriate due diligence of all purchases made by any entity that utilizes this Agreement. NCPA and Region 14 ESC each reserve the

right to audit the accounting for a period of three (3) years from the time such purchases are made. This audit right shall survive termination of this Agreement for a period of one (1) year from the effective date of termination. In the State of New Jersey, this audit right shall survive termination of this Agreement for a period of five (5) years from the date of final payment. Such records shall be made available to the New Jersey Office of the State Comptroller upon request.

- Region 14 ESC shall have the authority to conduct random audits of Vendor's pricing that is offered to eligible entities at Region 14 ESC's sole cost and expense. Notwithstanding the foregoing, in the event that Region 14 ESC is made aware of any pricing being offered to eligible agencies that is materially inconsistent with the pricing under this agreement, Region 4 ESC shall have the ability to conduct an extensive audit of Vendor's pricing at Vendor's sole cost and expense. Region 14 ESC may conduct the audit internally or may engage a third-party auditing firm. In the event of an audit, the requested materials shall be provided in the format and at the location designated by Region 14 ESC or NCPA.

- Indemnity

  - The awarded vendor shall protect, indemnify, and hold harmless Region 14 ESC and its participants, administrators, employees and agents against all claims, damages, losses and expenses arising out of or resulting from the actions of the vendor, vendor employees or vendor subcontractors in the preparation of the solicitation and the later execution of the contract.

- Licenses and Duty to keep current licenses

  - Vendor shall maintain in current status all federal, state and local licenses, bonds and permits required for the operation of the business conducted by vendor. Vendor shall remain fully informed of and in compliance with all ordinances and regulations pertaining to the lawful provision of services under the contract. Region 14 ESC reserves the right to stop work and/or cancel the contract of any vendor whose license(s) expire, lapse, are suspended or terminated. Vendor is expected to provide all required license(s) with this RFP response.

- Franchise Tax
  - The respondent hereby certifies that he/she is not currently delinquent in the payment of any franchise taxes.

- Supplemental Agreements
  - The entity participating in this contract and awarded vendor may enter into a separate supplemental agreement to further define the level of service requirements over and above the minimum defined in this contract i.e. invoice requirements, ordering requirements, specialized delivery, etc. Any supplemental agreement developed as a result of this contract is exclusively between the participating entity and awarded vendor.

- Certificates of Insurance

  - Certificates of insurance shall be delivered to the Public Agency prior to commencement of work. The insurance company shall be licensed in the applicable state in which work is being conducted. The awarded vendor shall give the participating entity a minimum of ten (10) days notice prior to any modifications or cancellation of policies. The awarded vendor

shall require all subcontractors performing any work to maintain coverage as specified.

- Legal Obligations
  - It is the Respondent's responsibility to be aware of and comply with all local, state, and federal laws governing the sale of products/services identified in this RFP and any awarded contract and shall comply with all while fulfilling the RFP. Applicable laws and regulation must be followed even if not specifically identified herein.
- Protest
  - A protest of an award or proposed award must be filed in writing within ten (10) days from the date of the official award notification and must be received by 5:00 pm CST. No protest shall lie for a claim that the selected Vendor is not a responsible Bidder. Protests shall be filed with Region 14 ESC and shall include the following:
    - Name, address and telephone number of protester
    - Original signature of protester or its representative
    - Identification of the solicitation by RFP number
    - Detailed statement of legal and factual grounds including copies of relevant documents and the form of relief requested
  - Any protest review and action shall be considered final with no further formalities being considered.
- Force Majeure
  - If by reason of Force Majeure, either party hereto shall be rendered unable wholly or in part to carry out its obligations under this Agreement then such party shall give notice and full particulars of Force Majeure in writing to the other party within a reasonable time after occurrence of the event or cause relied upon, and the obligation of the party giving such notice, so far as it is affected by such Force Majeure, shall be suspended during the continuance of the inability then claimed, except as hereinafter provided, but for no longer period, and such party shall endeavor to remove or overcome such inability with all reasonable dispatch.
  - The term Force Majeure as employed herein, shall mean acts of God, strikes, lockouts, or other industrial disturbances, act of public enemy, orders of any kind of government of the United States or any civil or military authority; insurrections; riots; epidemics; landslides; lighting; earthquake; fires; hurricanes; storms; floods; washouts; droughts; arrests; restraint of government and people; civil disturbances; explosions, breakage or accidents to machinery, pipelines or canals, or other causes not reasonably within the control of the party claiming such inability. It is understood and agreed that the settlement of strikes and lockouts shall be entirely within the discretion of the party having the difficulty, and that the above requirement that any Force Majeure shall be remedied with all reasonable dispatch shall not require the settlement of strikes and lockouts by acceding to the demands of the opposing party or parties when such settlement is unfavorable in the

judgment of the party having the difficulty.

- Prevailing Wage
  - It shall be the responsibility of the Vendor to comply, when applicable, with the prevailing wage legislation in effect in the jurisdiction of the purchaser. It shall further be the responsibility of the Vendor to monitor the prevailing wage rates as established by the appropriate department of labor for any increase in rates during the term of this contract and adjust wage rates accordingly.
- Miscellaneous
  - Either party may cancel this contract in whole or in part by providing written notice. The cancellation will take effect 30 business days after the other party receives the notice of cancellation. After the 30th business day all work will cease following completion of final purchase order.
- Cancellation for Non-Performance or Contractor Deficiency
  - Region 14 ESC may terminate any contract if awarded vendor has not used the contract, or if purchase volume is determined to be low volume in any 12-month period.
  - Region 14 ESC reserves the right to cancel the whole or any part of this contract due to failure by contractor to carry out any obligation, term or condition of the contract.
  - Region 14 ESC may issue a written deficiency notice to contractor for acting or failing to act in any of the following:
    - Providing material that does not meet the specifications of the contract;
    - Providing work and/or material that was not awarded under the contract;
    - Failing to adequately perform the services set forth in the scope of work and specifications;
    - Failing to complete required work or furnish required materials within a reasonable amount of time;
    - Failing to make progress in performance of the contract and/or giving Region 14 ESC reason to believe that contractor will not or cannot perform the requirements of the contract;
  - Upon receipt of a written deficiency notice, contractor shall have ten (10) days to provide a satisfactory response to Region 14 ESC. Failure to adequately address all issues of concern may result in contract cancellation. Upon cancellation under this paragraph, all goods, materials, work, documents, data and reports prepared by contractor under the contract shall become the property of Region 14 ESC on demand.
- Open Records Policy
  - Because Region 14 ESC is a governmental entity responses submitted are subject to release as public information after contracts are executed. If a vendor believes that its response, or parts of its response, may be exempted from disclosure, the vendor must specify page-by-page and line-by-line the parts of the response, which it believes, are exempt. In addition, the respondent must specify which exception(s) are applicable and provide detailed reasons to substantiate the exception(s).
  - The determination of whether information is confidential and not subject to disclosure is the duty of the Office of Attorney General (OAG). Region 14 ESC must provide the OAG sufficient information to render an opinion and therefore, vague and general claims to confidentiality by the respondent are not acceptable. Region 14 ESC must comply with the

opinions of the OAG. Region14 ESC assumes no responsibility for asserting legal arguments on behalf of any vendor. Respondent are advised to consult with their legal counsel concerning disclosure issues resulting from this procurement process and to take precautions to safeguard trade secrets and other proprietary information.

If awarded vendor is going to do business in the State of Arizona, the following terms and conditions shall apply

- Cancellation for Conflict of Interest
  - Per A.R.S. 38-511 a School District/public entity may cancel this Contract within three (3) years after Contract execution without penalty or further obligation if any person significantly involved in initiating, negotiating, securing, drafting, or creating the Contract on behalf of the School District/public entity is, or becomes at any time while the Contract or an extension the Contract is in effect, an employee of or a consultant to any other party to this Contract with respect to the subject matter of the Contract. The cancellation shall be effective when the awarded vendor receives written notice of the cancellation unless the notice specifies a later time.

- Registered Sex Offender Restriction
  - Pursuant to this order, the awarded vendor agrees by acceptance of this order that no employee of the awarded vendor or a subcontractor of the awarded vendor, who has been adjudicated to be a registered sex offender, will perform work on any School District's premises or equipment at any time when District students are, or are reasonably expected to be, present. The awarded vendor further agrees by acceptance of this order that a violation of this condition shall be considered a material breach and may result in a cancellation of the order at the District's discretion.

- Contract's Employment Eligibility
  - By entering the contract, awarded vendor warrants compliance with A.R.S. 41-4401, A.R.S. 23-214, the Federal Immigration and Nationality Act (FINA), and all other federal immigration laws and regulations. A School District/public entity may request verification of compliance from any contractor or subcontractor performing work under this contract. A School District/public entity reserves the right to confirm compliance in accordance with applicable laws. Should the School District/public entity suspect or find that the awarded vendor or any of its subcontractors are not in compliance, the School District/public entity may pursue any and all remedies allowed by law, including, but not limited to: suspension of work, termination of the contract for default, and suspension and/or debarment of the awarded vendor. All costs necessary to verify compliance are the responsibility of the award vendor.

- Terrorism Country Divestments
  - Per A.R.S. 35-392, a School District/public entity is prohibited from purchasing from a company that is in violation of the Export Administration Act.

- Fingerprint Checks

- If required to provide services on School District/public entity's property, awarded vendor shall comply with A.R.S. 15-511(h).

♦ Indemnification

- Notwithstanding all other provisions of this agreement, School District/public entity does not agree to accept responsibility, waive liability, or indemnify the awarded vendor, in whole or in part, for the errors, negligence, hazards, liabilities, contract breach and/or omissions of the awarded vendor, its employees and/or agents.

Process

Region 14 ESC will evaluate proposals in accordance with, and subject to, the relevant statutes, ordinances, rules, and regulations that govern its procurement practices. NCPA will assist Region 14 ESC in evaluating proposals. Award(s) will be made to the prospective vendor(s) whose response is determined to be the most advantageous to Region 14 ESC, NCPA, and its participating agencies. To qualify for evaluation, response must have been submitted on time, and satisfy all mandatory requirements identified in this document.

- Contract Administration
  - The contract will be administered by Region 14 ESC. The National Program will be administered by NCPA on behalf of Region 14 ESC.
- Contract Term
  - The contract term will be for one (1) year starting from the date of the award. The contract may be renewed for up to two (4) additional one-year terms or any combination of time equally not more than 4 years.
  - It should be noted that maintenance/service agreements may be issued for up to (5) years under this contract even if the contract only lasts for the initial term of the contract. NCPA will monitor any maintenance agreements for the term of the agreement provided they are signed prior to the termination or expiration of this contract.
- Contract Waiver
  - Any waiver of any provision of this contract shall be in writing and shall be signed by the duly authorized agent of Region 14 ESC. The waiver by either party of any term or condition of this contract shall not be deemed to constitute waiver thereof nor a waiver of any further or additional right that such party may hold under this contract.
- Products and Services additions
  - Products and Services may be added to the resulting contract during the term of the contract by written amendment, to the extent that those products and services are within the scope of this RFP and has written approval of NCPA and Region 14 ESC.
- Competitive Range
  - It may be necessary for Region 14 ESC to establish a competitive range. Responses not in the competitive range are unacceptable and do not receive further award consideration.
- Deviations and Exceptions
  - Deviations or exceptions stipulated in response may result in disqualification. It is the intent of Region 14 ESC to award a vendor's complete line of products and/or services, when possible.
- Estimated Quantities
  - The estimated dollar volume of Products and Services purchased under the proposed Master Agreement is $10 million dollars annually. This estimate is based on the anticipated volume of Region 14 ESC and current sales within the NCPA program. There is no guarantee or commitment of any kind regarding usage of any contracts resulting from this solicitation

- Evaluation
  - Region 14 ESC will review and evaluate all responses in accordance with, and subject to, the relevant statutes, ordinances, rules and regulations that govern its procurement practices. NCPA will assist the lead agency in evaluating proposals. Recommendations for contract awards will be based on multiple factors, each factor being assigned a point value based on its importance.
- Formation of Contract
  - A response to this solicitation is an offer to contract with Region 14 ESC based upon the terms, conditions, scope of work, and specifications contained in this request. A solicitation does not become a contract until it is accepted by Region 14 ESC. The prospective vendor must submit a signed Signature Form with the response thus, eliminating the need for a formal signing process.
- NCPA Administrative Agreement
  - The vendor will be required to enter and execute the National Cooperative Purchasing Alliance Administration Agreement with NCPA upon award with Region 14 ESC. The agreement establishes the requirements of the vendor with respect to a nationwide contract effort.
- Clarifications / Discussions
  - Region 14 ESC may request additional information or clarification from any of the respondents after review of the proposals received for the sole purpose of elimination minor irregularities, informalities, or apparent clerical mistakes in the proposal. Clarification does not give respondent an opportunity to revise or modify its proposal, except to the extent that correction of apparent clerical mistakes results in a revision. After the initial receipt of proposals, Region 14 ESC reserves the right to conduct discussions with those respondent's whose proposals are determined to be reasonably susceptible of being selected for award. Discussions occur when oral or written communications between Region 14 ESC and respondents are conducted for the purpose clarifications involving information essential for determining the acceptability of a proposal or that provides respondent an opportunity to revise or modify its proposal. Region 14 ESC will not assist respondent bring its proposal up to the level of other proposals through discussions. Region 14 ESC will not indicate to respondent a cost or price that it must meet to neither obtain further consideration nor will it provide any information about other respondents' proposals or prices.
- Multiple Awards
  - Multiple Contracts may be awarded as a result of the solicitation. Multiple Awards will ensure that any ensuing contracts fulfill current and future requirements of the diverse and large number of participating public agencies.
- Past Performance
  - Past performance is relevant information regarding a vendor's actions under previously awarded contracts; including the administrative aspects of performance; the vendor's history of reasonable and cooperative behavior and commitment to customer satisfaction; and generally, the vendor's businesslike concern for the interests of the customer.

Evaluation Criteria

- Product & Services/Pricing (40 points)
  - Respondent(s)' products and services (e.g.; quality and breadth of product(s)/service(s), description(s) quality, reputation in the marketplace, average on time delivery rate and historical shipping timelines, return and restocking policies and applicable fees, average Fill Rate, shipping charges and other)
  - Competitive Level of Pricing for vendor's available products and services
  - Warranties on Respondent(s)' products and services (e.g.; availability of standard/extended warranties, pricing, detailed descriptions, ease of process and others)
  - Evidence of the ability of Respondent(s)' products and services to save members time and money (e.g.; breadth of service departments, technological advances, personnel experience, product(s) efficiencies, and others)
  - Other factors relevant to this section as submitted by the responder(s)

- Ability to Provide and Perform the Required Services for the Contract (25 points)
  - Response to emergency orders & service (e.g.; response time, breadth of service coverage, strength of meeting service and warranty needs of members)
  - Customer service/problem resolution (e.g.; technical abilities of service personnel; quality of processes,)
  - Invoicing process (e.g.; ease of use; transparency, billing resolutions)
  - Respondent(s)' processes, and quality of organizational structure
  - Contract implementation/Customer transition
  - Financial condition of vendor
  - Offeror's safety record (e.g.; benchmarks, lost hours, reporting)
  - Instructional materials and training (e.g.; administrative documentation, internal technical training, training of agencies)
  - Other factors relevant to this section as submitted by the proposer

- References (10 points)
  - A minimum of ten (10) customer references for product and/or services of similar scope dating within past 3 years

- Qualification and Experience (15 points)
  - Respondent(s)' reputation in the marketplace
  - Past relationship with Region 14 ESC and/or NCPA members
  - Experience with cooperative selling (e.g.; number of other cooperatives, Exhibited understanding of cooperative purchasing)
  - Experience and qualification of key employees
  - Location and number of sales persons who will work on this contract
  - Marketing plan and capability
  - Past experience working with the government sector
  - Past litigation, bankruptcy, reorganization, state investigations of entity or current officers and directors

- Completeness of response (e.g.; filled out all sections, answered all questions, provided pricing)
- Other factors relevant to this section as submitted by the proposer

- Value Added Services Description, Products and/or Services (10 points)
  - Marketing and agency Training
  - Customer Service
  - Sales force training (e.g.; internal training plan, corporate officer involvement, orientation commitment)
  - Marketing plan and capability (e.g.; contract rollout plan, benchmarks, goals)
  - Green initiative(s) (e.g.; philosophy, certificates, awards)
  - Quality and breadth of value add(s)
  - Other factors relevant to this section as submitted by the proposer

SECRETARIAL CERTIFICATE
OF
AUTHORIZATION

The undersigned Assistant Secretary of Ferguson Enterprises, LLC, a Virginia limited liability company (the "Company"), hereby certifies that: i) certain of the Company's facilities in Texas are doing business as Ferguson Waterworks, and ii) Zeb Wright is Business Development Manager in Euless, Texas and iii) that the resolutions adopted by the Company's Board of Directors effective July 31, 2019, duly authorize certain of the Company's officers, including the Assistant Secretary, to designate, and I hereby do so designate Zeb Wright as an authorized representative of the Company to act for and on behalf of the Company to prepare and submit bids and proposals to the Company's customers, to enter into contracts, agreements or other documents, and to execute such documents and undertake all such acts as may be deemed in the best interest of the Company, including the execution of bonds and in doing so, to contractually bind the Company. Unless withdrawn sooner, this certification of authorization shall be effective until January 31, 2021.

Dated: 7/16/2020

FERGUSON ENTERPRISES, LLC

By: _____
Wesley E. Rice, Assistant Secretary

Commonwealth of Virginia)
)
City of Newport News)

Sworn to subscribed and acknowledged before me this 16th day of July, 2020, by Wesley E. Rice, personally known to me, in his capacity as Assistant Secretary of Ferguson Enterprises, LLC, a Virginia Company, on behalf of such Company.

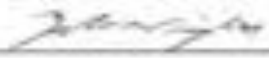
_____
Notary – Casey Mehlhoff

My commission expires: July 31, 2022

Signature Form

The undersigned hereby proposes and agrees to furnish goods and/or services in strict compliance with the terms, specifications and conditions at the prices proposed within response unless noted in writing. The undersigned further certifies that he/she is an officer of the company and has authority to negotiate and bind the company named below and has not prepared this bid in collusion with any other Respondent and that the contents of this proposal as to prices, terms or conditions of said bid have not been communicated by the undersigned nor by any employee or agent to any person engaged in this type of business prior to the official opening of this proposal.

Prices are guaranteed: **120 days**

Company name	Ferguson Enterprises, LLC dba Ferguson Waterworks
Address	2650 S Pipeline Rd,
City/State/Zip	Euless, TX 76041
Telephone No.	(214) 690-3604
Fax No.	(817) 267-3912
Email address	Zeb.Wright@Ferguson.com
Printed name	Zeb Wright
Position with company	Business Development Manager
Authorized signature	

TAB 2 – NCPA ADMINISTRATION AGREEMENT

Tab 2 – NCPA Administration Agreement

This Administration Agreement is made as of December 8, 2020, by and between National Cooperative Purchasing Alliance ("NCPA") and Ferguson Enterprises, LLC dba Ferguson Waterworks ("Vendor").

Recitals

WHEREAS, Region 14 ESC has entered into a certain Master Agreement dated December 8, 2020, referenced as Contract Number 02-104, by and between Region 14 ESC and Vendor, as may be amended from time to time in accordance with the terms thereof (the "Master Agreement"), for the purchase of Water Metering, Monitoring, Devices and Related Services;

WHEREAS, said Master Agreement provides that any state, city, special district, local government, school district, private K-12 school, technical or vocational school, higher education institution, other government agency or nonprofit organization (hereinafter referred to as "public agency" or collectively, "public agencies") may purchase products and services at the prices indicated in the Master Agreement;

WHEREAS, NCPA has the administrative and legal capacity to administer purchases under the Master Agreement to public agencies;

WHEREAS, NCPA serves as the administrative agent for Region 14 ESC in connection with other master agreements offered by NCPA

WHEREAS, Region 14 ESC desires NCPA to proceed with administration of the Master Agreement;

WHEREAS, NCPA and Vendor desire to enter into this Agreement to make available the Master Agreement to public agencies on a national basis;

NOW, THEREFORE, in consideration of the payments to be made hereunder and the mutual covenants contained in this Agreement, NCPA and Vendor hereby agree as follows:

- General Terms and Conditions
  - The Master Agreement, attached hereto as Tab 1 and incorporated herein by reference as though fully set forth herein, and the terms and conditions contained therein shall apply to this Agreement except as expressly changed or modified by this Agreement.
  - NCPA shall be afforded all of the rights, privileges and indemnifications afforded to Region 14 ESC under the Master Agreement, and such rights, privileges and indemnifications shall accrue and apply with equal effect to NCPA under this Agreement including, but not limited to, the Vendor's obligation to provide appropriate insurance and certain indemnifications to Region 14 ESC.
  - Vendor shall perform all duties, responsibilities and obligations required under the Master Agreement in the time and manner specified by the Master Agreement.
  - NCPA shall perform all of its duties, responsibilities, and obligations as administrator of purchases under the Master Agreement as set forth herein, and Vendor acknowledges that NCPA shall act in the capacity of administrator of purchases under the Master Agreement.
  - With respect to any purchases made by Region 14 ESC or any Public Agency pursuant to the Master Agreement, NCPA (a) shall not be construed as a dealer, re-marketer, representative, partner, or agent of any type of Vendor, Region 14 ESC, or such Public Agency, (b) shall not be obligated, liable or responsible (i) for any orders made by Region

14 ESC, any Public Agency or any employee of Region 14 ESC or Public Agency under the Master Agreement, or (ii) for any payments required to be made with respect to such order, and (c) shall not be obligated, liable or responsible for any failure by the Public Agency to (i) comply with procedures or requirements of applicable law, or (ii) obtain the due authorization and approval necessary to purchase under the Master Agreement. NCPA makes no representations or guaranties with respect to any minimum purchases required to be made by Region 14 ESC, any Public Agency, or any employee of Region 14 ESC or Public Agency under this Agreement or the Master Agreement.

- The Public Agency participating in the NCPA contract and Vendor may enter into a separate supplemental agreement to further define the level of service requirements over and above the minimum defined in this contract i.e. invoice requirements, ordering requirements, specialized delivery, etc. Any supplemental agreement developed as a result of this contract is exclusively between the Public Agency and Vendor. NCPA, its agents, members and employees shall not be made party to any claim for breach of such agreement.

- Term of Agreement
  - This Agreement shall be in effect so long as the Master Agreement remains in effect, provided, however, that the obligation to pay all amounts owed by Vendor to NCPA through the termination of this Agreement and all indemnifications afforded by Vendor to NCPA shall survive the term of this Agreement.

- Fees and Reporting
  - The awarded vendor shall electronically provide NCPA with a detailed quarterly report showing the dollar volume of all sales under the contract for the previous quarter. Reports are due on the fifteenth (15th) day after the close of the previous quarter. It is the responsibility of the awarded vendor to collect and compile all sales under the contract from participating members and submit one (1) report. The report shall include at least the following information as listed in the example below:

Agency Name	State	Zip Code	Date	PO or Job #	RQN Number	Sale Amount	Admin Fee
					Total		

  - Each quarter NCPA will invoice the vendor based on the total of sale amount(s) reported. From the invoice the vendor shall pay to NCPA an administrative fee of three (3%) for the amount of the agency's purchase order less any applicable sales tax and Performance and/or Payment bond cost. Vendor's annual sales shall be measured on a calendar year basis. Deadline for term of payment will be included in the invoice NCPA provides.

  - Supplier shall maintain an accounting of all purchases made by Public Agencies under the Master Agreement. NCPA and Region 14 ESC reserve the right to audit the accounting for a period of five (5) years from the date NCPA receives the accounting. In the event of such an audit, the requested materials shall be provided at the location designated by Region 14 ESC or NCPA. In the event such audit reveals an under reporting of Contract Sales and a resulting underpayment of administrative fees, Vendor shall promptly pay NCPA the amount of such underpayment, together with interest on such amount and shall be obligated to reimburse NCPA's costs and expenses for such audit.

- General Provisions
  - This Agreement supersedes any and all other agreements, either oral or in writing, between the parties hereto with respect to the subject matter hereof, and no other agreement, statement, or promise relating to the subject matter of this Agreement which is not contained herein shall be valid or binding.
  - Awarded vendor agrees to allow NCPA to use their name and logo within website, marketing materials and advertisement. Any use of NCPA name and logo or any form of publicity regarding this contract by awarded vendor must have prior approval from NCPA.
  - If any action at law or in equity is brought to enforce or interpret the provisions of this Agreement or to recover any administrative fee and accrued interest, the prevailing party shall be entitled to reasonable attorney's fees and costs in addition to any other relief to which such party may be entitled.
  - Neither this Agreement nor any rights or obligations hereunder shall be assignable by Vendor without prior written consent of NCPA, provided, however, that the Vendor may, without such written consent, assign this Agreement and its rights and delegate its obligations hereunder in connection with the transfer or sale of all or substantially all of its assets or business related to this Agreement, or in the event of its merger, consolidation, change in control or similar transaction. Any permitted assignee shall assume all assigned obligations of its assignor under this Agreement.
  - This Agreement and NCPA's rights and obligations hereunder may be assigned at NCPA's sole discretion, to an existing or newly established legal entity that has the authority and capacity to perform NCPA's obligations hereunder
  - All written communications given hereunder shall be delivered to the addresses as set forth below.

National Cooperative Purchasing Alliance:		**Vendor:**	Ferguson Enterprises LLC, dba - Ferguson Waterworks
Name:	Matthew Mackel	Name:	Zeb Wright
Title:	Director, Business Development	Title:	Business Development Manager
Address:	PO Box 701273	Address:	2650 S. Pipeline Rd.
	Houston, TX 77270		Euless TX 76040
Signature:		Signature:	
Date:	December 8, 2020	Date:	11/19/2020

NCPA Registered Vendor Quotation Number

RFP responders are requested to agree to a quotation number registration program to provide consistency and faster service for our facility awarded vendors, agency members and participants. The process will require Facility Contract holders to register and receive a NCPA Vendor Registered Quotation Number that must be prominently displayed on each proposal(s) that you present to the agencies. The system will track Facility transactions from the initial proposal stage to the completion of each project. NCPA has assembled an experienced Facilities Management Team that stands ready and willing to assist its vendors in providing quality services to the awarded vendor's organization. Failure to receive the Vendor Registered Quotation Number can result in potential delays to your services and the only acceptable proposals need to have a NCPA Vendor Registered Quotation Number.

NCPA Registered Vendor Quotation Number Process

Fill out the form on the Facilities page at www.NCPA.us

(Direct link is http://www.ncpa.us/Facilities/Register)

*** Fill out and submit.**

- All registered vendor quotation number requests must be submitted *and* a proposal number received *before* you present it to your potential customer.
- You will have a response with a NCPA Vendor Registered Quotation Number within 4 hours.
- If you have an emergency and need a quotation number sooner, call any member of the Facility Management team and we will help you.
- Include the quotation number on all proposals.

This document acknowledges that you have received and agree to the details, directions and expectations of the NCPA Vendor Registered Quotation Number process.

Date	11/19/2020
RFP Number	40-20
Company Name	Ferguson Enterprises, LLC dba Ferguson Waterworks
Printed Name	Zeb Wright
Signature	

TAB 3 – VENDOR QUESTIONNAIRE

Tab 3 – Vendor Questionnaire

Please provide responses to the following questions that address your company's operations, organization, structure, and processes for providing products and services.

- States Covered
  - Bidder must indicate any and all states where products and services can be offered.
  - Please indicate the price co-efficient for each state if it varies.

☐ **50 States & District of Columbia** (Selecting this box is equal to checking all boxes below)

☐ Alabama	☒ Maryland	☐ South Carolina
☐ Alaska	☐ Massachusetts	☐ South Dakota
☒ Arizona	☐ Michigan	☐ Tennessee
☐ Arkansas	☐ Minnesota	☒ Texas
☐ California	☐ Mississippi	☒ Utah
☒ Colorado	☐ Missouri	☐ Vermont
☐ Connecticut	☐ Montana	☒ Virginia
☐ Delaware	☐ Nebraska	☐ Washington
☐ District of Columbia	☒ Nevada	☐ West Virginia
☒ Florida	☐ New Hampshire	☐ Wisconsin
☒ Georgia	☐ New Jersey	☐ Wyoming
☐ Hawaii	☐ New Mexico	
☐ Idaho	☐ New York	
☐ Illinois	☐ North Carolina	
☐ Indiana	☐ North Dakota	
☐ Iowa	☐ Ohio	
☐ Kansas	☒ Oklahoma	
☐ Kentucky	☐ Oregon	
☒ Louisiana	☒ Pennsylvania	
☐ Maine	☐ Rhode Island	

☐ **All US Territories and Outlying Areas** (Selecting this box is equal to checking all boxes below)

☐ American Samoa
☐ Federated States of Micronesia
☐ Guam
☐ Midway Islands
☐ Northern Marina Islands
☐ Puerto Rico
☐ U.S. Virgin Islands

- Minority and Women Business Enterprise (MWBE) and (HUB) Participation
  - ➢ It is the policy of some entities participating in NCPA to involve minority and women business enterprises (MWBE) and historically underutilized businesses (HUB) in the purchase of goods and services. Respondents shall indicate below whether or not they are an M/WBE or HUB certified.
    - Minority / Women Business Enterprise
      - Respondent Certifies that this firm is a M/WBE ☐
    - Historically Underutilized Business
      - Respondent Certifies that this firm is a HUB ☐
- Residency
  - ➢ Responding Company's principal place of business is in the city of Newport News, State of Virginia
- Felony Conviction Notice
  - ➢ Please Check Applicable Box;
    - ☐ A publically held corporation; therefore, this reporting requirement is not applicable.
    - ☒ Is not owned or operated by anyone who has been convicted of a felony.
    - ☐ Is owned or operated by the following individual(s) who has/have been convicted of a felony
  - ➢ If the 3rd box is checked, a detailed explanation of the names and convictions must be attached.
- Distribution Channel
  - ➢ Which best describes your company's position in the distribution channel:
    - ☐ Manufacturer Direct
    - ☒ Authorized Distributor
    - ☐ Value-added reseller
    - ☐ Certified education/government reseller
    - ☐ Manufacturer marketing through reseller
    - ☐ Other: _____
- Processing Information
  - ➢ Provide company contact information for the following:
    - Sales Reports / Accounts Payable

      Contact Person: Zeb Wright
      Title: Business Development Manager
      Company: Ferguson Enterprises, LLC dba Ferguson Waterworks
      Address: 2650 S Pipeline Rd,
      City: Euless State: TX Zip: 77380
      Phone: 214-690-3604 Email: Zeb.Wright@Ferguson.com

- Purchase Orders
  - Contact Person: Same as Sales contact - Zeb Wright
  - Title: _____
  - Company: _____
  - Address: _____
  - City: _____ State: _____ Zip: _____
  - Phone: _____ Email: _____
- Sales and Marketing
  - Contact Person: Same as Sales contact- Zeb Wright
  - Title: _____
  - Company: _____
  - Address: _____
  - City: _____ State: _____ Zip: _____
  - Phone: _____ Email: _____

- Pricing Information
  - In addition to the current typical unit pricing furnished herein, the Vendor agrees to offer all future product introductions at prices that are proportionate to Contract Pricing.
    - If answer is no, attach a statement detailing how pricing for NCPA participants would be calculated for future product introductions.

      ☒ Yes ☐ No
  - Pricing submitted includes the required NCPA administrative fee. The NCPA fee is calculated based on the invoice price to the customer.

    ☒ Yes ☐ No
  - Vendor will provide additional discounts for purchase of a guaranteed quantity.

    ☒ Yes ☐ No

TAB 4 – VENDOR PROFILE

Please provide answers to the following questions in a clear and concise manner. Provide the question number in your response:

GENERAL:

1. Company's official registered name.

   Ferguson Enterprises, LLC dba Ferguson Waterworks

2. Brief history of your company, including the year it was established.

Ferguson Enterprises, LLC, headquartered in Newport News Virginia, and established in 1953 to serve the needs of local plumbing contractors, Ferguson has continued to grow and redefine its distributor sales and service footprint. Today, Ferguson is a publicly traded limited liability company and the largest, top-rated wholesale supplier of commercial and residential plumbing supplies in the country. Through significant diversification, the company is also a leading distributor in municipal waterworks and metering technology; HVAC/R; industrial pipe, valves and fittings; and maintenance, repair and operating supplies. This unprecedented growth has resulted in numbers that are impressive: **$18.9 Billion annual sales – 2,200 locations - 34,000 associates.**

3. Company's Dun & Bradstreet (D&B) number.

   D-U-N-S: 00-895-5171

4. Corporate office location.

   12500 Jefferson Ave,
   Newport News, VA, 23602

5. List number of employees either nationally or regionally (if your response is not all states) with breakdown of direct sales, sales support, service technicians, engineering support and administration.

   Approximately 34,000 associates nationally.

6. List the number and location of offices, or service centers for all states being offered in solicitation. Additionally, list the names of key contacts at each location with title, address, phone and e-mail address.

   Approximately 2,200 locations across the nation, due to the size and scope we are unable to provide key contacts for all national locations.

7. Please provide contact information for the person(s) who will be responsible for the following areas, including resumes:

a. Sales

Zeb Wright, Business Development Manager – Central Region
Zeb.Wright@Ferguson.com

Zeb Wright joined Ferguson Waterworks in 2004. He began his career in Euless, TX, moving through each level of the business, and managing projects in an Inside Sales role. Zeb was then transferred to San Antonio, TX where he managed the new Waterworks counter while performing inside sales duties and managing shipping and receiving logistics. Zeb then took over the Branch Training Manager position for Oregon and SW Washington state. As an additional responsibility, Zeb became the AMR System Support Specialist for that territory and later became a Municipal Outside Sales associate, providing support to Municipalities and Water Districts. During his tenure as a municipal sales associate, Zeb specialized in AMR and AMI projects. In 2010, Zeb Wright accepted a promotion in Texas to become the AMR/AMI Sales Manager and was instrumental in the creation of the Ferguson Meter and Automation Group in the South-Central Waterworks District. In 2014, Zeb Wright then became the Business Development Manager for Ferguson Waterworks' new Meter and Automation Group specializing in the Mueller Systems AMR / AMI product line.

b. Sales Support

Rebecca Lynn, Quotations Manager
Email: Rebecca.Lynn@Ferguson.com

Rebecca Lynn began her career in metering after graduating from Texas State University in the summer of 2015 with a Bachelors of Business Administration. Rebecca quickly advanced out of the Trainee role and in to Quotations Specialist for Meter and Automation, working exclusively with one of the top five meter manufacturers in the country. During this role, Rebecca's responsibilities entailed overseeing numerous sales and marketing tasks required to ensure a successful project. Throughout the last 5 years, Rebecca has supported the sales team through the creation of proposals in both the Central and Eastern territories. Rebecca has been an integral part of many winning proposals resulting in large sales, including Newport News, VA, the home of Ferguson's Headquarters. In August 2020, Rebecca accepted the promotion of Quotations Manager on a National Level for Ferguson Meter and Automation. Rebecca continues to ensure that each group and team member provide the strongest solution to the customer through collaboration with many areas of the business. These include working with Project Management, Sales, Management, Finance, Legal, Tax and Risk Management.

c. Marketing

Ferguson has a marketing team who work on individual field requests as well as national initiatives.

d. Financial Reporting

John Gordy, Director of Finance for Ferguson Waterworks

e. Executive Support

Walter Quigg, Director of Meter & Automation for Ferguson Waterworks
Josh Hunt, District Manager for Ferguson Waterworks Meter & Automation.

8. Define your standard terms of payment.

Net10thProx

9. Who is your competition in the public marketplace?

Badger, Neptune, Sensus, Master Meter are some of the competitors in the market.

11. Overall public sector sales, excluding Federal Government, for last three (3) years; 2017, 2018, 2019.

Please refer to our annual report which can be found at www.fergusonplc.com.

12. What is your strategy to increase market share in the public space?

Ferguson Waterworks has a network 1,400 locations, and approximately over 27,000 associates that either directly, or indirectly provide services to Municipalities, and Water Districts across the state of Texas. As we conduct our day to day business, we plan to inform our customers of our partnership with NCPA, and encourage the involvement and use of this extremely beneficial purchasing cooperative. We have had success in the previous year with utilizing BuyBoard and TIPs. We also plan, with the permission of NCPA, to include advertisements, handouts and posters letting our customers know of our partnership, as we participate in dozens of conferences, inclusive of Texas AWWA, Texas Rural Water, Association of Water Board Directors, Texas Municipal League, and several more. Our goal is to inform as many of our Municipal and Water District customers about NCPA, and its many benefits, as we can, so that they may all have access to our product and services through NCPA's Water Metering, Monitoring, Devices and Related Services Contract.

13. What differentiates your company from your competitors?

Ferguson Enterprises LLC differentiates among other competitors in terms of Quality, Customer Service, Competitive Pricing, Ethical Business Approach, Secure Business Partners, Innovative Metering Technology, Online and Face-to-Face Sourcing, Full-System Installation, Financing solutions, Third-Party Data Analytics differentiates Ferguson among our Competitors.

14. Briefly summarize your company's Quality control/Quality assurance program.

Ferguson prides itself in the highest qualified industry partners, experienced project management teams, and vetted subcontractors. Our aim is to supply reliable and robust products to our customers. We are committed to continuous improvement to confirm we maintain appropriate and practical systems, processes and procedures in accordance

with Ferguson Enterprises policies and applicable with legislation.

15. Provide information regarding whether your firm, either presently or in the past, has been involved in any litigation, bankruptcy, or reorganization.

Former names the business has operated in is Ferguson Enterprises, Inc. and in March 2019 Ferguson switched over to an LLC. Ferguson Enterprises, LLC is a relationship focused business. It employs approximately 34,000 associates in 2,200 locations throughout the United States. Ferguson purchases from over 35,000 vendors and sells to over 300,000 customers annually. Given its size and scale, it regularly engages in litigation as either a plaintiff or a defendant in the ordinary course of business. However, there is no current claim or litigation that will have a material impact on its ability to perform the requirements of any prospective contract.

16. Provide evidence of your company's ability to continuously lower the customer's costs. Provide examples of any documented cost reduction results that your company has engaged in with your customers.

Ferguson Enterprises LLC follows market trends and is looks for opportunities to provide the lowest cost possible for our end-users and customers, while maintaining the highest level of service in the process.

PRODUCTS:

17. What is the reputation of your company's products in the public marketplace?

Ferguson Enterprises LLC is known for partnering with industry leaders and for providing quality products. Ferguson raises the bar for industry standards as the top-rated wholesale supplier of commercial and residential plumbing supplies. However, our expertise goes beyond plumbing. We are a diverse distributor that spans multiple businesses including HVAC/R, waterworks and industrial. In the past 65 years, we've grown from a local distributor to a $18.9 billion dollar company – 2,200 locations and 34,000 associates nationwide. Our associates provide expert advice and a range of products and services our customers want to improve their construction, renovation and maintenance projects. Providing world-class customer service is a cultural belief that is demonstrated every day through our expansive product selection backed by our knowledgeable associates.

18. What equipment/system support documents will your company provide?

Ferguson has provided all Product Specification Sheets regarding the Meters, Registers, System, and accessories for AMR/AMI solutions in this proposal. Ferguson has also provided Mueller's Systems Warranty and End User Agreement for additional details regarding the system. Ferguson can provide ample electronic or face to face training or technical documents for our customers.

19. Identify the process of receiving a purchase order to the ordering of equipment.

Once a Utility provides a purchase order to a Ferguson Associate, the purchase order will be made direct to either Ferguson's Mueller Depot in Dallas, TX if our current stock has the item available, or if a large quantity is desired, Ferguson can provide an order to Mueller Systems. If the purchase order is sent to Mueller, then Ferguson verifies the Purchase Order was successfully received.

19. Describe your company's shipping schedule notification procedures.

A team of sales support and project management associates are informed from the Manufacturer of ship dates on receival of the purchase order. Then this information is relayed to the appropriate customer contact to ensure prompt delivery of product.

20. Describe how your company deals with shipping delays. How do you notify your customer of delays?

Our protocols to mitigate supply chain disruption are as follows: Meters and equipment proposed to the Utility can be stored in the local servicing branch that is closest to the Utility's Address. Second, rather than waiting on shipment straight from Mueller, meters and equipment can be stored at our Meter Depot in Dallas, TX as this turns typical manufacturer lead times of 4-6 weeks into 1-3 days for quick supply to the Utility.

Ferguson obtains shipment delay notifications from Mueller through email or updated on our Ferguson Order System. Ferguson Project Managers and Sales Associates, also keep track of delayed shipment by verifying with Mueller's Customer Care Center if a delay has occurred. From there, Ferguson Associates can notify the customer direct through the Utility's preferred contact method in order to communicate the delay.

21. Provide your shipping schedule reporting form. How many times do you update?

Ferguson updates as any changes occur. Normal factory delivery is 4-6 weeks, and our Depot can provide same day shipping.

22. How many products do you stock? Where?

In a typical Ferguson Waterworks location, we stock thousands of SKU's, depending on the market. Our Meter Depot in Dallas, TX carries over $1M in Mueller inventory of over a hundred different SKU's.

23. What is your percentage of on-time delivery at each manufacturing plant?

The exact percentage is unknown, however Ferguson prides itself on on-time delivery thus providing the highest customer service possible.

24. Describe any direct order entry system or capabilities your organization has such as internet capabilities.

Ferguson has an internal order system for associates only to enter in direct orders. Orders

can be shipped straight to the customer as requested, or if local, picked up at the Ferguson Counter if preferred. Ferguson.com allows customers to customize their account page and enter in the order if they prefer to do it themselves. The Account allows customers to input their information, track orders, look at previous orders or items purchased etc. A Ferguson associate can look at the customer's requested items in their cart and verify all items are correct before making the order processed and shipped to reduce any errors.

25. If your product is defective, what is the replacement process and turnaround?

If an item/items are deemed as defective, Ferguson will replace the item and provide new serial number information to the Utility This item/items will then be warrantied to Mueller and the replacement item will go back to Ferguson. Ferguson will maintain a stock of replacement meters, meter registers, and transmitters to replace defective products in the field. A damaged item is considered an item that is not the blame of the manufacturer or Ferguson for its ability to communicate with the network. A monthly report will be sent to Utility/Owner with all findings in the field. An additional monthly report will be sent to Utility/Owner will all meter serial numbers, transmitters numbers to each account in the AMR/AMI system. If item is deemed to be a damaged item Ferguson will communicate with the Utility of the issue. The Utility will be responsible for replacing such item and providing data back to Ferguson. Data to include date of replacement and new serial number/s for items replaced.

Ferguson to work with Utility on a method to document information back to the Utility changes being made in the field by Ferguson. An electronic form will be configured to provide all necessary data needed to Utility. Electronic form will be agreed upon between Ferguson and Utility.

26. What is the capability of your company to respond to emergency/rush orders?

The order can be printed same day and shipped directly to the Utility within 1-3 days from the Ferguson Depot's Stock. If ordering through Mueller, depending on their stock level or specialty, shipping can be 4-6 weeks to arrive.

27. State whether your company provides a quality guarantee on your products. If so, please describe.

All the Mueller Systems meters are designed and manufactured to provide a 20 year service life and meet AWWA standards.

28. Describe your procedures to monitor the quality of your products.

Focused project management Ferguson support and training from our Regional AMR/AMI Specialist and Integration Field Specialists that provide a successful transition to an AMR or AMI system for the Utility. Migration for Ferguson's proposed solution to an AMI fixed-network further affords the unparalleled service and support offered through our NETWORK OPERATIONS CENTER (NOC), a world class facility with a multi-tiered support team. Keeping your system operating at peak performance is very important to Ferguson

and Mueller. The NOC is equipped with a team of experts dedicated to continuously monitoring and maintaining your Mi.Net System performance. Ferguson and Mueller is committed to creating value through an unbeatable combination of industry-leading technology, innovative and reliable water infrastructure products, while having laser-focused customer service. All of this comes together at the NOC.

29. Do you offer extended parts and labor warranties? If yes, state length of warranty.

All material warranty will be provided and attached. Extended warranty can be negotiated if additional support is needed at a later time.

30. Please give examples of state and local agencies where your company has extended labor warranties. Include length of these warranties.

Every project where labor is included has 1 year warranty on labor and is in effect.

31. What is your standard warranty on replacement parts?

Please see the attached Warranty for other meters and parts.

- Solid State Meters: All prorated warranty discounts are to be used towards the purchase of replacement units for the following sizes: 5/8"- 2" Meters.

- Models 400 and 500 Series Meters (Positive Displacement Meters):

5/8" – Fifteen (15) years from the date of shipment to Purchaser or the registration of 1,500,000 U.S. gallons, whichever comes first;

3/4" – Fifteen (15) years from the date of shipment to Purchaser or the registration of 2,250,000 U.S. gallons, whichever comes first;

1" – Fifteen (15) years from the date of shipment to Purchaser or the registration of 3,000,000 U.S. gallons, whichever comes first;

1-1/2" – Ten (10) years from the date of shipment to Purchaser or the registration of 5,000,000 U.S. gallons, whichever comes first;

2" – Ten (10) years from the date of shipment to Purchaser or the registration of 8,000,000 U.S. gallons, whichever comes first.

- Bronze Maincases: Twenty-Five (25) years from date of shipment to Purchaser.

- Model HbMAG electromagnetic cold-water meters - Two (2) years from date of shipment to Purchaser.

32. How does your company track warranties and update equipment lists/warranty periods as units or components are replaced?

The Manufacturer tracks all warranties of Mueller Products.

33. What states would your company not honor pricing on your supplied equipment for

this contract, in the event that this contract is made available to all states?

All the states that are not checked in the attached reference page will not be honored.

SERVICES:

34. Describe your company's Customer Service Department (hours of operation, number of service centers, parts outlets, number of technicians, etc.) Clarify if the service centers are owned by your company of if they are a network of subcontractors.

Ferguson's partner Mueller System's, live phone support is provided from 8:00 AM to 7:00 PM (Eastern Standard Time), Monday through Thursday and 8:00 AM to 5:00 PM (Eastern Standard Time) on Fridays. After hour availability can be provided upon request. Mueller Systems and Ferguson support teams and project management are utilized for projects. Ferguson Associates are available through phone and email for support from 8:00 AM to 5:00 PM (Central Time). Ferguson also uses vetted subcontractors for installation on projects.

35. Describe how your company handles after-hours customer service needs indicate your average response time to emergency service calls.

Upon request, Ferguson Associates are available after hours if needed, as they carry cell phones for service to customers.

36. Discuss your organization's capability and historical flexibility in completing timely service calls and problem resolution.

Ferguson provides flexibility in service calls and our team goes above and beyond to provide exceptional customer service. Ferguson continues to meet customer expectations and needs by making sure customers have questions, concerns, and requests answered in a prompt manner.

37. Please describe the quality program(s) within your company which measures your service work.

We have several software systems in place that Ferguson utilizes in order to track and measure our service level to our customers, inclusive of Trilogie, Oracle, Pipedrive, Microsoft Platforms.

38. Describe your call center organization.

There are several call centers, Mueller Systems Care, Specific Call Centers for Installation Project, Individual customers will have contact information of Project Managers, Install managers etc.

39. Does your company offer a dedicated, 800 number for all locations to place phone and fax orders? Is the call center available 24 hours/7 days week?

Our Network Operations Center (NOC) continuously monitors network servers around the clock 24/7/365 and our highly trained technical staff are notified of any issues and will generally provide

resolution before any problem is even noticed by utility staff. Messages received from the utility staff during off hours will be evaluated and response provided early the next business day. Should on-site support become necessary or if there is an occurrence which is elusive to standard support processes in place, Mueller Systems will dispatch a product manager or engineer to evaluate the circumstances first hand on a mutually agreeable timeframe.

40. Describe how service call problems get escalated in emergency situations during and after hours. Who would be responsible in your company for assessing the appropriate course of action to remedy theproblem?

Within several layers of management, Ferguson and Mueller provide the highest level of customer service to our end users. Mueller's support team is responsible for solving system issues and driving each issue to resolution using the Salesforce case process. Support metrics in the Mueller NOC are utilized to manage resources, issue resolution and the customer experience. These include calls received, calls answered, calls abandoned, call duration, number of calls answered within 60 secs, number of cases created by analyst/team by date, number of cases resolved by analyst/team by date, number/percent of networks with a healthy read rate.

41. List the steps taken from start to finish in receiving a service call through to completion of repair and invoicing. Include time frames associated with each step.

Ferguson has support staff positioned at locations all over the state. Service calls are typically responded to and resolved within a 24-hr period, dependent upon the resolution required. If onsite troubleshooting or support is required, Ferguson will acknowledge and schedule within 72 hours with most requests being fully resolved within 5-10 business days.

42. What technology such as GPS tracking does your company use to track completion of repairs?

Trimble Juno handheld GPS uses satellite technology to pinpoint an exact location on the planet. It does this by using a minimum of three satellites transmitting a signal to an earth based receiver. The receiver requires a minimum of three satellite signals to trilateration the position (similar concept to triangulation). It does this based on the discrete travel times of the radio signals emanating from the different satellites to the receiver. The accuracy of GPS depends on a number of factors, number of channels on the receiver, number of satellites in view, and signal interference caused by buildings, mountains and ionospheric disturbances. Accuracy should be within 3-5 meters provided the receiver has a clear shot at a minimum of four satellites.

43. What is the reputation of your company's service in the public marketplace?

Established in 1953 and headquartered in Newport News, Virginia, Ferguson opened with several locations dedicated to servicing smaller plumbing contractors. From this modest start, we raised the bar for industry standards as the top-rated and largest wholesale supplier of commercial and residential plumbing supplies in the U.S. However, our expertise goes beyond plumbing. We are a diverse distributor that spans multiple businesses including HVAC/R, waterworks and industrial with 2,000 locations - 34,000 associates nationwide. We pride ourselves on delivering world-class service and our customers know that "Nobody expects more from us than we do" is more than just a tagline. It's a cultural belief that is demonstrated every day through exceptional customer service, product selection and industry knowledge. For added expertise around water meters and AMR/AMI technologies, Ferguson has made a significant investment in creating the Meter and

Automation Group and prides itself on providing service and support with a customized maintenance program after sale and installation, experienced associates, and project management services. Our partnership with Mueller started eight years ago and has experienced substantial organic growth. Ferguson can leverage its branch network and municipal sales focus to bring unprecedented support to any meter project.

44. Identify the process of receiving a purchase order to the providing of a service contract?

Ferguson receives the Purchase Order to the manufacturer for material then Ferguson can provide a service contract for supply or supply and installation of meters. Once the contract has been agreed, executed, and material is at the utility, Ferguson can schedule to start the installation process.

45. Describe your company's startup and system checkout responsibilities

Ahead of all deployments, pre-construction kickoff meetings are held where project deliverables and system expectations are discussed and assigned. Each project is assigned a dedicated Project Manager who provides oversight into all aspects of the deployment including product delivery, installation, training, and network management.

46. Describe your company's post-installation and warranty support

Post-installation and warranty support in the annual maintenance fee includes:

- Phone support including post training questions and assistance, and billing integration support.
- Virtual support including video guided trainings, virtual classroom training.
- Software upgrades and support.
- Return-Merchandise-Authorizations (RMA) support and guidance.

Installations has a one year warranty from time of install. Any installation related defect or concerns will be addressed by installations once notified by customer.

47. If your product is defective, what is the replacement process and turnaround?

Please refer to the warranty included in the response. Filing out a RMA and receiving back the RMA, shipping material back to Mueller, as soon as material can be diagnosed for reason of failure then repair or replacement material will be sent back to customer.

48. List the number of sites your company currently monitors.

Since inception of the Meter & Automation group, Ferguson has been awarded and has deployed almost 1,000 systems encompassing approximately two million endpoints.

49. List your company capabilities regarding system changes and repairs to your Monitoring systems.

The systems offered by Ferguson Meter and Automation include post-installation and warranty support in the annual maintenance fee includes:

- Phone support including post training questions and assistance, and billing integration support.
- Virtual support including video guided trainings, virtual classroom training.
- Software upgrades and support.
- Return-Merchandise-Authorizations (RMA) support and guidance.

Within our market our Meter and Automation team, we have 3 dedicated integration specialists that are in charge of monitoring, integrating, and providing support to all our existing customers.

50. List the reporting capabilities your company has for system parameters.

We have access on the AMR side, data report which provides 15 alerts to look for. On the AMI side the customer has access to the reporting functionality on a daily basis as do Ferguson system performance via our customer management tool.

51. Does your company maintain and repair/replace in-house (self-perform) systems including monitoring, alarm resolution, repairs and adjustments?

Our team is researching this market approach and not participating in this full metering as a service however we plan to enter into this arena.

52. Describe your process for trouble shooting a problem at a site with a monitoring system. How does repair get escalated for service?

Mueller systems can provide support to customers by contacting Mueller System's Customer Care and Software Support: 800-323-8584 and email: support@muellersystems.com. Based on the situation, Mueller will provide support on the tiers below.

Mueller's Tier's of Support include:

1) Tier 1 uses all available tools to troubleshoot, identify, and solve issues including the following typical examples: Website navigation, reports, handheld, basic system troubleshooting, billing and CIS.
2) Tier 2 consists of our Technical Services team located in the Mueller Systems' Network Operations Center (NOC) in Atlanta, GA. Tier 2 is primarily responsible for Radio Frequency (RF) network support while ensuring networks that are in Full Support phase perform within contractual or company standards. Tier 2 also troubleshoots accounts with no reads and monitors the network in accordance with departmental procedures and checklists and database issues that don't require development or advanced level work.
3) Tier 3 assists with new and unknown issues that are possibly bugs and cannot be solved at the first or second tier also located in the NOC in Atlanta, GA.
4) Tier 4, also located in Atlanta, GA consists of Engineering subject matter experts consisting of solving unknown or known software, firmware, hardware, or metrology not solved in the other tiers.

53. Describe your company's startup and system checkout responsibilities

Ahead of all deployments, pre-construction kickoff meetings are held where project deliverables and system expectations are discussed and assigned. Each project is assigned a dedicated Project Manager who provides oversight into all aspects of the deployment including product delivery, installation, training, and network management.

54. Discuss your company's current computer systems architecture. How does your company's computer system guarantee customer receive consistent service support,

security responsibility verification, and management reporting?

The Mueller Systems Migratable AMR System utilizes the 902 to 928 MHz ISM frequency band, which requires no FCC license or annual expense. This efficient advanced metering system, backed by innovation and superior local service that is critical to your goals of improving the meter reading process, increasing billing accuracy, satisfying the customer's expectations, and gaining overall system control. These improvements, combined with the cost savings in an advanced automated system, will enable the Utility to manage the water distribution system more effectively and responsibly. Mueller's Mi.Net® AMR metering solution confidently offers the functionality and cost-effectiveness needed to achieve the Utility's current and future goals.

The Mi.Net AMI System uses a robust, two-way communication network for passing both on-demand meter reading capability within 30 seconds or less and infrastructure management messages. A variety of hardware and software components make up the system and are organized into four functional operations: field monitoring and recording, network communications, system management and consumer engagement.

55. Explain how your company qualifies/certifies its service centers and what types of checks are performed to ensure standards are upheld.

Ferguson only uses approved installers vetted and proven skills to provide the best installation offered. QA/QC is complete daily with in field and photo documentation of daily installs. Mueller's Network Operations Center, NOC, provides system monitoring in order to ensure system operations are maintained and upheld.

56. Is warranty coverage dependent on using your start-up procedure?

Coverage starts 1 year after installation and the manufacturer covers warranty on products.

57. Who performs your start-up procedure?

After install Integration specialist/project manager, weekly meetings, pre con and post meetings to make sure all on track.

58. What is your standard warranty on installation?

Warranty on installation 1 year after install is completed and all will follow our start up procedures.

59. Do you differentiate in your company's standard warranty if financing is part of the contract? If so, please describe.

No, we do not alter previously stated warranty regardless of project being financed or not.

60. State whether your company provides a quality guarantee on your service. If so, please describe.

Product quality is based on testing on each individual meter to ensure AWWA meter accuracy. Quality in installation is based on our statement of work that is included in all our contracts, thus holding us accountable to provide the highest level of quality service.

61. What states would your company not honor pricing on services for this contract, in the event that this contract is made available to all states?

All the states that are not checked in the attached reference page will not be honored.

SAFETY:

62. Describe your company's safety program during service/repair work.

Ongoing safety awareness with daily and or weekly safety topics related to the service provided and the ever changing work environment.

63. Describe your company's safety program during construction.

Ongoing safety awareness with daily and or weekly safety topics related to the service provided and the ever changing work environment.

64. Indicate number of lost hours or other benchmarks to verify your company's effectiveness of their safety record.

Recordable Statistics	3 yr Average	5 yr Average	2019	2018	2017	2016	2015
Experience Modification Rate (EMR)	0.68	0.69	0.70	0.69	0.65	0.69	0.73
# lost workday/restricted work cases only	587	534	575	639	548	461	447
# restricted day cases only (started 2015)	294	277	316	320	246	237	266
# medical treatment	376	406	200	488	440	422	480
Total recordable cases	963	928	775	1127	986	883	867
Total lost workdays/restricted	24,502	19,657		36,260	18,994	18,251	13,886
Total restricted work days (started 2015)	7,557			10,405	5,989	6,278	6,100
Total hours worked	52,377,401	51,556,222	55,102,781	52,412,245	49,617,178	51,953,717	48,745,190
Lost workday case frequency rate (DART)	2.14	2.03	2.09	2.44	2.20	1.77	1.83
Lost workday case severity rate	95.06	78.76	0.00	138.36	76.56	70.26	56.97
Recordable case frequency rate (TRIR)	3.69	3.73	2.81	4.30	3.97	3.40	3.56
# fatalities			0	0	0	1	0
# associates	24,827.67	23,376.80	27,878.00	26,248	24,828	23,607	22,117

65. What reporting mechanism does your company provided to the customer upon completion of any project?

Upon completion of any project, the system can be rated based on performance through the Read Success Rate.

MARKETING/ SALES

66. Detail how your organization plans to market this contract within the first 90 days of the award date. This should include, but not be limited to:

    a. A co-branded press release within first 30 days. Comply.
    b. Announcement of award through any applicable social media sites. Comply.
    c. Direct mail campaigns. Comply.
    d. Co-branded collateral pieces. Comply.
    e. Advertisement of contract in regional or national publications. Comply.
    f. Participation in trade shows. Comply.
    g. Dedicated NCPA and Region 14 ESC internet web-based homepage with: Comply (i-v)
        i. NCPA and Region 14 ESC Logo
        ii. Link to NCPA and Region 14 ESC website
        iii. Summary of contract and services offered
        iv. Due Diligence Documents including: copy of solicitation, copy of contract and any
        v. amendments, marketing materials

Our municipal sales associates and our dedicated AMR/AMI specialists provide meter support and if the utility chooses one of these options, we are able to provide marketing and sales capabilities to meet the expectations of the utility.

67. Describe how your company will demonstrate the benefits of this contract to eligible entities if awarded.

Utilizing marketing above, and process driven sales techniques, selling training along with municipal associated and dedicated AMR/AMI specialists to show the benefits of moving forward with our system. Some benefits include: increase of revenue, decrease in water loss, decrease in carbon footprint, increase in efficiency, increase in available work time, increase customer service, decrease in write-offs.

68. Explain how your company plans to market this agreement to existing government customers.

Our municipal sales associates and our dedicated AMR/AMI specialists provide meter support and if the utility chooses one of these options, we are able to provide marketing and sales capabilities to meet the expectations of the utility.

69. Provide a detailed 90-day plan describing how the contract will be implemented within your company.

Ferguson Waterworks has a network 1,400 locations, and approximately over 27,000 associates that either directly, or indirectly provide services to Municipalities, and Water Districts across the state of Texas. As we conduct our day to day business, we plan to inform our customers of our partnership with NCPA, and encourage the involvement and use of this extremely beneficial purchasing cooperative. We have had success in the previous year with utilizing BuyBoard and TIPs. We also plan, with the permission of NCPA, to include advertisements, handouts and posters

letting our customers know of our partnership, as we participate in dozens of conferences, inclusive of Texas AWWA, Texas Rural Water, Association of Water Board Directors, Texas Municipal League, and several more. Our goal is to inform as many of our Municipal and Water District customers about NCPA, and its many benefits, as we can, so that they may all have access to our product and services through NCPA's Water Metering, Monitoring, Devices and Related Services Contract.

70. Describe how you intend on train your national and/or regional sales force on the Region 14 ESC agreement.

By holding virtual training sessions for NCPA, training can be provided.

71. Acknowledge that your organization agrees to provide its company logo(s) to Region 14 ESC and agrees to provide permission for reproduction of such logo in marketing communications and promotions.

Comply, Ferguson can provide logos per the Utility or City request.

ADMINISTRATION

73. Describe your company's implementation and success with existing cooperative purchasing programs, if any, and provide the cooperative's name(s), contact person(s) and contact information as reference(s).

We have deployed multiple projects that were procured through a purchasing co-operative, specifically BuyBoard. 2 recent projects deployed in Texas, Faulkey Gully and Dalworthington Gardens. Both projects have been executed seamlessly and successfully. Please see Faulkey Gully Case Study in our proposal.

74. Describe the capacity of your company to report monthly sales through this agreement.

Yes, Ferguson can provide reporting functionality monthly and annual basis through hour standard and existing operating and order management system.

75. Describe the capacity of your company to provide management reports, i.e. consolidated billing by location, time and attendance reports, etc. for each eligible agency.

This is easily performed through our existing Oracle operating programs.

76. Please provide any suggested improvements and alternatives for doing business with your

company that will make this arrangement more cost effective for your company and Participating Public Agencies.

Through our mutual beneficial relationship, Ferguson can provide customer service to municipalities, and entities, including a list of improvements for both process and revenue. Our dedicated AMR/AMI specialists and project managers have also worked on numerous projects and can provide improvements to make solutions cost effective.

77. Green Initiatives

As our business grows, we want to make sure we minimize our impact on the Earth's climate. We are taking every step we can to implement innovative and responsible environmental practices throughout NCPA to reduce our carbon footprint, reduce waste, energy conservation, ensure efficient computing and much more. To that effort we ask respondents to provide their companies environmental policy and/or green initiative.

Ferguson.com and our resources such as Pipeline and Operating system has become a vital tool in our company for reducing the carbon footprint by adding technology that can best serve customers and our associates. By becoming more paperless for orders, resources, and utilizing best practices for Ferguson.com has allowed out company to become more innovative in the technology space. In particular, this project we're proposing, holds several green initiatives by utilizing technology to make information more available and efficient.

78. Certifications (if applicable)

Provide a copy of all current licenses, registrations and certifications issued by federal, state and local agencies, and any other licenses, registrations or certifications from any other governmental entity with jurisdiction, allowing respondent to perform the covered services including, but not limited to, licenses, registrations, or certifications. Certifications can include M/WBE, HUB, and manufacturer certifications for sales and service.

Please see attached License numbers for each of the states Ferguson provides the Mueller System's product line. – Arizona, Colorado, Florida, Georgia, Louisiana, Maryland, Nevada, Oklahoma, Pennsylvania, Texas, Utah, Virginia.

The Company is strongly committed to providing equal employment opportunity for all associates and all applicants for employment. The purpose of this Policy is to educate all associates about what may constitute discrimination and harassment, to notify everyone working for the Company that management will not condone or tolerate discrimination or harassment, and to establish a procedure that encourages associates to report conduct that may constitute discrimination or harassment to designated Company representatives who will investigate and respond to any report. Please see attached Ferguson's SBE/MBE/WBE/VBE/SDVE/DBE RESELLERS/ DISTRIBUTORS POLICY.

TAB 5 – PRODUCTS AND SERVICES

Respondents are requested to provide product forms with detailed description of your product offerings. Provide the minimum information as listed for your product categories on the following classifications of product:

Water Saving device:

Type:

Positive Displacement 420 Series Bronze Body (5/8 x 1/2" - 5/8 x 3/4")
Positive Displacement 435 Series Bronze Body (3/4 short, 3/4 x 3/4"; standard 3/4 x 1")
Positive Displacement 452 Series Bronze (1")
Positive Displacement 500 Series Bronze (1-1/2, 2")
Positive Displacement 500 Series D, Ductile Iron (1-1/2 and 2")
Remote Disconnect 420 Series (5/8 x 3/4" and 5/8 x 1/2")
Solid State Meter (Ultrasonic SSM) Small (5/8 x 3/4" and 3/4" Short; 3/4" Long; and 1")
Solid State Meter (Ultrasonic SSM) Large (1 1/2" and 2")
HBMAG Flow Meter (Electromagnetic) (3", 4", 6", 8", 10" 12" 16" and 20." Larger sizes are available by request.
Magnetic Drive Vertical Turbine Meters (MVR) (3/4 x 1/2", 3/4" 3/4 x 1", 1", 1- 1/2", 2", 3", 4" and 6")
Residential Fire Service Meter (3/4", 1", 1-1/2" and 2")
Hydrant Meter (3")
Fire Service Meter (commercial with or without bypass) (3", 4", 6", 8" and 10.")

Brand Name(s)
Mueller System Products

Standard Warranty (Parts & Labor)
Please refer to our attached warranty.

Optional Warranty (components covered & Labor)
Please refer to our attached warranty.

Estimated Lead/Delivery Time
Lead Time from Meter Depot: 1-3 Days
Lead Time from Mueller (Manufacturer): 4-6 weeks

Location of Manufacturing (City, State or Country)
Cleveland, North Carolina

Estimated Market Share (North America)
20% market share

Provide example data on each type of product provided
Detail Features & Benefits

Positive Displacement Meters (5/8 x 3/4" – 2") for residential and small commercial applications where water volumes are low and low flow sensitivity is important. The meter has a straight reading, permanently sealed, magnetic drive with low flow indicator and remote reading capability

for Solid State Register (SSR) or Mueller Encoder Eight (ME-8) Registers. The SSR register provides up to 10 digits of visual resolution and up to 9 digits of electronic resolution for outstanding granularity when used in conjunction with current Mueller Systems AMR and AMI systems. Granularity of data and frictionless operation permit customers to capture maximum revenue and be proactive in leak detection and resource conservation. The ME-8 The ME-8 register provides 8 digit visual resolution and up to 8 digit electronic resolution with Mueller Systems AMR/AMI systems. The eight digit register resolution permits utilities to realize maximum revenue potential, be proactive in leak detection, manage resource conservation, and use event and duration data to manage their systems more effectively.

Remote Disconnect Meter (5/8 x 3/4"): The Hersey® RDM is a nutating disk, positive displacement meter that incorporates a radio controlled valve in a 7-1/2" laying length. The unique meter design allows utilities to retrofit 5/8" RDM meters in existing services where there is a high incidence of customer service call volume pertaining to transient or delinquent accounts, where employee safety may be a concern, or where it is difficult to gain access to meters. By accessing the account information through the MiNet™ AMI System User Interface screen, a radio frequency (RF) command can be initiated to turn on or off any service equipped with an RDM meter from any password protected computer authorized to access the utility site.

Solid State Meter (5/8 x 3/4" – 2"): The SSM meter provides 8 digits of granular data for visual reads and 8 digits in encoded electronic format for use in Mueller MiNet AMR / AMI applications. The meter can be used in any residential or commercial application where a high degree of accuracy at low flow rates is important. The SSM meter utilizes ultrasonic measurement technology to provide outstanding accuracy across a broad flow range with extremely low pressure loss. The static meter design means there are no moving parts inside the meter so it will not degrade in accuracy over the life of the meter due to mechanical wear, providing exceptional revenue for years to come.

HbMAG Meter (3" – 20"): The HbMAG Meter is an electromagnetic flow meter designed for use in the measurement of potable water in applications where a high degree of accuracy is required over a wide range of flow rates and conditions. Hotels, schools, factories, office buildings, apartment buildings, commercial properties and irrigation are all examples of installations where domestic and process water services may have widely varying flow rates and usage profiles. All Mueller models have electronic meter reading systems available for increased reading efficiency. (The Mueller HbMAG meter has advanced EMF measurement technology to provide a high degree of maintenance free accuracy over extended periods of deployment.

Magnetic Drive Vertical Turbine Meters (MVR) (3/4 x 1/2" - 6"): Measurement of water for residential, commercial, industrial and residential fire applications, where sensitivity to low flow is also important. Hersey® MVR meters are among the most sensitive vertical turbine meters available and may be used in place of compound meters in some applications. The compact design and integral strainer (separate external strainer is not needed) of Model MVR meters facilitate installation in tight spaces. They are ideal where flexibility is needed to meet wider flow ranges, where water temperatures are elevated between 80°F and 130°F, or where sand particles or other small debris may be encountered

Residential Fire Meter (3/4 – 2"): The Hersey Residential Fire Meter (RFM) is specifically designed for use in residential fire protection systems or combination systems that supply domestic plumbing needs and residential sprinkler fire protection service when installed as specified in NFPA 13D or NFPA 13R. The RFM utilizes Hersey's unique vertical turbine measuring element to

measure flow rates comparable to traditional positive displacement meters, yet provides a measuring element that allows suspended particulate matter to pass through the element unobstructed when emergency flow requirements for water are demanded.

Hydrant Meter (3"): Recommended for measuring high-volume water usage from fire hydrants or other fire protection systems. Convenient hose connections and light-weight construction make this portable turbine meter useful for accurately measuring water used to fill street sweepers, water tankers or other equipment.

Fire Service Meter with Bypass, or without Bypass (3"-10"): The Hersey® Meters FM3 fire service meter is designed for combined fire service and domestic water where a single supply line supports both fire and domestic or process needs. The meter may be utilized in automatic sprinkler systems and fire service, as a master meter for an entire water system, as a master meter for zoned systems, and for domestic or processed water where accuracy across a broad range of flows is critical. The FM3 meter eliminates the need for secondary service lines, saving time and reducing installation expenses and is compliant for all UL®, FM®, NSF®-61 fire service meter applications.

Please refer to our attached warranty for additional information on all meters, registers, and AMR/AMI System Solutions.

Controllers & Monitoring

Type : AMR/AMI

System Protocol AMR: Mueller's Migratable AMR System performance has been achieved by utilizing the most efficient antenna array, employing a long-life lithium-chloride battery, transmitting on multiple RF channels, and by developing an FCC approved transmitter. All of these performance attributes provide utilities with an AMR system that offers not only superior performance, but a cost-effective solution designed to last 20 years in the field. Ferguson Waterworks will supply Mueller line of meters and solutions.

AMI: Endpoints and Infrastructure within the Mi.Net system utilizes a specially designed radio chip that allows an endpoint operating in the 902-928 MHz band to essentially eliminate all interference and transmit substantially further (miles) using very little battery power. Because of this ability, it is quickly becoming the preferred radio chip for leading-edge devices operating in the Internet of Things (IoT). Furthermore, Mueller is a Class B member of the LoRa Alliance along with companies such as IBM® and Cisco®, which provides open, standards-based communication. The Mi.Net Solution uses a LoRa™ architecture to collect information from water meters equipped with the Mi.Node AMI endpoint, which transmits this information extreme long distances with great reliability to data collectors mounted at specific locations. The Mi.Hub™ Collectors multi-network backhaul communication sends this information to the data servers that are made available through web-based software. Mi.Net provides two-way communication to collect incoming consumption and alert messages while managing outgoing programming changes, on-demand read requests, or other commands to/from the City. This allows City staff members to get real-time readings or even turn off/on water service with our remote disconnect meter (for ⅝" x 3/4" services) within seconds from an account at the far end of the service territory, without ever leaving the office. Information is securely transferred by every system endpoint up through the Mi.Hub™ collectors, then made available to the City via a graphical and simple to use Sentryx web user interface.

LAN Communication Structure (Peer-to-peer, Polling) True, Point to point communication structure.

Human Machine Interface **(HMI)** types (PC, Notebooks, Handheld terminals) :
Windows 10, AMI on any device with internet capabilities

Third party interface (Drivers and Gateways) – Ferguson can interface with any utility billing company and interface the primary customer portal WaterSmart with billing.

Remote alarm and message capabilities
Standard Warranty (Parts & Labor)-
Please refer to our attached warranty.

Optional Warranty (components covered & Labor)
Please refer to our attached warranty.

Estimated Lead/Delivery Time
Lead Time from Meter Depot: 1-3 Days
Lead Time from Mueller (Manufacturer): 4-6 weeks

Location of Manufacturing (City, State or Country)
Manufacturing: Cleveland, North Carolina
Network Operations Center for system monitoring:
Atlanta, Georgia

Estimated Market Share (North America)
20% market share

Detail Features & Benefits

AMR:

- MiNode M Transmitters connected to each register
- Mi Net Mobile Transceiver
- EZ Reader™, EZMobile™, EZProfiler™ Software
- Panasonic Toughbook® Laptop
- MiNode M Installation

Please see below for benefits of the system components for AMR systems and our attached proposal for additional information and product specification sheets.

AMI:

- Incoming meter data is passed to a collector, called a MiHub™. The collector acts as the major network relay point for all the meters within a particular geographic area, communicating directly with the system's operating software to either deliver collected meter reads or to pass outgoing messages to specific meters or groups of meters.
- **MiHub™ Data Collectors** – Our Multi-Network Collectors are inexpensive, low-power/solar-power, compact devices which are easily mounted in accessible locations. Ideal mounting heights for the MiHub™ antenna are 100 feet or higher in order to provide the maximum coverage. The MiHub™ Collector itself is generally installed at a serviceable height regardless of the antenna height. MiHub™

data collectors are configured to automatically receive data from the Mi.Node endpoint at prescheduled intervals, but can also produce on demand reads.

- **Mi.Repeater™** – Mueller Systems also produces the Mi.Repeater™ signal repeater. These include AC powered, DC powered, and streetlight mount. This flexibility allows Mueller Systems to design and build the most robust AMI network available at the lowest overall cost. This network will allow the City to get reliable data in challenging RF areas.
- **Mi.Tech Handheld** - The Mi.Tech field handheld computer allows the installer to accurately retrieve installation work sheets from the Mi.Net AMI server via mobile internet access. At the time of installation, the handheld computer records the GPS Coordinates of the meter and tests/interrogates the Mi.Node endpoints using the install radio.

Please see and our attached proposal for additional information and product specification sheets

Respondents are requested to provide detailed description of your service offerings. Provide the minimum information as listed for your service categories on the following classifications of service:

- **Startup & Commissioning Services**

  Define process for validation of system or equipment operation to design
  Type (e.g., equipment startups, system checkouts, control verification, retro commissioning, M & V verifications, rebate auditing, other)
  List key personnel (factory, sub-contract, other)
  References (public sector only)
  Case studies describing benefits of services

  AMR: Confirming successful installation You can use the Mi.Node-M Install Tool to verify that a newly installed meter is correctly connected to the Mi.Node M unit, and is transmitting reads. After the Mi.Node-M unit has been physically installed and (if necessary) connected to the register, swipe the unit with a magnet to force an immediate read of all register data. The Mi.Net Mobile Transceiver receives data on multiple discreet frequencies for secure and reliable data processing. During the reading process, the technician can view a number of route progress screens which include route mapping with representations of all meter locations, tabular screens depicting all meters, meters remaining to be read, collected meter readings and route performance overview. At the end of the collection period, the data is uploaded via the EZ Reader™ route management software into the utility's billing software with just a few clicks of a mouse. A standard series of reports are available for viewing performance of the system, the status of all event and duration codes, battery health, and past high leaks and backflow events.

  AMI: Each individual water meter is equipped with and read by a two-way radio module known as a Mi.Node endpoint. The Mi.Node endpoint is attached to meters to make meter reading and data collection simple and automatic. In standard configuration, the Mi.Node endpoint stores data in 60 minute intervals. Each Mi.Node endpoint maintains the data in its non-volatile onboard memory for up to 120 days of hourly data in order to protect the City against any single point of failure that would result in system wide, cell wide, or other catastrophic loss of data. In addition to basic consumption data, system alerts such as leak detection, no flow, reverse flow, register removal, low battery alarm, and more are constantly monitored. Priority alerts, such as a reverse flow or high leak, will cause the Mi.Node to immediately wake and send a real-time message over the network.

  The Mi.Net log-in screen can be accessed over the web via the internet. All web accesses utilize Transport Layer Security (TLS) and 1024 bit key encryption. Access to the data and manipulation is based on user role and authenticated log-in. From the log-in screen users are directed to the Mi.Net homepage. From the homepage, the City personnel can search for specific accounts based on any number of

records, such as account ID, meter number, billing or service address, etc. By moving to the water tab, City's staff has access to all of the metered accounts within the database. A user can either select or search for a single account or group of accounts or choose to perform on on-demand read for a single meter or a larger global group of meters. A user can quickly identify accounts with active alerts or request the alert status (sending an actual query to the meter) of a meter or group of meters. All columns are "sortable" by a number of different logical filters (greater than, contains, not equal to, etc.) which allow a user to quickly drill down to specific accounts for report creation. Data reports are exportable from this page directly to Microsoft Excel®, Word, or PDF formats.

- **Service & Maintenance**

  Type (e.g., preventative and full maintenance contracts, remote monitoring) Define processes for each type of service and/or maintenance of the system or the equipment
  List key personnel (factory, sub-contract, other)
  References (public sector only)

  AMR tasks included in the annual maintenance contract fee:

  - Phone support including post training questions and assistance, billing integration support.
  - Virtual support including video guided trainings, virtual classroom training.
  - Software upgrades and support

  AMI tasks included in the annual maintenance contract fee:

  - Troubleshooting and replacement of existing Collectors and Repeaters
  - Removal / Decommissioning
  - Battery Exchange in collectors for contracts that are 6 years or longer.
  - Quarterly reporting – format to be mutually agreed upon

Key Personnel

Zeb Wright, Business Development Manager – Central Region
Zeb.Wright@Ferguson.com | Mobile: (214) 690-3604
Zeb Wright joined Ferguson Waterworks in 2004. He began his career in Euless, TX, moving through each level of the business, and managing projects in an Inside Sales role. Zeb was then transferred to San Antonio, TX where he managed the new Waterworks counter while performing inside sales duties and managing shipping and receiving logistics. Zeb then took over the Branch Training Manager position for Oregon and SW Washington state. As an additional responsibility, Zeb became the AMR System Support Specialist for that territory and later became a Municipal Outside Sales associate, providing support to Municipalities and Water Districts. During his tenure as a municipal sales associate, Zeb specialized in AMR and AMI projects. In 2010, Zeb Wright accepted a promotion in Texas to become the AMR/AMI Sales Manager and was instrumental in the creation of the Ferguson Meter and Automation Group in the South-Central Waterworks District. In 2014, Zeb Wright then became the Business Development Manager for Ferguson Waterworks' new Meter and Automation Group specializing in the Mueller Systems AMR / AMI product line.

Stacey Granhold
Information Technology Manager – TX, LA, OK, AZ, UT, CO
Email: Stacey.Granhold@Ferguson.com | Mobile: (817) 247-9339
In 2004, Stacey entered the waterworks industry as a Technical Trainer for a technology company specializing in automatic meter reading systems. She traveled to utilities nationwide and abroad providing installation, billing integration, software and product training, and project management. In

2010, Stacey accepted the Proposal Management position for a large meter manufacturer, providing sales management and support for an extensive distribution network as well as the national sales team. Stacey joined the Ferguson team in 2014 and assumed the responsibilities of overseeing numerous sales and marketing tasks required to ensure a successful project. In 2016, she moved into the role of Project Manager where she manages site preparation and component installation for new AMR / AMI projects, administers project deliverables, facilitates system setup and deployment, and manages the final system acceptance process to secure customer sign off. With over 15 years of experience in the AMR / AMI industry, in 2019 Stacey was promoted to role of IT Manager responsible for the oversight of the project management and integration associates in the Central / Western Meter and Automation Group. Her main focus is always the end result and building long term professional relationships with Ferguson customers.

+ **Installation**

> Define processes for each type install of the system or the equipment

Please see below, the installation scope of work.

> Bonding and licensing capabilities Ferguson can provide Bid Bonds, and once awarded, Performance and Payments for projects inquiring.

> List key personnel (factory, sub-contract, other) Jason Henderson, Ferguson's Installation Manager, Subcontractor is vetted through Ferguson and negotiated per project.

Jason Henderson, Project Manager
Email: Jason.Henderson@Ferguson.com | Mobile: (612) 437-9691
Jason Henderson has been involved in the water meter business for 8 years. In the last 4 years he has held the position of a Field Supervisor overseeing more than 50, 000 water meter installations. Jason joined the Ferguson Meter and Automation Group in 2016 as a Project Manager covering the territory of Texas, Oklahoma and Louisiana. Jason continues to oversee water meter installations and installers to get the installs complete in a timely and safe manner.

> References (public sector only) Please see references listed in Tab 6 of installation Ferguson and our approved subcontractors have been involved with.

> Case studies describing benefits of services

Please refer to our Case study attached that was completed on "Faulkey Gully Municipal Utility District" in Required Documents. Benefits of our Meter and Automation Services include but are not limited to:

SERVICES

Dedicated Ferguson AMR/AMI sales, service and support employees

More than 2 million points sold since the year 2000

In-house project management team provides assistance for a variety of water meter installation services

Project management services for subcontractor installation

Service and support with a customized maintenance program after sale and installation

Installation Scope of Work:

Installation of Endpoints: The proposer's pricing and installation scope of water meters and radio modules assume a "standard" installation. A standard meter installation is recognized as one which involves the replacement of an existing meter or the installation of a new meter with new gaskets, new washers and new bolt kits, provided the necessary setter/fittings are present and the following conditions are met:

1. Meters will be located in outside meter boxes (pits) or vaults with adequate access, or if access is restricted, proposer will be able to obtain access from the property owner within one week of request during normal business hours;

2. Meter access will not subject proposer's employees to dangerous or unsafe working conditions;

3. No additional labor or groundwork will be needed to access meters, including but not limited to cutting, removal and replacement of asphalt, tree roots, shrubbery or landscaping obstructions;

4. Existing meter locations and depths may or may not require confined space entry.

5. Proposer will not be required to remove excessive amounts of dirt, silt, water or other debris from meter boxes. Excessive amounts shall be defined as dirt, silt, water or other debris that requires 30 or more minutes of hand digging or hand pumping by one installer. The Utility will prep meter boxes to prevent excessive digging.

6. Proposer will not be required to repair or replace pipe due to corrosion, existing damage, plumbing irregularities, substandard conditions or existing connections not in conformity to current building codes;

7. Water meters are on setters or equipped with standard meter connections that can be reused during meter installation;

8. Meter exchanges are like-for-like, same lay length and no plumbing is required;

9. Existing meter boxes or meter vaults will be used, and curb stops, and valves are in good working condition.

10. Existing meter boxes must be in good condition, allowing enough room for easy replacement of the existing meter. Standard requirements are 6" on all sides of a residential meter/connections and 12" on all sides of a commercial meter/connections;

11. Proposer presumes they will be able to find the meter box at the specified physical address within 10 minutes or less. This may require that the Proposer is provided with accurate meter box location notes or that meter box locations are marked with blue paint/blue flags.

12. Existing meter box lids must be in good condition. Proposer will not be required to perform any modifications to the existing meter box lids or any replacement of meter box lids.

13. Nodes MUST be commissioned/activated at time of installation or within 24 hours of meter

installation, to be confirmed by installation and photographic data taken at both time of installation and time of node commissioning. If a given MiNode is not reporting due to installation related conditions (for example, handheld was not synced in a timely manner and installation data was lost), or non-responsive at time of commissioning, the installing entity shall take steps to remediate. Nodes that are not commissioned/activated, but submitted on an invoice, will not be paid.

+ **Warranty Services**
  - > Type (e.g., Extended parts & labor (define maximum number of years available), delayed start-up and other)
  - > Define processes for each type of warranty
  - > List key personnel (factory, sub-contract, other)
  - > References (public sector only)
  - > Case studies describing benefits of services

  Please refer to our warranty attached.

+ **Energy Services**
  - > Type (e.g., (Energy Tracking, Energy Analysis, Evaluation of Potential Upgrades, demand response, rebates and others)
  - > Define processes for each type of energy services
  - > Certifications of personnel
  - > List key personnel (factory, sub-contract, other)
  - > References (public sector only)
  - > Case studies describing benefits of services

  Not Applicable, Ferguson Enterprises, LLC dba Ferguson Waterworks provides a water only solution through our partnership with Mueller Systems.

+ **Financial Services**
  - > Type (e.g., leasing, prompt and pre-payment discounts, guaranteed savings and other)
  - > Describe type of each funding and availability
  - > Funding Sources (internal and/or external)
  - > List key personnel (internal and/or external)
  - > References (public sector only)
  - > Case studies describing benefits of services

  Ferguson and our Partner Mueller Systems are capable of working with multiple 3rd party finance companies to finance our project. Ferguson's most prominent is Holman Capital and Government Capital . Ferguson provides multiple funding options through length of firms as well as interest rates. An example would be first year non-payment or interest buy downs etc. This would all depend on what the utility most prefers. In terms of Case Studies, please refer to our attached Case Study completed on "Faulkey Gully Municipal Utility District" in Required Documents.

+ **Site Surveys** Please see attached Site Survey in Required Documents.
  - > Describe type of survey The survey is formatted as a questionnaire in order to get a sense of

the environment and location specifics for meter installation. It provides the Installation manager to be able to verify meter sizes, location, meter device number etc. before meter installation begins on a project. The survey allows the utility to see the scope of work Ferguson will be able to provide versus what the utility can do .

> Licensing and certification capabilities Yes.

> Advanced technology uses for each type of survey Yes. WOMS with photo documentation.

> List key personnel (internal and/or external) Jason Henderson, Installation Project Manager

> References (public sector only) Please see references on Tab 6.

> Case studies describing benefits of services Please refer to our Case study attached that was completed on "Faulkey Gully Municipal Utility District" in Required Documents.

TAB 8 – VALUE ADDED PRODUCTS AND SERVICES

EXECUTIVE SUMMARY

The Meter & Automation group, anchored within Ferguson Waterworks, provides the structure, tools and personnel that are necessary for project success. Ferguson's partnership with Mueller provide utilities with the Mi.Net® system. The future-proof system, offers an open-architecture RF platform that can start in AMR "drive-by" mode and upgrade to the industry's most-advanced AMI system when appropriate. Manufactured from a long history of quality offerings by Mueller Metrology, a subsidiary of Mueller Water Products. The Mi.Net® system was designed to deliver water utilities with innovative technology that makes the meter data collection process easy, reliable, and feature-rich. The Mi.Net® name itself is meant to represent the adaptability of the system and the multiple options available to cities this application-specific solution.

Our Mi.Net® M drive-by radio-read system provides two-way communication between every meter and the mobile collection software located in the meter technician's vehicle. When your system requirements become great enough, the system can be transformed into an AMI solution without replacement of the meters and Mi.Node M units; preserving your original investment in the technology. The addition of fixed collectors and hosted User Interface transforms your mobile system into a fixed network data generation machine; and your Mi.Net M mobile transceiver becomes your mobile backup device in the event of a catastrophic event that knocks out power for an extended period.

The Mi.Net® AMI system represents just one of the technologies seamlessly integrated into Mueller's Sentryx™ water intelligence platform. This means that meter data, leak detection, pressure monitoring and control, water quality testing, automatic flushing and other powerful tools from Mueller can be added in the future and managed collectively through a common interface and dashboard. The functionality and benefits of Mueller's integrated HES and MDMS can be a great asset for the City. The Mi.Net AMI system operates in the 902-928 MHz unlicensed frequency band and uses several radio frequency techniques like chirp spread spectrum through LoRa® signal modulation which greatly reduces interference, expands bandwidth and results in remarkable overall performance. The network is a "star" or "spoke and hub" design where

MIU's typically communicate directly with a DCU or through a repeater to a DCU. However, there is flexibility built in for an MIU to route its communications through another MIU if necessary. Mi.Net provides true two-way communication to every meter with minimal latency. An on-demand read can be obtained in under twenty seconds. The DCU is modular, wall or pole-mounted, rugged and powered by a 120V AC power supply or optional solar panel for locations with limited/no electrical power access. It contains a backup battery if electrical power is interrupted. As with any RF network, maximizing the install height of infrastructure antennas ensures a good balance of transmission range and data path redundancy. For this reason, our conservative network designs utilize water tanks, communication towers, utility buildings and similar vertical assets. The DCU communicates with the HES/MDMS through a cellular backhaul or Ethernet connection. Signal repeaters are used in conjunction with DCUs to backfill areas of the service area where signal strength is compromised or a DCU cannot be installed. Repeaters are supplied in either a 120V AC powered version for installing on a building or pole where a power supply is available or a battery-powered version for installing on posts to allow maximum flexibility. The MIU is connected to a meter register via a Nicor® connection and mounts through the meter box lid for optimum signal transmission. It uses a patented "wake-on-demand" technology that preserves battery life while allowing two-way communication with a DCU. The MIU operates on a full watt of power, maximum allowed by the FCC.

Value to NCPA

Water Resource Management
Reduce water loss/non-revenue water

Improve water conversation/water accountability to provide Green Initiatives

Customer Service
Improving customer service

Access to real-time data that can notify of abnormal water usage

Improve customer service through an interactive customer web portal with online customer bill pay

Infrastructure Management
Improve planning capabilities

Replace all water meters as they have exceeded their useful life – accuracy, dependability, etc.

Reduce current labor effort through read automation and systems interfacing

Improve cash flow and reduce long-term operating costs

ADVANTAGES:

- **100% TRUE TWO-WAY COVERAGE** – The Mueller Mi.Net® system guarantees two-way communications to every meter and brings industry-leading performance to remote disconnects or reconnects, on-demand reads and urgent alerts in under 20 seconds. Additionally, firmware upgrades or meter-specific configuration changes like alert trigger thresholds and shorter read intervals (less than one hour) can be managed remotely.
- **FUTURE PROOF SYSTEM** – Mueller engineers their system to ensure backwards compatibility so that utilities are not left with stranded assets. The Mueller Mi.Net® platform allows expansion into leak detection, water quality monitoring, pressure monitoring/control, etc., all while utilizing the same network. These designs allow you to rest easy and preserve your 20-year investment.

- **STRENGTH IN THE INDUSTRY** – Ferguson Waterworks is the largest, top-rated wholesale supplier of municipal waterworks and metering technology in the nation. We are aligned with four of the top five meter vendors across the country and have invested significant resources related to AMR/AMI deployment and long-term support, Our exclusive partnership with Mueller allows us to have the staff, tools and other resources available for a remarkable partnership. Ferguson can work with utilities on marketing opportunities inquired by working with our National Marketing team.
- **VETTED SUBCONTRACTORS** – Ferguson has already done all the work finding the right subcontractors. Our project partners, with their experience and proven track records meet Ferguson's high standards. This allows the Utility or City one point of contact - Ferguson. No finger-pointing necessary, just streamlined project deployment and excellent communication for the utility.
- **REMOTE DISCONNECT** – The Remote Disconnect Meter from Mueller is the only field-proven disconnect meter on the market with over 300,000 deployed since 2013. At a minimum, deployment of the remote disconnect meter in accounts that show-up on the cut-off list each cycle can provide substantial improvements in efficiency and safety while drastically reducing truck rolls and other costs for NCPA and utilities.
- **WEB-BASED CUSTOMER PORTAL** – Ferguson can provide the premier customer engagement portal in the industry - WaterSmart®. Using this powerful application, water utilities can better communicate with their consumers about the value of water, how their water use compares to others, and how they can save money.

SUMMATION:

Ferguson Waterworks sincerely appreciates the opportunity to submit the attached proposal. While all the qualified offerors will boast big numbers and various banners of success, Ferguson is the largest Waterworks/Plumbing wholesale distributor in North America and boasts larger annual revenue than the top 5 meter and automation manufacturers combined. Behind our success, we are an organization committed to partnership, the highest quality products, and a proven record of performance as detailed in our proposal.

Zeb Wright, Business Development Manager of Meter and Automation

- **Detail Description**

Where is the product manufactured? Any certifications provided?

The Mueller Systems manufacturing facility is located at 10210 Statesville Boulevard, Cleveland, NC 27013. This plant is ISO 9001:2015 certified by BRE Global Ltd.

Where is the service performed?

Services are provided in several locations such as the Network Operations Center (NOC) located in Atlanta, GA., virtually utilizing our own team, or provided on-site.

Who performs the service and what is their expertise?

Services are provided by Ferguson's Meter and Automation team. Our team has extensive knowledge and experience with AMR/AMI services including but not limited to project management, integration, and installation. Please see attached resumes of key personnel for our team's experience in the industry. Our partner Mueller also provides services and has technical knowledge on their software and products. They have support nationwide and can offer metering services for our projects. For additional information on Ferguson and Mueller Systems, please see our attached proposal including Industry Experience.

Is this a proprietary product and, if not, who is your competition? Provide references.

Yes, this a proprietary product.

Provide case studies. Please refer to our Case study attached that was completed on "Faulkey Gully Municipal Utility District."

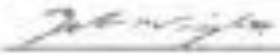
TAB 9 – REQUIRED DOCUMENTS

- Clean Air and Water Act / Debarment Notice
- Contractor's Requirements
- Antitrust Certification Statements
- Required Clauses for Federal Funds Certifications
- Required Clauses for Federal Assistance by FTA
- State Notice Addendum
- Exceptions and Assumptions
- Automated Meter Reading System (AMR) Details
- Advanced Metering Infrastructure (AMI) Details
- State Licenses
- DBE/WBE Policy Information
- Mueller Systems Certificate
- Faulkey Gully Case Study
- Site Survey and Installation Standard Process
- NSF-61 / ANSI Information
- Product Specification Sheets
- Warranty
- Certificate of Insurance

Clean Air and Water Act & Debarment Notice

I, the Vendor, am in compliance with all applicable standards, orders or regulations issued pursuant to the Clean Air Act of 1970, as Amended (42 U.S. C. 1857 (h), Section 508 of the Clean Water Act, as amended (33 U.S.C. 1368), Executive Order 117389 and Environmental Protection Agency Regulation, 40 CFR Part 15 as required under OMB Circular A-102, Attachment O, Paragraph 14 (1) regarding reporting violations to the grantor agency and to the United States Environment Protection Agency Assistant Administrator for the Enforcement.

I hereby further certify that my company has not been debarred, suspended or otherwise ineligible for participation in Federal Assistance programs under Executive Order 12549, "Debarment and Suspension", as described in the Federal Register and Rules and Regulations

Potential Vendor	Ferguson Enterprises, LLC dba Ferguson Waterworks
Print Name	Zeb Wright
Address	2650 S Pipeline Rd
City, Sate, Zip	Euless, TX 76040
Authorized signature	
Date	11/17/2020

Contractor Requirements

Contractor Certification
Contractor's Employment Eligibility

By entering the contract, Contractor warrants compliance with the Federal Immigration and Nationality Act (FINA), and all other federal and state immigration laws and regulations. The Contractor further warrants that it is in compliance with the various state statues of the states it is will operate this contract in.

Participating Government Entities including School Districts may request verification of compliance from any Contractor or subcontractor performing work under this Contract. These Entities reserve the right to confirm compliance in accordance with applicable laws.

Should the Participating Entities suspect or find that the Contractor or any of its subcontractors are not in compliance, they may pursue any and all remedies allowed by law, including, but not limited to: suspension of work, termination of the Contract for default, and suspension and/or debarment of the Contractor. All costs necessary to verify compliance are the responsibility of the Contractor.

The offeror complies and maintains compliance with the appropriate statutes which requires compliance with federal immigration laws by State employers, State contractors and State subcontractors in accordance with the E-Verify Employee Eligibility Verification Program.

Contractor shall comply with governing board policy of the NCPA Participating entities in which work is being performed

Fingerprint & Background Checks

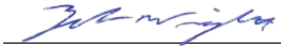
If required to provide services on school district property at least five (5) times during a month, contractor shall submit a full set of fingerprints to the school district if requested of each person or employee who may provide such service. Alternately, the school district may fingerprint those persons or employees. An exception to this requirement may be made as authorized in Governing Board policy. The district shall conduct a fingerprint check in accordance with the appropriate state and federal laws of all contractors, subcontractors or vendors and their employees for which fingerprints are submitted to the district. Contractor, subcontractors, vendors and their employees shall not provide services on school district properties until authorized by the District.

The offeror shall comply with fingerprinting requirements in accordance with appropriate statutes in the state in which the work is being performed unless otherwise exempted.

Contractor shall comply with governing board policy in the school district or Participating Entity in which work is being performed

Business Operations in Sudan, Iran

In accordance with A.R.S. 35-391 and A.R.S. 35-393, the Contractor hereby certifies that the contractor does not have scrutinized business operations in Sudan and/or Iran.

Authorized signature 

Date 11/17/2020

Antitrust Certification Statements (Tex. Government Code § 2155.005)

I affirm under penalty of perjury of the laws of the State of Texas that:

(1) I am duly authorized to execute this contract on my own behalf or on behalf of the company, corporation, firm, partnership or individual (Company) listed below;

(2) In connection with this bid, neither I nor any representative of the Company has violated any provision of the Texas Free Enterprise and Antitrust Act, Tex. Bus. & Comm. Code Chapter 15;

(3) In connection with this bid, neither I nor any representative of the Company has violated any federal antitrust law; and

(4) Neither I nor any representative of the Company has directly or indirectly communicated any of the contents of this bid to a competitor of the Company or any other company, corporation, firm, partnership or individual engaged in the same line of business as the Company.

Company name	Ferguson Enterprises, LLC dba Ferguson Waterworks
Address	2650 S Pipeline Rd
City/State/Zip	Euless, TX 76040
Telephone No.	(214) 690-3604
Fax No.	(817) 267-3912
Email address	Zeb.Wright@Ferguson.com
Printed name	Zeb Wright
Position with company	Business Development Manager
Authorized signature	

Required Clauses for Federal Funds Certifications

Participating Agencies may elect to use federal funds to purchase under the Master Agreement. The following certifications and provisions may be required and apply when a Participating Agency expends federal funds for any purchase resulting from this procurement process. Pursuant to 2 C.F.R. § 200.326, all contracts, including small purchases, awarded by the Participating Agency and the Participating Agency's subcontractors shall contain the procurement provisions of Appendix II to Part 200, as applicable.

APPENDIX II TO 2 CFR PART 200

(A) Contracts for more than the simplified acquisition threshold currently set at $150,000, which is the inflation adjusted amount determined by the Civilian Agency Acquisition Council and the Defense Acquisition Regulations Council (Councils) as authorized by 41 U.S.C. 1908, must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as appropriate.

(B) Termination for cause and for convenience by the grantee or subgrantee including the manner by which it will be effected and the basis for settlement. (All contracts in excess of $10,000)

(C) Equal Employment Opportunity. Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of "federally assisted construction contract" in 41 CFR Part 60-1.3 must include the equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 CFR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

Pursuant to Federal Rule (C) above, when a Participating Agency expends federal funds on any federally assisted construction contract, the equal opportunity clause is incorporated by reference herein.

(D) Davis-Bacon Act, as amended (40 U.S.C. 3141-3148). When required by Federal program legislation, all prime construction contracts in excess of $2,000 awarded by non-Federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non- Federal entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision

for compliance with the Copeland “Anti-Kickback” Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

(E) Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708). Where applicable, all contracts awarded by the non-Federal entity in excess of $100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

(F) Rights to Inventions Made Under a Contract or Agreement. If the Federal award meets the definition of “funding agreement” under 37 CFR §401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that “funding agreement,” the recipient or subrecipient must comply with the requirements of 37 CFR Part 401, “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements,” and any implementing regulations issued by the awarding agency.

(G) Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended— Contracts and subgrants of amounts in excess of $150,000 must contain a provision that requires the non-Federal award to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401- 7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251- 1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

(H) Debarment and Suspension (Executive Orders 12549 and 12689)—A contract award (see 2 CFR 180.220) must not be made to parties listed on the government wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), “Debarment and Suspension.” SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

(I) Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)—Contractors that apply or bid for an award exceeding $100,000 must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee

of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non-Federal award.

RECORD RETENTION REQUIREMENTS FOR CONTRACTS INVOLVING FEDERAL FUNDS

When federal funds are expended by Participating Agency for any contract resulting from this procurement process, offeror certifies that it will comply with the record retention requirements detailed in 2 CFR § 200.333. The offeror further certifies that offeror will retain all records as required by 2 CFR § 200.333 for a period of three years after grantees or subgrantees submit final expenditure reports or quarterly or annual financial reports, as applicable, and all other pending matters are closed.

CERTIFICATION OF COMPLIANCE WITH THE ENERGY POLICY AND CONSERVATION ACT

When Participating Agency expends federal funds for any contract resulting from this procurement process, offeror certifies that it will comply with the mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. 6321 et seq.; 49 C.F.R. Part 18).

CERTIFICATION OF COMPLIANCE WITH BUY AMERICA PROVISIONS

To the extent purchases are made with Federal Highway Administration, Federal Railroad Administration, or Federal Transit Administration funds, offeror certifies that its products comply with all applicable provisions of the Buy America Act and agrees to provide such certification or applicable waiver with respect to specific products to any Participating Agency upon request. Purchases made in accordance with the Buy America Act must still follow the applicable procurement rules calling for free and open competition.

Required Clauses for Federal Assistance provided by FTA

ACCESS TO RECORDS AND REPORTS

Contractor agrees to:

a) Maintain all books, records, accounts and reports required under this Contract for a period of not less than three (3) years after the date of termination or expiration of this Contract or any extensions thereof except in the event of litigation or settlement of claims arising from the performance of this Contract, in which case Contractor agrees to maintain same until Public Agency, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto.

b) Permit any of the foregoing parties to inspect all work, materials, payrolls, and other data and records with regard to the Project, and to audit the books, records, and accounts with regard to the Project and to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed for the purpose of audit and examination.

FTA does not require the inclusion of these requirements of Article 1.01 in subcontracts. Reference 49 CFR 18.39 (i)(11).

CIVIL RIGHTS / TITLE VI REQUIREMENTS

1) Non-discrimination. In accordance with Title VI of the Civil Rights Act of 1964, as amended, 42 U.S.C. § 2000d, Section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, Section 202 of the Americans with Disabilities Act of 1990, as amended, 42 U.S.C. § 12132, and Federal Transit Law at 49 U.S.C. § 5332, Contractor or subcontractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, marital status age, or disability. In addition, Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

2) Equal Employment Opportunity. The following Equal Employment Opportunity requirements apply to this Contract:

   a. Race, Color, Creed, National Origin, Sex. In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal Transit Law at 49 U.S.C. § 5332, the Contractor agrees to comply with all applicable Equal Employment Opportunity requirements of U.S. Dept. of Labor regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor, 41 CFR, Parts 60 et seq., and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of this Project. Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, marital status, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, Contractor agrees to comply with any implementing requirements FTA may issue.

   b. Age. In accordance with the Age Discrimination in Employment Act (ADEA) of 1967, as amended, 29 U.S.C. Sections 621 through 634, and Equal Employment Opportunity Commission (EEOC) implementing regulations, "Age Discrimination in Employment Act", 29 CFR Part 1625, prohibit employment discrimination by Contractor against individuals on the basis of age, including present and prospective

employees. In addition, Contractor agrees to comply with any implementing requirements FTA may issue.

c. Disabilities. In accordance with Section 102 of the Americans with Disabilities Act of 1990, as amended (ADA), 42 U.S.C. Sections 12101 *et seq.*, prohibits discrimination against qualified individuals with disabilities in programs, activities, and services, and imposes specific requirements on public and private entities. Contractor agrees that it will comply with the requirements of the Equal Employment Opportunity Commission (EEOC), "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 CFR, Part 1630, pertaining to employment of persons with disabilities and with their responsibilities under Titles I through V of the ADA in employment, public services, public accommodations, telecommunications, and other provisions.

d. Segregated Facilities. Contractor certifies that their company does not and will not maintain or provide for their employees any segregated facilities at any of their establishments, and that they do not and will not permit their employees to perform their services at any location under the Contractor's control where segregated facilities are maintained. As used in this certification the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion or national origin because of habit, local custom, or otherwise. Contractor agrees that a breach of this certification will be a violation of this Civil Rights clause.

3) Solicitations for Subcontracts, Including Procurements of Materials and Equipment. In all solicitations, either by competitive bidding or negotiation, made by Contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by Contractor of Contractor's obligations under this Contract and the regulations relative to non-discrimination on the grounds of race, color, creed, sex, disability, age or national origin.

4) Sanctions of Non-Compliance. In the event of Contractor's non-compliance with the non-discrimination provisions of this Contract, Public Agency shall impose such Contract sanctions as it or the FTA may determine to be appropriate, including, but not limited to: 1) Withholding of payments to Contractor under the Contract until Contractor complies, and/or; 2) Cancellation, termination or suspension of the Contract, in whole or in part.

Contractor agrees to include the requirements of this clause in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary to identify the affected parties.

DISADVANTAGED BUSINESS PARTICIPATION

This Contract is subject to the requirements of Title 49, Code of Federal Regulations, Part 26, *"Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs"*, therefore, it is the policy of the Department of Transportation (DOT) to ensure that Disadvantaged Business Enterprises (DBEs), as defined in 49 CFR Part 26, have an equal opportunity to receive and participate in the performance of DOT-assisted contracts.

1) Non-Discrimination Assurances. Contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. Contractor shall carry out all applicablerequirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by Contractor to carry out these requirements is a material breach of this Contract, which may result in the termination of this Contract or other such remedy as public agency deems appropriate. Each subcontract Contractor signs with a subcontractor must include the assurance in this paragraph. (See 49 CFR 26.13(b)).

2) Prompt Payment. Contractor is required to pay each subcontractor performing Work under this prime Contract for satisfactory performance of that work no later than thirty (30) days after Contractor's receipt of payment for that Work from public agency. In addition, Contractor is required to return any retainage payments to those subcontractors within thirty (30) days after the subcontractor's work related to this Contract is satisfactorily completed and any liens have been secured. Any delay or postponement of payment from the above time frames may occur only for good cause following written approval of public agency. This clause applies to both DBE and non-DBE subcontractors. Contractor must promptly notify public agency whenever a DBE subcontractor performing Work related to this Contract is terminated or fails to complete its Work, and must make good faith efforts to engage another DBE subcontractor to perform at least the same amount of work. Contractor may not terminate any DBE subcontractor and perform that Work through its own forces, or those of an affiliate, without prior written consent of public agency.

3) DBE Program. In connection with the performance of this Contract, Contractor will cooperate with public agency in meeting its commitments and goals to ensure that DBEs shall have the maximum practicable opportunity to compete for subcontract work, regardless of whether a contract goal is set for this Contract. Contractor agrees to use good faith efforts to carry out a policy in the award of its subcontracts, agent agreements, and procurement contracts which will, to the fullest extent, utilize DBEs consistent with the efficient performance of the Contract.

ENERGY CONSERVATION REQUIREMENTS

Contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the State energy conservation plans issued under the Energy Policy and Conservation Act, as amended, 42 U.S.C. Sections 6321 *et seq.* and 41 CFR Part 301-10.

FEDERAL CHANGES

Contractor shall at all times comply with all applicable FTA regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Contract between public agency and the FTA, as they may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this Contract.

INCORPORATION OF FEDERAL TRANSIT ADMINISTRATION (FTA) TERMS

The provisions include, in part, certain Standard Terms and Conditions required by the U.S. Department of Transportation (DOT), whether or not expressly set forth in the preceding Contract provisions. All contractual provisions required by the DOT, as set forth in the most current FTA Circular 4220.1F, dated November 1, 2008, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Contract. Contractor agrees not to perform any act, fail to perform any act, or refuse to comply with any public agency requests that would cause public agency to be in violation of the FTA terms and conditions.

NO FEDERAL GOVERNMENT OBLIGATIONS TO THIRD PARTIES

Agency and Contractor acknowledge and agree that, absent the Federal Government's express written consent and notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying Contract, the Federal Government is not a party to this Contract and shall not be subject to any obligations or liabilities to agency, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying Contract.

Contractor agrees to include the above clause in each subcontract financed in whole or in part with federal assistance provided by the FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS

Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. §§ 3801 et seq. and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 CFR Part 31, apply to its actions pertaining to this Contract. Upon execution of the underlying Contract, Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to me made, pertaining to the underlying Contract or the FTA assisted project for which this Contract Work is being performed.

In addition to other penalties that may be applicable, Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on Contractor to the extent the Federal Government deems appropriate.

Contractor also acknowledges that if it makes, or causes to me made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307 (n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

Contractor agrees to include the above clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

State Notice Addendum

The National Cooperative Purchasing Alliance (NCPA), on behalf of NCPA and its current and potential participants to include all county, city, special district, local government, school district, private K-12 school, higher education institution, state, tribal government, other government agency, healthcare organization, nonprofit organization and all other Public Agencies located nationally in all fifty states, issues this Request for Proposal (RFP) to result in a national contract.

For your reference, the links below include some, but not all, of the entities included in this proposal:

http://www.usa.gov/Agencies/State_and_Territories.shtml

https://www.usa.gov/local-governments

EXCEPTIONS AND ASSUMPTIONS

Tab 1 Master Agreement General Terms and Conditions

- Warranty. Ferguson take's exception to the extent a product warranty is implied from the Vendor. All meters and materials are covered by manufacturer warranties.
- Audit Rights. Ferguson take's exception to any audits. Vendor will provide documentation that is reasonably requested as it relates to the resulting contract.
- Indemnity. Delete "arising out of or resulting from the" and insert "to the extent caused in whole or in part by the negligent"
- Cancellation for Non-Performance or Contractor Deficiency. In the 4th sub-section, delete the second sentence.

Tab 2 NCPA Administration Agreement

- Fees and Reporting

o In the 3rd paragraph Ferguson take's exception to any audits. Vendor will provide documentation that is reasonably requested as it relates to the resulting contract

AMR SYSTEM

SYSTEM HIGHLIGHTS

The Mi.Net® system is future-proof, offering an open-architecture RF platform that can start in AMR "drive-by" mode and upgrade to the industry's most-advanced AMI system when appropriate. Manufactured from a long history of quality offerings by Mueller Metrology, a subsidiary of Mueller Water Products. The Mi.Net® system was designed to deliver water utilities with innovative technology that makes the meter data collection process easy, reliable, and feature-rich. The Mi.Net® name itself is meant to represent the adaptability of the system and the multiple options available to utilities this application-specific solution.

Our Mi.Net® M drive-by radio-read system provides two-way communication between every meter and the mobile collection software located in the meter technician's vehicle. When your system requirements become great enough, the system can be transformed into an AMI solution without replacement of the meters and Mi.Node M units; preserving your original investment in the technology. The addition of fixed collectors and hosted User Interface transforms your mobile system into a fixed network data generation machine; and your Mi.Net M mobile transceiver becomes your mobile backup device in the event of a catastrophic event that knocks out power for an extended period.

MI.NET® M AMR ("M" for easy Migration)

The Mi.Net Migratable solution is more than just a meter reading system; it's a comprehensive water utility data gathering solution, capable of taking any utility to a true Smart Water platform. The Mi.Node M endpoint will operate effortlessly in both AMR and AMI modes. The AMR mode offers the following features:

- **20 Years of Battery Life**
- **LoRa™ Frequency Modulation Technology Provides Long Range, High-Bandwidth, Two-Way Transmission**
- **Endpoint Firmware Upgraded from the vehicle**
- **Over 100 Days of Hourly Interval Data Storage (Consumption Profile)**
  - Interval data can be extracted from the endpoint in AMR mode by a wireless command from the vehicle or by activating a magnetic switch on the actual endpoint.
- **Meter Right-Sizing Functionality**
  - Mi.Node M endpoints can also be set to capture five (5) or fifteen (15) minute intervals of data for up to 30 days for proper meter sizing and advanced troubleshooting.

Our Mi.Net Migratable solution will allow any utility to deploy endpoints alongside other existing meter reading platforms while moving toward a complete mobile AMR system. Deploying the Mi.Net system in an AMR mode brings much of the functionality and two-way capabilities of the Mi.Net AMI system into a mobile environment. The performance and cost effectiveness will allow any utility to maximize efficiencies and reduce costs encountered in the meter reading process. The Mi.Net mobile configuration is powered by the same LoRa technology mentioned previously, providing long range capability and security. It offers the ability to read at long distances as well as process multiple commands/communications while driving at posted speed limits.

MI.NET MOBILE COLLECTOR

The Mi.Net Mobile Collector communicates with Mi.Node M endpoints in order to perform the following functions:

Collection of consumption readings
Two-way commands to initiate the collection of data logging information in hourly or daily intervals

- 105 days of hourly data
- 45 days of 15-minute data
- 30 days of 5-minute interval data for meter right-sizing

Over-the-air firmware upgrades for improvements to the Mi.Node M endpoints in the field

Mueller Systems' Mi.Net Mobile Collector is designed with water utility daily usage in mind. It offers such design features as GPS mapping for efficient route management, a single unobtrusive antenna for listening and receiving, and a small robust design for easy portability and reliability.

TRUE FLEXIBILITY AND SCALABILITY WITH MI.NODE M ENDPOINTS

Mi.Node Radio Module

Mi.Node TTL (Through-The-Lid) Adapter

Each individual water meter is equipped with and read by a two-way radio module known as a Mi.Node endpoint. The Mi.Node endpoint is attached to meters to make meter reading and data collection simple and automatic. In standard configuration, the Mi.Node endpoint stores data in 60-minute intervals. Each Mi.Node endpoint maintains the data in its non-volatile onboard memory for up to 120 days of hourly data in order to protect the Utilities against any single point of failure that would result in system wide, cell wide, or other catastrophic loss of data. In addition to basic consumption data, system alerts such as leak detection, no flow, reverse flow, register removal, low battery alarm, and more are constantly monitored. Priority alerts, such as a reverse flow or high leak, will cause the Mi.Node to immediately wake and send a real-time message over the network. These alerts can generate notification to both the Utilities personnel and individual water consumers. Interval data and non-priority alarms are transmitted back to the User Interface (UI) every 24 hours.

Due to the severe environment of meter pits, it is essential that any AMR device installed is engineered for the harshest of conditions. Mi.Node endpoints are designed to survive life inside the meter pit and be subjected to the nastiest of temperature and moisture extremes. Each Mi.Node circuit board is potted to best in industry standards then isolated within an engineered potting compound inside the enclosure. The Mi.Node is designed with no customer serviceable or replaceable parts, including batteries. This methodology eliminates any possible pathways for moisture intrusion and provides the Utility with the highest level of protection against environmental damage to the radio unit. This has been proven effective in similar locations across the country, including multiple installations in the northeast. The Mi.Node units are designed and warranted for a 20-year life inside the meter pit.

The Mi.Node is available in multiple mounting configurations for pit installations including versions to mount

through metal meter box lids. In order for the radio signal propagation to be most effective, the MI.Node needs to be through the lid for maximum performance.

MI.Node M INSTALLATION TOOL

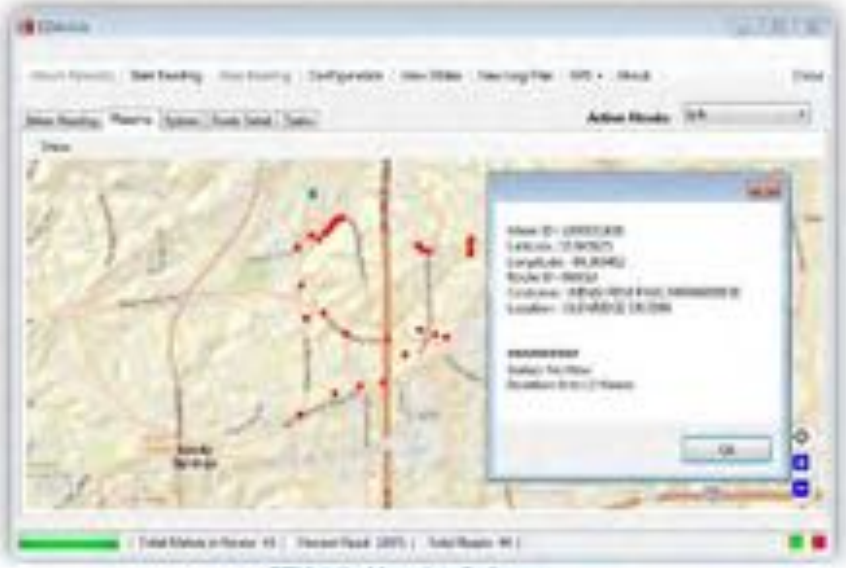
The Mueller Systems Installation Tool is a high performance Diagnostic Tool designed for use with the MI.Net M system. The primary function of the MI.Node M installation tool is to interrogate MI.Node M to obtain the serial number from the register, water consumption, leak detection, backflow, no flow, no communication and duration data via radio frequency transmission. Verification of proper installation and trouble shooting are easy with this simple to use diagnostic tool. The MI.Node M installation tool can also be used in conjunction with the appropriate EZ Export software to provide small scale, close range meter reading solutions. The software provides a standard export to an EXCEL spreadsheet for apartment and condominium complex reading solutions.

SOFTWARE OVERVIEW

MI.Net M Mobile Features

- Leak Detection
- No Flow Warning
- Tamper Indication
- Instant Data Logging Alarms
- SSR Register Alerts
- Hourly Consumption Data

When deploying the MI.Net M system in mobile mode, utilities gain the advantages of increased meter reading efficiency, instant data logging alarms and hourly consumption with the capability to migrate to a hybrid or fixed network AMI system at a later date. Forget extra site visits with additional equipment to obtain data; with the MI.Net M mobile system, it's available immediately and at increased distances.



EZMobile Mapping Software

Utilities choosing to implement Mueller Systems' MI.Net M mobile system can expect to dramatically increase their overall meter reading efficiency by being able to read more meters in a shorter amount of time. In addition to increased efficiency, utilities can be assured that the meter data is more accurate as

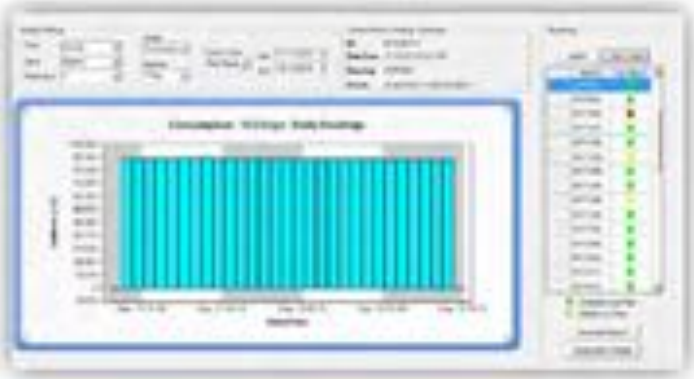
well. By providing highly accurate meter data in a more efficient manner, the Mi.Net mobile system is superior to other mobile systems.
While reading a route, instant data logging alarms provide immediate notification of potential issues on the mapping screen. This gives the meter reader the option to stop and take care of issues right away or to create a work order for a field crew (who are typically providing ongoing maintenance of the system by addressing leaks, reverse flow, no flow, tampers and other meter reading, field-related concerns). Instant data empowers utilities to make proactive calls to customers about potential problems like leaking toilets or line breaks *before* they lead to billing disputes. With the appropriate information, all this can be done without leaving the office or scheduling additional costly field investigations that increase the utility's carbon footprint.

In the unfortunate event that billing disputes occur, hourly consumption data can be obtained from the Mi.Net M mobile system in order to profile historical meter reading information pertinent to a specific customer's account. The two-way Mi.Net M mobile transceiver allows the meter reader to query meters for hourly data logging results from the comfort of the vehicle. The Mi.Net M radio stores up to 105 days of hourly consumption data, which can be easily retrieved, viewed and graphed using the EZ Profiler™ software. This data goes a long way in determining proper meter sizing, leak identification and resolution of customer complaints.

With the implementation of the Mi.Net M mobile system, utilities immediately reap the benefits of instant data logging and consumption profiling whenever the mobile collector is within range.

EZMobile™ Software

EZMobile™ software, part of EZ Reader™ Software Suite, is used for the collection of meter reads and instant data logging alarms throughout a meter reading route. EZ Mobile is designed for increased meter reading efficiency by providing the meter reader a series of tabs for viewing route information in several formats including: All Meters, Unread Meters, Read Meters and via the Map. The various tabs and mapping screen will display the current meter read and any instant data logging alarms associated with a specific account such as leaks, backflow, etc.



The "All Meters" tab displays a list view of every meter in the selected route database; "Unread Meters" displays a list view of those meters for which data has not yet been collected; and "Read Meters" displays a list view of locations that a meter reading has been received. The "Route Detail" tab contains additional information about individual meters, such as route sequence number, high/low reading parameter, message(s) about the account, etc. The "Route Detail" tab also offers additional functions like "Speed Search" (allowing the user to find a particular meter quickly) and "Attach Notes" (allowing the user to make notes on a specific account for themselves or to relay back to the billing department).

The "Mapping" tab is not only the most popular but the most efficient and convenient way for meter readers to view their route data. Within the "Mapping" tab, a physical representation of the geographical area being read and the meter locations are displayed. Each meter location is based on GPS Lat/Long coordinates and is displayed on the screen. Each meter location is visually depicted on the map using blue dots. As the

operator selects "Start Reading," these blue dots will begin to disappear as meter data is retrieved. If there is an instant data logging alarm associated with a specific meter location (i.e. leak), the blue dot will turn to a red dot instead of disappearing prompting the meter reader to take action while in the field if so desired. With the EZ Mobile Software, not only can the operator visually see the progress being made throughout the route but notifications of any problems are immediate. If one of the blue dots turns to a red dot, the operator can *Stop Reading* and double click on the dot in order to determine the actual problem at this location (it could be a Small Leak, Continuous Flow, Reverse Flow, No Flow, or Register Disconnect).

Once the situation has been assessed, utilities can be proactive in determining how to handle the account. Meter readers can initiate a download of 105 days of hourly data that can be used then or in the future for resolution of issues related to the account. Instant data logging alarms eliminate driving back and forth to the office; powerful and useful data is now at the fingertips of utility personnel to determine the proper course of action. Door hangers or customer phone calls are immediate options.

INSTANT DATA LOGGING ALARMS

SMALL LEAK: This exclusive and highly sophisticated alarm algorithm identifies extremely small leaks that other systems may miss. The MLNet M mobile system Small Leak alarm will identify almost undetectable leaks for added water conservation. This alarm is set when the following data logging parameters are met for at least three weeks: the current meter read is higher than that of the previous meter read for at least 18 out of the past 24-hourly intervals, and there are no two (2) consecutive zero flow events. This alarm provides on the spot data logging notification of a *potential* small leak. A proactive solution would be to use a door hanger or send an email to the homeowner/tenant informing them of a possible leaky toilet or faucet drip. This will help to increase consumer awareness of water conservation issues and generate good will as the customer recognizes the town's effort to proactively work against unnecessary water loss.

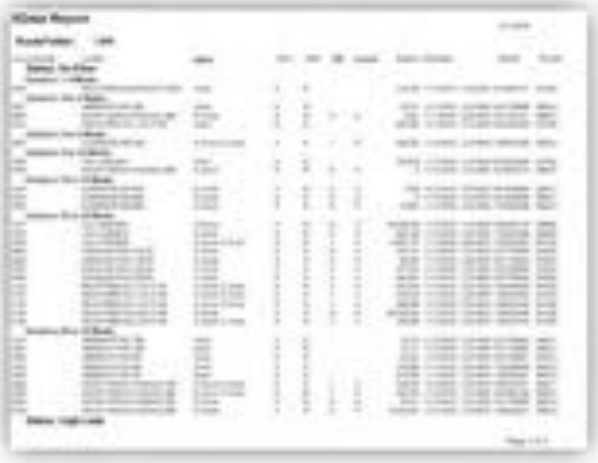
CONTINUOUS FLOW LEAK: The Continuous Flow alarm alerts utilities of constant flow (aka High Leak) through the water meter. This leak alarm is defined as 1/4 gallon per minute (gpm) or higher and is triggered when the following parameter is met: the current meter reading is higher than that of the previous meter reading for more than 96 hours. A leak of this nature could be something like a broken or cracked pipe, theft, or a malfunctioning fixture or tap. In this case, a door hanger or a phone call to the homeowner/tenant would alert them before they receive a higher than usual water bill in the mail. This will not only alert the customer but could also prevent an angry phone call to a customer service representative down the line. For Continuous Flow alarms, the notification will remain in the system for 60 days after the problem ceases to notify utility personnel of a previous problem at this account.

REVERSE FLOW: The Reverse Flow alarm alerts the Utility that a water meter has registered water in the reverse direction. The following parameter is met to trigger a reverse flow alarm: the current meter reading is less than the previous meter reading for more than 6 hours. This type of alert could indicate theft, improper installation of the meter or a potential plumbing problem. In the event of a reverse flow alarm, the operator is being notified while still at the site, so the meter could be

immediately inspected to find the cause of the alarm. For Reverse Flow alarms, the notification will remain in the system for 60 days after the problem ceases to notify utility personnel of previous problem at this account.

NO FLOW: The No Flow alarm alerts utilities to the fact that there is no water flowing through the meter. The No flow alarm is set when the current meter reading equals that of the previous meter reading for at least three weeks. This type of alarm could suggest vacant property, seasonal property, or the meter has been removed from the line (potential theft). The ability to monitor the meter while at the site prevents additional site visits.

REGISTER DISCONNECT: The Register Disconnected alarm alerts utilities that the Transmitter Radio device is unable to communicate with the Encoder register for some unidentified reason. The Disconnect alarm is set when the Transmitter is getting no response from an interrogation request to the register. This alarm could mean the register wire has been tampered with or a potential bad connection between radio and register. The alarm is logged each time it does not communicate with the encoder register, keeping utility personnel informed and able to decide on the best course of action to be taken. This is another alarm that is beneficial for immediate investigation to determine the cause of the problem and eliminate a costly return trip.



Extended Data Report: The Extended Data Report is a feature of EZ Mobile that allows utility personnel to view all Instant Data Logging Alarm information in a single report. The Extended Data report can be extremely helpful when the meter reader is in a populated area and several locations have an alarm. Additionally, the report is useful at the end of the reading route and an overview of all instant data logging alarms is necessary. To view the report, select the "View XData" button within EZ Mobile and a concise list of all locations with an instant data logging alarm will be shown, along with the duration of each alarm.

Hourly Consumption Data: In addition to the Instant Data Logging Alarms, the MiNet M mobile system will capture up to 105 days (over 3 months) of hourly consumption data that can be easily retrieved using Mueller Systems MiNet M Mobile Transceiver utilizing EZ Profiler software. The detailed information can be viewed in the field or back in the office to resolve and address customer billing complaints and disputes, monitoring and enforcing watering bans/restrictions, etc. The hourly consumption data can be viewed in a number of ways to help utility personnel better address the concerns of their customers. Displaying the data in

graphical form provides a view of historical data from the past 105 days in hourly, daily, weekly or monthly intervals. The data may be viewed in a variety of ways depending on the most applicable format for the situation. In addition to the graph settings which may be modified to present the data in a variety of way, passing the mouse over the graph will display an individual hourly meter reading or consumption. The mouse can also be used to drill down into a subset of data.

B	C	D	E	F	G	H	I	J
	12/23/2008 12:38 AM			143			Good Meter Rea	
	12/23/2008 01:38 AM			143			Good Meter Rea	
	12/23/2008 02:38 AM			143			Good Meter Rea	
	12/23/2008 03:38 AM			143			Good Meter Rea	
	12/23/2008 04:38 AM			143			Good Meter Rea	
	12/23/2008 05:38 AM			143			Good Meter Rea	
	12/23/2008 06:38 AM			143			Good Meter Rea	
	12/23/2008 07:38 AM			143			Good Meter Rea	
	12/23/2008 08:38 AM			144			Good Meter Rea	
	12/23/2008 09:38 AM			144			Good Meter Rea	
	12/23/2008 10:38 AM			140			Good Meter Rea	

Hourly Consumption Data is also available in a report format with easy export into the format of your choice (i.e. Excel, PDF). Report information includes the serial number of the meter's register, hourly reading, hourly usage and any Instant Data Logging alarms received from each meter. Historical profiles can be built for troublesome accounts to provide your billing and customer service representatives the chronological data they need to resolve billing disputes. This information can also be invaluable when right sizing meters and locating line breaks when zone or utility metering is employed.

EASE OF USE

When you combine Mueller Systems' exclusive Instant Data Logging Alarms, available only with the MiNet M mobile system, along with Hourly Consumption Data, you now have a Customer Relationship Manager (CRM) solution. Instant Data Logging will provide an alarm on a geographical map immediately at the meter location and an informed decision can be made instantly to stop and download the hourly consumption data for that meter. Utilities can instantly notify their customers of leaks before they receive a large bill, as well as generate a detailed profile of their usage in case they ask for details of a billing period in question. The MiNet M mobile system provides data typically associated with AMI systems in an efficient and cost-effective manner.

MIGRATION SOLUTIONS

The MI.Net® system is future-proof, offering an open-architecture RF platform that can start in AMR "drive-by" mode and upgrade to the industry's most-advanced AMI system when appropriate. Our MI.Net® M drive-by radio-read system provides two-way communication between every meter and the mobile collector located in the meter technician's vehicle. Meters and transmitters are also AMI-ready, so there is no stranding of components when the move to a fixed-base network is implemented. When your system requirements become great enough, the system can be transformed into an AMI solution without replacement of the meters and MI.Node M units; preserving your original investment in the technology. The addition of fixed collectors and hosted User Interface transforms your mobile system into a fixed network data generation machine; and your MI.Net M mobile transceiver becomes your mobile backup device in the event of a catastrophic event that knocks out power for an extended period.

MIGRATION FROM AMR TO AMI AND BEYOND

MI.Net Migratable solution will allow the Utility to deploy endpoints alongside other existing meter reading platforms while moving toward a complete mobile AMR or AMI fixed network system. Deploying the MI.Net

Migratable system in an AMR mode brings much of the functionality and two-way capabilities of the Mi.Net AMI system into a mobile application. The performance and cost effectiveness will allow the Town to maximize efficiency and reduce costs encountered in the meter reading process.

In the event system requirements remain the same, the Mi.Net Migratable system will still deliver more functionality, more effectively than other meter reading systems available today. This proposed system includes a migratable AMR to AMI strategy, with mobile capabilities and optional remote water service disconnect with the use of Mueller Systems' exclusive Remote Disconnect Meter (RDM), as well as additional (optional) system monitoring products. No other network solution offers the same level of functionality, value, and service as Mueller Systems and the Mi.Net Migratable system.

The Mi.Net® system is future-proof, offering an open-architecture RF platform that can start in AMR "drive-by" mode and upgrade to the industry's most-advanced AMI system when appropriate. Mi.Net® supports the Long Range, Low Power Wide Area Network (LoRaWAN) protocol which is an emerging industry standard for various "smart utility" and "smart city" monitoring and control devices. As development progresses, the Utility could incorporate irrigation system control in common areas, water main leak detection and pressure monitoring, automatic line flushing, automated water quality testing, smart dumpsters that signal when they are full, parking meter automation, pet tracking and much more as the list of LoRaWAN-compliant products and services continues to grow.

Our Mi.Net® M drive-by radio-read system provides two-way communication between every meter and the mobile collector located in the meter technician's vehicle. Meters and transmitters are also AMI-ready, so there is no stranding of components when the move to a fixed-base network is implemented. When your system requirements become great enough, the system can be transformed into an AMI solution without replacement of the meters and Mi.Node M units; preserving your original investment in the technology. The addition of fixed collectors and hosted User Interface transforms your mobile system into a fixed network data generation machine; and your Mi.Net M mobile transceiver becomes your mobile backup device in the event of a catastrophic event that knocks out power for an extended period.

Migration to fixed-network further affords the unparalleled service and support offered through our Network Operations Center (NOC), a world class facility with a multi-tiered support team. Keeping your system operating at peak performance is very important to Mueller Systems which is why we built this state-of-the-art NOC and equipped it with a team of experts dedicated to continuously monitoring and maintaining your Mi.Net System performance. Mueller Systems is committed to creating value through an unbeatable combination of industry-leading technology, innovative and reliable water infrastructure products, while having laser-focused customer service. All of this comes together at the NOC.

AMI SYSTEM

AMI SOLUTION DETAILS

The Mi.Net System uses a robust, two-way communication network for passing both on-demand meter reading capability within 30 seconds or less and infrastructure management messages. A variety of hardware and software components make up the system and are organized into four functional operations: field monitoring and recording, network communications, system management and consumer engagement.

LoRa TECHNOLOGY

Endpoints and infrastructure within the Mi.Net system utilize a specially-designed radio chip that allows an endpoint operating in the 902-928 MHz frequency band to essentially eliminate all interference and transmit substantially further (miles) using very little battery power. Because of this ability, it is quickly becoming a preferred radio chip for leading-edge devices operating in the Internet of Things (IoT). Furthermore, Mueller is a Class B member of the LoRa Alliance along with companies such as IBM® and Cisco®, which provides open, standards-based communication. The Mi.Net system uses LoRa® signal modulation to collect water meter data from the Mi.Node AMI radio endpoint long distances with great reliability to data collectors mounted at specific, city-owned locations. The data collectors uses 4G cellular backhaul communication to send this information to the data server where it can be viewed and manipulated through web-based software. Mi.Net provides two-way communication to collect incoming consumption and alert messages while managing outgoing programming changes, on-demand read requests, or other commands to/from the City. This allows utility staff to get real-time readings or even turn off/on water service with our remote disconnect meter (for ⅝" x ¾" services) within seconds from an account at the far end of the service territory, without ever leaving the office. Information is securely transferred by every system endpoint up through the data collectors, then made available to the City via a graphical and simple-to-use meter data management software (MDMS) interface.

The unlicensed frequency band allows the Mi.Node endpoint a full one-Watt (1W) transmission power which is used with LoRa® signal modulation technology to virtually eliminate any interference, achieving greater transmission distances than many other FCC unlicensed or licensed systems. Mi.Net also takes advantage of the increased bandwidth the unlicensed frequency band provides over licensed systems, which allows us to easily integrate other water management technologies.

NETWORK DEVICES

Mueller Multi-Network Collector

Incoming meter data is passed to a data collector. The collector acts as the major network relay point for all the meters within a particular geographic area, communicating directly with the system's operating software to either deliver collected meter reads or to pass outgoing messages to specific meters or groups of meters.

Data Collectors – Our Multi-Network Data Collectors are inexpensive, 120v AC or solar-powered, compact devices which are easily mounted in accessible locations. Ideal mounting heights for the collector antenna are 100 feet or higher in order to provide the maximum coverage. The collector itself is generally installed at a serviceable height regardless of the antenna height. Collectors are configured to automatically receive data from the Mi.Node radio endpoint at prescheduled intervals but can also process on-demand reads in less than thirty seconds.

Signal Repeaters – Mueller also produces the RF signal repeater. These include AC-powered or DC-powered versions which allow Mueller to design and build the most robust unlicensed AMI network available at the lowest overall cost. This network will allow the Utility and City to get reliable data in challenging RF areas.

Mi.Tech Handheld

Mi.Tech Handheld – The Mi.Tech field handheld computer allows the installer to accurately retrieve installation work sheets from the Mi.Net AMI server via mobile internet access. At the time of installation, the handheld computer records the GPS coordinates of the meter and tests/interrogates the Mi.Node radio endpoints using the install radio.

SOFTWARE

Consumer Portal – WaterSmart® is our web-based on-line information presentment tool, which lets the City's and Utility's water consumers see their personal consumption and interval data, compare use between current and previous periods, set and adjust target spending budgets, and manage a personal email or SMS alert for immediate notification of account problems, leaks or abnormal usage.

WaterSmart® Software provides intelligence beyond the meter to make the lives of the City or Utility staff easier.

- Water providers using WaterSmart's cloud-based, customer engagement and analytics platform have been proven to reduce costs, protect revenue, and increase customer satisfaction by more than 25%.

- WaterSmart® enables the City and Utility to easily engage with your customers to build satisfaction and support through omni-channel, personalized communications. The Group Messenger feature allows the City and Utility to send timely, targeted emails, SMS, and voice messages to groups of customers.
- WaterSmart® provides improved data intelligence to help save time, improve data quality, reduce billing errors, and measure program effectiveness.
- WaterSmart® delivers a best-in-class payment solution for the City and Utility to drive online payments, autopay, paperless billing adoption and improved payment performance with an integrated Customer Self-Service Portal.
- Affordability programs for low income customers can be delivered through WaterSmart® forms, Group Messenger, Recommendations, and other resources in the Portal. WaterSmart's Customer Success team is experienced in configuring the Portal to better serve low income or fixed income customers.

SOFTWARE MI.NODE RADIO MODULE

Each individual water meter is equipped with and read by a two-way radio module known as a Mi.Node endpoint. The Mi.Node endpoint is attached to meters to make meter reading and data collection simple and automatic. In standard configuration, the Mi.Node endpoint stores data in 60-minute intervals. Each Mi.Node endpoint maintains the data in its non-volatile onboard memory for up to 511 days of hourly data in order to protect the City or Utility against any single point of failure that would result in system wide, cell wide, or other catastrophic loss of data.

In addition to basic consumption data, system alerts such as leak detection, no flow, reverse flow, register removal, low battery alarm, and more are constantly monitored. Priority alerts, such as a reverse flow or high leak, will cause the Mi.Node to immediately wake and send a real-time message over the network. These alerts can generate notification to both the City and Utility personnel and individual water consumers. Interval data and non-priority alarms are transmitted back to the User Interface (UI) every 24 hours.

Due to the severe environment of meter pits, it is essential that any AMI device installed is engineered for the harshest of conditions. Mi.Node endpoints are designed to survive life inside the meter pit and be subjected to the nastiest of temperature and moisture extremes. Each Mi.Node circuit board is potted to best in industry standards then isolated within an engineered potting compound inside the enclosure. The Mi.Node is designed with no customer serviceable or replaceable parts, including batteries. This methodology eliminates any possible pathways for moisture intrusion and provides the City and Utility with the highest level of protection against environmental damage to the radio unit. This has been proven effective in similar locations across the country. The Mi.Node units are designed and warranted for a 20-year life inside the meter pit.

The Mi.Node is available in multiple mounting configurations for pit installations including versions to mount through meter box lids. In order for the radio signal propagation to be most effective, the Mi.Node needs to be positioned properly in the pit, as high as possible, if installed underneath a plastic pit lid, or through the lid for maximum performance.

Sentryx Water Intelligence Platform, AMI Head End, and Meter Data Management System

Coming in 2020, Mueller will once again revolutionize the water market with the release of its Sentryx Water Intelligence Platform. Approximately three years ago, Mueller recognized the need for a single, integrated, smart water platform that could serve as the central data repository for its intelligent water technologies and began building one from the ground up. This platform would need to provide lightning fast analytics and reporting tools across various technologies, including traditional meter AMI data, pressure data, water quality data, acoustic leak detection data, and more. Sentryx is the future of intelligent water management. It is a single solution for end-to-end water management. Sentryx measures, monitors, and will empower the Utility staff to act on insights from across your water distribution system. It ensures efficient, safe, and reliable delivery of high-quality water to your customers. Utilities today tell us that it is no longer enough to focus only water consumption. Today's water distribution challenges require a deep understanding of data from across the distribution system to make informed decisions. By aligning previously separate tools, the Sentryx Water Analytics Platform lets you take a holistic approach to challenges today's utilities face including increasing distribution operations efficiency, actively managing aging water infrastructure, and building the utility workforce of tomorrow. Sentryx was designed to power smart decisions on water loss analysis, distribution leak monitoring, understanding and reducing non-revenue water (NRW), pressure and transient pressure management, water quality analysis, remote control and disconnect, and hydraulic model support. With the Sentryx Water Intelligence Platform, you no longer need separate Meter Data Management (MDMS) and AMI Head End systems. Both are merged into a single powerful platform bringing you the robust features you expect from standalone systems, unified into a single, easy to use, high performance, and secure single solution. More than that, Sentryx also unifies other sensors and controls from across your distribution system, enabling you to manage Echologics fixed acoustic leak detection, pressure monitoring, flushing, and water quality analysis from HydroGuard, and Singer control valves, all from the same shared user interface. Mueller realizes there are many roles in your organization—customer service, general management, billing, water quality, conservation, distribution maintenance—and all need access to timely, relevant, and actionable data to do their jobs effectively. But not everyone needs access to the same functions and data or wants things displayed in the same way. Whether users are accessing meter or other sensor data, setting and reviewing alerts, generating reports, managing system communications, or looking up individual meter details, users use the same software, but they use it differently.

Sentryx is a customizable user experience allowing utility administrators to manage the roles, access levels, and functions available to each user. Sentryx also enables each user to individually customize their views and layouts to match the dashboard tools, visualizations, alert preferences, table filters, and map settings to best align to their own preferences and support their unique roles and responsibilities. Users can easily customize which fields they want to view and the order that they are displayed on screen. These settings are then saved to their profile without affecting the view that other users see. Users can save views and filters and easily revert to the standard view if they do not like the changes they made. This allows users with different roles to customize the way they use the system to best serve their own individual needs.

Sentrxy is a fully hosted solution. That means, the Utility has nothing to install, no licenses to manage, no upgrades to schedule and deploy, and no need to maintain costly servers. Users can access Sentryx from any desktop or laptop computer running Windows 7, Windows 10, or Apple IOS along with a current browser such as Chrome, FireFox, Safari, Internet Explorer or Microsoft Edge.

USER DASHBOARD AND CUSTOM REPORTING

After logging in, users begin with a fully configurable dashboard. The dashboard below has been configured to show total aggregate usage (water sales) for an entire system. This view compares daily consumption across an entire water system to daily consumption of the previous week. This view is useful for users with operational and day to day focus. Users could easily change this view to compare to the same time frame to the same dates in a prior year. This is particularly useful when examining consumption on a holiday. A different user could configure this chart to show hourly usage to aid in planning pumping cycles, and another could use a monthly focus to better understand year over year revenue trends. This tool makes it easy to identify days or times when usage is different than expected and further investigation could be warranted.

A user can also quickly and easily add additional "Widgets" to customer their dashboard. Widgets can include scheduled reports, alerts, or other data sets an individual user deems important. For example, if the Utility or City elects to deploy an Echologics acoustic leak detection system from Mueller, a user may want to view all new PCN (Persistently Correlated Noises or leaks) which were identified the night before. Sentryx also provides intuitive yet powerful tools for reporting across multiple data sets. Any reports that are particular useful can be saved and sent to the user's dashboard so they are always updated and available whenever he or she logs in. Sentryx also makes it easy for the Utility staff to search for individual accounts or devices. Working from the "Water Meters" tab, a Customer Service Representative (CRS) can easily search for an account based one or multiple criteria, such as account ID, customer name, billing or service address, or any other field imported from CIS. Simply click in the filter box to find the account. This helps utilities provide a high level of customer service by quickly and accurately looking up customer accounts and responding to customer concerns.
Sometimes users may not know the account they are looking for. If users are looking for meters that meet a particular condition, like high unbilled consumption or meters with alert statuses. Simply make sure "unbilled consumption" or any other relevant column is visible, then sort (ascending or descending) or filter to find the meters the Utility needs.

As shown in the attached images, Sentryx is built on an ESRI platform. Any time a user sorts, filters, or selects groups of data in the table, the map updates to reflect the same data set. Any reports or other data views that a user the saves or sends to their dashboard also include the map extents. Clicking on a saved view or report will automatically update the map. The converse is also true. Users can find accounts, meters, or other devices directly from the map or use the map to create groups or selections. This is useful when a user is familiar with the locale and wants to identify any meters, accounts or other devices in the area. Click and zoom on the map. As you do the, table adjusts to only show data relevant to what is visible on screen. In this way, users can quickly zoom to a known intersection or part of the City.

Users can combine these search techniques. A customer care representative might to zoom to a given area of the City that they cover, then filter to only show residential size meters, filter again to only show meters with leak alerts, and then sort by unbilled consumption. In this way they can decide how to respond to the potential leak—sending a mailer, making a call, or using a remote disconnect to turn off the service. If the user thinks this

particular data set is worth saving, they can simply "star" it for later use.

Data from the meter list can be exported in csv, excel, PDF for reporting or manually loading into other systems. From the meter list, users can also click on an individual meter to view its details to quickly view account specific information such as hourly consumption and a history of any issues at the property such as leaks. Note the consumption graph has the same features as the full system consumption on the dashboard making it easier to train staff. Customer service staff frequently view individual meter consumption by hour. Doing so makes it easy to determine the possible presence of a leak—if hourly consumption never returns to zero, the customer likely has some type of leak or continuous usage.

A customer service representative can utilize this information to help resolve customer complaints by initiating an on-demand read which provides a real-time reading of the customer's meter and brings the answer back in seconds. These high speed on demand reads make it possible to often resolve customer questions while on the phone, without a lengthy delay, or need for a call back or truck roll. On demand reads are also quite useful for collecting final reads for move-ins and move-outs.

VIEWING AND MANAGING ALERTS

Alerts are another component of the meter details page. Alerts in Sentryx are highly configurable and easily accessible from the meter details page. They can provide insights into the meter or its use that previously required a truck roll to the consumer's meter. Users can configure endpoint based alert settings for issues such as tampers or reverse-flows and set limits for software-based alerts such as low-leak and no-flow.

Soft disconnect is a special type of alert that monitors an account for any usage during a given date range (or indefinitely). This is useful for monitoring vacant properties or seasonally occupied homes. This alert can be set to notify users at the City or Utility as well as to email homeowners directly. Soft disconnects are automatically set when a Remote Disconnect Meter is closed to identify any potential tampering or a failure of the valve.

Provisionable Consumption Alerts are another specialized alert in Sentryx. This alert sets a defined threshold of consumption and enables the utility to monitor meters based on a defined and expected flow rate instead of relying solely on consumption values. This is key for monitoring large meters in industrial facilities or hospitals where a customer is always using water. When there is expected around-the-clock usage, traditional leak detection alerting, which checks for continuous usage over a defined time-period is of no value. The meter will likely always be running and would trigger a consumption-based leak alert.

With Sentryx's Provisionable Consumption users can turn off leak detection and instead enable consumption monitoring. Even though the meter is always running, you can determine and set a defined flow rate per hour, day, or week that exceeding would indicate abnormal usage. These alarms can be used to monitor either maximum or minimum levels or both at the same time. This allows a staff to monitor drops in usage as well, which may not trigger a non-consumption alarm, but do represent an abnormal drop in usage and revenue. This is critically important for commercial meters or high-volume accounts which represent an important revenue stream.

Alerts can be reprogrammed for an individual meter as shown above, but they can also be set globally for all meters, or by groups which can be defined by meter type, size, route or any other data field available in Sentryx. This gives utilities the flexibility to configure different alerts for different meter types such as irrigation meters; reclaim meters, commercial meters, etc. Since different customer types use water in different ways, have different needs, and often different rates, the priority and type of alerts necessary to monitor and support this variety in accounts is also different.

Alerts, like most data in Senrtyx can be added to any table. From there information is sortable using logical filters and capable of being exported for reporting. Meters with active alerts also show as red on the map. This makes it easy to focus on the meters that need attention or action.

Another useful feature is the alert history, which lists all the active alerts (high leak, reverse flow, zero consumption, etc.) associated with this account within the database along with the time and duration of the alert and any notes associated with this alert. This is helpful for those times when an alert is identified such as a high flow alert and investigated by an employee. This employee can note what was found (such as "homeowner filling pool") and then save this information if the customer questions the higher than normal bill down the road.

In addition to the ability to remotely configure the alert settings stored at the meter, Sentryx allows the users to configure the way in which the system handles alert notification to both staff and homeowners or consumers. By selecting the "Alerts" tab, a user can add utility personnel to the notification list, choose to notify personnel by text or email, and decide which alerts should go to which personnel. This increases efficiency and reduces the total number of "wasted" emails by only sending alerts to the relevant parties. Customer Service can be notified by email for customer leak alerts, Cross Connection Control can be notified by email or text or backflow alarms, Distribution Technicians can be notified for large drops or increases on commercial accounts, Code Enforcement can receive tamper alarms, IT can receive cell health alarms, etc. Utilities can even configure alarm settings differently based on shifts or time of day depending on work schedules or who's on call.

Users can also configure the logging intervals remotely for each endpoint. By default, most meters are set to read and store data hourly. This provides a good balance of battery life and granular data. Meters can be set to read in 5, 15, or 30-minute intervals for a specific date window. This is useful for engineering and conservation studies as well as upon customer request for a more detailed usage pattern analysis, after which the meter will automatically return to hourly readings to conserve battery life.

VIRTUAL METERING AND DMA'S

Virtual metering is one of the most powerful tools Sentryx provides. Virtual metering is provided using the MDMS "groups" function. Meter groups enable utility staff to use the sorting and filter tools within Sentryx to select specific accounts. For example, a user may filter look for all accounts within a certain route or cycle, or all accounts that have a certain rate class. The user can then create a new group from those accounts.

The user can sum consumption for all meters in a group, apply actions like on demand reads, or RDM actuation, and better organize their meters for analysis. Groups can be as simple as two meters (a compound meter perhaps) on the same property or more complex like all meters feeding a large industrial compound or military complex. A group could include hundreds or thousands of meters in the case of analysis by rate type. Groups can be kept private to an individual user or shared across a utility. A great example would be a local school board. Often the schoolboard will have multiple meters spread across the City. Grouping allows the Utility to create a virtual meter by combining all of the school meters to view the total consumption, view the total hourly usage and flow rates, and provide a single bill.

Sentryx makes it easy to build groups. From meter list table, select more than one meter and then choose New Group or Add To Group (to add new meter to an existing group) from the actions drop down. Groups can be based off any of the data that can be made visible in the meter listing table. Users simply show the columns they want, then filter to limit their selection to a specific group of meters, and then make their group. Users can also use the map to focus on a specific area and then use the columns, sorts and filters to make their group.

Groups can be used to better manage accounts with a history of tamper or leak, to monitor newly installed meters, or track a random sample of customers for research and analysis.

There is no limit to the number of virtual meters or groups a user can define, nor is there a limit on the number of groups a meter can be assigned to. Alerts can be set for all the virtual meter just like any other meter. Alerts can also be set for specific meters within the group.

District Metering Areas (DMA) are special groups that can be defined to gather synchronized readings from a group of meters. The DMA tool utilizes a both a graphical and tabular approach to creating custom groups of meters and calculate the consumption within that group. Utilizing the ESRI based mapping engine by drawing a box, polygon, or free-form shape to create custom groups of meters the graphical feature easily scopes the size of the DMA by geographical location and calculates the consumption within that group. Identifying meters as input, output, mixed use, and consumption allows the calculation of water loss within the DMA. By understanding how much water has been pumped into a DMA by a production site, and then sold either through retail consumption or wholesale to a neighboring utility, utilities can quickly identify areas of water loss for maintenance and inspection.

UI REPORTS AND ANALYTICS

Sentryx provides powerful, flexible, and user-friendly options for reporting and analytics. Sentryx's smart UI connects users to timely, relevant, and actionable data to make good decisions and do their jobs efficiently. Users can view the health of communication infrastructure, perform on-demand meter readings, generate billing information, view graphs based on usage, view all current alerts in the system, and set up daily, weekly or monthly automated reports.

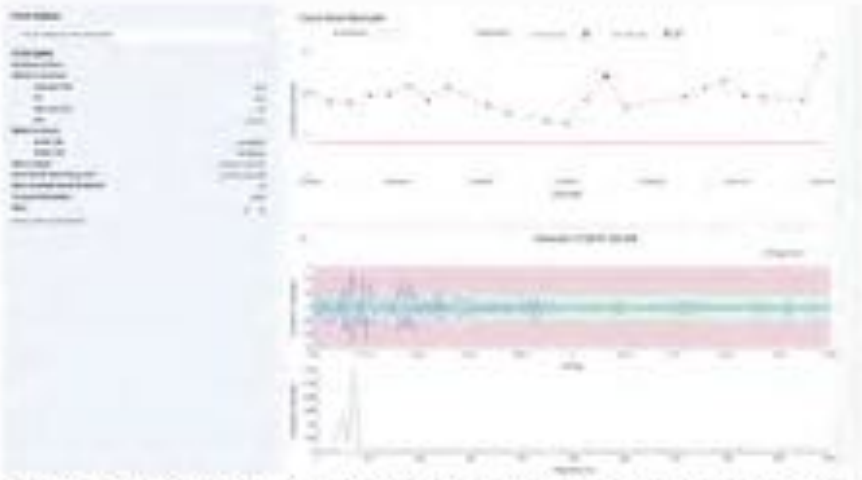
The data enables users to set up smart alerts to drive new insights by combining alerts with sensors (like RDM or leak detection) for efficient and effective operations. Such as automatically setting high flow alerts when remote disconnect meters are opened to monitor for potential flooding.
Sentryx is built on the concept of putting analytics "at your fingertips". This means that anywhere data exists it can be sorted, filtered, combined with additional sets, and used for reporting. Reports created anywhere within Sentryx on any type of data, whether it be meter usage, alerts, infrastructure status, or pressure alerts can be saved or scheduled for automatic reporting. Sentryx is built using powerful BI tools so that analytics and reporting is not a separate add-on or module. Wherever data is displayed in Sentryx, users have the power and flexibility to select the data and date ranges they wish to display, then sort and filter that data and display it as a table, graph, or map layer their desired information. In this way, reporting and analytics becomes part of everyday processes. Visualization allows operators to quickly identify abnormal patterns, graphically compare different customers or groups of customers, convert units of measurement, and even email a usage graph to a customer. These views can be saved as snapshots or scheduled to recur as needed and exported as PDF, CSV or excel.

As noted earlier, Sentryx is built to be the single data repository and analytics tool for all of Mueller's intelligent water products. By using a true data lake, Mueller is now able to not only provide information on meter data, but pressure, water quality, and acoustic leak detection as well and allow users to view, report, and analyze data from separate data sources such as leak detection and pressure management. Sentryx also provides remote command and control for these distribution automation devices as well.

Sentryx will allow the Utility to monitor for both pressure and water quality using Mueller's HydroGuard SMART devices. If a particular parameter, such as chlorine levels drop below acceptable levels, a Utility user can remotely schedule flushing events as long as the scheduled time. By using smart alerts, a Utility rep can also schedule flushing events to automatically happen whenever the Chlorine residuals reach a certain level, and to continue flushing until those levels are back to acceptable parameters.

Data fusion provides new insights at the interaction of previously separate data sets such as when a pressure sensor detects a drop in close proximity to a persistently correlated noise (PCN) identified by acoustic leak detection or monitoring pressure levels after a repair. Machine learning pushes analytics even further helping users to prioritize leaks by likelihood--helping users differentiate between small leaks on old pipe sections from those on newly installed segments.

By analyzing separate data sets in a single Water Intelligence Platform, the Utility can dramatically improve distribution operations and hydraulic modeling. Pressure management is just is just one example. The Utility or City can reduce system operating pressures, either remotely using Mueller's Singer valve technology, or by reduced pumping, and then use Sentryx's DMA tools to see the actual reduction in NRW through leaks being monitored with Mueller's acoustic leak detection technology. Comparing the pressure data with the number of new PCNs also provides insight into operating cost reductions (cost of repairs) and changes in total water sold allows the Utility the ability to optimize your system at the most economical point along the pressure curve.



REPORTING AS SERVICE

In addition to the reporting and analytics within Sentryx, Mueller also offers managed reporting as a service. These reports distill data from across the system and provide actionable data without having to dedicate resources to execute or interpret your data. Key reporting services include:

- Network Performance Report: Information about the health and performance of the MLNet network
- Meter Consumption or Reading Report: Detailed information in tabular or graph format for any meter or for a group of meters
- Aborted Meter Report: Displays meters that have not been installed and provides detailed information

for the reason the installer decided to skip or abort them
- Manual Reading Report: Shows any meters that have not reported on time and might need to be visited
- Task Report: Ability to run multiple reports related to tasks; for example, how many on-demand reads were sent during a specific time period
- Routing Report: Provides information regarding the network's routes
- Routing Configuration Report: 13 reports showing different network configurations
- Pending Message Report: Information about specific sections of the network
- Audit and Validation Report: 10 reports providing information for operational configuration and data validation
- Cell Health Reports: Multiple reports showing each endpoint configuration and performance

Additional reports are available and Mueller's NOC will provide helpful reports and services for the Utility.

SOLUTION IT ARCHITECTURE

The Sentryx water analytics platform which provides all required functions for day-to-day use of metering and water distribution systems, including assistance to customer service representatives, as well as general network management, alert management, database management, system configuration and troubleshooting. Sentryx provides a fully integrated MDMS solution in addition to its HES capabilities—this type eliminates the need for utilities to purchase a third-party MDMS solution. This can be a significant cost savings to the utility. It also significantly reduces technical project risk because it eliminates the need to integrate the AMI software with a separate software package, thereby reducing the possibility of subsequent delays in the implementation of the project. Additionally, Sentryx natively supports sensors from across the Mueller family of brands including Hydro

Guard pressure and water quality and Echologics fixed acoustic leak detection.
Sentryx is deployed through Amazon Web Services (AWS). INAP hosts the sever back end servers for the AMI network. In the diagram below, note the nodes—labeled discrete devices—communicate with collectors. Collectors in turn communicate with servers at INAP where data is ingested and then served to a virtual private cloud on AWS.

Individual users access Sentryx through the internet. On login, Mueller invokes authentication services provided by Cognito. On successful authentication, Mueller uses AWS Cloudfront content delivery network (CDN) and its global network of proxy servers to provide high performance data access. All services are accessed through the API gateway where all actions are logged. Sentryx also uses AWS Lamba functions for server-less computing functions, dynamically scaling based on application demand.

Mi.Net AMI SYSTEM ALERTS

One of the key benefits of any AMI system is providing proactive alerts for customer service issues such as leaks or operational issues such as customer tampering or potential backflow events. One of the key benefits of Mi.Net® over other AMI platforms is the ability to provide alerts in real-time, sending email or text messages to utility staff for issues like tampering or backflow within minutes of the actual occurrence in the field, while employing a smart battery management to ensure that the Utility gets greater than 20-years of operational life out of the system. Additionally, Mi.Net® allows a utility like the Utility to customize the alerts, whether based in the software or at the meter, to a greater degree than other AMI platforms either for a single meter or account, globally, or by group.

STANDARD ALERTS

The following alerts are monitored at the MI.Node™ endpoint level. When triggered during the regularly scheduled interval read (once per hour) they can be sent either with the standard consumption message at the end of the day (non-priority is the default), or in real-time when set as urgent (determined by the Utility) Settings can be reprogrammed over the network by the Utility or with assistance from Mueller's NOC.

- Unable to Read Device - Radio cannot communicate with the register indicating a cut wire condition.
- Reverse Flow - MI.Node™ has registered negative consumption over a programmable number of consecutive intervals. This indicates a continuous backflow event.
- High Flow - MI.Node™ has exceeded a programmable threshold for flow rate per hour/day/week. See table below. This typically indicates a pipe burst at the property
- Low Battery - MI.Node™ battery voltage is below minimum requirements indicating 3 - 6 months of remaining life.

The following alerts are monitored at the Sentryx database. These alerts are triggered daily as the meter data is uploaded to the database and analyzed by Sentryx. These can be reprogrammed in the software by the Utility or with assistance from Mueller's NOC.

- Small Leak - Often indicates a leaking toilet flapper or other small leak.
- No Flow - Could indicate a stuck meter, tampering, or other issue.
- Large Leak - Often indicates a larger leak at the property showing continuous usage.
- Soft Disconnect Violation - There is consumption on an account that has been identified by the Utility as vacant property or a property that has been disconnected for non-payment or other reasons. This typically indicates tampering.
- Wheel Location Error - Register cannot read the location of one or more mechanical odometer wheels (only for mechanical registers).

- Device Read Failure - MI.Node can communicate with the register but is not receiving valid information. Typically, this indicates a wiring issue or other register failure.
- Tamper Detected - Register ID number does not match the expected ID number indicating the meter or MI.Node has been switched. This could be due to incorrect installation or tampering.
- Provisioned Consumption - Meter usage has exceeded programmable thresholds for either minimum or maximum daily/weekly/monthly flow rates. Extremely helpful for commercial or other high use accounts where constant flow is often expected.

As noted above, MI.Net® provides multiple levels of leak detection and alerts for customer side leaks. The ability to identify leaks and to understand the size of the leak will allow the Utility to do a proper "leak triage" and provide customers with the pertinent information as well as understanding where to look for leaks. The following table describes the various parameters available for managing and understanding the leak alerts as well as the size of the leak needed to trigger each alert. All alerts are immediately viewable within Sentryx and are capable of sending email or text messages to the City or Utility staff. Alert thresholds are programmable over the network and the monitoring level is indicated by an icon.

Alert Type	Default Trigger	Minimum Flow Rate (Residential)	Customizable Fields
Large Leak	Continuous flow of at least 1 cubic foot per hour for 95 hours (4 days)	0.167 gpm (less than ¼ gpm but more than ⅛ gpm)	• Minimum hourly usage (resolution) • Number of hours examined (days)
Small Leak	Consumption of at least 1 cubic foot an hour for at least 1 hour out of every 3 hour window during a 21 day window	0.056 gpm (less than ⅛ gpm)	• Minimum hourly usage (resolution) • Number of instances needed • Number of hours examined (days)
High Flow	Consumption of the Utility specified volume within the Utility's specified time	Generally used to identify emergency high flow conditions	• Number of hours examined • Minimum consumption value • Maximum consumption value
No Flow	Zero Consumption or Zero Consumption higher than a specified threshold for 21 days in a row	Not applicable	• Maximum allowable hourly consumption to trigger alert (default < 1 gallon) • Number of hours examined (days)

Sentryx also supports the following alerts and diagnostics for the MNC: High Temperature, AC Power Out, Low Power Battery, GPS Signal Loss, GPS Not Locked, No Network Connection, Tower Top Unit Signal, Collector Antenna Signal, Tower Top Unit Power, Door Tamper. The user interface provides AC power outage and restoration indication for AC repeaters. The user interface provides a low battery alarm for battery powered repeaters.

ALERT PRIORITY LEVELS

Priority level and reporting capabilities for alerts are set to a factory default but are remotely configurable by the Utility staff. If desired, MI.Node endpoints can be programmed to immediately wake up and send alerts through the network when triggered. Lower priority alerts may also be established which would cause the MI.Node to log an event and send the data along with its normal consumption message. All alerts are immediately viewable by the Utility personnel logged onto the system and can be configured to send email alerts or text messages according to a built-in scheduler application. This will contact the Utility personnel and/or homeowners and notify them of the specifics of an alert condition. The Utility can identify specific staff members or departments to receive various alert types based on schedules (shifts, days, calendars, etc.). The Utility can have several options available for how to deal with alerts, such as simply acknowledging the alert, or tagging it for further actions or analytics.

Meter alerts are viewable in GIS or tabular view

SECURITY

As the number of connected devices increase, and user expectations expand, the challenge of providing highly secure and reliable systems becomes more and more complex—yet absolutely essential. Mueller understands security and make it a part of everything they do. It is more than just protecting data or securing devices and communication networks—it is adopting policies and processes and investing in people that make security a priority. Mueller takes a holistic approach to cybersecurity. Security processes and policies, rooted in the NIST Cybersecurity Framework, and aligned to ANSI/AWWA G430: Security Practices for Operations and Management, exemplify best practices from across industries. Software development is also guided by cyber security best practices including OWASP and SANS SWAT.

Mueller provides *Annual Commercial Security Briefings* because they believe in sharing their security expertise with their utility partners. *Quarterly Internal Testing, Security Audits, and Vulnerability Reviews* keep customers informed on how Mueller has responded to changes in the security landscape, both within the industry and beyond. Yearly, *Third-Party Penetration Testing* (software, hardware, devices, network, and infrastructure) ensures the system remains safe and strong. Mueller's *Product Security Incident Response Team* (PSIRT) regularly rehearses responses to various cyber-attacks, maintains a response playbook, and is always ready to help customers respond to any threat or incident that does occur using encrypted communications for added security.

AMI COMMUNICATION SAFTEY

Robust communication protocols guard against eavesdropping and data loss between MiNet® endpoints, collectors, and Sentryx. MiNet endpoints are programmed with individual, unique keys at time of manufacture. Unique keys mean every endpoints has its own unique encryption. These keys are used to generate AES-128 session keys for joining the network, signing and encrypting control messages down to the node from the network, and to sign all upstream messages. Packets contain a 16-bit Cyclic Redundancy Check (CRC) to ensure data and message integrity. Any packet that arrives at the network server which fails a CRC check, or fails the network signature check is rejected, and not processed by the network server, nor forwarded to the application server. If the keys become compromised, new keys can be generated for that MiNode™ by having it rejoin the network.

Keys are never transmitted over the radio network, or between collectors and the network server.
The MiNet® system also incorporates industry leading security features for remote disconnect commands. This methodology was developed in concert with a 3rd party cyber-security firm, hired by one of the largest water utilities in the United States. These features include the ability to require users to re-authenticate to initiate disconnect or reconnect commands and throttling procedures to safeguard against mass commands sent from an

individual user account accidentally or with malicious intent. More importantly, in addition to the unique security keys referenced above, each individual disconnect command receives a digital signature which can't be reused, eliminating the threat of "copy-cat" commands. Mueller's leading position as the industry's only proven supplier of remote disconnect meters has allowed them to also lead the industry in RDM security protocols.

NETWORK AND SOFTWARE SECURITY

Traffic between network collectors, the network provider server, and the Sentryx application server all utilize HTTPS to guarantee security and message delivery (at the TCP level). Messages that fail transmission are cached or stored at the appropriate level and delivered later when communication has been restored. If there is a persistent communication error between the collector and network server, or network server and the application server, the data is able to be retrieved at a later time.

The Sentryx user interface utilizes parameterized queries to access data from the database which prevents SQL injection from untrusted user input. The user interface also utilizes input validation to protect from cross- site scripting attacks. Sentryx is also protected by an industry standard Web Application Firewall, Intrusion Prevention, and Intrusion Detection System that is monitored twenty-four hours a day, seven days a week. All Sentryx application servers are fully backed up weekly, with incremental backups daily. Sentryx database servers are fully backed up weekly, with incremental backups every other day. The database logs are backed up every 30 minutes, allowing a database restore to occur for a period granularity of 30 minutes.

Access to data within Sentryx is securely controlled through rights/privileges, from single account viewing to full administrative rights. Sentryx utilizes parameterized queries to access data from the database which prevents SQL injection from untrusted user input. The user interface also utilizes input validation to protect from cross-site scripting attacks.

Our cloud hosting provider, Amazon Web Services, maintains Web Application Firewalls, Intrusion Prevention Systems, and Intrusion Detection Systems, and other technology to constantly monitor for Denial of Service (DoS) attacks and other potentially malicious activity, and alerts Mueller of any potential threats. Mueller is able to proactively protect against DoS through traffic filtering before the traffic reaches the Sentryx applications and data.

Software and Network Security Including:

ACOUSTIC LEAK DETECTION

The Mueller MiNode endpoints can be configured to log data from acoustic leak detection sensors strategically placed on fire hydrants throughout the City's service area. Specialized pumper nozzle caps are configured with integrated acoustic sensors which listen for leaks in between several adjacent points and can identify distribution side leaks then use this data to pinpoint a location. By monitoring for leaks over the network on a 24/7 basis, the Utility staff will be able to immediately address leaks as they arise. This leak detection data is passed through the network and analyzed to find distribution side leaks and to lower unbilled water loss. In addition, the City or Utility will benefit from the following capabilities:

- Ability to identify leaks or points of interest early
- Monitor leak progression
- Prioritize field crew schedules
- Significantly reduce pipe repair costs
- Achieve non-revenue water loss targets

STATE LICENSES

FERGUSON ENTERPRISES - CONTRACTOR AND GAMING COMMISSION LICENSES/REGISTRATIONS			
STATE	LICENSE NUMBER	CLASSIFICATION/TYPE	RENEWAL DATE:
Arkansas Contractor License Board	342001119	Meter Installation & Service	11/30/2020
Arizona Contractor License Board	ROC278489	Class A General Contractor	5/31/2022
	ROC215325	K-60 Dual Finish Carpentry	1/31/2022
	ROC215326	K-63 Appliances	2/28/2022
	ROC259640	C-05 Residential Light/Fan Fixtures	10/31/2021
AZ: Salt River Maricopa Indian Community	10-00210-PT	Non-gaming vendor registration	RENEWAL PENDING
CA: Santa Rosa Rancheria Gaming Comm.	SRRGC-2015-051	Non-gaming vendor registration	Evergreen
California Contractor License Board	1059063	Class A - Engineering (WW - meters)	10/31/2021
	1059063	C-36 Plumbing (meters)	10/31/2021
	1059063	Class D34 - appliance installs	10/31/2021
California Dept. of Industrial Relations	1000401934	Public Works Contractor Registration	6/30/2021
Florida Contractor License Board	CUC1225379	Certified Underground Utility & Excavation	8/31/2022
Idaho Contractor License Board	016718-D-4	Public Works Contractor	12/31/2020
Iowa Division of Labor Board	C108704	Contractor Registration (WW)	12/11/2020
Iowa Plumbing & Mechanical Board	24453	Master Plumber - Brian Rollins	6/30/2022
Louisiana Contractor License Board	63963	Specialty: Telecommunications (meters)	9/12/2022
MA Gaming Commission	NGV000385	Non-gaming vendor registration	6/30/2020
Minnesota Dept of Labor & Industry	PC644488	Plumbing Contractor (WW)	12/31/2021
Mississippi State Board of Contractors	23771-MC	Municipal Contractor (WW meters) (exam 9-20)	4/15/2021
Nebraska	46289	Contractor Registration only	8/15/2021
Nevada Contractor License Board	85179	Class A - Engineering (WW meters)	3/31/2021
New Jersey	13VH03924200	Home Improvement Contractor	3/31/2021
New Mexico	377598	GF-09 (Utility Lines - WW meters)	1/31/2023
North Carolina	74102	GC w/Bldg_Public Utility Specialty (WW meters)	12/31/2020
NC:Cherokee Tribal Gaming Commission	15-1315	Class III Non-Gaming Vendor	12/31/2020
North Dakota	36055	Class A	3/1/2021
Oklahoma	N/A	DEQ WW Operator certificates (multiple assoc.)	Evergreen
		Waterworks Operator - Class D	Evergreen
Oregon	157743	Residential GC & Commercial GC2	11/21/2021

South Carolina	118541	General Contractor (FWW)	10/31/2022
South Dakota	SSCNER1006172005C	Plumbing Contractor (Unlimited)	12/31/2020
Texas	N/A	No state license req'd - check local rules	N/A
Utah - FEL dba FWW	11944201-5501	E100 Engineering (water meter install)-no limit	11/30/2021
Virginia	2705-058435A	Class A (Unlimited) (HIC&HVA)	10/31/2022
Virginia	2705-058435A	Highway/Heavy classification (Utilities)	10/31/2022
Washington	FERGUEL813O5	General Construction Contractor	12/27/2021
Washington - Muckleshoot Indian Tribe	FER0224NG	Non-gaming vendor registration	2/25/2021

DBE/WBE POLICY INFORMATION

FERGUSON ENTERPRISES, INC.
SBE/MBE/WBE/VBE/SDVE/DBE RESELLERS/DISTRIBUTORS POLICY

Ferguson (including subsidiaries) expects all associates to comply with all local, state and federal laws and regulations related to the utilization of Small, Minority, Women, Veteran/Service Disable, Disadvantaged owned business enterprises. Such laws require that, in addition to being properly certified by federal, state, local government agencies and 3rd party certifying organizations, Small, Minority, Women, Veteran/Service Disable, Disadvantaged owned business enterprises resellers/distributors must provide a **commercially useful function** on public sector and/or private industry projects that require or have good faith efforts diversity goals.

Small, Minority, Women, Veteran/Service Disable, Disadvantaged owned business enterprises that act as a **"pass-through"** for billing purposes only to create the appearance of participation on projects does not meet the role of providing a **commercially useful function**

Performing a commercially useful function requires that Small, Minority, Women, Veteran/Service Disable, Disadvantaged owned business enterprises resellers/distributors add value to a transaction through performing a meaningful combination of the following responsibilities:

- Developing customer contacts independently
- Soliciting orders
- Providing product knowledge
- Determining quantity and quality
- Quoting jobs
- Negotiating pricing
- Receiving purchase orders directly
- Managing customer and vendor relations
- Establishing creditworthiness
- Sourcing material
- Paying vendors within terms
- Maintaining inventory
- Arranging direct shipments
- Expediting orders
- Delivering material
- Installing or modifying products
- Overseeing quality controls
- Responsibility for project management/contract performance
- Troubleshooting problems
- Assuming credit risk
- Invoicing
- Collecting and servicing warranties

Participation in a **"pass-through" transaction** in which Small, Minority, Women, Veteran/Service Disable, Disadvantaged owned business enterprises resellers/distributors does not add value through a commercially useful function is against Ferguson policy and is prohibited. Ferguson associates may not:

create fraudulent business records that do not accurately reflect the business transaction(s);

(i) re-bill a third party for materials previously ordered by, delivered and invoiced to another party; or knowingly participate in jobs involving the false utilization certifications by others.

All Small, Minority, Women, Veteran/Service Disable, Disadvantaged owned business enterprises resellers/distributors utilized in transactions must either be (i) currently participating in Ferguson's Distributor Alliance Program ("DAP") or (ii) reviewed and approved by the Business Diversity and Government Administration Manager under the SBE/MBE/WBE/VBE/SDVE/DBR RESELLERS/DISTRIBUTORS exception policy.

Any associate who knowingly violates this policy will be subject to disciplinary action, up to and including termination. Additionally, violators are at risk of personal criminal prosecution under federal, state and local laws.

Questions regarding a particular transaction or administration of this policy may be directed to Ferguson's Business Diversity and Government Administration Manager or Senior Director and Deputy General Counsel of Compliance

Updated: June 2020

MUELLER SYSTEMS CERTIFICATE

LPCB

www.redhat-fire.com

Certificate of Management System Registration

Certificate Number: 481 Issue: 09

Mueller Systems LLC

having complied with the requirements of

ISO 9001:2015

Quality Management Systems - Requirements

are certified by BRE Global Ltd. and are authorised to use the LPCB Certification Mark on stationery and publications related to the products and/or services listed in the attached Appendix.

Mueller Systems LLC
10210 Statesville Boulevard
Cleveland
NC 27013
USA

Scope:
Design and manufacture of electro-mechanical water meters and related waterworks products.

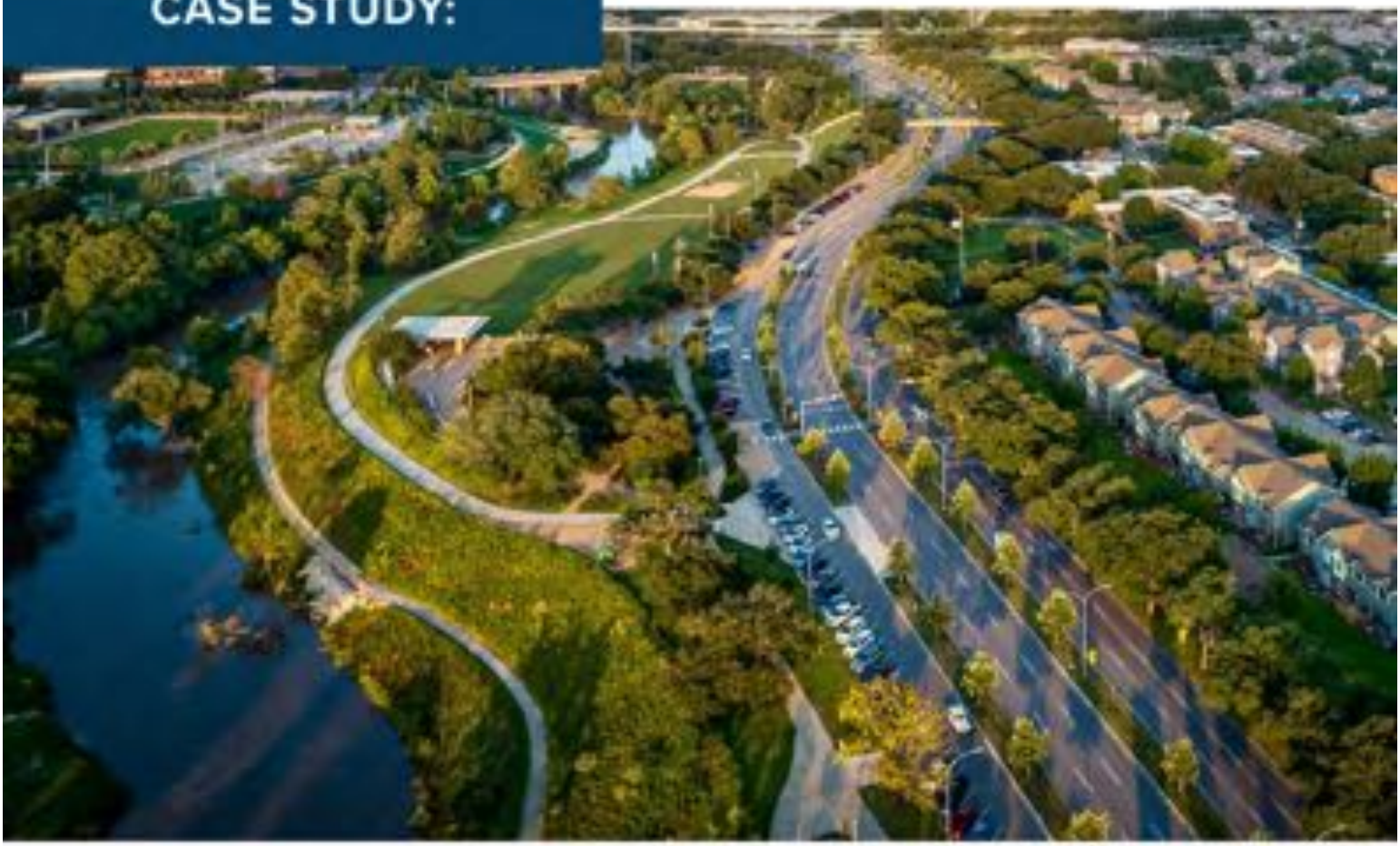
This certificate and appendix is maintained and held in force through regular surveillance activities.

Signed for BRE Global Ltd.	Phil Clary BRE Associate Director	03 September 2018 Date of BRE Board	02 September 2021 Expiry Date	30 November 1999 Date of First Issue

FAULKEY GULLY CASE STUDY

FERGUSON WATERWORKS

CASE STUDY:



Upgrading and Modernizing the Faulkey Gully Municipal Utility District

The Faulkey Gully Municipal Utility District (MUD) serves a rapidly developing suburb northwest of Houston. More than 8,000 people live in the district, located where the coastal prairie transitions to oak and pine woodlands. The population is rising steadily, fueled by economic expansion in Harris County and nearby Galveston.

MUDs were originally created to spur development near high-growth urban areas with the hope of eventual annexation by a larger municipality. The Faulkey Gully MUD was formed in 1973 by the Texas Water Commission to purchase, construct, operate and maintain water infrastructure with 3,000 meters. Its duties include providing water service to residential and commercial customers, maintaining the water supply and water quality, and managing wastewater and stormwater. It issues bonds, collects taxes and sets water rates.

The advent of new technologies and increasing demand for data-driven operations and customer service prompted officials to investigate a meter upgrade to improve efficiency and customer service.

THE CHALLENGES

- **Aging infrastructure:** Faulkey Gully's meter system was nearing the end of its useful life.
- **Community satisfaction:** Leaky pipes and other infrastructure issues weren't apparent until customers complained about high bills.
- **Challenging environmental factors:** The surrounding area frequently floods and the local soil is mostly sandy and clay loams.
- **Lost revenue:** Insufficient leak detection meant the MUD was unable to account for water lost to infrastructure and equipment issues.
- **Limited visibility:** A lack of access to real-time data, trend analysis and automated readings hampered accurate monitoring and meter reading.
- **Rising cost of water:** The surface water cost alone will be at $5.00 per 1,000 gallons within the next two years.

THE RECOMMENDATION

Doug Allen, a member of the district board, began investigating an update of the monitoring technology and replacement of the district's 2,300 residential connections and 700 commercial and agricultural ones.

"I looked at what would happen if we did nothing and just continued with the meters we have now versus solutions from various manufacturers," Allen recalls. "Using conservative numbers on our end, I found that switching to smart meters would save us $800,000 over 20 years, and that's after covering the cost of putting in new infrastructure and other upfront costs."

Another part of his analysis was comparing vendor networks against building a proprietary one. "Going with a vendor enables you to start getting data immediately, but it's expensive — about 89 cents per month per meter — and all it does is read," he adds. "Building our own data-collection system would give us real-time data and analysis. We're going to install ultrasonic leak detection on main line piping, so instead of waiting for a water geyser, we'll know when the problem is very small. With another system, I don't know that we'd even be able to get that for mainlines."

The MUD elected to work with Ferguson Waterworks and Mueller on the upgrade and collaborated with the company for almost a year prior to project launch.

"Using conservative numbers on our end, I found that switching to smart meters would save us $800,000 over 20 years, and that's after covering the cost of putting in new infrastructure and other upfront costs."

— Doug Allen,
Member of The District Board

THE TECHNOLOGY

The system upgrade consisted of:

- **2:** MiHub XR-R Data Collectors
- **6:** MiNet Repeaters
- **2,721:** 5/8" to 2" solid state water meters with MiNet radios
- **3:** 12" HbMag electromagnetic water meters with MiNet radios
- MiHost Data Analytics User Interface
- Consumer Portal
- **114:** MiEcho Leak Detection Sensors
- MiEcho Leak Detection Software

THE INSTALLATION

The installation went smoothly, thanks in part to the district's preparation before and responsiveness during the project. "Being prepared upfront is better," Allen says. His recommendations:

1. Make a data-informed case. Preparation begins even before the installation. Allen's analysis provided the right level of detail to support decision-making. "One board member was questioning the recommendations, so I showed him the data and he saw the value immediately. I also used conservative numbers to build it so we wouldn't be promising the pie in the sky results." This expedites approvals and gives stakeholders confidence in the decision in upgrading and working with Ferguson Waterworks.

2. Do fieldwork and verification. Before the project kicked off, the district looked at what could be done before installations began to help reduce costs and speed delivery.

Others can consider being proactive by:

- Verifying the meter serial number and size at each location. "That gives you an accurate count of meters needed, so Ferguson can make sure we had all meters on hand for installations," Allen says.
- Cleaning boxes of excessive dirt and reset as needed. Faulkey Gully's operator, Municipal Operations and Consulting, cleared out all the meter locations to expose them, so install crews could focus on putting the meters in.
- Noting locations that have nonplastic lids (including the size) and schedule replacement before installation begins.
- Validating the accuracy of data points as much as possible.

3. Collaborate and communicate. Create a unified team and set expectations with a kickoff meeting for all stakeholders. During weekly project calls, stakeholders tracked progress, managed expectations and identified potential issues. Working together reduces bottlenecks and issues in the field. "We finished the meter deployment before we'd conducted the training," Allen says.

"One board member was questioning the recommendations, so I showed him the data and he saw the value immediately."

— Doug Allen,
Member of The District Board

THE RESULTS

Faulkey Gully's installation began on Dec. 16, 2019, and was completed on Feb. 19, 2020. It's still too early for a robust analysis of benefits and savings, but Allen is already seeing anecdotal upsides for the district, chiefly:

- More efficient use of staff time, and reduced vehicle travel costs and gas expenses with the rollout of automated meter reading.
- Increasing cost savings and water supply from leak detection, data monitoring and rapid response.

"It's already paying dividends," he asserts. "As much as the water's costing us and is not getting cheaper — this is a great way to help the district and our customers be smarter about water usage."

Customer service and satisfaction are improving, as well. The advanced metering infrastructure program has allowed the MUD to reach out to customers about high water use.

"As much as the water's costing us and is not getting cheaper — this is a great way to help the district and our customers be smarter about water usage."

— Doug Allen,
Member of The District Board

"I reached out to a residential customer because we were showing 25-gallon-an-hour usage around the clock at her location," Allen says. "She'd gotten her water bill a few minutes before my email arrived and was about to call. Turns out it was the upstairs toilet. And a little fast food place in our district was showing more than 130 gallons an hour. The operator went out there and, working with the restaurant's staff, found out a valve in the ice machine was stuck open and water was going straight through."

With more visibility into the flow of water through the system, the district and its customers can curb water lost to leaks and equipment issues, reduce demand on the stream, increase source sustainability and operate more efficiently.

"Ferguson's personnel, from salesperson, sales management, installation manager to the installation crews, were all very customer service oriented," Allen says. "They were all very customer satisfaction driven and flexible to the district and the district's operator."

ABOUT FERGUSON

As one of the nation's largest waterworks companies, Ferguson Waterworks offers contractors and municipalities a variety of products and services, including on-time delivery, unmatched support and industry-leading fill rates thanks to a coast-to-coast network of more than 200 locations and over 2,400 highly trained associates.

The Ferguson Waterworks Meter & Automation Group (MAG) has years of experience supporting customer meteringneeds and assisting with designing and installing a range of devices and technologies. Our highly trained team stays up to date on the latest metering technology from top brands, helping you increase meter reading accuracy, associate safety and water conservation.

For more information, visit www.ferguson.com/waterworks

FERGUSON WATERWORKS

SITE SURVEY

FERGUSON Waterworks
Meter & Automation Group

Installation Project Survey Questionnaire

- Project Owner / Location?
- The date the survey is needed. (Need min. 14 days)
- What is the age of the current system?
- Is there a meter specification? Please provide.
- Estimated project start date?
- Are there liquidated damages? If so, what are they?
- Does this project require payment of Prevailing Wage?
- Are there other special labor or licensing requirements (DBE, MWBE, contractor's license, plumber's?
- What is the proposed meter reading solution? AMR/AMI?
- What is the meter density? Are the endpoints spread across a large geographic area?
- Provide a list of water meter sizes and quantities of each.
  5/8"x3/4" -
  1" -
  2" -
  4" -
  6" -
  8" –
- Number of Full Meter Change-outs vs. Retrofits?
- Are we able to charge for work beyond a standard meter change-out? (Additional Services) or is the Utility going to do this work on their own?
- Are replacement meters the same lay lengths as those currently installed?
- What is the expected piping material? (Straight pipe, Setters, Galvanized, PVC, Pex)
- Age / condition?
- What are the requirements for customer notification – letters, calls, door hangers, etc?
- Describe current soil conditions.
- Are the meter boxes generally clean or dirty?

  *(Dirt below the meter register is a clean box) *
  *(Dirt below the register and covering meter coupler is minimal digging) *
  *(Dirt above the register is considered excessive digging) *

FERGUSON Waterworks
Meter & Automation Group

Installation Project Survey Questionnaire

- What is the current construction of the meter boxes/lids – concrete, composite, metal, etc.?
- Are current meter boxes generally in decent shape or deteriorated?
- What is the proposed node mounting position?
- If drilling is required-what type of lids? Plastic/Metal?
- Will lids need to be replaced at time of install? If so, what percentage?
- Does the Utility have a location for Storage of product?

*** Please supply as many photos as possible,

a. **Minimum of 30 separate residential (5/8”-1”) pit locations from all areas of town;**
b. **A representative sample of 1-1/2” and larger meters;**
c. **Any other unusual meter setups which could impact the scope of work?**
d. **Any additional items outside the contracted SOW will result in a change order signed by all parties before installs can move forward.**

INSTALLATON STANDARD PROCESS

Installation Guidelines

A. Installation Responsibilities of the Proposer:

(1) Water Shutoffs. The Proposer, including its agents and subcontractors, will be responsible for shutting off the water to each meter serviced as well as notifying each customer of the water shutoff. Some assistance may be required by Buyer with the notification of its customers. The Installation team will knock on the doors of residential customers as well as leave notifications on their doors. In the case of large commercial customers such as: schools, hospitals, nursing homes or any other commercial customer, special efforts will be made to ensure minimum disruption to their water needs. In order to prevent any damage from running flush valves or any other plumbing fixtures that are sensitive to water shutoffs, the Proposer, with the assistance of the City, will schedule replacements with these commercial customers and will notify the maintenance personnel when turning the water back on at these facilities.

(2) Meter Boxes, Vaults, and Roadways. The Proposer is responsible for repairing any damage it causes to meter boxes or vaults that result from the installation of the Project; the Proposer shall not be liable for pre-existing conditions or leaks. The Proposer may install new meter boxes or vaults as part of the project as authorized by the Buyer, if this work is requested it shall be billed per item at a rate established under the Contingency item section of the pricing schedule. Boxes shall be concrete box with metal top provided by the City. The Proposer may use salvageable meter box parts to repair existing meter boxes.

(3) Disposal. The Buyer will work with The Proposer for the disposal of all waste, debris and materials from the installation of the Project. The Proposer shall collect all debris from the work area and return them to a central collection point which the Buyer shall establish at the Buyer's work facility. The Buyer shall establish a storage location for any goods they wish to salvage and provide a refuse container for item they wish to dispose of.

(4) Liability. The Proposer is responsible for any damages that occur within 12" on either side of the water meter resulting from the Project installation. Any damages incurred within this 12" area will be promptly repaired at the expense of the Proposer. The Proposer is not liable for damages outside the 12" zone, either on the water distribution side or on the customer side incurred from the Project installation including shutoff, temporary outage, and restart of water service. The Proposer is not liable for

any preexisting conditions including leaks, faulty workmanship and materials from previous projects or rust. Should such conditions occur (*i.e.* leaks) the Proposer may document them and at Buyer's written request repair them for a negotiated price.

(5) Data Integration. The Proposer shall be responsible for the accuracy of all data collected with its
AMR and Implementation system and shall configure its data file format to interface with the Buyer's
Import/Export file format.

(6) Non-Covered Work. Contracted meter change outs contemplate a standard meter change out. In
the event that location's conditions require nonstandard work (i.e. move a service location, move fences for
or other customer structures and items for access, install systems in heavy traffic locations, alleys, parking
lots, resize or re-plumb services, etc.), Proposer and the Buyer will discuss pricing and work may proceed from this point or the Buyer may elect to excuse this work from the project.

NSF – 61/ ANSI INFORMATION

Mueller Systems
10210 Statesville Boulevard
Cleveland, NC 27013

office: 704-278-2221
toll free: 800-323-8584

November 10, 2020

To Whom It May Concern,

Please note that the American Iron & Steel Certification does not apply to our products:

Lined or unlined pipes or fittings; Manhole Covers; Municipal Castings; Hydrants; Tanks; Flanges; Pipe clamps and restraints; Valves; Structural steel; Reinforced precast concrete; and Construction materials.

Please refer to items 21 and 22 of the AIS Guidance Document (pages 8 and 9) available on the link below. The document states mechanical and electrical equipment are not considered "construction materials" for purposes of the AIS requirement. It specifically calls out meters as an example of equipment NOT considered to be a construction material. Therefore, meters are not subject to the AIS requirement.

http://www.epa.gov/sites/production/files/2015-09/documents/ais-final-guidance-3-20-14.pdf

Regards,

Joe Engram

Territory Manager

Mueller Metrology

NSF International
Ann Arbor, MI

February 25, 2013

Mr. Jeremy McCraven
Hersey Meter Incorporated
10210 Statesville Boulevard
Cleveland, NC 27013

Re: Compliance with NSF/ANSI 61-G

Dear Mr. McCraven,

At this time the following Hersey Meter products currently certified by NSF International to NSF/ANSI 61-G and meet both the health effects requirements of NSF/ANSI 61 when evaluated for ambient water contact (CLD23) and the lead content requirement of Annex G.

Water Meters:

430II 5/8" x 1/2", 5/8" x 3/4"
442II 3/4" x 3/4" , 3/4" short x 3/4",3/4" x 1"
452II 1" x 1"
562D 1 1/2", 562II 1 1/2"
572D 2", 572II 2"
MVR 1300 6" , MVR 350 3" , MVR 650 4" , MVR100 Flanged 1 1/2" , MVR100 Threaded 1 1/2"
MVR160 Flanged 2", MVR160 Threaded 2", MVR30 3/4" x 1/2", MVR30A 3/4" , MVR30B 3/4" x 1" , MVR50 1"
Model 420 Bronze Meter 5/8" x 1/2", 5/8" x 3/4"
Model 420 Bronze RDM Meter 5/8" x 1/2", 5/8" x 3/4"
Model 420 Plastic Meter 5/8" x 1/2", 5/8" x 3/4"
Model 435 Plastic Meter 3/4"
Model 445 Plastic Meter 1"
RFM100 1 1/2", RFM160 2", RFM30 3/4" x 1/2", RFM50 1"

If you require any additional information, please contact me at 734-913-5773.

Best Regards

Theresa Bellish

Theresa Bellish
Business Unit Manager
Water Treatment and Distribution Systems
Email: bellish@nsf.org

NSF International
Ann Arbor, MI

February 25, 2013

Mr. Jeremy McCraven
Hersey Meter Incorporated
10210 Statesville Boulevard
Cleveland, NC 27013

Re: Compliance with NSF/ANSI 61, Annex F

Dear Mr. McCraven,

Annex F took effect on July 1, 2012. At this time the following Hersey Meter products currently certified by NSF International to NSF/ANSI 61 meet the health effects requirements of NSF/ANSI 61 including the lower lead leachate requirements of Annex F for ambient water contact conditions, CLD 23:

Valves:

EDC IV 3" - 10"

Water Meters:

430II 5/8" x 1/2", 5/8" x 3/4"
442II 3/4" x 3/4" , 3/4" short x 3/4",3/4" x 1"
452II 1" x 1"
562D 1 1/2", 562II 1 1/2"
572D 2", 572II 2"
FM3 with HP PD bypass 6" x 2" - 10" x 2"
FM3 with RFM bypass 6" x 2" - 10" x 2" , 3" x 3/4" - 4" x 1"
FM3 without bypass 3" - 10"
MVR 1300 6" , MVR 350 3" , MVR 650 4" , MVR100 Flanged 1 1/2" , MVR100 Threaded 1 1/2"
MVR160 Flanged 2", MVR160 Threaded 2", MVR30 3/4" x 1/2", MVR30A 3/4" , MVR30B 3/4" x 1" , MVR50 1"
Model 420 Bronze Meter 5/8" x 1/2", 5/8" x 3/4"
Model 420 Bronze RDM Meter 5/8" x 1/2", 5/8" x 3/4"
Model 420 Plastic Meter 5/8" x 1/2", 5/8" x 3/4"
Model 435 Plastic Meter 3/4"
Model 445 Plastic Meter 1"
RFM100 1 1/2", RFM160 2", RFM30 3/4" x 1/2", RFM50 1"

If you require any additional information, please contact me at 734-913-5773.

Best Regards

Theresa Bellish

Theresa Bellish
Business Unit Manager
Water Treatment and Distribution Systems
Email: bellish@nsf.org

10210 Statesville Blvd.
P.O. Box 128
Cleveland, NC 27013
Phone: 704.278.2221
Fax: 704.278.9616
www.MuellerSystems.com

To Our Valued Customers:

In reference to: The “Buy American” provisions of The American Recovery and Reinvestment Act of 2009

As you know, Section 1605 of The American Recovery and Reinvestment Act (ARRA) requires that none of the funds authorized under ARRA may be used for a project for the construction, alteration, maintenance or repair of a public building or a public work unless all of the iron, steel, and manufactured goods used in the project are produced in the United States. These “Buy American” requirements have been interpreted by the Office of Management and Budget in a memorandum dated April 3, 2009, and further interpreted with respect to EPA State Revolving Funds in a memorandum from the Environmental Protection Agency dated April 28, 2009.

Based on these interpretations, and discussions with the relevant regulatory authorities, please accept this documentation as certification that the following Mueller Systems products assembled and tested at 10210 Statesville Blvd, Cleveland, NC 27013 comply with the Buy American requirements of ARRA:

400 & 500 Series positive displacement meters: 5/8” – 2”
MVR turbine meters: 3/4” – 6”
FM3 fire service meters: 3” – 10”
Mi.Net AMI System
Hot Rod AMR System

Mueller Systems LLC is a leading manufacturer and supplier of water meters, advanced metering infrastructure technology and controls to the municipal utility industry. Their products provide measurement and revenue information for utilities from the smallest residential account to the largest industrial users. These products improve revenue accuracy while encouraging conservation and providing information technology for reading, billing, and system analysis. Products are manufactured in the company’s modern ISO 9002 certified facility in Cleveland, NC. The product line Hersey, Established in 1859, is part of Mueller Water Products, Inc.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 20 2014

OFFICE OF WATER

MEMORANDUM

SUBJECT: Implementation of American Iron and Steel provisions of P.L. 113-76, Consolidated Appropriations Act, 2014

FROM: Andrew D. Sawyers, Director
Office of Wastewater Management (4201M)

Peter C. Grevatt, Director
Office of Ground Water and Drinking Water (4601M)

TO: Water Management Division Directors
Regions I - X

P.L. 113-76, Consolidated Appropriations Act, 2014 (Act), includes an "American Iron and Steel (AIS)" requirement in section 436 that requires Clean Water State Revolving Loan Fund (CWSRF) and Drinking Water State Revolving Loan Fund (DWSRF) assistance recipients to use iron and steel products that are produced in the United States for projects for the construction, alteration, maintenance, or repair of a public water system or treatment works if the project is funded through an assistance agreement executed beginning January 17, 2014 (enactment of the Act), through the end of Federal Fiscal Year 2014.

Section 436 also sets forth certain circumstances under which EPA may waive the AIS requirement. Furthermore, the Act specifically exempts projects where engineering plans and specifications were approved by a State agency prior to January 17, 2014.

The approach described below explains how EPA will implement the AIS requirement. The first section is in the form of questions and answers that address the types of projects that must comply with the AIS requirement, the types of products covered by the AIS requirement, and compliance. The second section is a step-by-step process for requesting waivers and the circumstances under which waivers may be granted.

Implementation

The Act states:

Sec. 436. (a)(1) None of the funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j–12) shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.

(2) In this section, the term ''iron and steel products'' means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

(b) Subsection (a) shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency (in this section referred to as the ''Administrator'') finds that—

(1) applying subsection (a) would be inconsistent with the public interest;

(2) iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(3) inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

(c) If the Administrator receives a request for a waiver under this section, the Administrator shall make available to the public on an informal basis a copy of the request and information available to the Administrator concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. The Administrator shall make the request and accompanying information available by electronic means, including on the official public Internet Web site of the Environmental Protection Agency.

(d) This section shall be applied in a manner consistent with United States obligations under international agreements.

(e) The Administrator may retain up to 0.25 percent of the funds appropriated in this Act for the Clean and Drinking Water State Revolving Funds for carrying out

the provisions described in subsection (a)(1) for management and oversight of the requirements of this section.

(f) This section does not apply with respect to a project if a State agency approves the engineering plans and specifications for the project, in that agency's capacity to approve such plans and specifications prior to a project requesting bids, prior to the date of the enactment of this Act.

The following questions and answers provide guidance for implementing and complying with the AIS requirements:

Project Coverage

1) What classes of projects are covered by the AIS requirement?

All treatment works projects funded by a CWSRF assistance agreement, and all public water system projects funded by a DWSRF assistance agreement, from the date of enactment through the end of Federal Fiscal Year 2014, are covered. The AIS requirements apply to the entirety of the project, no matter when construction begins or ends. Additionally, the AIS requirements apply to all parts of the project, no matter the source of funding.

2) Does the AIS requirement apply to nonpoint source projects or national estuary projects?

No. Congress did not include an AIS requirement for nonpoint source and national estuary projects unless the project can also be classified as a 'treatment works' as defined by section 212 of the Clean Water Act.

3) Are any projects for the construction, alteration, maintenance, or repair of a public water system or treatment works excluded from the AIS requirement?

Any project, whether a treatment works project or a public water system project, for which engineering plans and specifications were approved by the responsible state agency prior to January 17, 2014, is excluded from the AIS requirements.

4) What if the project does not have approved engineering plans and specifications but has signed an assistance agreement with a CWSRF or DWSRF program prior to January 17, 2014?

The AIS requirements do not apply to any project for which an assistance agreement was signed prior to January 17, 2014.

5) What if the project does not have approved engineering plans and specifications, but bids were advertised prior to January 17, 2014 and an assistance agreement was signed after January 17, 2014?

If the project does not require approved engineering plans and specifications, the bid advertisement date will count in lieu of the approval date for purposes of the exemption in section 436(f).

6) What if the assistance agreement that was signed prior to January 17, 2014, only funded a part of the overall project, where the remainder of the project will be funded later with another SRF loan?

If the original assistance agreement funded any construction of the project, the date of the original assistance agreement counts for purposes of the exemption. If the original assistance agreement was only for planning and design, the date of that assistance agreement will count for purposes of the exemption only if there is a written commitment or expectation on the part of the assistance recipient to fund the remainder of the project with SRF funds.

7) What if the assistance agreement that was signed prior to January 17, 2014, funded the first phase of a multi-phase project, where the remaining phases will be funded by SRF assistance in the future?

In such a case, the phases of the project will be considered a single project if all construction necessary to complete the building or work, regardless of the number of contracts or assistance agreements involved, are closely related in purpose, time and place. However, there are many situations in which major construction activities are clearly undertaken in phases that are distinct in purpose, time, or place. In the case of distinct phases, projects with engineering plans and specifications approval or assistance agreements signed prior to January 17, 2014 would be excluded from AIS requirements while those approved/signed on January 17, 2014, or later would be covered by the AIS requirements.

8) What if a project has split funding from a non-SRF source?

Many States intend to fund projects with "split" funding, from the SRF program and from State or other programs. Based on the Act language in section 436, which requires that American iron and steel products be used in any project for the construction, alteration, maintenance, or repair of a public water system or treatment works receiving SRF funding between and including January 17, 2014 and September 30, 2014, any project that is funded in whole or in part with such funds must comply with the AIS requirement. A "project" consists of all construction necessary to complete the building or work regardless of the number of contracts or assistance agreements involved so long as all contracts and assistance agreements awarded are closely related in purpose, time and place. This precludes the intentional splitting of SRF projects into separate and smaller contracts or assistance agreements to avoid AIS coverage on some portion of a larger

project, particularly where the activities are integrally and proximately related to the whole. However, there are many situations in which major construction activities are clearly undertaken in separate phases that are distinct in purpose, time, or place, in which case, separate contracts or assistance agreement for SRF and State or other funding would carry separate requirements.

9) What about refinancing?

If a project began construction, financed from a non-SRF source, prior to January 17, 2014, but is refinanced through an SRF assistance agreement executed on or after January 17, 2014 and prior to October 1, 2014, AIS requirements will apply to all construction that occurs on or after January 17, 2014, through completion of construction, unless, as is likely, engineering plans and specifications were approved by a responsible state agency prior to January 17, 2014. There is no retroactive application of the AIS requirements where a refinancing occurs for a project that has completed construction prior to January 17, 2014.

10) Do the AIS requirements apply to any other EPA programs, besides the SRF program, such as the Tribal Set-aside grants or grants to the Territories and DC?

No, the AIS requirement only applies to funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j–12)

<u>Covered Iron and Steel Products</u>

11) What is an iron or steel product?

For purposes of the CWSRF and DWSRF projects that must comply with the AIS requirement, an iron or steel product is one of the following made primarily of iron or steel that is permanently incorporated into the public water system or treatment works:

Lined or unlined pipes or fittings;
Manhole Covers;
Municipal Castings (defined in more detail below);
Hydrants;
Tanks;
Flanges;
Pipe clamps and restraints;
Valves;
Structural steel (defined in more detail below);
Reinforced precast concrete; and
Construction materials (defined in more detail below).

12) What does the term 'primarily iron or steel' mean?

'Primarily iron or steel' places constraints on the list of products above. For one of the listed products to be considered subject to the AIS requirements, it must be made of greater than 50% iron or steel, measured by cost. The cost should be based on the material costs.

13) Can you provide an example of how to perform a cost determination?

For example, the iron portion of a fire hydrant would likely be the bonnet, body and shoe, and the cost then would include the pouring and casting to create those components. The other material costs would include non-iron and steel internal workings of the fire hydrant (i.e., stem, coupling, valve, seals, etc). However, the assembly of the internal workings into the hydrant body would not be included in this cost calculation. If one of the listed products is not made primarily of iron or steel, United States (US) provenance is not required. An exception to this definition is reinforced precast concrete, which is addressed in a later question.

14) If a product is composed of more than 50% iron or steel, but is not listed in the above list of items, must the item be produced in the US? Alternatively, must the iron or steel in such a product be produced in the US?

The answer to both question is no. Only items on the above list must be produced in the US. Additionally, the iron or steel in a non-listed item can be sourced from outside the US.

15) What is the definition of steel?

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels.

16) What does 'produced in the United States' mean?

Production in the United States of the iron or steel products used in the project requires that all manufacturing processes, including application of coatings, must take place in the United States, with the exception of metallurgical processes involving refinement of steel additives. All manufacturing processes includes processes such as melting, refining, forming, rolling, drawing, finishing, fabricating and coating. Further, if a domestic iron and steel product is taken out of the US for any part of the manufacturing process, it becomes foreign source material. However, raw materials such as iron ore, limestone and iron and steel scrap are not covered by the AIS requirement, and the

material(s), if any, being applied as a coating are similarly not covered. Non-iron or steel components of an iron and steel product may come from non-US sources. For example, for products such as valves and hydrants, the individual non-iron and steel components do not have to be of domestic origin.

17) Are the raw materials used in the production of iron or steel required to come from US sources?

No. Raw materials, such as iron ore, limestone, scrap iron, and scrap steel, can come from non-US sources.

18) If an above listed item is primarily made of iron or steel, but is only at the construction site temporarily, must such an item be produced in the US?

No. Only the above listed products made primarily of iron or steel, permanently incorporated into the project must be produced in the US. For example trench boxes, scaffolding or equipment, which are removed from the project site upon completion of the project, are not required to be made of U.S. Iron or Steel.

19) What is the definition of 'municipal castings'?

Municipal castings are cast iron or steel infrastructure products that are melted and cast. They typically provide access, protection, or housing for components incorporated into utility owned drinking water, storm water, wastewater, and surface infrastructure. They are typically made of grey or ductile iron, or steel. Examples of municipal castings are:

Access Hatches;
Ballast Screen;
Benches (Iron or Steel);
Bollards;
Cast Bases;
Cast Iron Hinged Hatches, Square and Rectangular;
Cast Iron Riser Rings;
Catch Basin Inlet;
Cleanout/Monument Boxes;
Construction Covers and Frames;
Curb and Corner Guards;
Curb Openings;
Detectable Warning Plates;
Downspout Shoes (Boot, Inlet);
Drainage Grates, Frames and Curb Inlets;
Inlets;
Junction Boxes;
Lampposts;
Manhole Covers, Rings and Frames, Risers;

Meter Boxes;
Service Boxes;
Steel Hinged Hatches, Square and Rectangular;
Steel Riser Rings;
Trash receptacles;
Tree Grates;
Tree Guards;
Trench Grates; and
Valve Boxes, Covers and Risers.

20) What is 'structural steel'?

Structural steel is rolled flanged shapes, having at least one dimension of their cross-section three inches or greater, which are used in the construction of bridges, buildings, ships, railroad rolling stock, and for numerous other constructional purposes. Such shapes are designated as wide-flange shapes, standard I-beams, channels, angles, tees and zees. Other shapes include H-piles, sheet piling, tie plates, cross ties, and those for other special purposes.

21) What is a 'construction material' for purposes of the AIS requirement?

Construction materials are those articles, materials, or supplies made primarily of iron and steel, that are permanently incorporated into the project, not including mechanical and/or electrical components, equipment and systems. Some of these products may overlap with what is also considered "structural steel". This includes, but is not limited to, the following products: wire rod, bar, angles, concrete reinforcing bar, wire, wire cloth, wire rope and cables, tubing, framing, joists, trusses, fasteners (i.e., nuts and bolts), welding rods, decking, grating, railings, stairs, access ramps, fire escapes, ladders, wall panels, dome structures, roofing, ductwork, surface drains, cable hanging systems, manhole steps, fencing and fence tubing, guardrails, doors, and stationary screens.

22) What is not considered a 'construction material' for purposes of the AIS requirement?

Mechanical and electrical components, equipment and systems are not considered construction materials. Mechanical equipment is typically that which has motorized parts and/or is powered by a motor. Electrical equipment is typically any machine powered by electricity and includes components that are part of the electrical distribution system.

The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials: pumps, motors, gear reducers, drives (including variable frequency drives (VFDs)), electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators), mixers, gates, motorized screens (such as traveling screens), blowers/aeration equipment, compressors, meters, sensors, controls and switches, supervisory control and

data acquisition (SCADA), membrane bioreactor systems, membrane filtration systems, filters, clarifiers and clarifier mechanisms, rakes, grinders, disinfection systems, presses (including belt presses), conveyors, cranes, HVAC (excluding ductwork), water heaters, heat exchangers, generators, cabinetry and housings (such as electrical boxes/enclosures), lighting fixtures, electrical conduit, emergency life systems, metal office furniture, shelving, laboratory equipment, analytical instrumentation, and dewatering equipment.

23) If the iron or steel is produced in the US, may other steps in the manufacturing process take place outside of the US, such as assembly?

No. Production in the US of the iron or steel used in a listed product requires that all manufacturing processes must take place in the United States, except metallurgical processes involving refinement of steel additives.

24) What processes must occur in the US to be compliant with the AIS requirement for reinforced precast concrete?

While reinforced precast concrete may not be at least 50% iron or steel, in this particular case, the reinforcing bar and wire must be produced in the US and meet the same standards as for any other iron or steel product. Additionally, the casting of the concrete product must take place in the US. The cement and other raw materials used in concrete production are not required to be of domestic origin.

If the reinforced concrete is cast at the construction site, the reinforcing bar and wire are considered to be a construction material and must be produced in the US.

Compliance

25) How should an assistance recipient document compliance with the AIS requirement?

In order to ensure compliance with the AIS requirement, specific AIS contract language must be included in each contract, starting with the assistance agreement, all the way down to the purchase agreements. Sample language for assistance agreements and contracts can be found in Appendix 3 and 4.

EPA recommends the use of a step certification process, similar to one used by the Federal Highway Administration. The step certification process is a method to ensure that producers adhere to the AIS requirement and assistance recipients can verify that products comply with the AIS requirement. The process also establishes accountability and better enables States to take enforcement actions against violators.

Step certification creates a paper trail which documents the location of the manufacturing process involved with the production of steel and iron materials. A step certification is a process under which each handler (supplier, fabricator, manufacturer,

processor, etc) of the iron and steel products certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin. A certification can be quite simple. Typically, it includes the name of the manufacturer, the location of the manufacturing facility where the product or process took place (not its headquarters), a description of the product or item being delivered, and a signature by a manufacturer's responsible party. Attached, as Appendix 5, are sample certifications. These certifications should be collected and maintained by assistance recipients.

Alternatively, the final manufacturer that delivers the iron or steel product to the worksite, vendor, or contractor, may provide a certification asserting that all manufacturing processes occurred in the US. While this type of certification may be acceptable, it may not provide the same degree of assurance. Additional documentation may be needed if the certification is lacking important information. Step certification is the best practice.

26) How should a State ensure assistance recipients are complying with the AIS requirement?

In order to ensure compliance with the AIS requirement, States SRF programs must include specific AIS contract language in the assistance agreement. Sample language for assistance agreements can be found in Appendix 3.

States should also, as a best practice, conduct site visits of projects during construction and review documentation demonstrating proof of compliance which the assistance recipient has gathered.

27) What happens if a State or EPA finds a non-compliant iron and/or steel product permanently incorporated in the project?

If a potentially non-compliant product is identified, the State should notify the assistance recipient of the apparent unauthorized use of the non-domestic component, including a proposed corrective action, and should be given the opportunity to reply. If unauthorized use is confirmed, the State can take one or more of the following actions: request a waiver where appropriate; require the removal of the non-domestic item; or withhold payment for all or part of the project. Only EPA can issue waivers to authorize the use of a non-domestic item. EPA may use remedies available to it under the Clean Water Act, the Safe Drinking Water Act, and 40 CFR part 31 grant regulations, in the event of a violation of a grant term and condition.

It is recommended that the State work collaboratively with EPA to determine the appropriate corrective action, especially in cases where the State is the one who identifies the item in noncompliance or there is a disagreement with the assistance recipient.

If fraud, waste, abuse, or any violation of the law is suspected, the Office of Inspector General (OIG) should be contacted immediately. The OIG can be reached at 1-

888-546-8740 or OIG_Hotline@epa.gov. More information can be found at this website: http://www.epa.gov/oig/hotline.htm.

28) How do international trade agreements affect the implementation of the AIS requirements?

The AIS provision applies in a manner consistent with United States obligations under international agreements. Typically, these obligations only apply to direct procurement by the entities that are signatories to such agreements. In general, SRF assistance recipients are not signatories to such agreements, so these agreements have no impact on this AIS provision. In the few instances where such an agreement applies to a municipality, that municipality is under the obligation to determine its applicability and requirements and document the actions taken to comply for the State.

Waiver Process

The statute permits EPA to issue waivers for a case or category of cases where EPA finds (1) that applying these requirements would be inconsistent with the public interest; (2) iron and steel products are not produced in the US in sufficient and reasonably available quantities and of a satisfactory quality; or (3) inclusion of iron and steel products produced in the US will increase the cost of the overall project by more than 25 percent.

In order to implement the AIS requirements, EPA has developed an approach to allow for effective and efficient implementation of the waiver process to allow projects to proceed in a timely manner. The framework described below will allow States, on behalf of the assistance recipients, to apply for waivers of the AIS requirement directly to EPA Headquarters. Only waiver requests received from states will be considered. Pursuant to the Act, EPA has the responsibility to make findings as to the issuance of waivers to the AIS requirements.

Definitions

The following terms are critical to the interpretation and implementation of the AIS requirements and apply to the process described in this memorandum:

Reasonably Available Quantity: The quantity of iron or steel products is available or will be available at the time needed and place needed, and in the proper form or specification as specified in the project plans and design.

Satisfactory Quality: The quality of iron or steel products, as specified in the project plans and designs.

Assistance Recipient: A borrower or grantee that receives funding from a State CWSRF or DWSRF program.

Step-By-Step Waiver Process

Application by Assistance Recipient

Each local entity that receives SRF water infrastructure financial assistance is required by section 436 of the Act to use American made iron and steel products in the construction of its project. However, the recipient may request a waiver. Until a waiver is granted by EPA, the AIS requirement stands, except as noted above with respect to municipalities covered by international agreements.

The waiver process begins with the SRF assistance recipient. In order to fulfill the AIS requirement, the assistance recipient must in good faith design the project (where applicable) and solicit bids for construction with American made iron and steel products. It is essential that the assistance recipient include the AIS terms in any request for proposals or solicitations for bids, and in all contracts (see Appendix 3 for sample construction contract language). The assistance recipient may receive a waiver at any point before, during, or after the bid process, if one or more of three conditions is met:

1. Applying the American Iron and Steel requirements of the Act would be inconsistent with the public interest;
2. Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
3. Inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Proper and sufficient documentation must be provided by the assistance recipient. A checklist detailing the types of information required for a waiver to be processed is attached as Appendix 1.

Additionally, it is strongly encouraged that assistance recipients hold pre-bid conferences with potential bidders. A pre-bid conference can help to identify iron and steel products needed to complete the project as described in the plans and specifications that may not be available from domestic sources. It may also identify the need to seek a waiver prior to bid, and can help inform the recipient on compliance options.

In order to apply for a project waiver, the assistance recipient should email the request in the form of a Word document (.doc) to the State SRF program. It is strongly recommended that the State designate a single person for all AIS communications. The State SRF designee will review the application for the waiver and determine whether the necessary information has been included. Once the waiver application is complete, the State designee will forward the application to either of two email addresses. For CWSRF waiver requests, please send the application to: cwsrfwaiver@epa.gov. For DWSRF waiver requests, please send the application to: dwsrfwaiver@epa.gov.

Evaluation by EPA

After receiving an application for waiver of the AIS requirements, EPA Headquarters will publish the request on its website for 15 days and receive informal comment. EPA Headquarters will then use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.

In the event that EPA finds that adequate documentation and justification has been submitted, the Administrator may grant a waiver to the assistance recipient. EPA will notify the State designee that a waiver request has been approved or denied as soon as such a decision has been made. Granting such a waiver is a three-step process:

1. Posting – After receiving an application for a waiver, EPA is required to publish the application and all material submitted with the application on EPA's website for 15 days. During that period, the public will have the opportunity to review the request and provide informal comment to EPA. The website can be found at: http://water.epa.gov/grants_funding/aisrequirement.cfm

2. Evaluation – After receiving an application for waiver of the AIS requirements, EPA Headquarters will use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.

3. Signature of waiver approval by the Administrator or another agency official with delegated authority – As soon as the waiver is signed and dated, EPA will notify the State SRF program, and post the signed waiver on our website. The assistance recipient should keep a copy of the signed waiver in its project files.

Public Interest Waivers

EPA has the authority to issue public interest waivers. Evaluation of a public interest waiver request may be more complicated than that of other waiver requests so they may take more time than other waiver requests for a decision to be made. An example of a public interest waiver that might be issued could be for a community that has standardized on a particular type or manufacturer of a valve because of its performance to meet their specifications. Switching to an alternative valve may require staff to be trained on the new equipment and additional spare parts would need to be purchased and stocked, existing valves may need to be unnecessarily replaced, and portions of the system may need to be redesigned. Therefore, requiring the community to install an alternative valve would be inconsistent with public interest.

EPA also has the authority to issue a public interest waiver that covers categories of products that might apply to all projects.

EPA reserves the right to issue national waivers that may apply to particular classes of assistance recipients, particular classes of projects, or particular categories of iron or steel products. EPA may develop national or (US geographic) regional categorical waivers through the identification of similar circumstances in the detailed justifications presented to EPA in a waiver request or requests. EPA may issue a national waiver based on policy decisions regarding the public's interest or a determination that a particular item is not produced domestically in reasonably available quantities or of a sufficient quality. In such cases, EPA may determine it is necessary to issue a national waiver.

If you have any questions concerning the contents of this memorandum, you may contact us, or have your staff contact Jordan Dorfman, Attorney-Advisor, State Revolving Fund Branch, Municipal Support Division, at dorfman.jordan@epa.gov or (202) 564-0614 or Kiri Anderer, Environmental Engineer, Infrastructure Branch, Drinking Water Protection Division, at anderer.kirsten@epa.gov or (202) 564-3134.

Attachments

Appendix 1: Information Checklist for Waiver Request

The purpose of this checklist is to help ensure that all appropriate and necessary information is submitted to EPA. EPA recommends that States review this checklist carefully and provide all appropriate information to EPA. This checklist is for informational purposes only and does not need to be included as part of a waiver application.

Items	✓	Notes
General • Waiver request includes the following information: — Description of the foreign and domestic construction materials — Unit of measure — Quantity — Price — Time of delivery or availability — Location of the construction project — Name and address of the proposed supplier — A detailed justification for the use of foreign construction materials • Waiver request was submitted according to the instructions in the memorandum • Assistance recipient made a good faith effort to solicit bids for domestic iron and steel products, as demonstrated by language in requests for proposals, contracts, and communications with the prime contractor		
Cost Waiver Requests • Waiver request includes the following information: — Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products — Relevant excerpts from the bid documents used by the contractors to complete the comparison — Supporting documentation indicating that the contractor made a reasonable survey of the market, such as a description of the process for identifying suppliers and a list of contacted suppliers		
Availability Waiver Requests • Waiver request includes the following supporting documentation necessary to demonstrate the availability, quantity, and/or quality of the materials for which the waiver is requested: — Supplier information or pricing information from a reasonable number of domestic suppliers indicating availability/delivery date for construction materials — Documentation of the assistance recipient's efforts to find available domestic sources, such as a description of the process for identifying suppliers and a list of contacted suppliers. — Project schedule — Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of construction materials • Waiver request includes a statement from the prime contractor and/or supplier confirming the non-availability of the domestic construction materials for which the waiver is sought • Has the State received other waiver requests for the materials described in this waiver request, for comparable projects?		

Appendix 2: HQ Review Checklist for Waiver Request

Instructions: To be completed by EPA. Review all waiver requests using the questions in the checklist, and mark the appropriate box as Yes, No or N/A. Marks that fall inside the shaded boxes may be grounds for denying the waiver. If none of your review markings fall into a shaded box, the waiver is eligible for approval if it indicates that one or more of the following conditions applies to the domestic product for which the waiver is sought:

1. The iron and/or steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality.
2. The inclusion of iron and/or steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Review Items	Yes	No	N/A	Comments
Cost Waiver Requests • Does the waiver request include the following information? — Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products — Relevant excerpts from the bid documents used by the contractors to complete the comparison — A sufficient number of bid documents or pricing information from domestic sources to constitute a reasonable survey of the market • Does the Total Domestic Project exceed the Total Foreign Project Cost by more than 25%?				
Availability Waiver Requests • Does the waiver request include supporting documentation sufficient to show the availability, quantity, and/or quality of the iron and/or steel product for which the waiver is requested? — Supplier information or other documentation indicating availability/delivery date for materials — Project schedule — Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of materials • Does supporting documentation provide sufficient evidence that the contractors made a reasonable effort to locate domestic suppliers of materials, such as a description of the process for identifying suppliers and a list of contacted suppliers? • Based on the materials delivery/availability date indicated in the supporting documentation, will the materials be unavailable when they are needed according to the project schedule? (By item, list schedule date and domestic delivery quote date or other relevant information) • Is EPA aware of any other evidence indicating the non-availability of the materials for which the waiver is requested? Examples include: — Multiple waiver requests for the materials described in this waiver request, for comparable projects in the same State — Multiple waiver requests for the materials described in this waiver request, for comparable projects in other States — Correspondence with construction trade associations indicating the non-availability of the materials • Are the available domestic materials indicated in the bid documents of inadequate quality compared those required by the project plans, specifications, and/or permits?				

Appendix 3: Example Loan Agreement Language

ALL ASSISTANCE AGREEMENT MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE AIS REQUIREMENT. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN SRF ASSISTANCE AGREEMENTS. EPA MAKES NO CLAIMS REGARDING THE LEGALITY OF THIS CLAUSE WITH RESPECT TO STATE LAW:

Comply with all federal requirements applicable to the Loan (including those imposed by the 2014 Appropriations Act and related SRF Policy Guidelines) which the Participant understands includes, among other, requirements that all of the iron and steel products used in the Project are to be produced in the United States ("American Iron and Steel Requirement") unless (i) the Participant has requested and obtained a waiver from the Agency pertaining to the Project or (ii) the Finance Authority has otherwise advised the Participant in writing that the American Iron and Steel Requirement is not applicable to the Project.

Comply with all record keeping and reporting requirements under the Clean Water Act/Safe Drinking Water Act, including any reports required by a Federal agency or the Finance Authority such as performance indicators of program deliverables, information on costs and project progress. The Participant understands that (i) each contract and subcontract related to the Project is subject to audit by appropriate federal and state entities and (ii) failure to comply with the Clean Water Act/Safe Drinking Water Act and this Agreement may be a default hereunder that results in a repayment of the Loan in advance of the maturity of the Bonds and/or other remedial actions.

Appendix 4: Sample Construction Contract Language

ALL CONTRACTS MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE AIS REQUIREMENT. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN ALL CONTRACTS IN PROJECTS THAT USE SRF FUNDS. EPA MAKES NO CLAIMS REGARDING THE LEGALITY OF THIS CLAUSE WITH RESPECT TO STATE OR LOCAL LAW:

The Contractor acknowledges to and for the benefit of the City of _____ ("Purchaser") and the _____ (the "State") that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund that have statutory requirements commonly known as "American Iron and Steel;" that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided by the Contactor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

Appendix 5: Sample Certifications

The following information is provided as a sample letter of **step** certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Step Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. Xxxx
2. Xxxx
3. Xxxx

Such process took place at the following location:

_____

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

The following information is provided as a sample letter of certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. Xxxx
2. Xxxx
3. Xxxx

Such process took place at the following location:

_____

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

PRODUCT SPECIFICATION SHEETS

Meters and Parts

FERGUSON
WATERWORKS

MUELLER

420 SERIES BRONZE

420 Bronze PD Meter - Sizes ⅝" x ½" and ⅝" x ¾"

FEATURES

Applications: The Mueller® 420 bronze is a nutating disc style, positive displacement meter designed for residential and small commercial applications where water volumes are low and low flow sensitivity is important.

Conformance to Standards: All Mueller 420 bronze meters meet or exceed the latest revision of the AWWA C 700 Standard for positive displacement meters. Every 420 bronze no lead meter is compliant with the latest initiatives of NSF, ANSI and EPA standards.

Construction: Mueller 420 water meters consist of three basic parts: maincase, measuring chamber, and permanently sealed register. The maincase is made of bronze for long life. Direction of flow arrows and model are cast into each maincase for ease of identification. The bottom cover is epoxy coated cast iron with a molded plastic liner separating it from the waterway. Optional bronze and polymer bottom covers are available. The measuring chambers are designed for reduced wear during operation. The measuring chamber, integral strainer, nutating disc and thrust roller are thermoplastic, which is dimensionally stable and will not corrode. The register housing and lid are available in your choice of plastic or bronze for standard visual read registers. The meter is designed so that the register can be replaced easily without removing the meter from the service line.

Register: The permanently sealed visual read register has a unique triple "L" seal and heat treated, glass lens to eliminate dirt, moisture infiltration and fogging. An integral tamper proof locking feature is provided to resist tampering with the register. The rotating register has a straight reading odometer type display, a 360° test circle with center sweep hand and a low flow (leak) detector. Standard gearing is used, making registers interchangeable by size. The 420 bronze meter is available with all AMR and AMI options for increased reading efficiency.

Operation: Water flows through the meter's strainer where debris is screened out. The incoming water fills a known volume of the measuring chamber on one or the other side of a movable disc that separates the chamber into two sections. As water enters, it moves the disc (nutates), forcing a known volume of water out of the meter from the opposite side of the disc. The process repeats as the sections refill and empty in turn. The nutating action of the disc is coupled magnetically to the register to indicate the volume of water that passes through the meter.

Maintenance: The Mueller 420 positive displacement meter is designed and manufactured to provide long service life with virtually no maintenance required. Repair components available include complete chamber assemblies and bottom plate gaskets. All components can be accessed without removing the meter body from the service line for simplified maintenance.

Connections: Supplied with external straight pipe threads (NPSM) per ANSI B1.20.1

⅝" X ½" 420 BRONZE PD METER

MATERIALS AND SPECIFICATIONS

Model	420 Bronze Meter
Sizes	⅝" x ½", ⅝" x ¾"
Standards	AWWA C 700, Most current NSF 61, ANSI, & EPA Initiatives
Service	Measurement of flow in forward direction only
Installation	Horizontal or Vertical
Operating Flow Range	See charts on the following pages
Accuracy	See charts on the following pages
Maximum Working Pressure	150 psi
Temperature Range	33° F to 100° F water temperature
Measuring Element	Nutating Disc PD Chamber
Register Type	Straight reading, permanently sealed, magnetic drive with low flow indicator and remote reading capability
Meter Connections	External straight pipe threads (NPSM)
Materials	Meter case: Bronze Bolts: Stainless Steel Measuring Element Chamber and Disc: Thermoplastic Disc Pin: SST Strainer: Thermoplastic
Options	AMR/AMI Reading Systems

420 SERIES BRONZE

420 Bronze PD Meter - Sizes 5/8" x 1/2" and 5/8" x 3/4"

METER REGISTRATION

METER SIZE	INITIAL DIAL*	CAPACITY	INITIAL DIAL*	CAPACITY
5/8"	10 Gallons	10 Million	1 Cubic Feet	1 Million

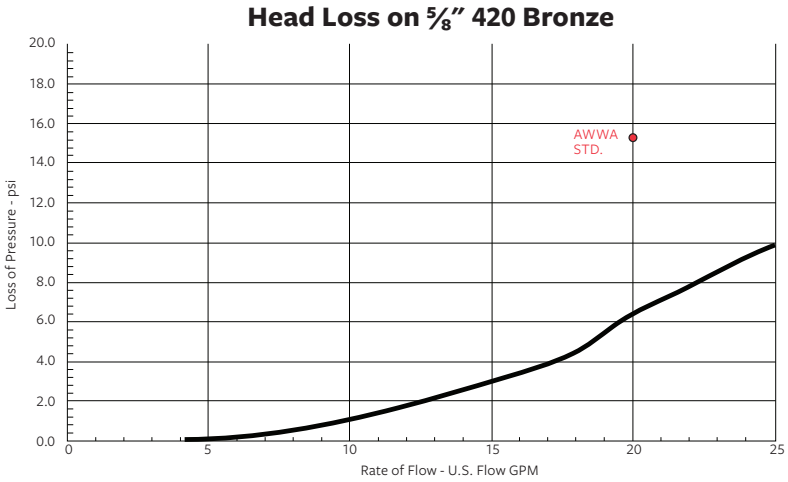
*Registration equal to one full revolution of the sweep hand.

FLOW CHARACTERISTICS

METER SIZE	TYPICAL LOW FLOW (95% MINIMUM)	TYPICAL OPERATING RANGE (100% ± 1.5%)	MAXIMUM CONTINUOUS OPERATION
5/8"	1/8 GPM	1/2 to 20 GPM	15 GPM

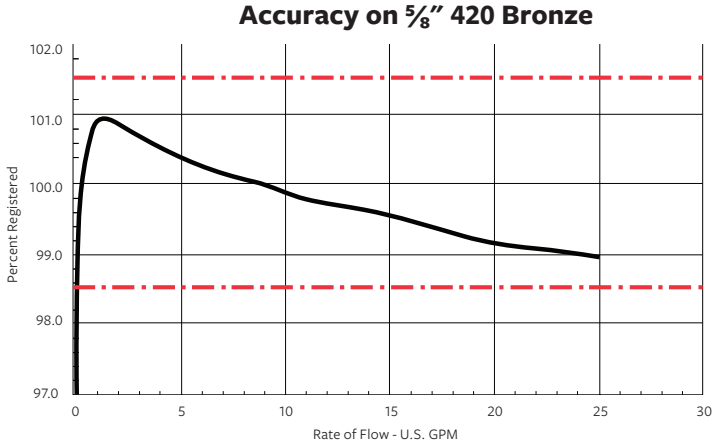
PERFORMANCE

HEAD LOSS



NOTE: Performance curves are typical only and NOT a guarantee of performance.

ACCURACY



NOTE: Performance curves are typical only and NOT a guarantee of performance.

420 SERIES BRONZE

420 Bronze PD Meter - Sizes 5/8" x 1/2" and 5/8" x 3/4"

MODEL 420 BRONZE METER ASSEMBLY COMPONENTS

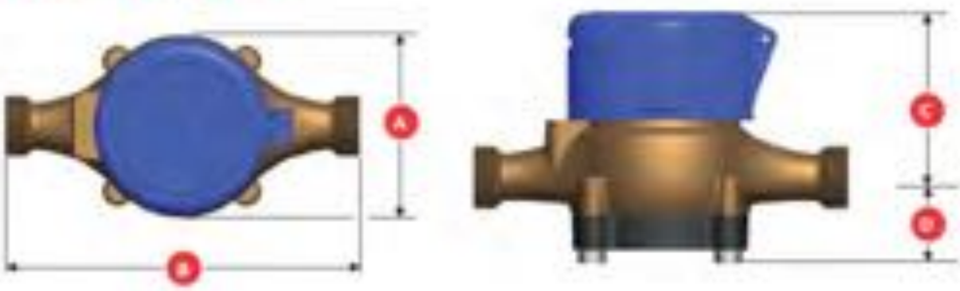
ITEM	PART #	DESCRIPTION	QTY
1	C6768	Plastic Register Cover	1
	C5774	Bronze Register Cover	
2	C5769	Plastic Register Housing Base	1
	C5772	Bronze Register Housing Base	
3	A541122	Plastic Lid Spiral Pin	1
	A541123	Bronze Lid Spiral Pin	
4	A512658	Blue Color Register Locking Pin	1
	A5126581	Bronze Color Register Locking Pin	
5	D36981	Model 420 Visual Register SG	1
	D36982	Model 420 Visual Register CF	
	D36983	Model 420 Visual Register CM	
6	C5770	Register Housing Insert	1
7	D36805I	¾" x ¾" Model 420 Main Case	1
	D3681 7SI	¾" x 1" Model 420 Main Case	
8	A12320	Model 420 Chamber O Ring	1
9	D3635PO	Model 420 Chamber Assembly	1
10	C6681	Model 420 Bronze Strainer Retainer	1
11	B8664	Model 420 Bronze Gasket	1
12	B8665	Model 420 Liner (Iron / Brz Only)	1
13	B8663	Model 420 Iron Bottom Plate	1
	B8662	Model 420 Bronze Bottom Plate	
	C6682	Model 420 Polymer Bottom Plate	
14	90026	10-32 x ⅜" Hex Bolt SS (Iron / Brz Btm)	4
	90010	10-32 x 1 ¼" Hex Bolt SS (Plastic Btm)	
15	90018	#10 Flat Washer SS (Polymer Btm)	4

DIMENSIONS, WEIGHTS AND PARTS

METER SIZE	[illegible]		
MODEL	420 BRONZE STANDARD REGISTER	420 BRONZE [illegible] REGISTER	420 BRONZE [illegible] REGISTER
DIMENSION			
A	3.8125"	3.8125"	3.8125"
B	7.5"	7.5"	7.5"
C	3.3125	3"	3.5"
D	1.375"	1.375"	1.375"
Weight	3.7	3.7	3.7

Weights are in pounds are approximate.
Inlet and outlet: [illegible]

420 BRONZE METER



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MUELLER

MUELLER

435 SERIES BRONZE

435 Bronze PD Meter - Sizes ¾" Short, ¾" x ¾" Standard, ¾" x 1"

FEATURES

Applications: The Mueller® 435 bronze is a nutating disc style, positive displacement meter designed for residential and small commercial applications where water volumes are low and low flow sensitivity is important.

Conformance to Standards: All Mueller 435 bronze meters meet or exceed the latest revision of the AWWA C 700 Standard for positive displacement meters. Every 435 bronze no lead meter is compliant with the latest initiatives of NSF, ANSI and EPA standards.

Construction: Mueller 435 water meters consist of three basic parts: maincase, measuring chamber, and permanently sealed register. The maincase is made of bronze for long life. Direction of flow arrows and model are cast into each maincase for ease of identification. The bottom cover is epoxy coated cast iron with a molded plastic liner separating it from the waterway. Optional bronze bottom covers are available. The measuring chambers are designed for reduced wear during operation. The measuring chamber, integral strainer, nutating disc and thrust roller are thermoplastic, which is dimensionally stable and will not corrode. The meter is designed so that the register can be replaced easily without removing the meter from the service line.

Register: The permanently sealed solid state encoder register has a heat treated, glass lens and thermoplastic housing to eliminate dirt, moisture infiltration and fogging. An integral tamper proof locking feature is provided to resist tampering with the register. The totalizing register has a 10 digit LCD reading display, up to 9 digit electronic output, specifiable visual back flow detection, battery life icon, and a low flow and leak detector. Visual tamper codes are displayed intermittently with the reading data in the event of register removal or magnetic tampering. The 435 bronze meter is compatible with all AMR and AMI options for increased reading efficiency.

Operation: Water flows through the meter's strainer where debris is screened out. The incoming water fills a known volume of the measuring chamber on one or the other side of a movable disc that separates the chamber into two sections. As water enters, it moves the disc (nutates), forcing a known volume of water out of the meter from the opposite side of the disc. The process repeats as the sections refill and empty in turn. The nutating action of the disc is owned by the register to accurately indicate the volume of water that passes through the meter.

Maintenance: The Mueller 435 positive displacement meter is designed and manufactured to provide long service life with virtually no maintenance required. Repair components available include complete chamber assemblies and bottom plate gaskets. All components can be accessed without removing the meter body from the service line for simplified maintenance.

Connections: Supplied with external straight pipe threads (NPSM) per ANSI B1.20.1

¾" SHORT BRONZE 435 PD BRONZE BODIED METER WITH SSR REGISTER

MATERIALS AND SPECIFICATIONS

Model	435 Composite Meter
Sizes	¾" Short, ¾" x ¾" Standard, ¾" x 1"
Standards	AWWA C 710, Most Current NSF 61, ANSI, & EPA Initiatives
Service	Measurement of flow in forward direction only
Installation	Horizontal or Vertical
Operating Flow Range	See charts on the following pages
Accuracy	See charts on the following pages
Maximum Working Pressure	150 psi
Temperature Range	33° F to 100° F water temperature
Measuring Element	Nutating Disc PD Chamber
Register Type	Solid State Register (SSR) ME 8 Register 5' flying lead wire, 5' Nicor connector, 5' Itron connector
Meter Connections	External straight pipe threads (NPSM)
Materials	Meter case: Bronze Bolts: Stainless Steel Measuring Element Chamber and Disc: Thermoplastic Disc Pin: SST Strainer: Thermoplastic
Options	AMR/AMI Reading Systems

435 SERIES BRONZE

435 Bronze PD Meter - Sizes ¾" Short, ¾" x ¾" Standard, ¾" x 1"

METER REGISTRATION

METER SIZE	REGISTRATION	REGISTRATION	REGISTRATION
¾"	Gallons	Cubic Feet	Cubic Meters

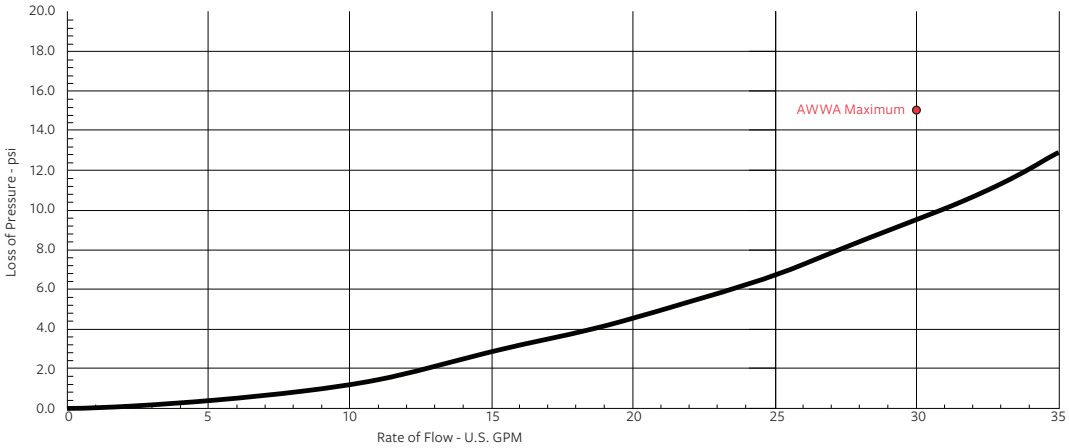
*All registration values are factory programmable and must be specified prior to ordering.

FLOW CHARACTERISTICS

METER SIZE	TYPICAL LOW FLOW (95% MINIMUM)	TYPICAL OPERATING RANGE (100% ± 1.5%)	MAXIMUM CONTINUOUS OPERATION
¾"	¼ GPM	¾ to 30 GPM	25 GPM

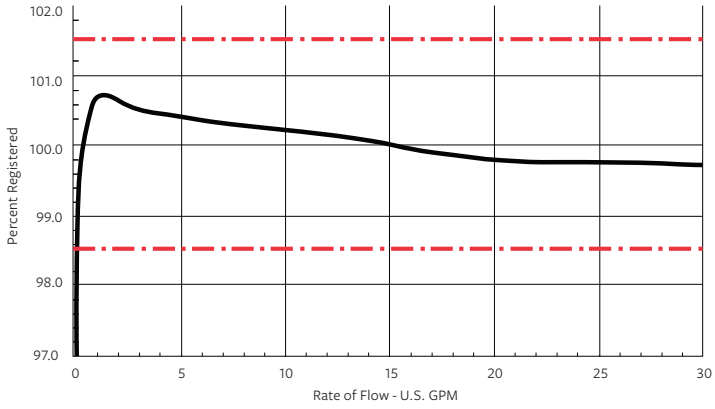
PERFORMANCE

HEAD LOSS



NOTE: Performance curves are typical only and NOT a guarantee of performance.

ACCURACY



NOTE: Performance curves are typical only and NOT a guarantee of performance.

435 SERIES BRONZE

435 Bronze PD Meter - Sizes ¾" Short, ¾" x ¾" Standard, ¾" x 1"

MODEL 435 BRONZE METER ASSEMBLY COMPONENTS

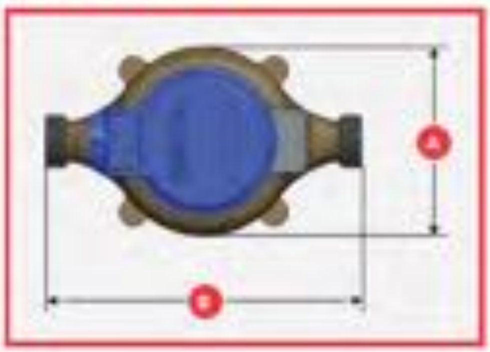
ITEM	PART #	DESCRIPTION	QTY
1	CAR99	SSR Cover	1
2	CALL C5	SSR Register Assembly	1
3	88703	SSR Housing Retainer	1
	D3707	½" x ½" x 7.5" Model 435 Main Case	
3B	88730	SSR Ring Wedge	1
4	D3723 1	¾" x ¾" x 9" Model 435 Main Case	1
	D3723 2	¾" x 1" x 9" Model 435 Main Case	
5	D3705	Model 435 Chamber Assembly	1
6	413128	Model 435 Chamber O Ring	1
7	C6933	Model 435 Strainer Retainer	1
8	88698	Model 435 Bronze Gasket	1
9	88699	Model 435 Liner (Iron / Brz Bottom Only)	1
10	88714	Model 435 Iron Bottom Plate	1
	88710	Model 435 Bronze Bottom Plate	
11	90026	5/16 - 18 x ¾ Hex Bolt SS (Iron/Brz Btm)	4

DIMENSIONS, WEIGHTS AND PARTS

METER SIZE	5/8" SHORT 7.5"	5/8" STANDARD 9"	5/8" X 3/4" X 9"
MODEL	435 BRONZE SSR REGISTER	435 BRONZE SSR REGISTER	435 BRONZE SSR REGISTER
DIMENSION			
A	4.475"	4.475"	4.475"
B	7.5"	9"	9"
C			
Visual Register	3.25"	3.25"	3.25"
SSR Register	3.035"	3.035"	3.035"
ME-8 Register	3.5"	3.5"	3.5"
D	1.925"	1.925"	1.925"
Weight	4.6	4.7	4.8

Weights are in pounds are approximate.

435 BRONZE METER



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F-14070 4/20

452 Series

Magnetic Drive Positive Displacement Disc Meters
Size 1"

Features

APPLICATIONS: Measurement of cold water for residential and small commercial applications where water volumes are low, and low flow sensitivity is important.

CONFORMANCE TO STANDARDS: Hersey Series 400 Water Meters comply with latest version of ANSI/AWWA Standard C700, NSF-61 372 and the Safe Water Drinking Act. Each meter is tested to ensure compliance.

CONSTRUCTION: Hersey 400 Water Meters consist of three basic parts: maincase, measuring chamber, and permanently sealed register. The maincase is made of bronze for long life. Direction of flow arrows and model are cast into each maincase. The bottom cover is epoxy-coated cast iron with a molded plastic liner separating it from the waterway. Optional plastic and bronze bottom covers are available. The measuring chambers are large for reduced wear during operation. The measuring chamber, integral strainer, nutating disc and thrust roller are thermoplastic, which is dimensionally stable and will not corrode. The thrust roller moves smoothly along a stainless steel wear plate to reduce friction and maintain accuracy. The register box and lid are available in plastic or bronze. The meter is designed so that the register can be replaced without removing the meter from the line.

REGISTER: The permanently sealed register has a unique seal and heat-treated glass to eliminate dirt, moisture infiltration and lens fogging. An integral tamper-proof locking feature is provided to resist tampering with the register. The totalizing register has a straight-reading odometer type display, a 360° test circle with center sweep hand and a low flow (leak) detector. Standard gearing is used, making registers interchangeable by size. All Hersey meter Models have electronic meter reading systems available for increased reading efficiency (see Meter Reading Systems.)

OPERATION: Water flows through the meter's strainer where debris is screened out. The incoming water fills a known volume of the measuring chamber on one or the other side of a movable disc that separates the chamber into two sections. As water enters, it moves the disc (nutates), forcing a known volume of water out of the meter from the opposite side of the disc. The process repeats as the sections refill and empty in turn. The nutating action of the disc is coupled magnetically to the register to indicate the volume of water that passes through the meter. The large capacity measuring chamber requires fewer nutations of the disc for each gallon measured, which helps to limit wear, extend the life of the meter, and reduce pressure loss.

MAINTENANCE: The Hersey Series 400 Water Meters are designed and manufactured to provide long service life with virtually no maintenance required.

CONNECTIONS: Supplied with external straight pipe threads (NPSM) per ANSI B1.20.1.

452 with Translator Register and Hot Rod

Materials and Specifications

MODEL NUMBER	452
SIZES	1"x1"
STANDARDS	Manufactured and tested to meet or exceed all applicable parts of ANSI/AWWA C700 Standard NSF-61 372 and the Safe Water Drinking Act
SERVICE	cold water measurement with flow in only one direction
OPERATING FLOW RANGE	See Chart on the following page
ACCURACY	See Chart on the following page
PRESSURE LOSS	See Chart on the following page
MAXIMUM WORKING PRESSURE	150 PSI
TEMPERATURE RANGE	33F to 100F Water Temperature
MEASURING ELEMENT	Nutating Disc
DISC NUTATIONS (per Gallon)	452: 11.7
REGISTER TYPE	Straight reading, permanently sealed, magnetic drive with low flow indicator. Remote reading units optional.
METER CONNECTIONS	1" external (NPSM) straight pipe threads per ANSI B1.20.1
MATERIALS	Meter case – No Lead Bronze, Bottom cover – cast iron ASTM A126 CL. B, Chamber top/bottom – thermoplastic, Nutating disc – thermoplastic, Disc pin – stainless steel, Thrust roller – thermoplastic, Wear plate – stainless steel, Coupling – Ceramic magnet, Strainer – thermoplastic, Coupling shaft – stainless steel ANSI B18, Top cover bolts – stainless steel ANSI B18, Bottom cover bolts – stainless steel ANSI B18, Register box and lid – thermoplastic.
OPTIONS	Bottom cover – bronze UNSC84400 or thermoplastic, Register box and lid – bronze UNSC85700, AMR/AMI Reading Systems

452 Series

Magnetic Drive Positive Displacement Disc Meters
Size 1"

Meter Registration

Meter Size	Initial Dial*	Capacity	Initial Dial*	Capacity
1"	10 Gallons	10 Million	1 Cubic Feet	1 Million

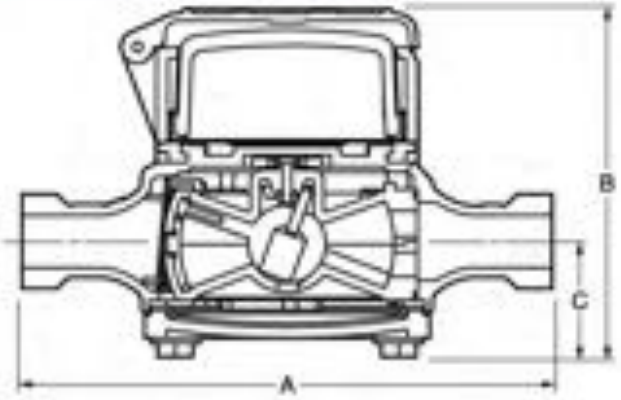
*Registration equal to one full revolution of the sweep hand.

Flow Characteristics

Meter Size	Typical Low Flow (95% Minimum)	Typical Operating Range (100% ± 1.5%)	Maximum Continuous Operation
1"	3/4 GPM	2 to 50 GPM	35 GPM

NOTE: Performance curves are typical only and NOT a guarantee of performance.

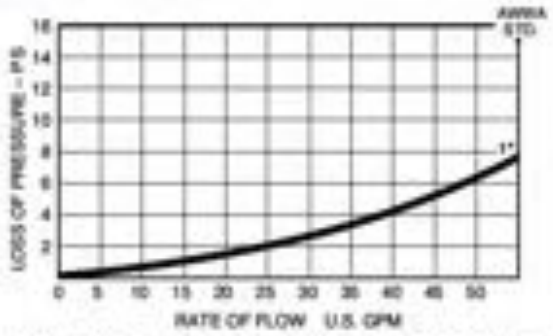
Dimensions and Weights



Meter Size	1"
	Ends External (NPSM) straight pipe threads
Model	452
Dimensions	
A	10-3/4"
B Visual Reg	6-5/ 8"
B Translator Reg	5.5
C	2-1/ 8"
Width	7.22"
Inlet & outlet	1"
Net weight	11

Performance

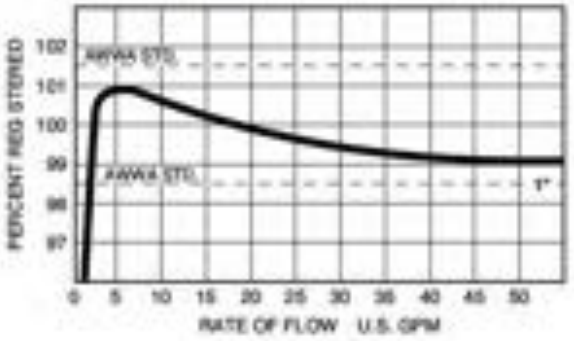
HEAD LOSS – 1" (Figure 1)



NOTE: Performance curves are typical only and NOT a guarantee of performance.

Performance

ACCURACY – 1" (Figure 2)



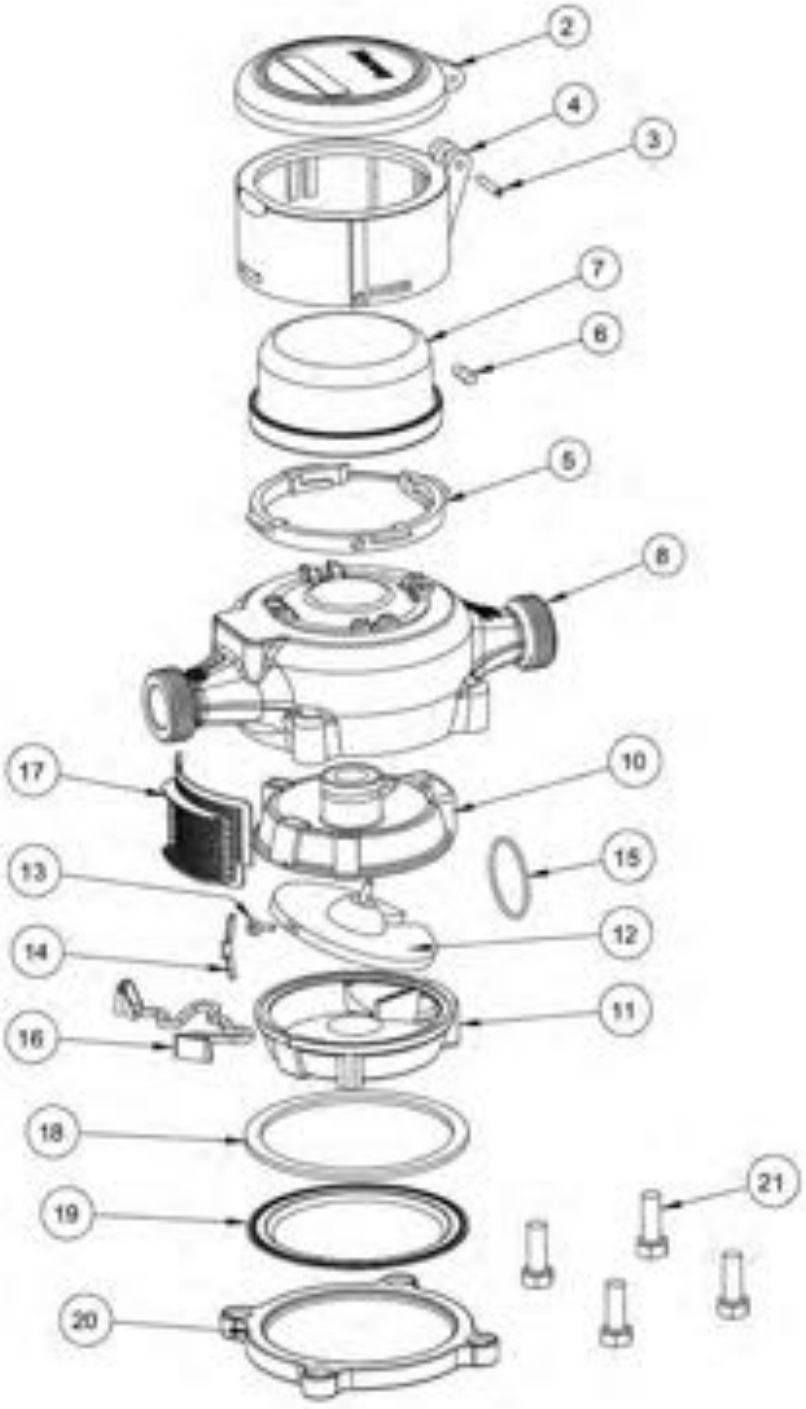
452 Series

Mueller SYSTEMS

Magnetic Drive Positive Displacement Disc Meters
Size 1" Parts

Ref No.	Description	Material	1" Model 452
1	Complete Register Housing Assembly Includes the following:	Plastic	B7856
		Bronze	B7857
2	Register Cover	Plastic	C5768
3	Spiral Pin	Plastic	4040.122
	Spiral Pin	Bronze	4040.123
4	Register Housing Base	-	C5769
5	Register Housing Insert	-	C5770
6	Register Locking Pin	Blue Color Plastic	A11658
	Register Locking Pin	Brass Color Plastic	A129345
7	Visual Register USG	Glass/Brass	332565
	Visual Register CF	Glass/Brass	332566
	Translator Register USG*	Plastic/Brass	335/031am
	Translator Register CF*	Plastic/Brass	335/032am
	Specify Electronic Reading Value 4, 5, or 6 Wheel		
8	5/8" x 1/2 Main Case 2006 and after	Bronze	–
	5/8" x 1/2 Main Case 2006 and after	No Lead Bronze	–
	5/8" x 3/4" Main Case 2006 and after	Bronze	–
	5/8" x 3/4" Main Case 2006 and after	No Lead Bronze	–
	3/4" Regular Main Case 2006 and after	Bronze	–
	3/4" Regular Main Case 2006 and after	No Lead Bronze	–
	3/4" Short Main Case 2006 and after	Bronze	–
	3/4" Short Main Case 2006 and after	No Lead Bronze	–
	1" Main Case 2006 and after	Bronze	
	1" Main Case 2006 and after	No Lead Bronze	D358932
9	Complete Chamber Assembly includes following parts 10-13	Plastic	C5432P0
10	Top Chamber Assembly	Plastic**	–
11	Bottom Chamber Assembly	Plastic**	–
12	Disc Assembly	Plastic/SST**	–
13	Thrust Roller	Plastic SST	– A12482
14	Wear Plate	SST	B7666
15	Outlet Seal	Rubber	A1.30293
16	Chamber Retainer	Plastic	C5464
17	Strainer	Plastic	5241SP045
18	Gasket	Rubber	C5489
19		Plastic	C5606
20	Bottom Cover 2006 and after	Cast Iron	68621
	Bottom Cover 2006 and after	Bronze	68624
	Bottom Cover 2006 and after	Plastic	–
21	Case Bolt 2006 and after	SST	90010 SS
22	Washer – Plastic Bottom Only	SST	–

*Call Mueller Systems Customer Service for appropriate Translator Register and AMR Device part number.
**Available only as part of Item 9 – Complete Chamber Assembly. Note: If more than one part is required per assembly, quantity is noted after part number (in parenthesis). The different top and bottom case requirements for the various flange configurations. Bolt quantities and sizes vary.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452 Series

Mueller SYSTEMS

Magnetic Drive Positive Displacement Disc Meters
Size 1" – Manufactured prior to 2006

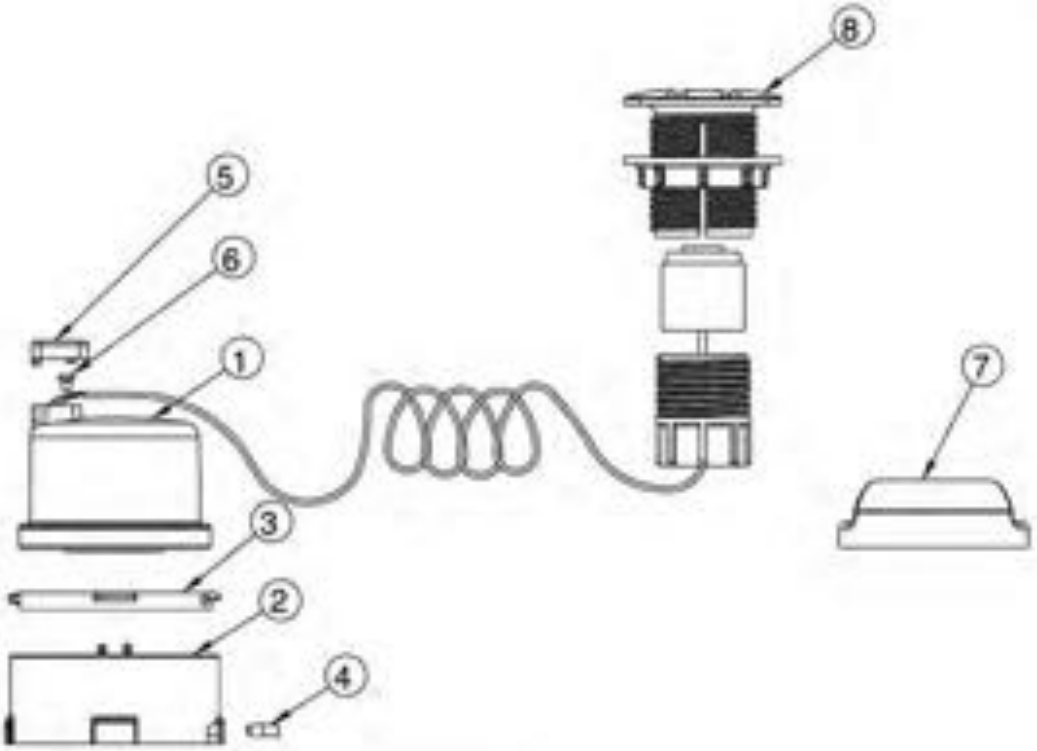
Ref No.	Description	Material	1" Model 452
1	Complete Register Housing Assembly Includes the following:	Plastic	87856
		Bronze	87857
2	Register Cover	Plastic	C5768
3	Spiral Pin	Plastic	A541122
	Spiral Pin	Bronze	A541123
4	Register Housing Base	-	C5769
5	Register Housing Insert	-	C5770
6	Register Locking Pin	Blue Color Plastic	A12658
	Register Locking Pin	Brass Color Plastic	A126581
7	Visual Register USG	Glass/Brass	D52565
	Visual Register CF	Glass/Brass	D52566
	Translator Register USG*	Plastic/Brass	D35031axx
	Translator Register CF*	Plastic/Brass	D35032axx
	Specify Electronic Reading Value 4, 5, or 6 Wheel		
8	5/8" x 1/2" Main Case prior to 2006	Bronze	-
	5/8" x 3/4" Main Case prior to 2006	Bronze	-
	3/4" Regular Main Case prior to 2006	Bronze	-
	3/4" Short Main Case prior to 2006	Bronze	-
	1" Main Case prior to 2006	Bronze	-
9	Complete Chamber Assembly Includes following parts 10-16	Plastic	C5692PD
10	Top Chamber Assembly	Plastic**	-
11	Bottom Chamber Assembly	Plastic**	-
12	Disc Assembly	Plastic/SST**	-
13	Thrust Roller	Plastic	-
		SST	A12667
14	Wear Plate	SST	87666
15	Outlet Seal	Rubber	A130200
16	Chamber Retainer	Plastic	C5466
17	Strainer	Plastic	51026P045
18	Gasket	Rubber	C5489
19	Liner	Plastic	C5506
20	Bottom Cover prior to 2006	Cast Iron	D3211
	Bottom Cover prior to 2006	Bronze	C5512
	Bottom Cover prior to 2006	Plastic	-
21	Case Bolt prior to 2006		90065 (6)
22	Washer – Plastic Bottom Only	SST	-

*Call Mueller Systems Customer Service for appropriate Translator Register and AMR Device part number.

**Available only as part of Item 9 – Complete Chamber Assembly. Note: If more than one part is required per assembly, quantity is noted after part number (in parenthesis). The different top and bottom size requirements for the various flange configurations. Bolt quantities and sizes vary.

452 Series

Magnetic Drive Positive Displacement Disc Meters
Translator Parts



Ref	Description	1" Model 452
1	Translator Register* Gallons Cubic Feet Specify Electronic Reading Value 4, 5, or 6 Wheel	 035031xxx 035032xxx
2	Register Housing Base (Plastic)	C5769
3	Register Housing Insert (Plastic)	C5770
4	Register Locking Pin (Blue Color Plastic)	A12658
5	Lens Terminal Cover	B8447
6	Terminal Lug Screw	98197 (3)
7	Wall Pad	T1234
8	Pit Pad with 3' of wire	T1235
9	1,000' Spool of Wire (not shown)	A13015
10	Register Housing Lid (not shown)	B8638

*Call Mueller Systems Customer Service for appropriate Translator Register and AMR Device part number.
**Begins with 2004 meters, for earlier retrofits call Mueller Systems Customer Service.

500 Series

Magnetic Drive Positive Displacement Disc Meters
Sizes 1-1/2" & 2"

Mueller SYSTEMS

Features

APPLICATIONS: Measurement of cold water for residential, commercial and industrial applications where water volumes are low, and low flow sensitivity is important.

CONFORMANCE TO STANDARDS: Hersey Series 500 Water Meters comply with ANSI/AWWA Standard C700, NSF-61 372 and the Safe Water Drinking Act. Each meter is tested to ensure compliance.

CONSTRUCTION: Hersey Series 500 Water Meters consist of three basic parts: maincase, measuring chamber, and permanently sealed register. The maincase and topcase are made of bronze. The measuring chamber, nutating disc and strainer are made of thermoplastic, which is dimensionally stable and will not corrode. A test port in the body permits in-line testing. Register box and lid are available in plastic or bronze.

The meter is designed so that the register, measuring chamber and strainer can be replaced without removing the meter from the line.

REGISTER: The permanently sealed register has a unique seal and heat-treated glass to eliminate dirt, moisture infiltration and lens fogging. An integral tamper-proof locking feature is provided to resist tampering with the register. The totalizing register has a straight-reading odometer type display, a 360° test circle with center sweep hand and a low flow (leak) detector. Standard gearing is used, making registers interchangeable by size.

All Hersey Meter Models have electronic meter reading systems available for increased reading efficiency (see Meter Reading Systems.)

OPERATION: Water flows through the meter's strainer where any debris that could adversely affect meter accuracy or free operation is screened out. As the water enters, it fills a known volume of the measuring chamber on one or the other side of a movable disc that separates the chamber into two sections. As water enters it moves the disc (nutates), forcing a known volume of water out of the meter from the opposite side of the disc. The process repeats as the sections refill and empty in turn. The nutating action of the disc is coupled magnetically to the register to indicate the volume of water that passes through the meter. The large measuring chamber requires fewer nutations of the disc for each gallon measured, which helps to limit wear, reduce pressure loss and extend the life of the meter.

MAINTENANCE: The Hersey Series 500 Water Meters are designed and manufactured to provide long service life with virtually no maintenance required.

CONNECTIONS: Available with integral two-bolt oval flanges.

562

562 with Hot Rod

Materials and Specifications

MODEL NUMBER	562 and 572
SIZES	1-1/ 2" and 2"
STANDARDS	Manufactured and tested to meet or exceed all applicable parts of ANSI/AWWA C700 Standard, NSF-61 372 and the Safe Water Drinking Act
SERVICE	Cold water measurement with flow in only one direction
OPERATING FLOW RANGE	See Chart on following page
ACCURACY	See Chart on following page
PRESSURE LOSS	See Chart on following page
MAXIMUM WORKING PRESSURE	150 PSI
TEMPERATURE RANGE	33°F to 100°F water temperature
MEASURING ELEMENT	Nutating Disc
DISC NUTATIONS (per Gallon)	562: 6.47, 572: 3.92
REGISTER TYPE	Straight reading, permanently sealed,magnetic drive with low flow indicator. Remote reading units optional.
METER CONNECTIONS	1-1/ 2" size and 2" size available with two bolt flanged ends
MATERIALS	Maincase – No Lead Bronze, Measuring Chamber – Thermoplastic, Magnets – ceramic, Strainer – Thermoplastic, Casing bolts – stainless steel AISI 316, Register box and lid – thermoplastic.
OPTIONS	Register box and lid – bronze UNSC85700, AMR/MR Reading Systems.

Mueller SYSTEMS

500 Series

Magnetic Drive Positive Displacement Disc Meters
Sizes 1-1/2" & 2"

Meter Registration

Meter Size	Initial Dial*	Capacity	Initial Dial*	Capacity
1-1/2"	100 Gallons	100 Million	10 Cubic Feet	10 Million
2"	100 Gallons	100 Million	10 Cubic Feet	10 Million

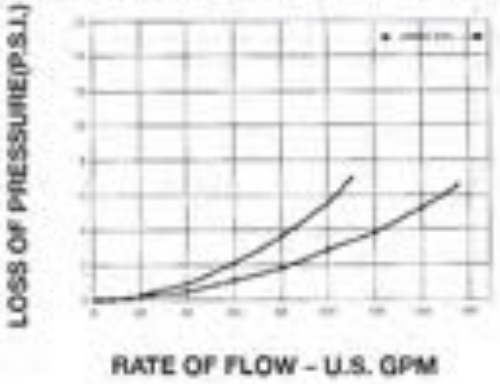
*Registration equal to one full revolution of the sweep hand.

Flow Characteristics

Meter Size	Typical Low Flow (95% Minimum)	Typical Operating Range (100% ± 1.5%)	Maximum Continuous Operation
1-1/2"	3-1/2 GPM	5 to 100 GPM	50
2"	7 GPM	8 to 160 GPM	80

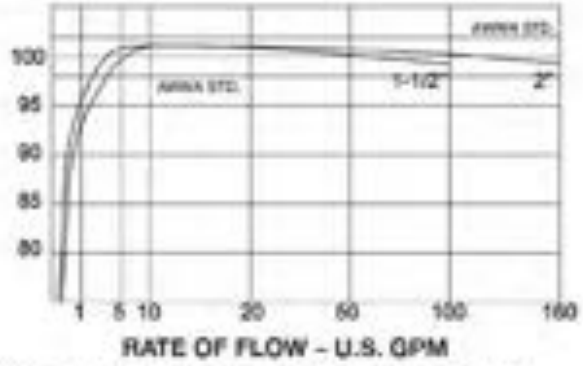
Performance

HEAD LOSS – 1-1/2" AND 2" (Figure



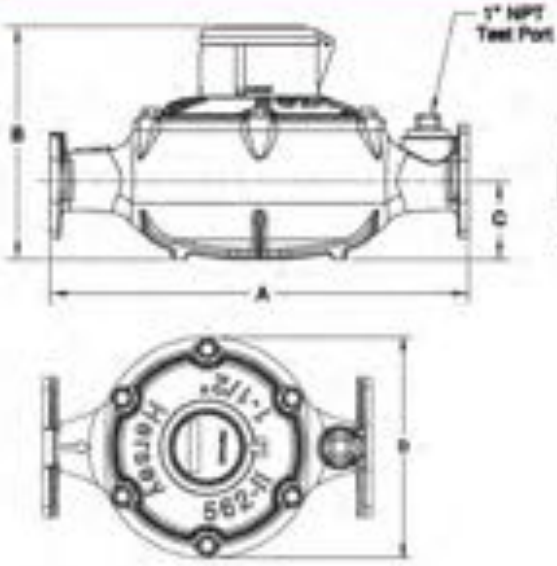
Performance

ACCURACY – 1-1/2" AND 2" (Figure 2)



NOTE: Performance curves are typical only and NOT a guarantee of performance.

Dimensions and Weights



Meter Size	1-1/2"	2"
Ends	Two Bolt Flanged	
Model	562	572
Dimension		
A	13"	17"
B Visual Reg	7.250"	8.125"
B Translator Reg	5.82	6.13
C	2.412"	3.00"
D	8.750"	10.437"
E	4.00"	4.50"
W	9-1/4"	10-1/2"
Net weight	18	28

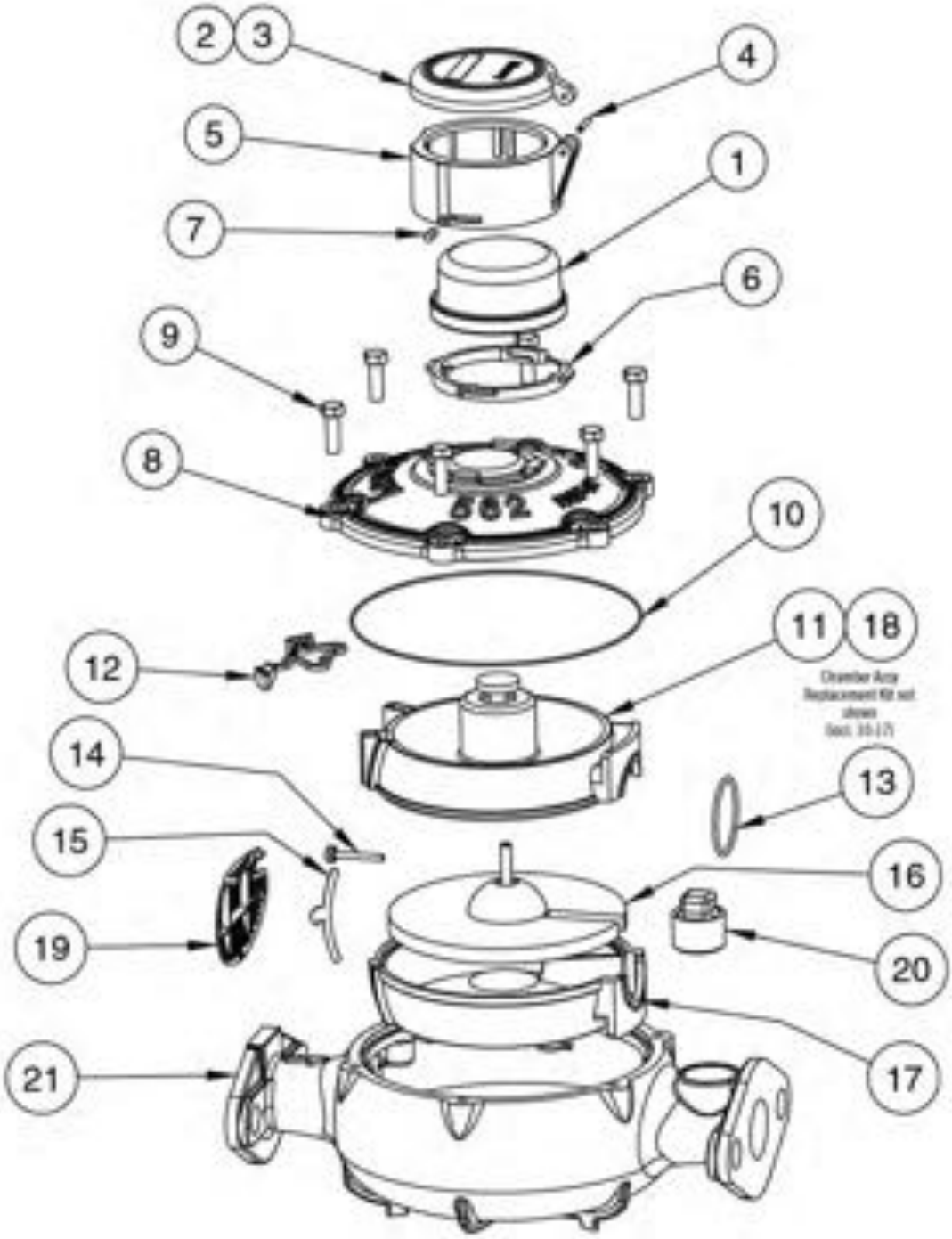
NOTE: Meter couplings are optional and must be ordered separately. Weights are in pounds and are approximate.

500 Series

Magnetic Drive Positive Displacement Disc Meters
Sizes 1-1/2" & 2" Parts

Ref No.	Description	Material	562, 1-1/2" Model	572, 2" Model
1	Round Register — US Gallons	Glass/Brass	D357715	D358125
	CF	Glass/Brass	D357725	D358225
	Translator Register* — US Gallons	Plastic/Brass	D357810xx	D358310xx
	CF	Plastic/Brass	D357910xx	D358410xx
	Specify Electronic Reading Value A, S, or E Wheel			
2	Complete Register Housing Assembly Includes parts 3-7	Plastic	B7856	B7856
		Bronze	B7857	B7857
3	Register Cover	Plastic	C5768	C5768
		Bronze	C5778	C5778
4	Spool Pin	Plastic cover: SST	A541122	A541122
		Bronze Cover: SST	A541123	A541123
5	Register Housing Base	Plastic	C5769	C5769
		Bronze	C5772	C5772
6	Register Housing Insert	Plastic	C5770	C5770
7	Register Locking Pin	Blue Colored Plastic	A126168	A126168
		Brass Colored Plastic	A126161	A126161
8**	Top Case 2 Bolt Flange			
	Top Case 2 Bolt Flange	Low Lead Bronze	D354603	D355203
9**	Case Bolts for 2 Bolt Flange Units	SST	90026 (qty 6)	90010 (qty 8)
10	O-ring Case Seal	Rubber	A130206	A130207
11	Top Chamber Assembly		D327A602F	D327A603F
12	Chamber Retainer	Plastic	C5466	C5466
13	O-ring Chamber Seal	Rubber	A130204	A130205
14	Thrust Roller	SST	A12781	B6824
15	Wear Plate	SST	B8026	B8025
16	Disk Assembly	Plastic/SST	B8067	B8068
17	Bottom Chamber	Plastic	D3274	D3276
18	Chamber Assy Replacement Kit (excl. 10-17)		D3575	D3576
19	Strainer	Plastic	C6576	C6577
20	Test Plug			
		Low Lead Bronze	590003	590002
		SST	59013	59013
21	Bottom Case 2 Bolt Flange			
	Bottom Case 2 Bolt Flange	Low Lead Bronze – test port	D354603	D355203

Call Mueller Systems Customer Service for Appropriate Translator Register and AMR Device part number
*Not shown



MUELLER

500 SERIES D

Magnetic Drive Positive Displacement Disc Meters Sizes 1 ½" & 2"

FEATURES

Applications: Measurement of cold water for residential, commercial and industrial applications where water volumes are low, and low flow sensitivity is important.

Conformance to Standards: Mueller Series 500 D Water Meters comply with ANSI / AWWA Standard C700. Meters which are manufactured with the Nylon-coated ductile iron maincase option meet the requirements of NSF Standard 61, Annex 372. The meters provide a no lead solution. Each meter is tested to ensure compliance.

Construction: Mueller Series 500 D Water Meters consist of three basic parts: maincase; measuring chamber, and permanently sealed register. The maincase and topcase are made of Nylon coated ductile iron. The measuring chamber, nutating disc and strainer are made of thermoplastic, which is dimensionally stable and will not corrode. A test port in the body permits in-line testing. Register box and lid are available in plastic or bronze.

The meter is designed so that the register, measuring chamber and strainer can be replaced without removing the meter from the line.

Register: The permanently sealed register has a unique seal and heat-treated glass to eliminate dirt, moisture infiltration and lens fogging. An integral tamper-proof locking feature is provided to resist tampering with the register. The totalizing register has a straight-reading odometer type display, a 360° test circle with center sweep hand and a low flow (leak) detector. Standard gearing is used, making registers interchangeable by size.

All Mueller Meter Models have electronic meter reading systems available for increased reading efficiency (see Meter Reading Systems.)

Operation: Water flows through the meter's strainer where any debris that could adversely affect meter accuracy or free operation is screened out. As the water enters, it fills a known volume of the measuring chamber on one or the other side of a movable disc that separates the chamber into two sections. As water enters it moves the disc (nutates), forcing a known volume of water out of the meter from the opposite side of the disc. The process repeats as the sections refill and empty in turn. The nutating action of the disc is coupled magnetically to the register to indicate the volume of water that passes through the meter. The large measuring chamber requires fewer nutations of the disc for each gallon measured, which helps to limit wear, reduce pressure loss and extend the life of the meter.

Maintenance: The Mueller Series 500 D Water Meters are designed and manufactured to provide long service life with virtually no maintenance required.

Connections: Available with integral two-bolt oval flanges.

572 D METER

MATERIALS AND SPECIFICATIONS

Model Number	562 D and 572 D
Sizes	1 ½" and 2"
Standards	Manufactured and tested to meet or exceed all applicable parts of ANSI / AWWA C700 Standard. Nylon coated ductile iron options meet requirements of NSF Standard 61, Annex G.
Operating Flow Range	Cold water measurement with flow in only one direction
Accuracy	See chart on following page
Pressure Loss	See chart on following page
Maximum Working Pressure	See chart on following page
Temperature Range	150 psi
Measuring Element	33°F to 100°F water temperature
Disc Nutations (Per Gallon)	Nutating disc
Register Type	562 D: 6.47; 572 D: 3.92
Meter Connections	Straight reading, permanently sealed, magnetic drive with low flow indicator. Remote reading units optional
Materials	Maincase - Nylon coated ductile iron; Measuring Chamber - Thermoplastic; Magnets - ceramic; Strainer - Thermoplastic; Casing bolts - stainless steel ANSI B18; Register box and lid - thermoplastic.
Options	Meter case - Nylon coated ductile iron. Register box and lid - bronze UNSC 85700; AMR / AMI Reading Systems.

500 SERIES D

Magnetic Drive Positive Displacement Disc Meters Sizes 1 ½" & 2"

METER REGISTRATION

METER SIZE	INITIAL DIAL*	CAPACITY	INITIAL DIAL*	CAPACITY
1 ½"	100 Gallons	100 Million	10 Cubic Feet	10 Million
2"	100 Gallons	100 Million	10 Cubic Feet	10 Million

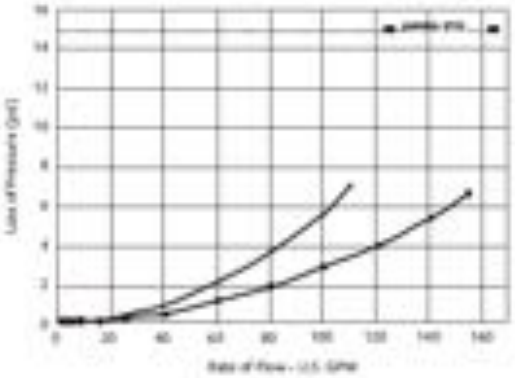
*Registration equal to one full revolution of the sweep hand.

FLOW CHARACTERISTICS

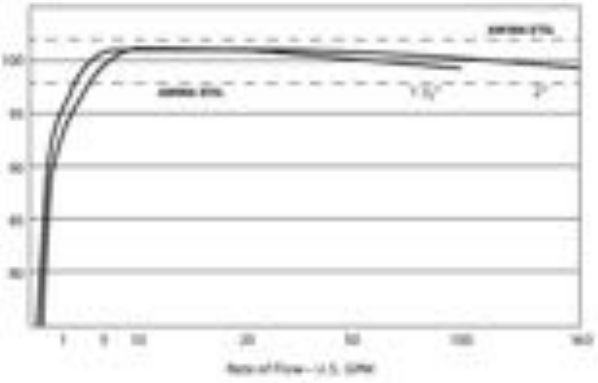
METER SIZE	TYPICAL LOW FLOW (95% MINIMUM)	TYPICAL OPERATING RANGE (100% ± 1.5%)	MAXIMUM CONTINUOUS OPERATION
1 ½"	1 ½ GPM	5 to 100 GPM	50
2"	2 GPM	8 to 160 GPM	80

PERFORMANCE

Head Loss - 1 ½" and 2" (Figure 1)

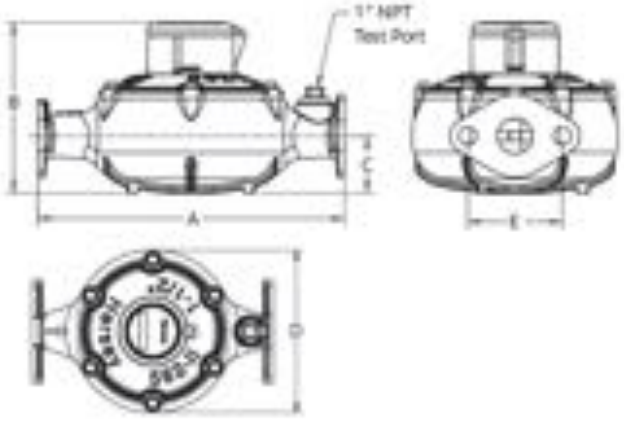


ACCURACY – 1 ½" AND 2" (Figure 2)



Note: Performance curves are typical only and NOT a guarantee of performance.

DIMENSIONS AND WEIGHTS

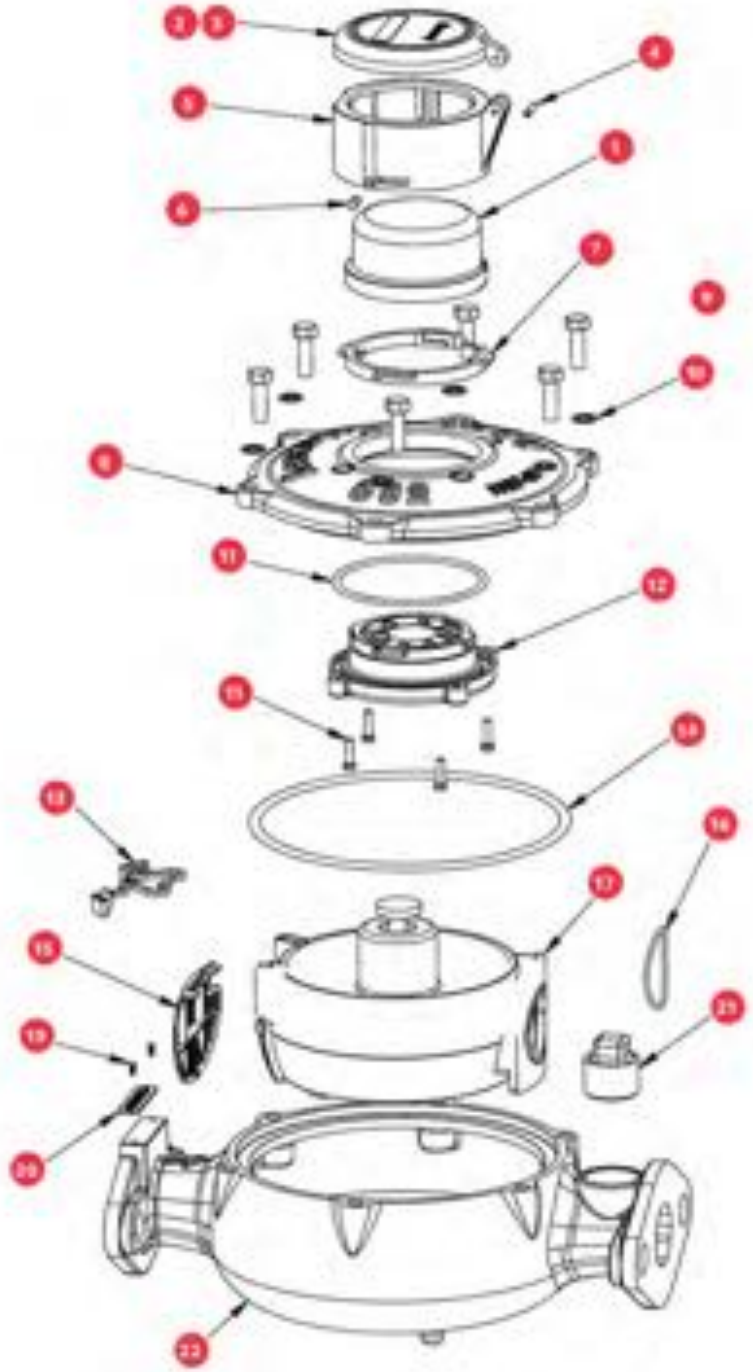


METER SIZE	1½"	2"
ENDS	FLANGED	
MODEL	562 D	572 D
DIMENSION		
A	13"	17"
B		
Visual Registration	7.250"	8.125"
SSR Registration	7"	7"
ME-Registration	7.750"	7.750"
C	2.437"	3.00"
D	6.750"	10.437"
E	4.00"	4.50"
Net weight	18	28

Note: Meter couplings are optional and must be ordered separately. Weights are in pounds and are approximate.

500 SERIES D

Magnetic Drive Positive Displacement Disc Meters Sizes 1 ½" & 2"



500 SERIES D

Magnetic Drive Positive Displacement Disc Meters Sizes 1 ½" & 2" Parts

REF NO.	DESCRIPTION	MATERIAL	1½" MODEL	2" MODEL
1	Visual Register	US Gallons Glass / Brass	D357715	D358115
		CF Glass / Brass	D357725	D358125
	Translator Register	US Gallons Plastic / Brass	D35791xxx	D35831xxx
		CF Plastic / Brass	D35792xxx	D35832xxx
	Specify Electronic Reading Value 4, 5, or 6 Wheel			
2	Complete Register Housing Assembly Includes parts 3 7	Plastic	B7856	B7856
		Bronze	B7857	B7857
3	Register Cover	Plastic	C5768	C5768
		Bronze	C5774	C5774
4	Spirol Pin	Plastic cover: SST	A541122	A541122
		Bronze Cover: SST	A541123	A541123
5	Register Housing Base	Plastic	C5769	C5769
		Bronze	C5772	C5772
6	Register Locking Pin	Blue Colored Plastic	A12658	A12658
		Brass Colored Plastic	A126581	A126581
7	Register Housing Insert	Plastic	C5770	C5770
8	Top Case	Nylon Coated Ductile Iron	D3642C	D3646C
9	Case Bolts	SST	90026 (qty 4)	90050 (qty 8)
10	Washers	SST	90018 (Qty 4)	90018 (Qty 8)
11	Register Hub O Ring	Rubber	98313	98313
12	Register Hub	Plastic	C6631	C6631
13	Socket Head Cap Screws	SST	98157 (Qty 4)	98157 (Qty 4)
14	O Ring Case Seal	Rubber	98314	98315
15	Chamber Retainer	Plastic	C5466	C5466
16	O Ring Chamber Seal	Rubber	A130204	A130205
17	Complete Chamber Assembly Includes parts 14, 15, 16		D3575	D3576
18	Strainer	Plastic	C6576	C6577
19	Type U Drive Screw	Plated	98158 (Qty 2)	98158 (Qty 2)
20	Serial Number ID Plate		A13070	A13070
21	Test Plug	SST	99013	99013
22	Bottom Case	Nylon Coated Ductile Iron	D3644C	D3648C

420 Remote Disconnect*

Bronze PD Disconnect Meter

Sizes 5/8" X 3/4" and 5/8" X 1/2

*Pat. www.mueller.com

Mueller SYSTEMS

Features

APPLICATIONS: The **Hersey®** RDM is a nutating disk, positive displacement meter that incorporates a radio controlled valve in a 7-1/2" laying length. The unique meter design allows utilities to retrofit 5/8" RDM meters in existing services where there is a high incidence of customer service call volume pertaining to transient or delinquent accounts, where employee safety may be a concern, or where it is difficult to gain access to meters. By accessing the account information through the **M.Net™** AMI System User Interface screen, a radio frequency (RF) command can be initiated to turn on or off any service equipped with an RDM meter from any password protected computer authorized to access the utility site.

CONFORMANCE TO STANDARDS: All 5/8" X 3/4" **Hersey** Remote Disconnect Meters meet or exceed the latest revision of the AWWA C-700 Standard for positive displacement meters. Every 420 RDM no lead meter is compliant with the latest initiatives of NSF, ANSI and EPA standards. All electronic components utilized in the meter and RF transceiver design comply with applicable FCC, Part 15 standards and AWWA Standard C-707 for Encoded Remote Reading Systems.

CONSTRUCTION: Hersey 420 Residential Disconnect Meters consist of five basic parts: maincase; measuring chamber; permanently sealed register; pilot valve; and RF transceiver. The maincase is made of no lead bronze for long life. Direction of flow arrows, model, and NSF-61 designation are permanently cast into the body components. The RDM is available with a plastic bottom cover only. The measuring chambers are designed for reduced wear during operation. The top and bottom of the measuring chamber, strainer, nutating disc and thrust roller are dimensionally stable thermoplastic which will not corrode. The electronic register housing and lid, **M.Node** and pilot valve housing are all made from thermoplastic. The meter is designed so that the register and pilot valve replacement components can be serviced easily without removing the meter from the line and are protected by **Hersey**'s unique tamper resistant locking pin and tamper resistant screw.

REGISTER: The permanently sealed electronic register has a unique triple "L" seal and Grilimid lens to eliminate dirt, moisture infiltration and fogging. An integral tamper-proof locking feature is provided to resist tampering with the register. The totalizing register has a straight-reading odometer type display, a 360° test circle with center sweep hand and a low flow (leak) detector. Standard gearing is used, making registers interchangeable by size. The RDM is available with an integral or a remote mounted RF transceiver for optimal performance.

OPERATION: Water flows through dual strainers in the pilot valve assembly. Differential pressure provides the operating principal for the valve activation. Water flows through the meter's strainer where debris is screened out. The incoming water fills a known volume of the measuring chamber on one or the other side of a movable disc that separates the chamber into two sections. As water enters, it moves the disc (nutates), forcing a known volume of water out of the meter from the opposite side of the disc. The process repeats as the sections refill and empty in turn. The nutating action of the disc is coupled magnetically to the register to indicate the volume of water that passes through the meter.

The pilot valve can be actuated via the User Interface from any web enabled device with the proper log in and password. System screens indicate the position of the valve (open or closed) and record the date and time for all valve activations providing a permanent record of each account's history.

5/8" x 3/4" Remote Disconnect Meter

MAINTENANCE: The **Hersey** RDM meter is designed and manufactured to provide long service life with virtually no maintenance required. Repair components available include complete chamber assemblies and pilot valve repair kits when required. All components can be accessed without removing the meter from the service line for simplified maintenance.

CONNECTIONS: Supplied with external straight pipe threads (NPSM) per ANSI B1.20.1

Materials and Specifications

MODEL	(RDM) or Remote Disconnect Meter
SIZES	5/8" X ¾", 5/8" X ½"
STANDARDS	AWWA C-700, Current NSF-61, ANSI, & EPA Initiatives
SERVICE	Measurement of flow in forward direction only
INSTALLATION	Horizontal
OPERATING FLOW RANGE	See Charts on the following pages
ACCURACY	See Charts on the following pages
MAXIMUM WORKING PRESSURE	150 PSI
TEMPERATURE RANGE	33° F to 100° F water temperature
MEASURING ELEMENT	Nutating Disc PD Chamber
WIRE LENGTH OPTIONS	INTEGRAL, 3', 15'
REGISTER TYPE	Straight reading, permanently sealed, magnetic drive with low flow indicator and remote reading capability
BATTERY LIFE	20 Years
METER CONNECTIONS	External straight pipe threads (NPSM)
MATERIALS	Meter case – Bronze Disconnect Valve – Pilot Type Bolts – Stainless Steel Measuring Element Chamber and Disc - Thermoplastic Disc Pin - SST Strainer - Thermoplastic

Mueller SYSTEMS

420 Remote Disconnect*

Bronze PD Disconnect Meter
Sizes 5/8" X 3/4" and 5/8" X 1/2

*Pat. www.mwpat.com

420 RDM

Meter Registration

Meter Size	Initial Dial*	Capacity	Initial Dial*	Capacity
5/8"	10 Gallons	10 Million	1 Cubic Ft.	1 Million

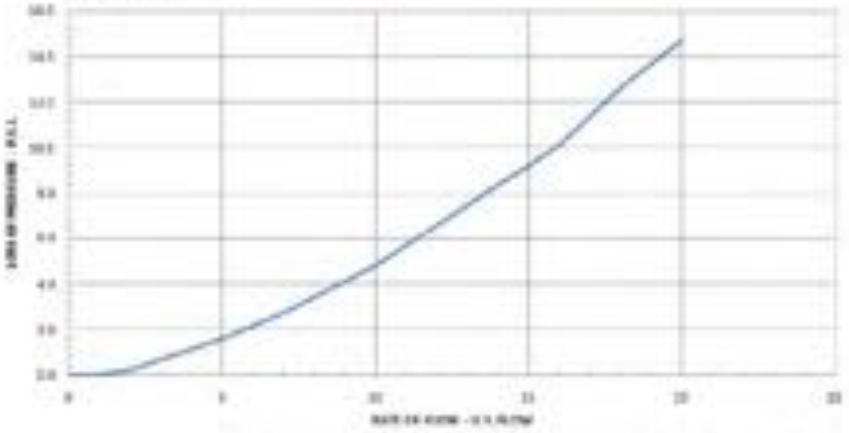
*Registration equal to one full revolution of the sweep hand.

Flow Characteristics

Meter Size	Typical Low Flow (95% Minimum	Typical Operating Range (100% ± 1.5%)	Maximum Continuous Operation
5/8"	1/8 GPM	1/2 to 20 GPM	15 GPM

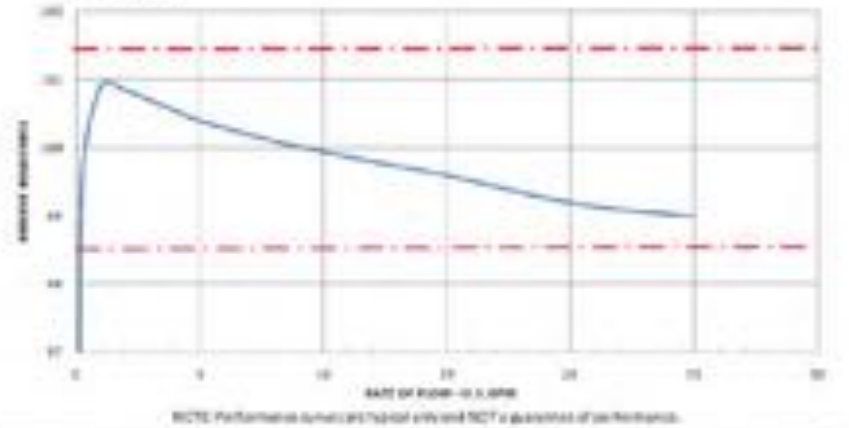
Performance

Head loss



NOTE: Performance curves are typical only and NOT a guarantee of performance.

Accuracy



NOTE: Performance curves are typical only and NOT a guarantee of performance.

420 Remote Disconnect*

Bronze PD Disconnect Meter

Sizes 5/8" X 3/4" and 5/8" X 1/2

*Pat. www.mueller.com

Mueller SYSTEMS

MODEL 420 RDM BRONZE METER ASSEMBLY COMPONENTS			
ITEM	PART #	DESCRIPTION	QTY
1	BKPLTSCREW	#6 X 1/2" SELF TAPPING TRI-WING HEAD SS	1
2	C6680	SOLENOID TAMPER COVER	1
3	MSW-RDM-XX	MI.NODE RADIO WITH SOLENOID	1
4	C6679A	MODEL 420 RDM VALVE COVER WITH ORIFICE	1
5	98411	1/4-20 X 1" BHCS SS	4
6	A13099	MODEL 420 RDM VALVE SPRING SS	1
7	B8676	MODEL 420 RDM DIAPHRAGM ASSEMBLY	1
8	B8676KIT	DIAPHRAGM REPLACEMENT KIT (PARTS 6,7, & 9)	-
9	B8684	MODEL 420 RDM SUPPORT RING	1
10	D36991XX	MODEL 420 TRANSLATOR REGISTER SG	1
	D36992XX	MODEL 420 TRANSLATOR REGISTER CF	
	D36993XX	MODEL 420 TRANSLATOR REGISTER CM	
11	A12658	REGISTER LOCKING PIN	1
12	D36885I	5/8" X 3/4" MODEL 420 RDM MAIN CASE	1
	D2688-15I	5/8" X 1/2" MODEL 420 RDM MAIN CASE	
13	D3635PO	MODEL 420 CHAMBER ASSEMBLY	1
14	A13120	MODEL 420 CHAMBER O-RING	1
15	C6681	MODEL 420 BRONZE STRAINER RETAINER	1
16	B8664	MODEL 420 BRONZE GASKET	1
17	C6682	MODEL 420 PLASTIC BOTTOM PLATE	1
18	90010	5/16-18 x 1-1/8" HEX BOLT SS	4
19	90018	5/16 FLAT WASHER SS	4

Mueller SYSTEMS

420 Remote Disconnect *

Bronze PD Disconnect Meter
Sizes 5/8" X 3/4" and 5/8" X 1/2

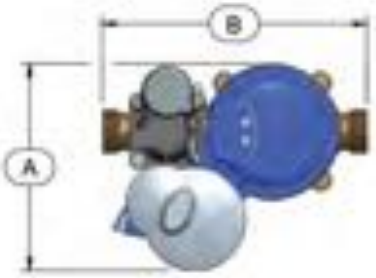
*Pat. www.mueller.com

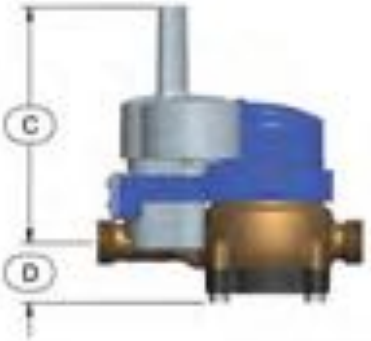
Dimensions, Weights and Parts

Meter Size	5/8"	
Model	RDM INTEGRAL	RDM REMOTE
Dimension		
A	5.875"	3.875"
B	7.5"	7.5"
C	6.6875"	4.1875"
D	1.6875"	1.6875"
Weight	5.0	5.0

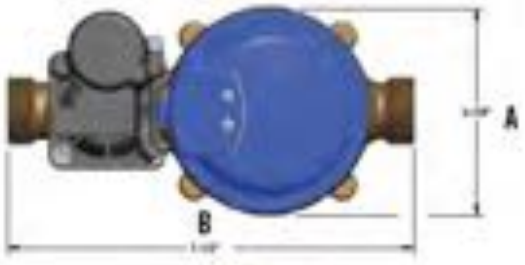
Weights are in pounds and are approximate.
Inlet and outlet 1/2" or 3/4"

420 RDM with Integral Mi.Node





420 RDM with Remote Mi.Node



APPROXIMATE WEIGHT: 5 LBS.

MUELLER

SOLID STATE METER (SSM)

Sizes 5/8" x 3/4" and 3/4" Short; 3/4" Long; and 1"

Applications: The Mueller solid state meter (SSM) is available in ⅝" X ¾" through 2" sizes. The SSM meter provides 8 digits of granular data for visual reads and 8 digits in encoded electronic format for use in Mueller Mi.Net AMR / AMI applications. The meter can be used in any residential or commercial application where a high degree of accuracy at low flow rates is important.

Construction: The SSM meter utilizes a low lead copper alloy body with a polymer measuring tube and patented stainless steel reflectors. A heat treated glass lens and polymer lid surround provide protection for the liquid crystal display. 3.6 volt lithium batteries provide power for the processor for 20 years of life. All internal electronics are potted to prevent water intrusion in the toughest environments.

Operation: The SSM meter utilizes ultrasonic measurement technology to provide outstanding accuracy across a broad flow range with extremely low pressure loss. The static meter design means there are no moving parts inside the meter so it will not degrade in accuracy over the life of the meter due to mechanical wear, providing exceptional revenue for years to come.

With starting flow rates as low as 0.017 GPM and ultra-low flow accuracy of 95% at 0.05 GPM on the ¾" X ¾" and ¾" short sizes, the SSM is capable of wringing every drop of revenue from your system and detecting the smallest leaks and backflow conditions. The stainless steel reflectors and measuring tube design channel water over the reflectors to keep them free of debris and increase the velocity of the water as it passes through the tube, contributing to the high degree of meter accuracy.

The display provides large numerals and icons that permit verification of the 8-digit meter volume as well as direction of flow, error alarm status, and battery life. A unique, never duplicated 8-digit serial number on the SSM meter faceplate and lid identifies it as the basis for all systems communication. The register face plate and housing provide visual information specific to the registration units, model, size, date of manufacture, and billing units, to provide verifiable and retrievable data in the event it is required.

Conformance to standards: Mueller SSM meter complies with AWWA C-715 requirements for accuracy and odometer wheel height as well as the American Standard Code for Information Interchange or ASCII.

Operation: When interrogated by a Mueller AMR / AMI device, the SSM meter communicates the unique 8-digit serial number and 8-digit electronic reading in ACSII format where it can be recorded and maintained within the reporting structure of the AMR / AMI system. In the event that field testing is required, an optical button located on the display faceplate can be utilized to place the meter in test mode which provides excellent resolution for testing purposes.

SOLID STATE METER
⅝" X ¾" - 1"

Maintenance: The Mueller SSM meter is designed and manufactured to provide a 20 year service life with virtually no maintenance required. Meter lids are available as replacement components in the event of vandalism or the need for meter retrofits.

MATERIALS AND SPECIFICATIONS

Model	Solid State Meter (SSM)
Register Type	Solid State Encoder Register
Sizes	⅝" through 2" Ultrasonic Meters
Standards	Manufactured and tested to meet or exceed all applicable accuracy and pressure loss requirements of the AWWA C 715 standard and the American Standard Code for Information Interchange (ASCII)
Temperature Operating Range	34°F to 158°F
Storage Temperature Range	4°F to 158°F
Water Temperature Range	34°F to 140°F
Connection Options	18" Nicor Connector, 5' flying lead wire, with factory potted connections
Materials	Processor / register housing and lid thermoplastic; Register lens - heat treated, tempered glass; LCD, polymer measuring tube, SST reflectors
AMR / AMI Compatibility	Mi.Net AMR / AMI system, and other AMR / AMI systems that can utilize the standard 8 digit encoder protocol output.

SOLID STATE METER (SSM)

Sizes 5/8" x 3/4" and 3/4" Short; 3/4" Long; and 1"

GENERAL TECHNICAL DATA

	5/8" – 3/4" – 1"
Medium Temperature Range	34 ... 122 °F
Ambient Operating Temperature	34 ... 158 °F
Ambient Storage Temperature	4 ... +140 °F (>90° F max. for one hour)
Maximum Pressure	psi 200
Power Supply	3.6 VDC lithium battery
Battery Lifetime	20 years
Interfaces	Industry standard Encoder protocol, ASCII output for compatibility with all AMR / AMI systems
Data Storage	Alarms and consumption values
Protection Class	IP 68

TECHNICAL DATA DISPLAY

	5/8" – 3/4" – 1"
Display Indication	LCD, 8 digit, Gallon Visual display to 0.1 Gallons and Cubic Foot Display to 0.01 Cubic Feet
Units	Flow and volume (GPM, gal, Ft^3)
Values Displayed	Volume flow reverse flow water temperatures display test error and alarm status battery lifetime
Values Transmitted	8 digit electronic resolution only

APPROVAL

	5/8" – 3/4" – 1"
NSF	Complies with NSF / ANSI Standard 61, Annex F/G
AWWA	Meets or exceeds applicable sections of the AWWA / ANSI C700 Standards
FCC	Complies with FCC part 15 B

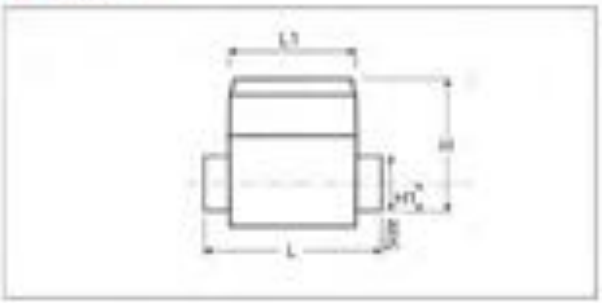
MATERIAL

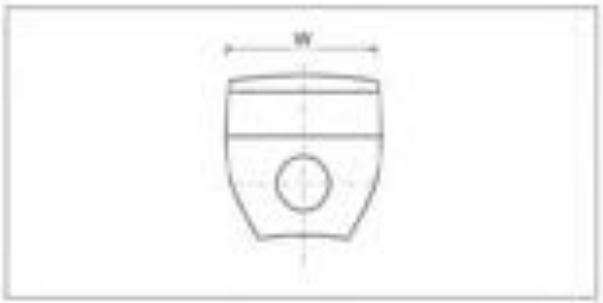
	5/8" – 3/4" – 1"
Measuring Pipe	Lead free copper alloy "CUPHIN®"
Register Housing	Engineered Polymer
Transducers	Composite
Reflectors	Stainless steel

SOLID STATE METER (SSM)

Sizes 5/8" x 3/4" and 3/4" Short; 3/4" Long; and 1"

DIMENSIONS

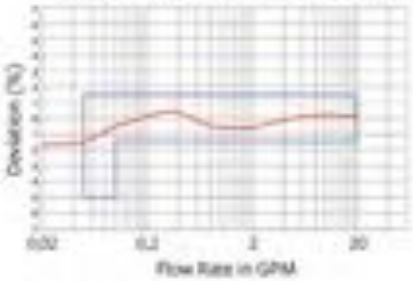




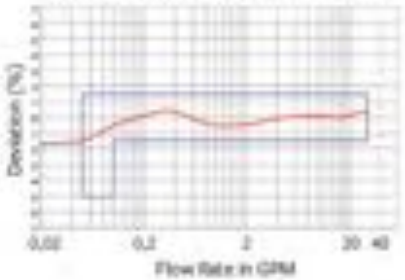
SSM			5/8" X 3/4"	3/4" S	3/4" L	1"
Lay Length	L	Inch	7.5"	7.5"	9.0"	10.75"
Register Length	L1	Inch	3.5"	3.5"	3.5"	3.5"
Register Width	W	Inch	3.7"	3.7"	3.7"	3.7"
Height to Center of Pipe	H	Inch	4.0"	4.0"	4.0"	4.2"
Height to Center of Pipe	H1	Inch	1.3"	1.3"	1.3"	1.4"
Nominal Thread Size			1" 11.5 NPSM	1" 11.5 NPSM	1" 11.5 NPSM	1.25" 11.5 NPSM
Net Weight		Lb.	2.8	2.8	3.1	3.5

TYPICAL FLOW CHARTS

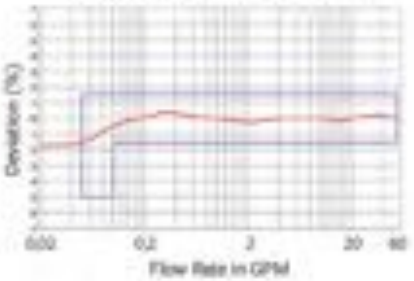
Typical Flow Chart ½" Mueller SSM



Typical Flow Chart ¾" Mueller SSM



Typical Flow Chart 1" Mueller SSM



TECHNICAL DATA

M25			5/8" X 3/4"	3/4" S	3/4" L	1"
Lay Length	L	Inch	7.5	7.5	9	10.75
Operating Flow Range		GPM	0.1 30	0.1 30	0.1 30	0.4 55
Low Flow Range		GPM	0.05 0.1	0.05 0.1	0.05 0.1	0.25 0.4
Operating Range accuracy		%	±1.5	±1.5	±1.5	±1.5
Low Flow Range accuracy		%	5 / ±1.5	5 / ±1.5	5 / ±1.5	5 / ±1.5
Pressure Loss			2.0 psi at 15 GPM	2.0 psi at 15 GPM	2.0 psi at 15 GPM	1.5 psi at 25 GPM
Operating Performance			In the temperature range of 45 to 85° F, meter consumption measurement is accurate to ±1.5% over the normal flow range (reference: approved test bench, ISO9001 certified).			

MUELLER

SOLID STATE METER (SSM)

Sizes 1 ½" & 2"

Applications: The Mueller solid state meter (SSM) is available in 1½" and 2" sizes. The SSM meter provides 8 digits of granular data for visual reads and 8 digits in encoded electronic format for use in Mueller Mi.Net AMR / AMI applications. The meter can be used in any residential or commercial application where a high degree of accuracy at low flow rates is important.

Construction: The SSM meter utilizes a stainless steel body with a polymer measuring tube and patented stainless steel reflectors. A heat treated glass lens and polymer lid and surround provide protection for the liquid crystal display. 3.6 volt lithium batteries provide power for the processor for 20 years of life. All internal electronics are potted to prevent water intrusion in the toughest environments.

Operation: The SSM meter utilizes ultrasonic measurement technology to provide outstanding accuracy across a broad flow range with extremely low pressure loss. The static meter design means there are no moving parts inside the meter so it will not degrade in accuracy over the life of the meter due to mechanical wear, providing exceptional revenue for years to come.

With ultra-low flow accuracy of 95% at 0.08 GPM on the 1 ½" sizes, the SSM is capable of wringing every drop of revenue from your system and detecting the smallest leaks and backflow conditions. The stainless steel reflectors and measuring tube design channel water over the reflectors to keep them free of debris and increase the velocity of the water as it passes through the tube, contributing to the high degree of meter accuracy.

The display provides large numerals and icons that permit verification of the 8-digit meter volume as well as direction of flow, error and alarm status, and battery life. A unique, never duplicated 8-digit serial number on the SSM meter faceplate and lid identifies it as the basis for all systems communication. The register face plate and housing provide visual information specific to the registration units, model, size, date of manufacture, and billing units, to provide verifiable and retrievable data in the event it is required.

Conformance To Standards: Mueller SSM meter complies with AWWA C-715 requirements for accuracy and odometer wheel height as well as the American Standard Code for Information Interchange or ASCII.

Operation: When interrogated by a Mueller AMR / AMI device, the SSM meter communicates the unique 8-digit serial number and 8-digit electronic reading in ACSII format where it can be recorded and maintained within the reporting structure of the AMR / AMI system. In the event that field testing is required, an optical button located on the display faceplate can be utilized to place the meter in test mode which provides excellent resolution for testing purposes.

SOLID STATE METER
SIZES 1 ½" & 2"

Maintenance: The Mueller SSM meter is designed and manufactured to provide a 20 year service life with virtually no maintenance required. Meter lids are available as replacement components in the event of vandalism or the need for meter retrofits.

MATERIALS AND SPECIFICATIONS

Model	Solid State Meter (SSM)
Register Type	Solid State Encoder Register
Sizes	1½" & 2" Ultrasonic Meters
Standards	Manufactured and tested to meet or exceed all applicable accuracy and pressure loss requirements of the AWWA C 715 standard and the American Standard Code for Information Interchange (ASCII)
Temperature Operating Range	34°F to 110°F
Storage Temperature Range	4°F to 110°F
Water Temperature Range	34°F to 140°F
Connection Options	18" Nicor Connector, 5' flying lead wire, with factory potted connections
Materials	Processor / register housing and lid thermoplastic; Register lens heat treated, tempered glass; LCD, polymer measuring tube, SST reflectors
AMR / AMI Compatibility	Mi.Net AMR / AMI system, and other AMR / AMI systems that can utilize the standard 8 digit encoder protocol output.

SOLID STATE METER (SSM)

Sizes 1 ½" & 2"

GENERAL TECHNICAL DATA

	1.5" AND 2"
Potable Water Temperature Range	34 ... 122 °F
Ambient Operating Temperature	34 ... 158 °F
Ambient Storage Temperature	4 ... +140 °F (>90° F max. for one hour)
Maximum Pressure	psi 300
Power Supply	3.6 VDC lithium battery
Battery Lifetime	20 years
Interfaces	Industry standard Encoder protocol, ASCII output for compatibility with all AMR / AMI systems
Data Storage	Alarms and consumption values
Protection class	IP 68
Operating performance	In the temperature range of 45 to 85 °F, meter consumption measurement is accurate to ±1.5% over the normal flow range (reference: approved test bench, ISO9001 certified.

TECHNICAL DATA DISPLAY

	1.5" AND 2"
Display	LCD, 8 digit Visual resolution in US Gallons to 0.1 and Ft3 to 0.01
Units	Flow and volume (GPM, gal, Ft3)
Values Displayed	Volume flow reverse flow water temperatures display test error and alarm status battery lifetime

APPROVAL

	1.5" AND 2"
NSF	Complies with NSF / ANSI Standard 61, Annex F/G
AWWA	Meets or exceeds applicable sections of the AWWA / ANSI C715 Standards
FCC	Complies with FCC part 15 B

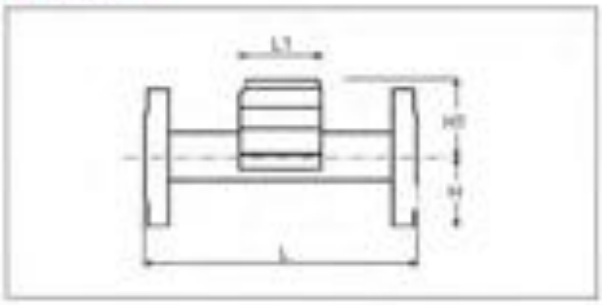
MATERIAL

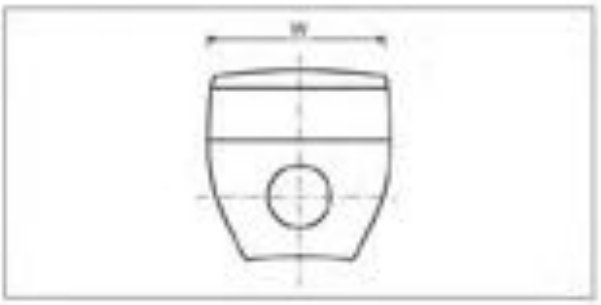
	1.5" AND 2"
Measuring Pipe	Stainless Steel
Register Housing	Engineered Polymer
Transducers	Composite
Reflectors	Stainless steel

SOLID STATE METER (SSM)

Sizes 1 ½" & 2"

DIMENSIONS

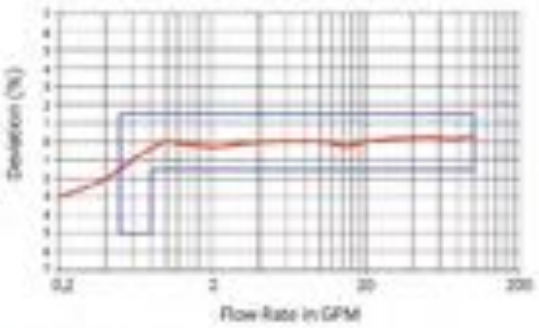




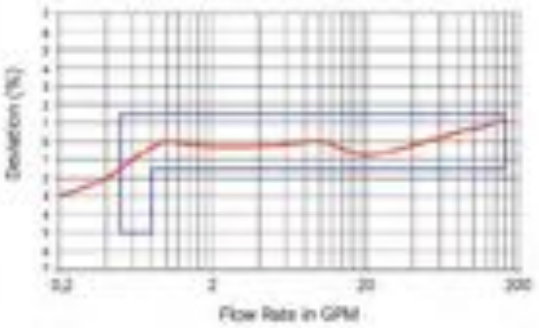
SIZE			1½"	2"
Lay Length	L	Inch	13"	17"
Register Length	L1	Inch	3.5"	3.5"
Register Width	W	Inch	3.75"	3.75"
Height to Center of Pipe	H1	Inch	2"	2.5"
Height to Center of Pipe	H1	Inch	3.3"	3.3"
Net Weight		Lb	14.1	19.2

TYPICAL FLOW CHARTS

Typical Flow Chart 1 ½" Mueller SSM



Typical Flow Chart 2" Mueller SSM



TECHNICAL DATA

SIZE			1.5"	2"1
Lay Length	L	Inch	13"	17"
Operating Flow Range		GPM	0.8 100	0.8 160
Low Flow Range		GPM	0.5 0.8	0.55 0.8
Operating Range accuracy		%	±1.5	±1.5
Low Flow Range accuracy		%	5 / ±1.5	5 / ±1.5
Pressure Loss			3.5 psi at 70 GPM	3.6 psi at 110 GPM

MUELLER

HBMAG METER

FEATURES

Applications: The HBMAG Meter is an electromagnetic flow meter designed for use in the measurement of potable water in applications where a high degree of accuracy is required over a wide range of flow rates and conditions. Hotels, schools, factories, office buildings, apartment buildings, commercial properties and irrigation are all examples of installations where domestic and process water services may have widely varying flow rates and usage profiles. The Mueller HBMAG meter has advanced EMF measurement technology to provide a high degree of maintenance free accuracy over extended periods of deployment. Maximum continuous flow rates may be exceeded by as much as 50% for intermittent periods with virtually no pressure loss, permitting full pipe capacity measurement without damage to the meter.

Conformance to Standards: Mueller HBMAG meters have some of the widest flow ranges of any meter on the market. HBMAG meters meet all the requirements of the current AWWA C 715 standard for Type I and Type II meters. All HBMAG solid state meters provide comparable performance, accuracy and pressure loss standards referenced in the latest editions of AWWA Standards C 701 for horizontal turbine meters and C 702 for compound meters. All 3" through 12" HBMAG meters are also available in an FM Approved variant for fire meter use. HBMAG meters meet the Type 1 and Type 2 accuracy requirements of AWWA standard C 715 in 3" through 12" sizes.

Construction: The Mueller HBMAG consists of the epoxy coated outer main case, SST flow tube, EPDM liner, Hastelloy electrodes, and solid state register. Main cases are made of epoxy coated steel with an EPDM liner. Electrodes are made from Hastelloy C 276. It is low maintenance, delivering long term performance with minimal cost of ownership.

Register: Sealed LCD register with heat treated glass lens to eliminate dirt, moisture infiltration and fogging. Displays volume of water measured, flow rate, reverse flow and low battery alarm. Additional communication outputs are available. All Mueller models have electronic meter reading systems available for increased reading efficiency. (see Meter Reading Systems.)

Operation: The Mueller HBMAG is a microprocessor based water meter with graphical display for optimum customer operation and information. The transmitter drives the magnetic field in the sensor, evaluates the flow signal from the sensor and calculates the volume of liquid passing through the meter. It delivers required information via the integrated solid state register or communication interfaces as part of a system solution. The intelligent functionality, information and diagnostics ensure optimum meter performance and information to optimize water supply and billing. Water flows straight through an unobstructed body permitting high flow volumes with virtually no head loss.

Maintenance: The Mueller HBMAG is designed and manufactured to provide long service life with virtually no maintenance required.

Connections: ANSI 150 standard end flanges.

3" MUELLER HBMAG WITH INTEGRAL REGISTER

MATERIALS AND SPECIFICATIONS

Model	HBMAG
Sizes	3", 4", 6", 8", 10", 12", 16", 20" Larger sizes are available. Call Mueller Systems customer care for options.
Standards	IP68/NEMA 6P, NSF 61, Optional FM approval for fire meter use on 3" through 12" sizes
Service	Measurement of flow in BOTH forward and reverse directions
Installation	Horizontal or vertical with 5x pipe diameter of straight pipe (same size as meter)
Operating Flow Range	See Charts on the following pages
Accuracy	See Charts on the following pages
Maximum Working Pressure	175 psi
Temperature Range	33°F to 140°F water temperature
Measuring Element	Time varying magnetic field
Solid State Register	Permanently sealed nDA; Standard integrated infrared communication interface with Encoder Interface, AMR/AMI RF Modules
Battery Life	6 Years: Internal Battery Pack 10 Years: External Battery Pack
Meter Connections	ANSI class 150 standard end flanges
Materials	Maincase epoxy coated steel Electrodes Hastelloy C276 Liner EPDM
Options	AMR/AMI Reading Systems

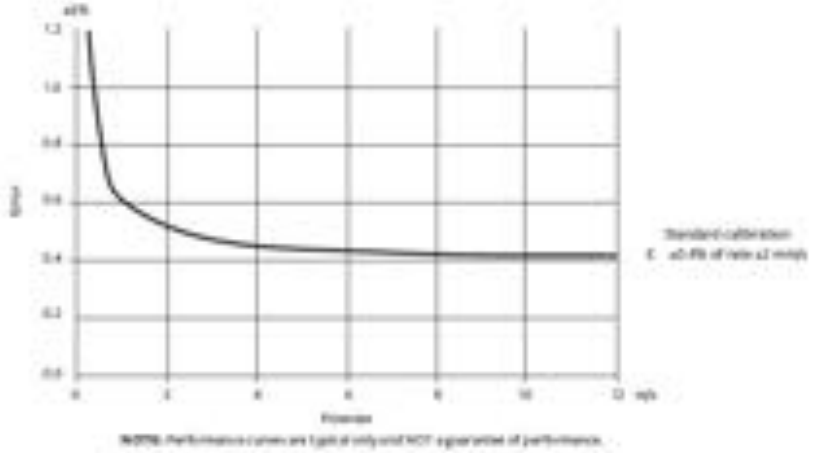
HBMAG METER

AWWA C-715 ACCURACY REQUIREMENTS FOR TYPE 1 AND TYPE 2 HBMAG SOLID STATE METERS

	PLUS/MINUS 1%		PLUS/MINUS 1.5%		PLUS/MINUS 2.5%	
SIZE	TYPE 1 LOW FLOW	TYPE 2 LOW FLOW	TYPE 1 MID FLOW	TYPE 2 MID FLOW	TYPE 1 HIGH FLOW	TYPE 2 HIGH FLOW
3"	2.5 GPM	4 GPM	7.5 GPM	15 GPM	350 GPM	500 GPM
4"	3.5 GPM	7.5 GPM	10 GPM	25 GPM	600 GPM	880 GPM
6"	9 GPM	15 GPM	20 GPM	55 GPM	1,350 GPM	1,400 GPM
8"	18 GPM	30 GPM	40 GPM	100 GPM	1,600 GPM	2,800 GPM
10"	N/A	50 GPM	N/A	150 GPM	N/A	4,500 GPM
12"	N/A	65 GPM	N/A	210 GPM	N/A	5,500 GPM
16"	N/A	110 GPM	N/A	375 GPM	N/A	9,000 GPM
20"	N/A	175 GPM	N/A	575 GPM	N/A	12,000 GPM

DIMENSIONS

SIZE"	LENGTH	APPROX WEIGHT
3"	7.9"	34 lbs
4"	9.8"	38 lbs
6"	11.8"	63 lbs
8"	13.8"	113 lbs
10"	17.7"	160 lbs
12"	19.7"	198 lbs
16"	23.6"	316 lbs
20"	26.8"	494 lbs



NOTE: Performance curves are typical only and NOT a guarantee of performance.

HBMAG METER

OVERVIEW

The Mueller HbMAG is a comprehensive meter which provides intelligent information and high performance measurement as well as the easy to install concept taking cost of ownership and customer service to a new level for a utility water meter.

BENEFITS

Easy to install

- Compact or remote solutions with factory mounted cable and customer setting from factory
- IP68 / NEMA 6P enclosure. Sensor can be buried
- Flexible power supply - internal or external battery pack or mains power supply with battery back-up

Superior measurement

- Down to 0.4% maximum uncertainty
- Bi-directional measurement

Long lasting performance / Low cost of Ownership

- No moving parts means less wear and tear
- 10 years maintenance-free operation in typical revenue applications with the 4D battery option
- Robust construction built for multiple applications

Intelligent information, easy to access

- Advanced information on site
- Advanced diagnostics

APPLICATION

The Mueller HbMAG has been developed as a standalone water meter for applications within:

- Distribution networks
- Revenue and bulk metering
- Irrigation
- Fire Meter with FM Approval 3" to 12" sizes

DESIGN

The Mueller HbMAG is designed with a focus on minimized power consumption.

The product program consists of:

- Sensor sizes from 3" to 48"
- Compact and remote installation in IP68 / NEMA 6P enclosure and factory-mounted cable
- Mueller Flow Tool PC configuration softwares

Communication module (left), PC-IrDA connection (right)

HBMAG METER

FUNCTION

The Mueller HbMAG is a microprocessor-based water meter with graphical display and key for optimum customer operation and information both on site and remotely. The transmitter drives the magnetic field in the sensor, evaluates the flow signal from the sensor and calculates the volume passing through. It delivers the required information via the integrated encoder output as part of Mueller Systems AMR and AMI solutions. Its intelligent functionality, information and diagnostics ensure optimum meter performance and information to optimize water supply and billing.

The Mueller HbMAG with integral battery option provides 10 years battery operation in typical revenue applications with the 4D battery option.

FEATURES/VERSION	MUELLER HBMAG
Measuring frequency in battery power mode	1/4s, 1/16s or 1/32s Hz
Output HbMAG	2 FW/RV/A/CA (max. 50 Hz pulse rate)
Communication	Encoder
Data logger	Yes

Information is accessible via the display whereas all information is accessible via the IrDA communication interface with Mueller software. Data and parameters are registered in a EEPROM. They can all be read, but changing the information demands a software password and a hardware key attached to the printed circuit board.

HBMAG METER
Technical Specifications

METER

Accuracy	Standard calibration: ±0.4% of rate ±2 mm/s
Media conductivity	Clean water > 20 µS/cm
Temperature **Ambient** **Media** **Storage**	 -4... +140° F (-20... +60° C) 32... +158° F (0... +70° C) -22... +158° F (-40... +70° C)
Enclosure rating	IP68/NEMA 6P, Cable glands mounted requires Sylgard potting kit to remain IP68/ NEMA 6P, otherwise IP67/NEMA 4 is obtained; Factory mounted cable provides IP68/NEMA 6P
Drinking water approvals	NSF/ANSI Standard 61 (cold water); USA
Sensor version	3"...48"
Measuring principle	Electromagnetic induction
	EXCITATION FREQUENCY
Battery-powered	3" 6": 1/4 Hz 8" 24": 1/16 Hz 28" 48": 1/64 Hz
Mains-powered	3" 6": 6.25 Hz 8" 24": 3.125 Hz
Flanges **ANSI 16.5 Class 150 lb** **AWWA C-207** **Liner** **Electrode and grounding electrodes** **Grounding straps**	 3" 24": 290 psi (20 bar) 28" 48": PN 10 145 psi EPDM Hastelloy C276 Grounding straps are premounted from the factory on each side of the sensor

HBMAG METER

Technical Specifications

TRANSMITTER

Installation	Compact (integral) or Remote with factory mounted cable 33″ (10 m)
Enclosure	Stainless steel top housing (AISI 316) and coated brass bottom. Remote wall mount bracket in stainless steel (AISI 304).
Cable entries	2 x M20 (one gland for one cable of size 0.02 0.026′ (6 8 mm) is included in the standard delivery)
Display	Display with 8 digits for visual meter reading information. Index, menu and status symbols for dedicated information
Standard Flow Units	Volume in Gallon and flow rate in GPM Volume in CF and flow rate as GPM Volume in m³ and flow rate in m³/h
Digital output **Output A function** **Output B function** **Output**	2 passive outputs (MOS), individual galvanically isolated Maximum load ± 35 V DC, 50 mA short circuit protected Programmable as pulse volume forward reverse forward/net reverse/net Programmable as pulse volume (like output A), alarm Max. pulse rate of 50 Hz , pulse width of 5, 10, 50, 100, 500 ms
Communication	IrDA: Standard integrated infrared communication interface with Mueller/Sensus Encoder Protocol for Hot Rod, Mi.Net, Itron AMR/AMI Systems
Power supply	Auto detection of power source with display symbol for operation power.
Internal battery pack **External battery pack** **Mains power supply**	2 D Cell 3.6 V/33 Ah 4 D Cell 3.6 V/66 Ah 12 ... 24 V AC/DC (10 ... 32 V) 2 VA 115 ... 230 V AC (85 ... 264 V) 2 VA The power supply has 9.8′ (3 m) power cable for external connection to mains supply (without cable plug) Both mains power supply systems are backed up by an internal D Cell 3.6 V 16.5 Ah battery pack.
Installation	Integral (compact) or remote with factory mounted cable in 33′ lengths with IP68/NEMA 6P connectors. Connection is made at the transmitter bottom.
Enclosure	Stainless steel top housing (AISI 316) and coated brass bottom. Remote wall mount bracket in stainless steel (AISI 304).
Cable entries	2 x M20 (one gland for one cable of size 0.24 ... 0.31″ (6 ... 8 mm) is included in the standard delivery)

FEATURES

Time and date	Real time clock
Totalizer	2 totalizer: Forward, Reverse, Bidirectional netflow calculation and free selectable start value. 1 customer totalizer, following totalizer 1 setting and resetable via display key or software with logging of date and time
Measurement **Low flow cut-off** **Empty pipe detection** **Data logger**	0.025% of high flow or free adjustable Symbolized in display Logging of 26 records: selectable as daily, weekly or monthly logging
Alarm **Monitoring** **Fatal faults** **Warning Faults**	Active alarm is indicated on the display Total hours an alarm has been active Numbers of times the alarm has been activated First time an alarm appears Last time the alarm disappears Coil current Fault in driving magnetic sensor field Amplifier Fault in signal circuit Check sum Fault in calculation or handling of data Low Power customer selectable battery alarm level or power drop out Flow overflow Flow in sensor exceeds intermittent high flow Pulse overflow on output A and B Selected pulse volume is too small compared to actual flow rate and max. output pulse rate Consumption saved data logger consumption exceeds customer selected limit on high or low consumption Empty pipe no water in the pipe/sensor Low impedance measured electrode impedance below customer low impedance level Flow limit actual flow exceeds selected high flow limit
Data protection	All data stored in an EEPROM. Totalizers 1 and 2 are backed up every 10 min, statistics every hour and power consumption and temperature measurement every 4 hour. Password protection of all parameters and hardware protection of calibration and revenue parameters.
Battery power management	Optimal battery information on remaining capacity Calculated capacity includes all consuming elements and available battery capacity is adjusted related to change in ambient temperature. Numbers of power ups Date and time registered for first and last time power alarm.
Diagnostics **Continuous self test including** **Alarm statistics and logging for fault analysing**	Coil current to drive the magnetic field Signal input circuit Data calculation, handling and storing Electrode impedance to check actual media contact Flow simulation to check pulse and communication signal chain for correct scaling Number of sensor measurements (excitations) Transmitter temperature (battery capacity calculation) Low impedance alarm for change in media Flow alarm when defined high flow is exceed Verification mode for fast measure performance check

HBMAG METER

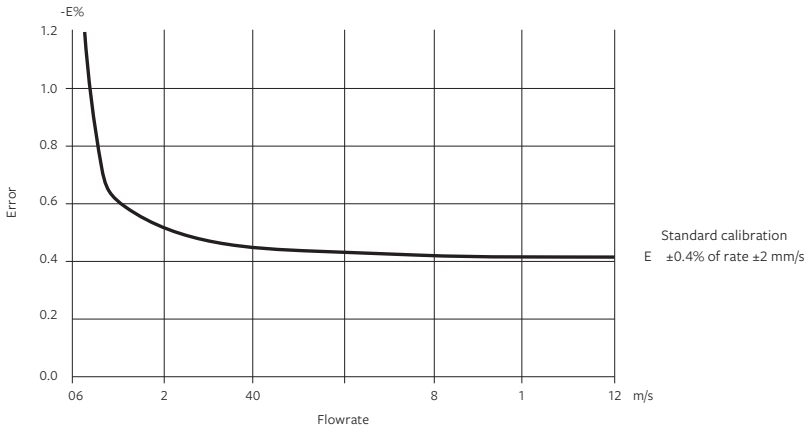
MUELLER HBMAG WATER METER UNCERTAINTY

To ensure continuous accurate measurement, flow meters must be calibrated. The calibration is conducted at flow facilities with traceable instruments referring directly to the physical unit of measurement according to the International System of Units (SI). Therefore, the calibration certificate ensures recognition of the test results worldwide, including the US (NIST traceability).

Mueller can provide accredited calibration in the flow range from 0.0001 m³/h to 10,000 m³/h.

The accredited laboratories are recognized by ILAC MRA (International Laboratory Accreditation Corporation - Mutual Recognition Arrangement) ensuring international traceability and recognition of the test results worldwide.

The selected calibration determines the accuracy of the meter. A standard calibration results in max. ±0.4 % uncertainty. A calibration certificate is provided with every sensor and calibration data are stored in the meter unit.



NOTE: Performance curves are typical only and NOT a guarantee of performance.

The Label is placed on the side of the display housing. An example of the product label is shown below:

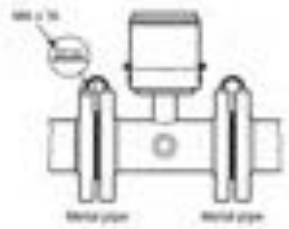
INSTALLATION CONDITIONS

Please refer to "System information for Mueller HbMAG electromagnetic flow meters".

Battery packs must be installed with the hanging bracket in upwards direction to reach maximum capacity.

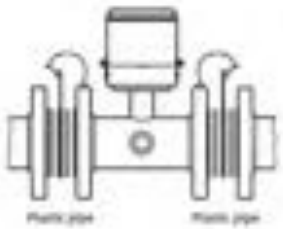
BONDING AND GROUNDING

The sensor body must be grounded using grounding / bonding straps and/ or grounding rings to protect the flow signal against stray electrical noise and/or lightning. This ensures that the noise is carried through the sensor body and a noise-free measuring area within the sensor body.



METAL PIPELINES

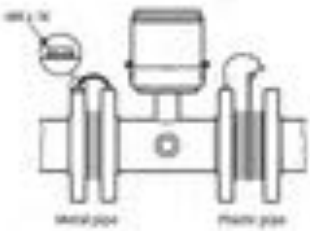
On metal pipelines, connect the straps to both flanges.



PLASTIC PIPELINES

On plastic pipelines and lined metal pipes, optional grounding rings must be used at both ends.

Grounding rings must be ordered separately see grounding ring kit.

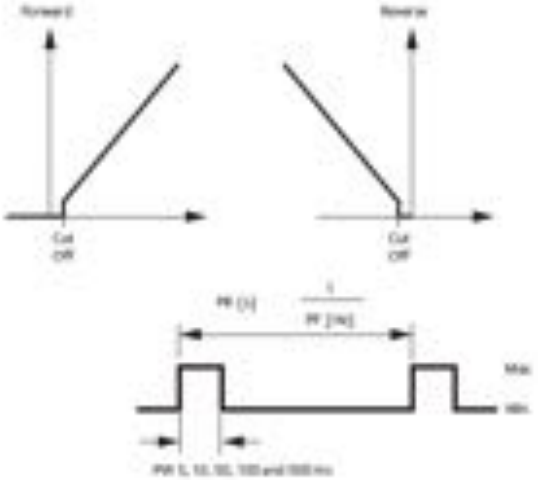


COMBINATION OF METAL AND PLASTIC PIPELINES

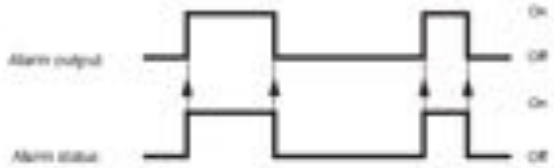
A combination of metal and plastic requires straps for metal pipeline and grounding rings for plastic pipeline.

HBMAG METER

OUTPUT CONFIGURATION HBMAG



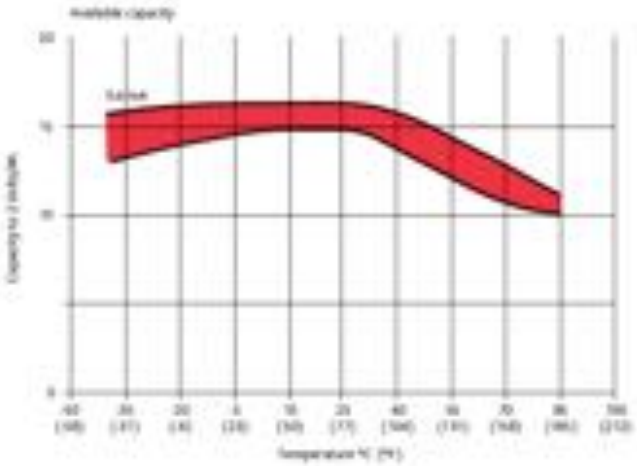
Pulse volume: Output A/B configured as volume per pulse, the output delivers a pulse when the preset volume has passed the selected direction, calculated on forward / reverse or Net forward / reverse flow. The volume per pulse is freely scalable, from 0.0001 to 10,000 meter-unit per pulse. PR = pulse rate and PF = pulse frequency.



Alarm: The alarm will follow the internal alarm status

BATTERY OPERATION TIME AND CALCULATION

The battery operation time depends on the connected battery pack as well as the operation condition of the meter.
HBMAG calculates the remaining capacity every 4 hours and includes all consuming elements. Calculation compensates for temperature influence on battery capacity (drawing).



The effect from other temperatures can be seen from the figure. A variation in temperature from 15° C to 55° C (59 to 131° F) reduces the capacity by 17% in the table from 15 Ah to 12.5 Ah.
At typical revenue scenario of expected battery operation time can be seen in the table.
The measurement for calculating the rest capacity of the battery life time is only completed if the system has no active fatal faults or the empty pipe is active. Maximum battery specification is 10 years operation.

BATTERY LIFETIME (SUBJECT TO THE ASSUMPTIONS MENTIONED ABOVE)

EXCITATION FREQUENCY (24 H OPERATION)		1/64 Hz	1/32 Hz	1/16 Hz	1/8 Hz	1.5625 Hz	3.125 Hz	6.25 Hz
Two D-Cell battery 33 Ah internal battery pack	3" 8"	8 years	8 years	8 years	40 months	8 months	4 months	2 months
	10" 24"	8 years	6 years	4 years	20 months	4 months	2 months	N/A
	28" 48"	6 years	4 years	2 years	1 year	2 months	N/A	N/A
Four D-Cell battery 66 Ah External battery pack	3" 8"	N/A	8 years	8 years	80 months	16 months	8 months	4 months
	10" 24"	N/A	10 years	10 years	40 months	8 months	4 months	N/A
	28" 48"	10 years	8 years	4 years	2 years	4 months	N/A	N/A

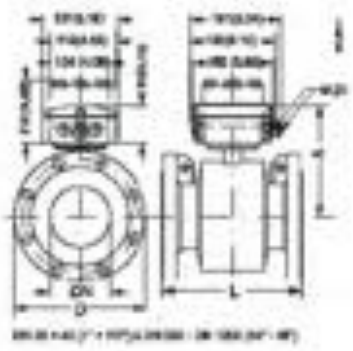
External battery pack can be used as battery backup for mains power supply

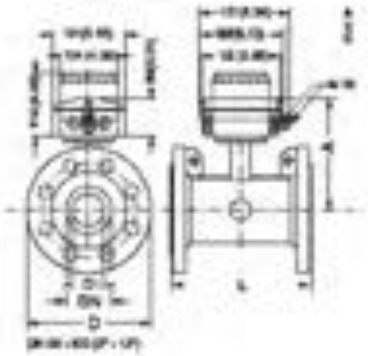
SCENARIO - REVENUE APPLICATION

Output A	Pulse rate max. 10 Hz
Output B	Alarm or call up
Meter dialog	1 hour per month
Add-com	None
Temperature profile	5% at 32° F (0° C) 80% at 59° F (15° C) 15% at 122° F (50° C)

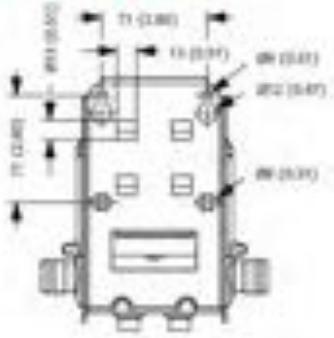
HBMAG METER

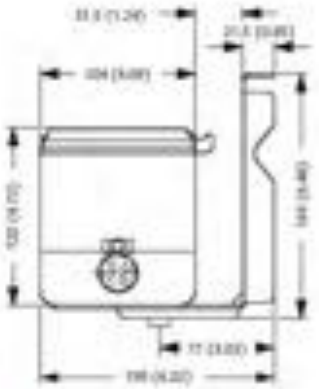
Dimensional Drawings

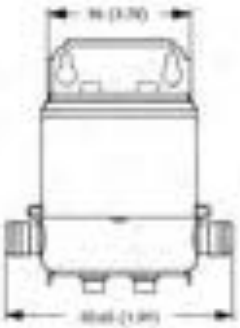




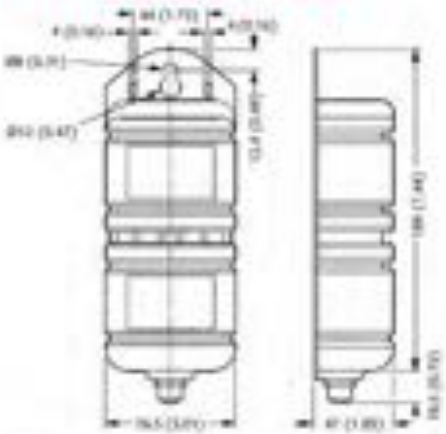
REMOTE VERSION





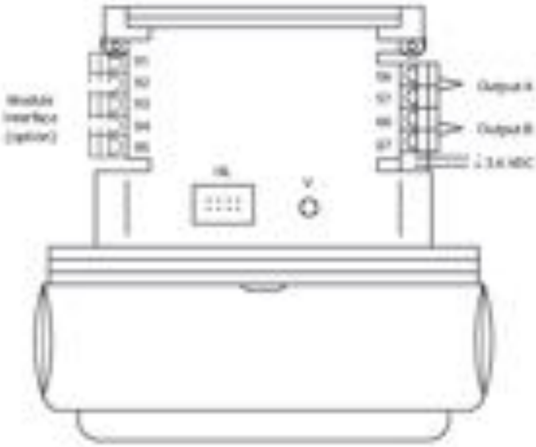


EXTERNAL BATTERY PACK



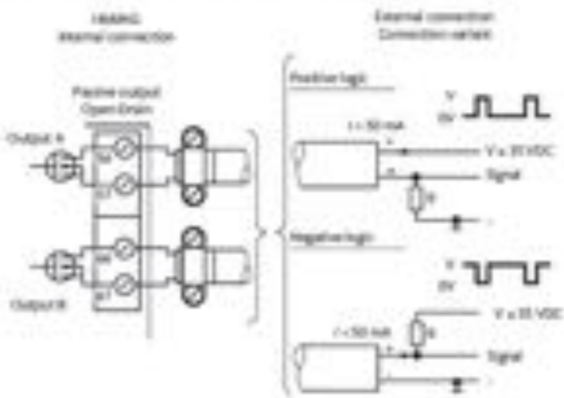
SCHEMATICS

ELECTRICAL INSTALLATION AND PULSE OUTPUT – CONNECTION DIAGRAM



HL Hardware lock key connection
V Push button for verification mode

PULSE WIRE CONNECTION



The pulse output can be configured as volume, alarm or tall-up. The output can be connected as positive or negative logic.
R pull up/down is selected in relation to the Vs power supply and with a max. current I of 50 mA.
Use shielded cable to avoid EMC problems. Make sure the shield is correctly mounted under the cable clamp (no pig tail).

For more information about Mueller or to view our full line of water products, please visit muellersystems.com or call Mueller customer service at 1.800.423.1323.

MUELLER

Model MVR

Mueller SYSTEMS

Magnetic Drive Vertical Turbine Meters
Sizes 3/4"x1/2", 3/4", 3/4"x1", 1", 1-1/2", 2", 3", 4" and 6"

Features

APPLICATIONS: Measurement of water for residential, commercial, industrial and residential fire applications, where sensitivity to low flow is also important. Hersey® MVR meters are among the most sensitive vertical turbine meters available and may be used in place of compound meters in some applications. The compact design and integral strainer (separate external strainer is not needed) of Model MVR meters facilitate installation in tight spaces. They are ideal where flexibility is needed to meet wider flow ranges, where water temperatures are elevated between 80°F and 130°F, or where sand particles or other small debris may be encountered. May be installed vertically or horizontally for greater installation flexibility.

CONFORMANCE TO STANDARDS: Hersey Model MVR Water Meters comply with ANSI/AWWA Standard C701 Class I. Each meter is tested to ensure compliance. EnviroBrass® II options conform to the NSF 61 Standard.

CONSTRUCTION: Hersey Model MVR Water Meters consist of three basic parts: maincase, rotor assembly, and a permanently sealed register. Maincases are made of bronze for long life. Rotor assemblies are thermoplastic, which is dimensionally stable and will not corrode. Retro Thrust rotor design extends the life of the meter by dividing wear between two points: during low flow the tungsten carbide thrust bearing floats against a sapphire bearing surface; during high flow the stainless steel shaft gently contacts a second sapphire bearing. During medium flow, the rotor floats between the thrust bearings without contact. Optional test ports are available on all sizes 1-1/2" and larger. The measuring chamber is protected by an internal strainer. No external strainer is required.

REGISTER: Permanently sealed register has a unique seal and heat-treated glass to eliminate dirt, moisture infiltration and lens fogging. The totalizing register has a straight-reading odometer type display, a 360° test circle with center sweep hand and a low flow (leak) detector.

All Hersey Meter models have electronic meter reading systems available for increased reading efficiency (see Meter Reading Systems.)

OPERATION: Water flows through the integral strainer and into the vertical turbine assembly. There the direction of the water flow is directed by the hub into the rotor at the precise angle necessary for accurate measurement over the full range of flow rates. No straight pipe requirements apply before or after the meter. The turbine turns freely and rotates in direct proportion to the volume of water passing through the meter. The Model MVR turbine operates more quietly than conventional disc or piston meters.

MAINTENANCE: The Hersey Model MVR Water Meters are designed and manufactured to provide long service life. The register on all sizes, and meter interior and strainer on sizes 3" and larger, can be replaced without removing the meter from the line. Modular design and economical internal parts allow for inexpensive, speedy rebuilds. Optional built-in test ports make field testing easy and convenient.

CONNECTIONS: Available with external (N.P.S.M.) straight pipe threads (ANSI B1.20.1) on 3/4" and 1" sizes; integral two-bolt oval flanges or internal (NPT) pipe threads (ANSI B1.20.1) on 1-1/2" and 2" sizes. ANSI class 150 flanges on 3" through 6" sizes (class 125 cast iron or class 150 bronze companion flanges available on request).

MVR 30

MVR 30 with adapter

MVR 350

Materials and Specifications

MODEL NUMBER	MVR 30, MVR 30A, MVR 30B, MVR 50, MVR 100, MVR 160, MVR 350, MVR 650, and MVR 1300.
SIZES	3/4"x1/2", 3/4", 3/4"x1", 1", 1-1/2", 2", 3", 4" and 6"
STANDARDS	Manufactured and tested to meet or exceed all applicable parts of ANSI/AWWA C701 Class I Standard.
SERVICE	Cold water measurement with flow in only one direction.
OPERATING FLOW RANGE	See Chart on following page
ACCURACY	See Chart on following page
PRESSURE LOSS	See Chart on following page
MAXIMUM WORKING PRESSURE	150 PSI
TEMPERATURE RANGE	33°F to 130°F water temperature Hot water up to 180° available upon request.
MEASURING ELEMENT	Rotor
REGISTER TYPE	Straight reading, permanently sealed, magnetic drive with low flow indicator. Remote reading units optional.
METER CONNECTIONS	1/2", 3/4" and 1" external (NPSM) straight pipe threads; 1-1/2 size and 2" size available with either two bolt flanged ends or internal thread (NPT) ends same nominal size as size of meter; 3" thru 6" ANSI class 150 flanges.
MATERIALS	Maincase – bronze UNSC84400; 3/4" - 1-1/2" Bottom cover – cast iron ASTM A126 CL. B enamel painted; 2" Bottom cover – bronze UNSC84400; Rotor assembly – thermoplastic; Strainer – thermoplastic std. in 3/4" thru 1-1/2", or stainless steel (2" – 6"); Casing bolts – stainless steel ANSI B18.
OPTIONS	Meter case – EnviroBrass® II UNSC89520. Stainless steel ring strainer is available on 3/4", 1" and 1-1/2" meters. AMR Reading Systems.

Mueller SYSTEMS

Model MVR

Magnetic Drive Vertical Turbine Meters

Sizes 3/4"x1/2", 3/4", 3/4"x1", 1", 1-1/2", 2", 3", 4" and 6"

Meter Registration

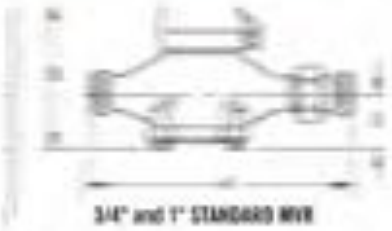
Meter Size	Initial Dial*	Capacity	Initial Dial *	Capacity
3/4"	10 Gallons	10 Million	1 Cubic Foot	1 Million
1"	10 Gallons	10 Million	1 Cubic Foot	1 Million
1-1/2"	100 Gallons	100 Million	10 Cubic Feet	10 Million
2"	100 Gallons	100 Million	10 Cubic Feet	10 Million
3"	100 Gallons	100 Million	10 Cubic Feet	10 Million
4"	100 Gallons	100 Million	10 Cubic Feet	10 Million
6"	1000 Gal	1 Billion	100 Cubic Ft	100 Mill.

* Registration equal to one full revolution of the sweep hand.

Flow Characteristics

Meter Size	Typical Low Flow (95% Min.)	Typical Operating Range (98% ± 2%)	Maximum Continuous Operation	Maximum Intermittent Flow
3/4"	1/2 GPM	1 to 30 GPM	25 GPM	35 GPM
1"	3/4 GPM	1-1/2 to 50 GPM	35 GPM	55 GPM
1-1/2"	1-1/2 GPM	2 to 100 GPM	70 GPM	110 GPM
2"	2 GPM	3 to 160 GPM	115 GPM	175 GPM
3"	2-1/2 GPM	4 to 350 GPM	240 GPM	380 GPM
4"	3-1/2 GPM	5 to 650 GPM	450 GPM	715 GPM
6"	5 GPM	15 to 1300 GPM	910 GPM	1430 GPM

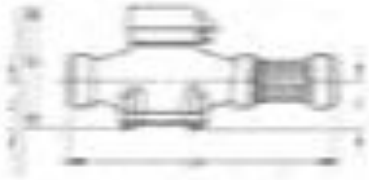
Dimensions and Weights



3/4" and 1" STANDARD MVR

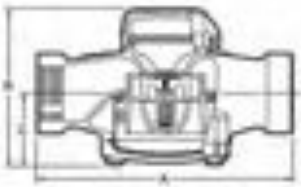
3/4" and 1" COMPACT MVR

1-1/2" and 2" STANDARD MVR with 2 bolt flange ends** and spool piece

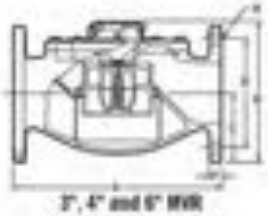


1-1/2" and 2" STANDARD MVR with Internal NPT ends

1-1/2" and 2" COMPACT MVR with integral 2 bolt flange ends**



1-1/2" and 2" COMPACT MVR with Internal NPT ends



3", 4" and 6" MVR

Meter Size	3/4"x1/2"	3/4"	3/4"x1"	1"	1-1/2"	2"	1-1/2"	2"	3"	4"	6"
Ends	Threaded (screwed)						Flanged				
Model	MVR30	MVR30A	MVR100	MVR50	MVR100	MVR160	MVR100	MVR160	MVR250	MVR650	MVR1300
Dimensions											
A	9"	9"	9"	10-3/8"	12-5/8"	15-1/4"	13"	17"	13"	14"	18"
A*	7-1/2"	7-1/2"	7-1/2"	9"	9"	10-1/2"	9"	10"	-	-	-
B	5"	5"	5"	5-1/2"	5-3/4"	6-1/4"	5-3/4"	6-1/4"	6-7/16"	9-3/8"	12-9/16"
C	1-13/16"	1-13/16"	1-13/16"	2-3/8"	2-3/8"	3"	2-3/8"	3"	3-7/8"	4-5/8"	6"
D	N/A	N/A	N/A	N/A	N/A	N/A	4"	4-1/2"	6"	7-1/2"	9-1/2"
E	N/A	N/A	N/A	N/A	N/A	N/A	5/8"	5/8"	3/4"	3/4"	7/8"
F	N/A	N/A	N/A	N/A	N/A	N/A	11/16"	15/16"	5/8"	11/16"	13/16"
Max.width	3-3/4"	3-3/4"	3-3/4"	4-1/4"	4-3/8"	5-3/8"	5-3/8"	5-15/16"	7-7/8"	9-3/4"	12-7/8"
Net weight	6 (5*)	6 (5*)	6 (5*)	8 (7*)	11 (9*)	15 (14 *)	12 (9*)	20 (14*)	38	68	140

*Compact length

**1-1/2" and 2" Flanged meters have 2 bolt oval flange pattern

NOTE: Meter couplings are optional and must be ordered separately. Weights are in pounds and are approximate.

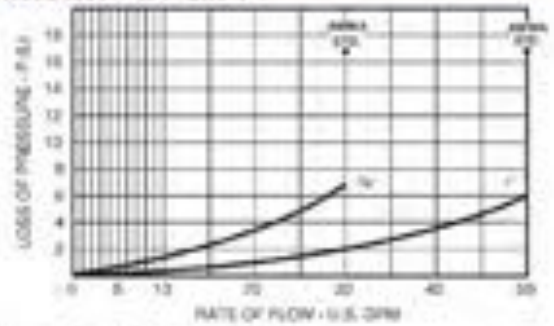
Model MVR

Magnetic Drive Vertical Turbine Meters
Sizes 3/4"x1/2", 3/4", 3/4"x1", 1", 1-1/2", 2", 3", 4" and 6"

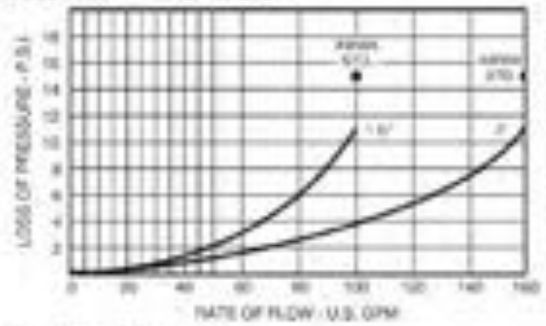
Mueller SYSTEMS

Performance

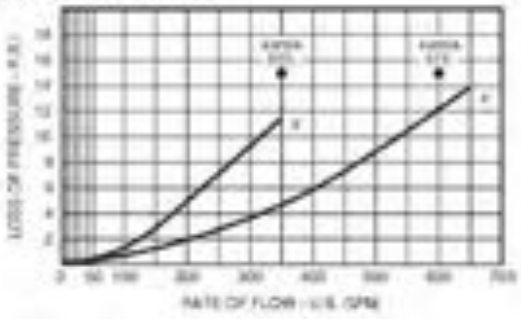
Head loss – 3/4" and 1"



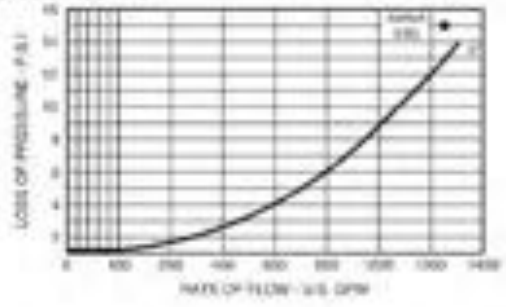
Head loss – 1-1/2" and 2"



Head loss – 3" and 4"



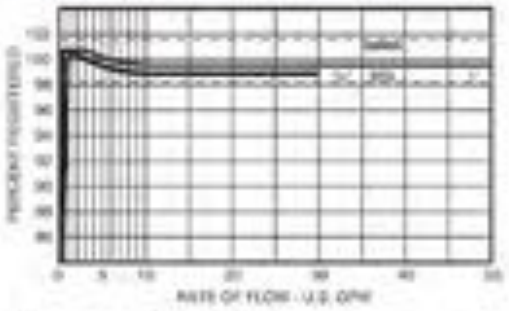
Head loss – 6"



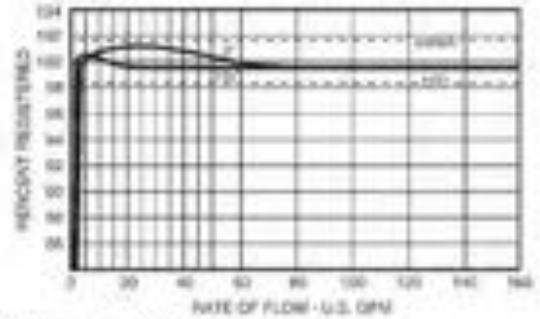
*Performance curves are typical only and not a guarantee of performance.

Performance

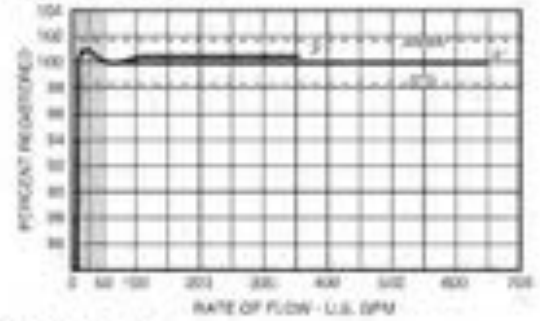
Accuracy – 3/4" and 1"



Accuracy – 1-1/2" and 2"



Accuracy – 3" and 4"



Accuracy – 6"

Model MVR

Models MVR-30, MVR 50, MVR 100 and MVR 160

Ref. No.	Description	Model MVR-30	Model MVR-50	Model MVR-100	Model MVR-160
1	Lid (Plastic)	50377	50377	50377	50377
	Lid (Bronze)	50390	50390	50390	50390
2	Black Clamp Band for Visual Register Blue Clamp Band for Translator Register	50579 88602	50579 88602	50579 88602	50579 88602
3	Lid Seal Screw	19945	19945	19945	19945
4	Lid Nut	19999	19999	19999	19999
5	Sealed Registers (Specify unit of measurement)	See pages 4.5-4.11			
6	MVR 30 Top Case (7-1/2" length): 1/2" M.I.P. Ends 3/4" M.I.P. Ends 1" M.I.P. Ends	 50452 50466 (A) 50476 (B)	 - - -	 - - -	 - - -
6	MVR 50 Top Case (9" length): 1" M.I.P. Ends 1-1/4" M.I.P. Ends	 - -	 50566 (C) 50576 (D)	 - -	 - -
6	MVR 100 Top Case (9" length): 1-1/2" F.I.P. Ends 1-1/2" Bronze 2-Bolt Flange Assembly	 - -	 - -	 50776 (E) 50784 (F)	 - -
6	MVR 160 Top Case (10-1/2" length): 2" F.I.P. Ends 2" Bronze 2-Bolt Flange Assembly (10" length)	 - -	 - -	 - -	 50866 (G) 50884 (H)
7	Rotor	50471	50571	50771	50871
8	Inlet Hub	50469	50569	50769	50869
9	Lower Bushing	50574 (2)	50574 (2)	50574 (2)	-
10	Interior Screw	98394 (4)	98394 (4)	98304 (4)	98304 (4)
11	Strainer (Plastic)	50469	50569	50759	-
12	Strainer (Metal Ring)**	50480	50580	50780	50880
13	Liner	50365	50565	50765	50865
14	Bottom (Bronze)	50363	50563	50763	50863
	Bottom (Cast Iron)	50364	50564	50764	-
15	Case Washer	87792 (4)	87792 (4)	50378 (4)	98378 (4)
16	Case Bolt	96026 (4)	96026 (4)	90072 (4)	90872 (4)
	Inlet Hub Assembly	-	-	-	50862
	Bushing Spacer	-	-	-	53118
	Bushing	-	-	-	54915 (2)
	Inlet Plug Assembly	50493	50493	50493	53105
	Sapphire Thrust Bearing (Case)	98371	98371	98371	98371
	Complete Interior	50477	50577	50777	50872
	Bearing Adhesive *	-	-	-	-
	Adapters: 3/4" Adapter 3/4" Adapter Washer 1" Adapter 1" Adapter Washer 1-1/4" Adapter 1-1/4" Adapter Washer 1-1/2" Female Adapter 2" Female Adapter	95046 95014 95011 95064 - - - -	- - 95063 95064 95086 95007 - -	- - - - - - 95095 -	- - - - - - - 95195

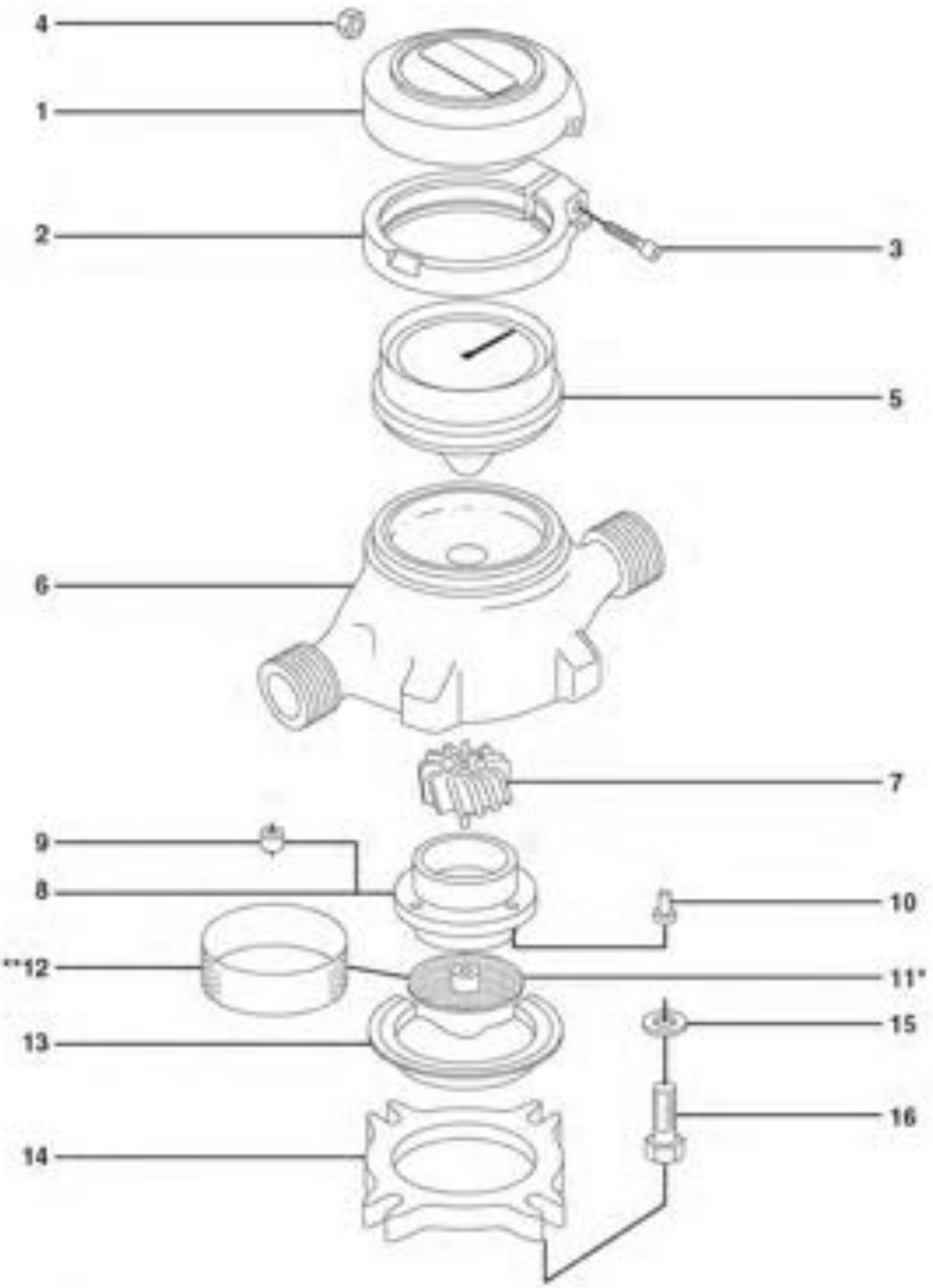
A. Order 3/4" Adapter 95046 and Adapter Washer 95014 to replace standard 3/4" disc meter, 9" long.
B. Order 1" Adapter 95011 and Adapter Washer 95064 with Top Case 50476 to replace 3/4" disc meter, 9" long, installed with 1" pipe connections.
C. Order 1" Adapter 95063 and Adapter Washer 95064 with Top Case 50566 to replace standard 1" disc meter, 10-3/4" long.
D. Order 1-1/4" Adapter 95086 and Adapter Washer 95007 with Top Case 50576 to replace 1" disc meter, 10-3/4" long, installed with 1-1/4" pipe connection.
E. Order 1- 1/2" Adapter 95095 with Top Case 50776 to replace 1-1/2" Nakade end meter installed with union connections. Assemble to length of 12-5/8".
F. Order 1-1/2" Bronze Spool Piece 50783 and gasket 95102 with Top Case 50784 to replace standard 1-1/2" disc meter, 13" long.
G. Order 2" Adapter 95195 with Top Case 50866 to replace standard 2" Female End disc meter, 15-1/4" long.
H. Order (2) Bronze Spool piece 50883 and gasket 95122 with Top Case 50868 for (1" length 2-90229 Bolt 2-90260 Nut.
* Purchase locally. Use a cyanoacrylic adhesive, such as Loctite Super Bonder #30-13, Eastman #910, Permabond or Aron Alpha.

**Standard on MVR 160. Optional on MVR 30, 50 100 in place of standard plastic disc strainer.
NOTE: If more than one part is required, quantity is noted after part number (in parenthesis).

Model MVR

Models MVR-30, MVR 50, MVR 100 and MVR 160

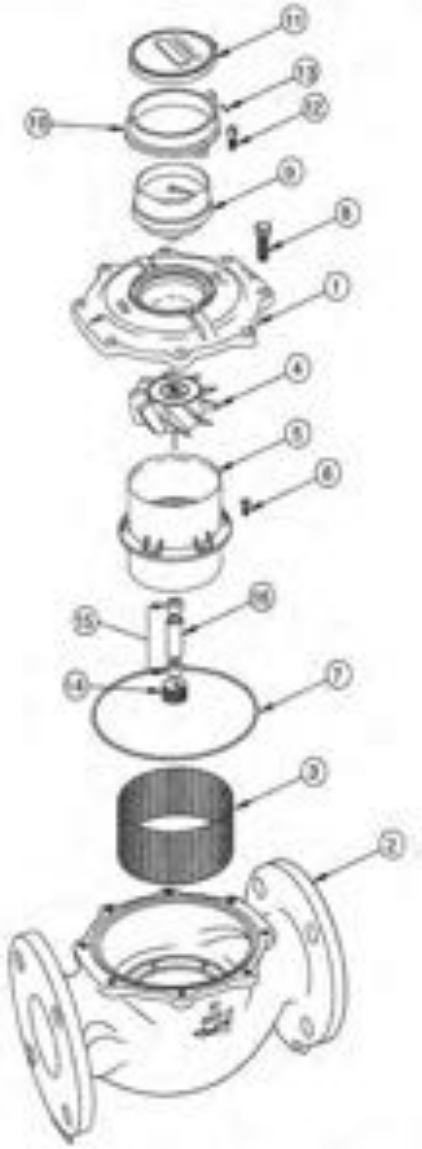
Mueller SYSTEMS



*Disc Strainer – standard on MVR 30, 50, 100.
**Ring Strainer – optional (in place of) disc strainer on MVR 30, 50 100
Standard on MVR 160.

Model MVR

Models MVR-350, MVR 650 and MVR 1300



Ref. No.	Description	Model MVR-350	Model MVR-650	Model MVR-1300
1	Top Case/Thrust Bearing	50991	51181	51381
2	Bottom Case	50992	51182	51382
3	Ring Strainer	50985	51185	51383
4	Rotor Assembly	50984	51184	51384
5	Inlet Hub Assembly	50987	51187	51387
6	Inlet Hub Screws	98095 (6)	98095 (6)	98409 (12)
7	Top Case O-Ring	98061	98062	98408
8	Top Cast Screw	90073 (8)	90073 (10)	90180 (14)
9	Register	See page following pages	See page following pages	See page following pages
10	Register Box (Bronze)	50998	50998	50998
11	Lid (Bronze)	19201	19201	19201
12	Register Box Screw	51605P007 (2)	51605P007 (2)	51605P007 (2)
13	Lid Pin	A041122	A041122	A041122
14	Inlet Plug/Thrust Bearing	50990	50990	-
15	Rotor Bushing	54915 (2)	56915 (2)	51392 (2)
16	Bushing Spacer	54914	51186	51391

NOTE: In order to retrofit translator registers on all 2"-6" MVR meters manufactured prior to 2003 a new top case (1) and top case o-ring (7) is required.

Model MVR

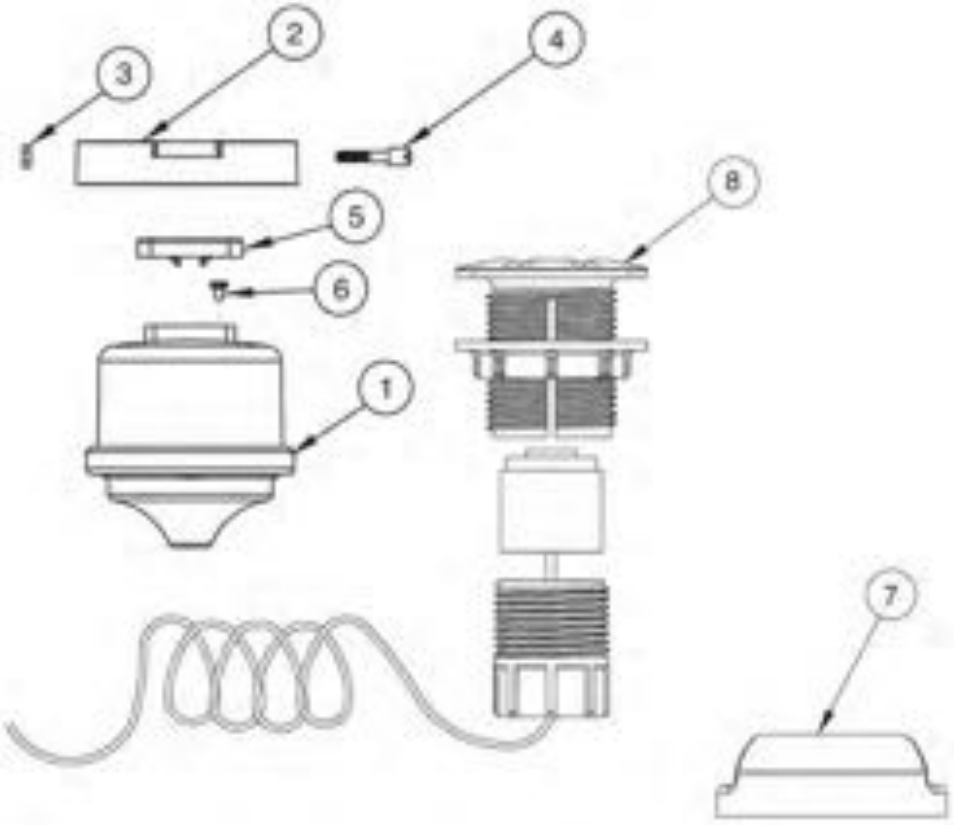
Registers

	Cubic Feet			U.S. Gallons		
MVR Model	Register Part Numbers	Internal Ratio	Relation to other Registers	Register Part Numbers	Internal Ratio	Relation to other Registers
MVR-30	879821	551.99	-4% (in relation to 879825)	879813	708.92	-4% (in relation to 879817)
MVR-30	879822	546.36	-3% (in relation to 879825)	879814	701.68	-3% (in relation to 879817)
MVR-30	879823	540.86	-2% (in relation to 879825)	879815	723.79	-2% (in relation to 879817)
MVR-30	879824	536.22	-1% (in relation to 879825)	879816	713.86	-1% (in relation to 879817)
MVR-30	879825	530.07	-	879817	709.01	-
MVR-30	879826	523.96	+1% (in relation to 879825)	879818	702.61	+1% (in relation to 879817)
MVR-30	879827	519.6	+2% (in relation to 879825)	879819	694.85	+2% (in relation to 879817)
MVR-30	879828	514.2	+3% (in relation to 879825)	879820	688.55	+3% (in relation to 879817)
MVR-50	879861	293.48	-4% (in relation to 879865)	879851	360.58	-3% (in relation to 879854)
MVR-50	879862	286.44	-2% (in relation to 879865)	879852	356.41	-2% (in relation to 879854)
MVR-50	879863	284.51	-1% (in relation to 879865)	879853	353.17	-1% (in relation to 879854)
MVR-50	879864	282.07	-1% (in relation to 879865)	879854	349.42	-
MVR-50	879865	258.83	-	879855	345.93	+1% (in relation to 879854)
MVR-50	879866	256.52	+1% (in relation to 879865)	879856	342.53	+2% (in relation to 879854)
MVR-50	879867	254	+2% (in relation to 879865)	879857	339.04	+3% (in relation to 879854)
MVR-100	879901	1573.95	-3% (in relation to 879904)	879893	2044.16	-3% (in relation to 879894)
MVR-100	879902	1551.68	-2% (in relation to 879904)	879892	2046.98	-2% (in relation to 879894)
MVR-100	879903	1535.27	-1% (in relation to 879904)	879893	2605.61	-1% (in relation to 879894)
MVR-100	879904	1512.65	-	879894	2586.61	-
MVR-100	879905	1501.98	+1% (in relation to 879904)	879895	2554.50	+1% (in relation to 879894)
MVR-100	879906	1482.77	+2% (in relation to 879904)	879896	2526.66	+2% (in relation to 879894)
MVR-100	879907	1462.97	+3% (in relation to 879904)	879897	2505.78	+3% (in relation to 879894)
MVR-160	879941	604.34	-3% (in relation to 879944)	879931	808.31	-3% (in relation to 879934)
MVR-160	879942	598.37	-2% (in relation to 879944)	879932	800.5	-2% (in relation to 879934)
MVR-160	879943	592.81	-1% (in relation to 879944)	879933	792.41	-1% (in relation to 879934)
MVR-160	879944	587.03	-	879934	784.64	-
MVR-160	879945	580.58	+1% (in relation to 879944)	879935	775.87	+1% (in relation to 879934)
MVR-160	879946	575.56	+2% (in relation to 879944)	879936	768.87	+2% (in relation to 879934)
MVR-350	879981	294.32	-2% (in relation to 879983)	879971	394.09	-2% (in relation to 879973)
MVR-350	879982	291.89	-1% (in relation to 879983)	879972	389.61	-1% (in relation to 879973)
MVR-350	879983	288.55	-	879973	385.91	-
MVR-350	879984	285.72	+1% (in relation to 879983)	879974	382.06	+1% (in relation to 879973)
MVR-350	879985	283.03	+2% (in relation to 879983)	879975	378.6	+2% (in relation to 879973)
MVR-350	879986	280.7	+3% (in relation to 879983)	879976	374.11	+3% (in relation to 879973)
MVR-650	880021	182.28	-3% (in relation to 880024)	880013	239.51	-3% (in relation to 880014)
MVR-650	880022	180.55	-2% (in relation to 880024)	880014	236.41	-
MVR-650	880023	178.86	-1% (in relation to 880024)	880015	234.58	+1% (in relation to 880014)
MVR-650	880024	176.9	-	880016	233.95	+2% (in relation to 880014)
MVR-650	880025	175.08	+1% (in relation to 880024)	880017	230.82	+3% (in relation to 880014)
MVR-650	880026	173.77	+2% (in relation to 880024)	880018	228.21	+4% (in relation to 880014)
MVR-650	880027	171.53	+3% (in relation to 880024)	-	-	-
MVR-650	880028	170.36	+4% (in relation to 880024)	-	-	-
MVR-1300	880067	611.05	-1% (in relation to 880068)	880056	551.99	1% (in relation to 880057)
MVR-1300	880068	609.61	-	880057	546.34	-
MVR-1300	880069	605.25	+1% (in relation to 880068)	880058	540.85	1% (in relation to 880057)

MVR Model	Cubic Feet Standard Register	US Gallons Standard Register
MVR-5D	879821	879813
MVR-6D	879822	879814
MVR-7D	879823	879815
MVR-8D	879824	879816
MVR-9D	879825	879817
MVR-10	879826	879818
MVR-20	879827	879819
MVR-30	879828	879820
MVR-5D	879851	879851
MVR-6D	879852	879852
MVR-7D	879853	879853
MVR-8D	879854	879854
MVR-9D	879855	879855
MVR-10	879856	879856
MVR-20	879857	879857
MVR-30	879901	879901
MVR-5D	879902	879902
MVR-6D	879903	879903
MVR-7D	879904	879904
MVR-8D	879905	879905
MVR-9D	879906	879906
MVR-10	879907	879907
MVR-16D	879941	879931
MVR-16D	879942	879932
MVR-16D	879943	879933
MVR-16D	879944	879934
MVR-16D	879945	879935
MVR-16D	879946	879936
MVR-25D	879961	879971
MVR-25D	879962	879972
MVR-25D	879963	879973
MVR-25D	879964	879974
MVR-25D	879965	879975
MVR-25D	879966	879976
MVR-45D	880021	880013
MVR-45D	880022	880014
MVR-45D	880023	880015
MVR-45D	880024	880016
MVR-45D	880025	880017
MVR-45D	880026	880018
MVR-45D	880027	880019
MVR-45D	880028	880020
MVR-120D	880067	880053
MVR-120D	880068	880054
MVR-120D	880069	880055

Model MVR

Translator Register Options for MVR 30 to 160



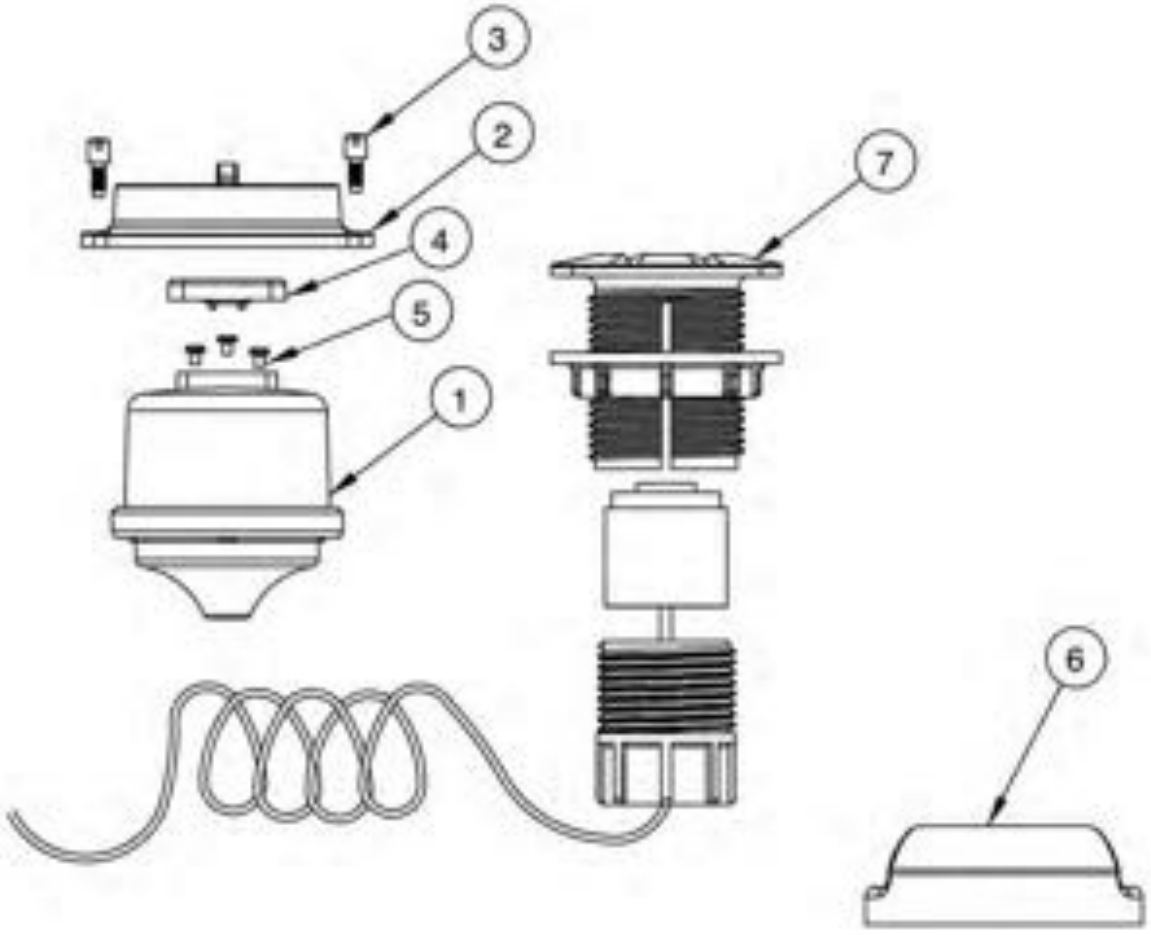
Ref	Description	MVR-30	MVR-50	MVR-100	MVR-160
1	Translator Register* Gallons Cubic Feet Specify Electronic Reading Value 4, 5, or 6 Wheel	005231xxx 005232xxx	005241xxx 005242xxx	005251xxx 005252xxx	005261xxx 005262xxx
2	Clamp Band (Plastic) Translator Only	88602	88602	88602	88602
3	Clamp Band Seal Nut	19999	19999	19999	19999
4	Clamp Band Seal Screw	19945	19945	19945	19945
5	Lens Terminal Cover	88447	88447	88447	88447
6	Terminal Lug Screw	98197 (3)	98197 (3)	98197 (3)	98197 (3)
7	Wall Pad	T1234	T1234	T1234	T1234
8	Pit Pad	T1240	T1240	T1240	T1240
9	Thumbscrew (not shown)	C65516	C65516	C65516	C65516
10	1,000' Spool of Wire (not shown)	65755	65755	65755	65755

*Call Mueller Systems Customer Service for appropriate Translator Register and ARB device part number

Mueller SYSTEMS

Model MVR

Translator Register Options for MVR 350 to 1300



Ref	Description	MVR-350	MVR-650	MVR-1300
1	Translator Register Gallons* Cubic Feet*	 D05271xxx D05272xxx	 D05281xxx D05282xxx	 D05291xxx D05292xxx
2	Register Box (Bronze) Translator Only	C65525	C65525	C65525
3	Register Box Screw	51609P007 (2)	51609P007 (2)	51609P007 (2)
4	Lens Terminal Cover	B8447	B8447	B8447
5	Terminal Lug Screw	98197 (3)	98197 (3)	98197 (3)
6	Wall Pad	T1234	T1234	T1234
7	Pit Pad	T1240	T1240	T1240
8	Headboat (not shown)	C65516	C65516	C65516
9	1,000' Spool of Wire (not shown)	A8255	A8255	A8255

*Call Mueller Systems Customer Service for appropriate Translator Register and AMR device part number.

Model RFM

Residential Fire Meter

Sizes 3/4", 1", 1-1/2" and 2"

Mueller SYSTEMS

Features

APPLICATIONS: The Hersey Residential Fire Meter (RFM) is specifically designed for use in residential fire protection systems or combination systems that supply domestic plumbing needs and residential sprinkler fire protection service when installed as specified in NFPA 13D or NFPA 13R. (Standards for the installation of sprinkler systems in one and two family dwellings, manufactured homes and residential occupancies up to and including four stories in height). The RFM utilizes Hersey's unique vertical turbine measuring element to measure flow rates comparable to traditional positive displacement meters, yet provides a measuring element that allows suspended particulate matter to pass through the element unobstructed when emergency flow requirements for water are demanded. No other meter provides more flexibility and dependability for measuring water accurately in residential fire suppression and domestic use applications.

CONFORMANCE TO STANDARDS: Each Hersey Residential Fire Service Meter is tested to assure compliance with ANSI/AWWA Standard C701, Class 1. Each male and female threaded RFM has UL Approval. EnviroBrass II® options conform to the NSF 61 Standard.

CONSTRUCTION: Hersey Residential Fire Water Meters consist of three basic parts: maincase, rotor assembly, and a permanently sealed register. Maincases and bottom plates are made of bronze for long service life. Rotor assemblies are thermoplastic, which is dimensionally stable and will not corrode. Retro Thrust® rotor design extends the life of the meter by dividing wear between two points: during low flow the tungsten carbide thrust bearing floats against a sapphire bearing surface; during high flow the stainless steel shaft gently contacts a second sapphire bearing and during medium flow, the rotor floats between the thrust bearings without contact. The measuring chamber is protected by an internal strainer with four times the effective straining area of the inlet pipe diameter. No external strainer is required. Fire service connections are easily recognized by the bright red register collar and lid on all visual read meters. Electronic meters are distinguished by the red collar and lease terminal cover on top of the Translator® register. Optional test ports are available on all 1-1/2" and 2" meters.

REGISTER: The permanently sealed register has a unique L seal and heat treated glass to eliminate dirt, moisture infiltration and lens fogging. The totalizing register has a straight-reading odometer type display, a 360° test circle with center sweep hand and a low flow (leak) detector.

All Hersey Meter models have electronic meter reading systems available for increased reading efficiency (see Meter Reading Systems).

OPERATION: Water flows through the integral strainer and into the vertical turbine assembly. There, the direction of the water flow is directed by the hub into the rotor at the precise angle necessary for accurate measurement over the full range of flow rates. No straight pipe requirements apply before or after the meter. The turbine turns freely and rotates in direct proportion to the volume of water passing through the meter. The Hersey turbine operates more quietly than conventional disc or piston meters.

MAINTENANCE: All Hersey Residential Fire Meters are designed and manufactured to provide long service life. The register on all sizes can be replaced without removing the meter from the line. Modular design and economical internal parts allow for inexpensive, speedy rebuilds.

CONNECTIONS: Available with external (N.P.S.M.) straight pipe threads (ANSI B1.20.1) on 3/4" and 1" sizes; internal (NPT) pipe threads (ANSI B1.20.1) on 1-1/2" and 2" sizes.

1" RFM 50

2" RFM 160

Materials and Specifications

MODEL	Residential Fire Meter (RFM)
SIZES	3/4", 1", 1-1/2" and 2"
STANDARDS	Manufactured and tested to meet or exceed all applicable parts of ANSI/AWWA C701, Class 1 Standard All Male and Female Threaded RFMS have UL Fire Service Approval
SERVICE	Cold water measurement with flow in only one direction
OPERATING FLOW RANGE	See Charts
ACCURACY	See Charts
MAXIMUM WORKING PRESSURE	175 PSI Meets Hydrostatic Pressure Testing to 875 PSI.
TEMPERATURE RANGE	33°F TO 110°F
MEASURING ELEMENT	Rotor
STRAINER	4 times the inlet pipe diameter of straining surface area with .080 perforations.
REGISTER TYPE	Straight reading, permanently sealed, magnetic drive with low flow indicator. Remote reading units optional.
METER CONNECTIONS	3/4" and 1" external (NPSM) straight pipe threads, 1-1/2" size and 2" size available with internal thread (NPT) ends same nominal size as size of meter
MATERIALS	Maincase – bronze UNSC84400, Rotor assembly – thermoplastic, Strainer – stainless steel, Casing bolts – stainless steel ANSI B18.
OPTIONS	Meter case – EnviroBrass II® UNSC89520, Translator registers and AMR Systems

Mueller SYSTEMS

Model RFM

Residential Fire Meter

Sizes 3/4", 1", 1-1/2" and 2"

Meter Registration

Meter Size	Initial Dial *	Capacity	Initial Dial *	Capacity
3/4"	10 Gallons	10 Million	1 Cubic Foot	1 Million
1"	10 Gallons	10 Million	1 Cubic Feet	1 Million
1-1/2"	100 Gallons	100 Million	10 Cubic Feet	10 Million
2"	100 Gallons	100 Million	10 Cubic Feet	10 Million

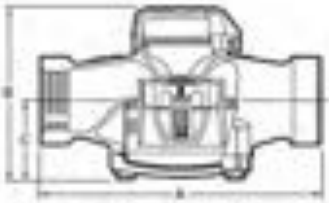
*Registration equal to one full revolution of the sweep hand.

Flow Characteristics

Meter Size	Typical Low Flow (95% Minimum)	Typical Operating Range (100% ± 2%)	Maximum Continuous Operation	Maximum Intermittent Flow
3/4"	1/2 GPM	1 to 30 GPM	25 GPM	35 GPM
1"	3/4 GPM	1-1/2 to 50 GPM	35 GPM	55 GPM
1-1/2"	1-1/2 GPM	2 to 100 GPM	70 GPM	110 GPM
2"	2 GPM	3 to 160 GPM	111 GPM	175 GPM

Dimensions and Weights

3/4" and 1" COMPACT RFM



1-1/2" and 2" COMPACT RFM with internal NPT ends

Meter Size	3/4"	1"	1-1/2"	2"
Ends	Threaded (screwed)			
Model	RFM3/4	RFM1	RFM1-1/2	RFM2
Dimensions				
A	7-1/2"	9"	9"	10-1/2"
B	5"	5-1/2"	5-3/4"	6-1/4"
C	1-13/16"	2-3/8"	2-3/8"	3"
Max.width	3-3/4"	4-1/4"	4-1/8"	5-3/8"
Net weight	5"	7"	9"	14"

* Weights are in pounds and are approximate.

Model RFM

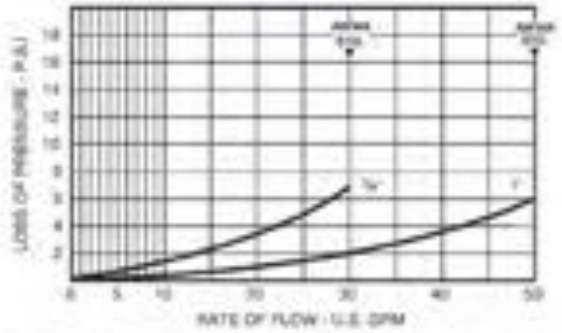
Residential Fire Meter

Sizes 3/4", 1", 1-1/2" and 2"

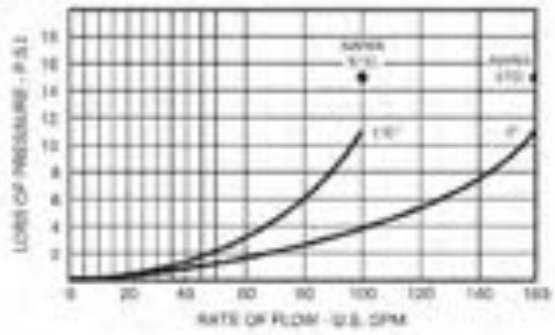
Mueller SYSTEMS

Performance

Head loss – 3/4" and 1"



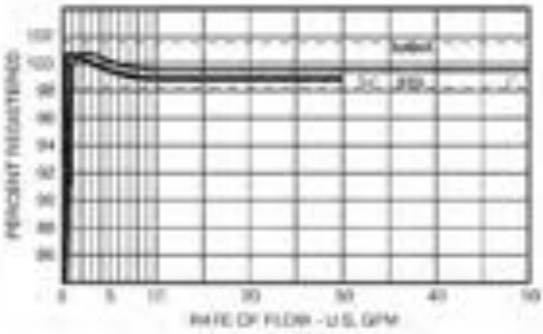
Head loss – 1-1/2" and 2"



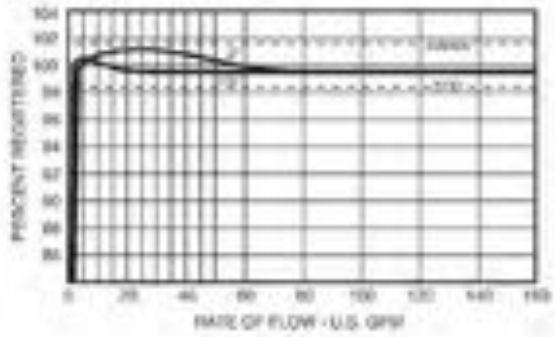
*Performance curves are typical only and not a guarantee of performance

Performance

Accuracy – 3/4" and 1"

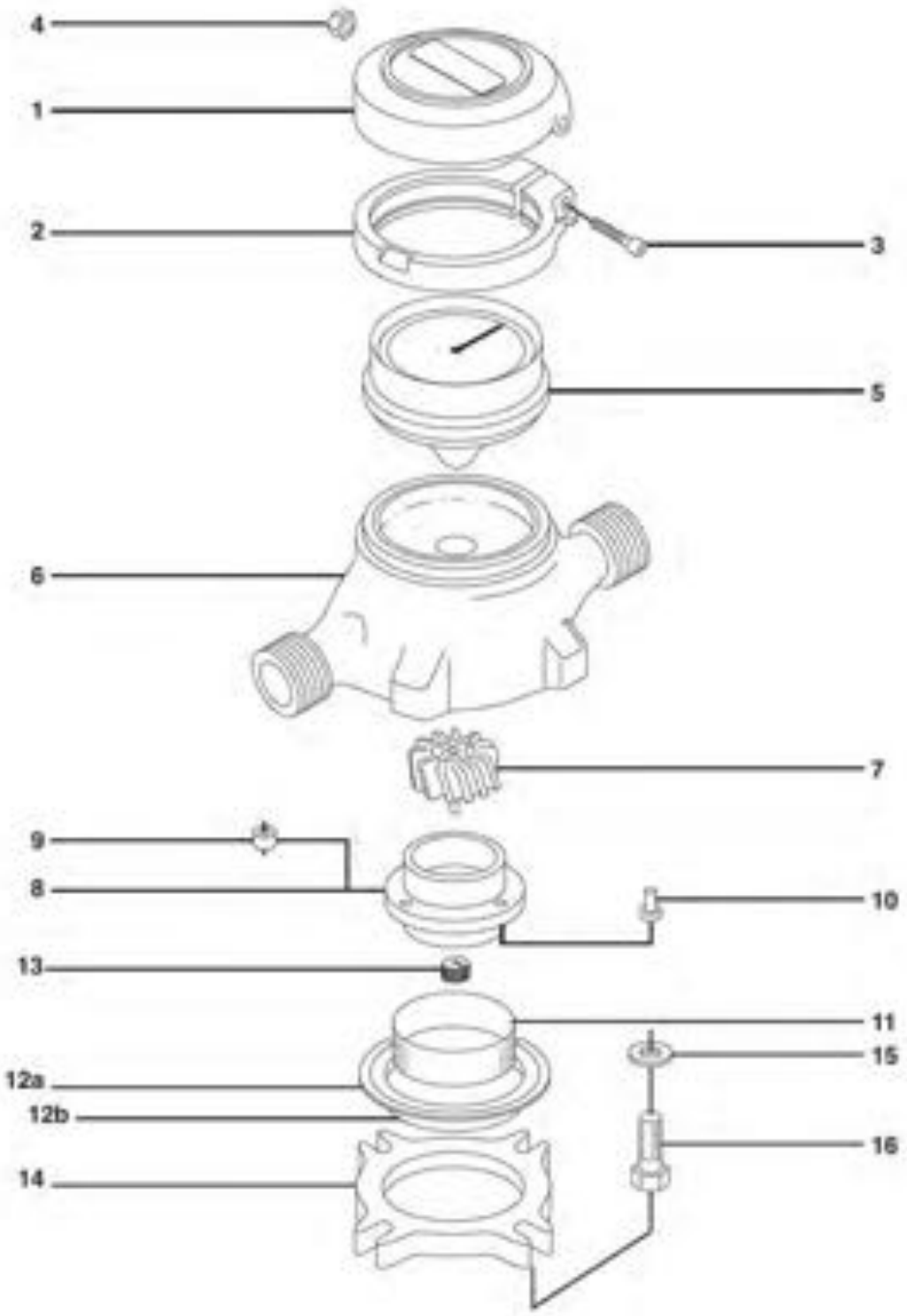


Accuracy – 1-1/2" and 2"



Model RFM

Models RFM-30, RFM 50, RFM 100 and RFM 160



Model RFM

Models RFM-30, RFM 50, RFM 100 and RFM 160

Mueller SYSTEMS

Ref. No.	Description	Model RFM-30	Model RFM-50	Model RFM-100	Model RFM-160
1	Lid (Plastic) Red	50377FS	50377FS	50377FS	50377FS
2	Red Clamp Band for Visual Register Red Clamp Band for Translator Register	50379FS B86032FS	50379FS B86032FS	50379FS B86032FS	50379FS B86032FS
3	Lid Seal Screw	19945	19945	19945	19945
4	Lid Nut	19999	19999	19999	19999
5	Sealed Registers (Specify unit of measurement)	See pages 7.7-7.8			
6	RFM 30 Top Case (7-1/2" length): 3/4" M.I.P. Ends	50466 (A)	-	-	-
6	RFM 50 Top Case (9" length): 1" M.I.P. Ends	-	50566FS (B)	-	-
6	RFM 100 Top Case (9" length): 1-1/2" F.I.P. Ends	-	-	50776FS (C)	-
6	RFM 160 Top Case (10-1/2" length): 2" F.I.P. Ends	-	-	-	50866FS (D)
7	Rotor	50471	50571	50771	50871
8	Inlet Hub	50467	50567	50767	50867
9	Lower Bushing	50574 (2)	50574 (2)	50574 (2)	-
10	Interior Screw	98394 (4)	98394 (4)	98394 (4)	98394 (4)
11	Strainer (Metal Ring)	50480	50580	50780	50880
12a	Rubber Gasket	-	B7047	50798	C5488
12b	Liner	50565	B7046	50766	C5491
13	Inlet Plug Assembly	50493	50493	50493	51105
14	Bottom (Bronze) only	C6592	C6593	C6594	D3594
15	Case Washer	A57792 (4)	A57792 (4)	98378 (4)	98378 (4)
16	Case Bolt	90010 (4)	90010 (4)	90073 (4)	90073 (4)
	Bushing Spacer	-	-	-	53114
	Bushing	-	-	-	54821 (2)
	Sapphire Thrust Bearing (Case)	98371	98371	98371	98371
	Complete Interior	50477FS	50577FS	50777FS	50872FS
	Bearing Adhesive*	-	-	-	-
	Adapters**: 3/4" Adapter 3/4" Adapter Washer 1" Adapter 1" Adapter Washer 1-1/2" Female Adapter 2" Female Adapter	 95046 95014 - - - -	 - - 95063 95064 - -	 - - - - 95091 -	 - - - - - 95195

A: Order 3/4" Adapter 95046 and Adapter Washer 95038 to replace standard 3/4" disc meter, 9" long.
B: Order 1" Adapter 95063 and Adapter Washer 95064 with Top Case 50566 to replace standard 1" disc meter, 10-3/4" long.
C: Order 1-1/2" Adapter 95091 with Top Case 50776 to replace 1-1/2" female end meter installed with union connections. Assemble to length of 12-5/8".
D: Order 2" Adapter 95195 with Top Case 50866 to replace standard 2" Female End disc meter, 15-1/4" long.
*Purchase locally. Use a cyanoacrylic adhesive, such as Loctite Super Bonder #30-13, Eastman #916, Permabond or Aron Alpha.
**Must be ordered separately. Not an integral meter component.
NOTE: If more than one part is required, quantity is noted after part number (in parenthesis).

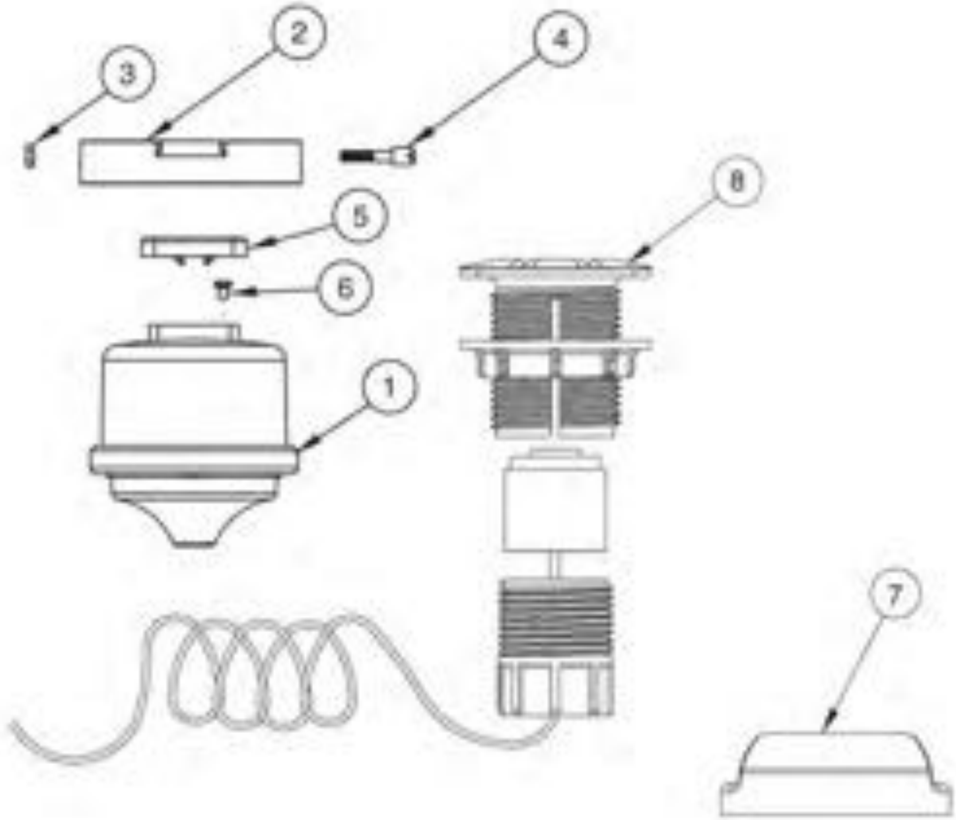
Cubic Feet				U.S. Gallons		
RFM Model	Register Part Numbers	Internal Ratio	Relation to other Registers	Register Part Numbers	Internal Ratio	Relation to other Registers
RFM-30	B79823FS	551.99	-4% (in relation to B79825)	B79818FS	738.92	-4% (in relation to B79817)
RFM-30	B79822FS	546.34	-3% (in relation to B79825)	B79814FS	731.88	-3% (in relation to B79817)
RFM-30	B79823FS	540.85	-2% (in relation to B79825)	B79815FS	725.79	-2% (in relation to B79817)
RFM-30	B79824FS	536.22	-1% (in relation to B79825)	B79816FS	715.88	-1% (in relation to B79817)
RFM-30	B79825FS	530.97	-	B79817FS	709.81	-
RFM-30	B79826FS	523.96	+1% (in relation to B79825)	B79818FS	702.61	+1% (in relation to B79817)
RFM-30	B79827FS	519.6	+2% (in relation to B79825)	B79819FS	694.85	+2% (in relation to B79817)
RFM-30	B79828FS	514.2	+3% (in relation to B79825)	B79820FS	688.55	+3% (in relation to B79817)
RFM-50	B79863FS	269.44	-4% (in relation to B79865)	B79851FS	360.58	-3% (in relation to B79854)
RFM-50	B79862FS	266.44	-3% (in relation to B79865)	B79852FS	356.41	-2% (in relation to B79854)
RFM-50	B79863FS	264.11	-2% (in relation to B79865)	B79853FS	353.17	-1% (in relation to B79854)
RFM-50	B79864FS	262.07	-1% (in relation to B79865)	B79854FS	349.42	-
RFM-50	B79865FS	258.83	-	B79855FS	345.53	+1% (in relation to B79854)
RFM-50	B79866FS	256.52	+1% (in relation to B79865)	B79856FS	342.53	+2% (in relation to B79854)
RFM-50	B79867FS	254	+2% (in relation to B79865)	B79857FS	339.04	+3% (in relation to B79854)
RFM-100	B79902FS	1973.55	-3% (in relation to B79904)	B79891FS	2664.16	-3% (in relation to B79894)
RFM-100	B79903FS	1951.68	-2% (in relation to B79904)	B79892FS	2646.38	-2% (in relation to B79894)
RFM-100	B79904FS	1935.27	-1% (in relation to B79904)	B79893FS	2605.61	-1% (in relation to B79894)
RFM-100	B79904FS	1912.65	-	B79894FS	2586.61	-
RFM-100	B79905FS	1901.98	+1% (in relation to B79904)	B79895FS	2554.55	+1% (in relation to B79894)
RFM-100	B79906FS	1882.27	+2% (in relation to B79904)	B79896FS	2526.66	+2% (in relation to B79894)
RFM-100	B79907FS	1862.97	+3% (in relation to B79904)	B79897FS	2505.78	+3% (in relation to B79894)
RFM-160	B79941FS	604.34	-3% (in relation to B79944)	B79931FS	808.31	-3% (in relation to B79934)
RFM-160	B79942FS	598.37	-2% (in relation to B79944)	B79932FS	800.5	-2% (in relation to B79934)
RFM-160	B79943FS	592.81	-1% (in relation to B79944)	B79933FS	792.41	-1% (in relation to B79934)
RFM-160	B79944FS	587.03	-	B79934FS	784.64	-
RFM-160	B79945FS	580.58	+1% (in relation to B79944)	B79935FS	775.87	+1% (in relation to B79934)
RFM-160	B79946FS	575.56	+2% (in relation to B79944)	B79936FS	768.47	+2% (in relation to B79934)

Model RFM

Translator Register Options for RFM 30 to 160

Mueller SYSTEMS

Model RFM



Ref	Description	RFM-30	RFM-50	RFM-100	RFM-160
1	Translator Register* Gallons Cubic Feet Specify Electronic Reading Value 4, 5, or 6 Wheel	 035231xxx 035232xxx	 035241xxx 035242xxx	 035251xxx 035252xxx	 035261xxx 035262xxx
2	Red Clamp Band (Plastic) Translator Only	B86029FS	B86029FS	B86029FS	B86029FS
3	Clamp Band Seal Nut	19999	19999	19999	19999
4	Clamp Band Seal Screw	19945	19945	19945	19945
5	Lens Terminal Cover Red	B8447FS	B8447FS	B8447FS	B8447FS
6	Terminal Lug Screw	98197 (3)	98197 (3)	98197 (3)	98197 (3)
7	Wall Pad	T1234	T1234	T1234	T1234
8	Pit Pad	T1240	T1240	T1240	T1240
9	TrueRead (not shown)	C6551G	C6551G	C6551G	C6551G
10	1,000' Spool of Wire (not shown)	A5755	A5755	A5755	A5755

*Call Mueller Systems Customer Service for appropriate Translator Register and AMR device part number.

Model Hydrant Meter

Size 3"

Mueller SYSTEMS

Features

APPLICATIONS: Recommended for measuring high-volume water usage from fire hydrants or other fire protection systems. Convenient hose connections and light-weight construction make this portable turbine meter useful for accurately measuring water used to fill street sweepers, water tankers or other equipment.

CONFORMANCE TO STANDARDS: Hersey Model HM Water Meters comply with ANSI/AWWA Standard C701 class II. Each meter is tested to ensure compliance.

CONSTRUCTION: Hersey Model HM Water Meters consist of three basic parts: D-I-M-E (Drop-In-Measuring-Element), bottom case and register. The D-I-M-E assembly contains all of the working parts inside of the meter and is easily removed from the bottom case when servicing is desired. The bottom case is constructed from cast aluminum to be lightweight and has built in carry handles for portability. The register is enclosed in a bronze register box. The rotor assembly is thermoplastic which is dimensionally stable and will not corrode. The inlet connection has a 2-1/2" female national hose thread swivel adapter and the outlet connection is 2-1/2" male national hose threads.

REGISTER: The permanently sealed register incorporates a bayonet style locking mechanism with Hersey's unique integral tamper pin. The totalizing register has a straight-reading odometer type display, a 360° test circle with center sweep hand and a low flow (leak) indicator.

OPERATION: Water flows straight through the turbine section where it turns a rotor at a rate in direct proportion to the amount of water flowing through the meter. The straight-through design allows high volumes to flow with a minimum of head loss. Retro Thrust™ rotor design extends the life of the meter by dividing wear between two points: during low flow the tungsten carbide thrustbearing floats against a sapphire bearing surface; during high flow the stainless steel shaft gently contacts a second sapphire bearing. During medium flow, the rotor floats between the thrust bearings without contact.

MAINTENANCE: The Hersey Model HM Meters are designed and manufactured to provide long service life with virtually no maintenance required. D-I-M-Es are available for field replacement and offer new meter accuracy and warranty benefits without field testing. Existing D-I-M-Es can be returned to the factory for refurbishment with new registers and measuring elements for installation later.

CONNECTIONS: Available with National Standard for fire hose coupling thread, female and male couplings.

CARRYING HANDLE: Facilitates ease of transportation.

3" Fire Hydrant Meter

Materials and Specifications

MODEL DESIGNATION	Hydrant Meter
SIZE	3"
MAXIMUM WORKING PRESSURE	175 PSIG
TEMPERATURE RANGE	33°F to 130°F water temperature
OPERATING RANGE	8 - 500 GPM
METER TOP CASE	Bronze
METER BOTTOM CASE	Epoxy-coated cast aluminum
MEASURING CHAMBER	Thermoplastic
REGISTER BOX AND LID	Bronze
END DETAIL (fire hose couplings)	Inlet: 2-1/2" - 7-1/2 NPSH (National Standard for fire hose coupling thread) Female Coupling. Outlet: 2-1/2" - 7-1/2 NPSH, Male Nipple
SHAFTS AND BOLTS	Stainless steel

Mueller SYSTEMS

Model Hydrant Meter

Size 3"

Meter Registration

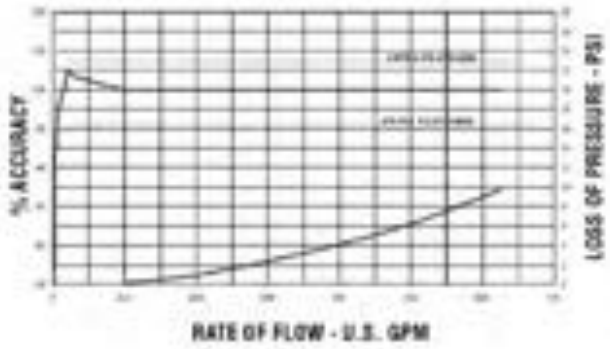
Meter Size	Initial Dial*	Capacity	Initial Dial*	Capacity
3"	100 Gal.	100 Million	10 Cubic Ft.	10 Million

Flow Characteristics

Meter Size	Typical Low Flow (95% Min.)	Typical Operating Range (100% ± 1.5%)	Maximum Continuous Operation	Maximum Intermittent Flow
3"	5 GPM	8 to 500 GPM	500 GPM	625 GPM

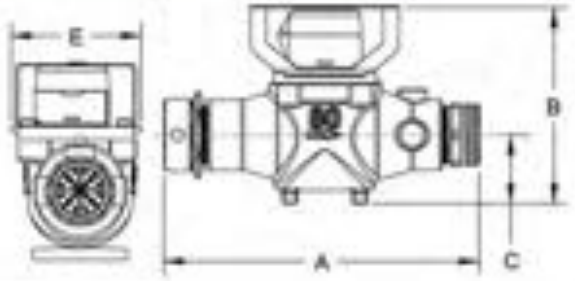
Performance

3" Hydrant Meter



*Performance curves are typical only and not a guarantee of performance.

Dimensions and Weights



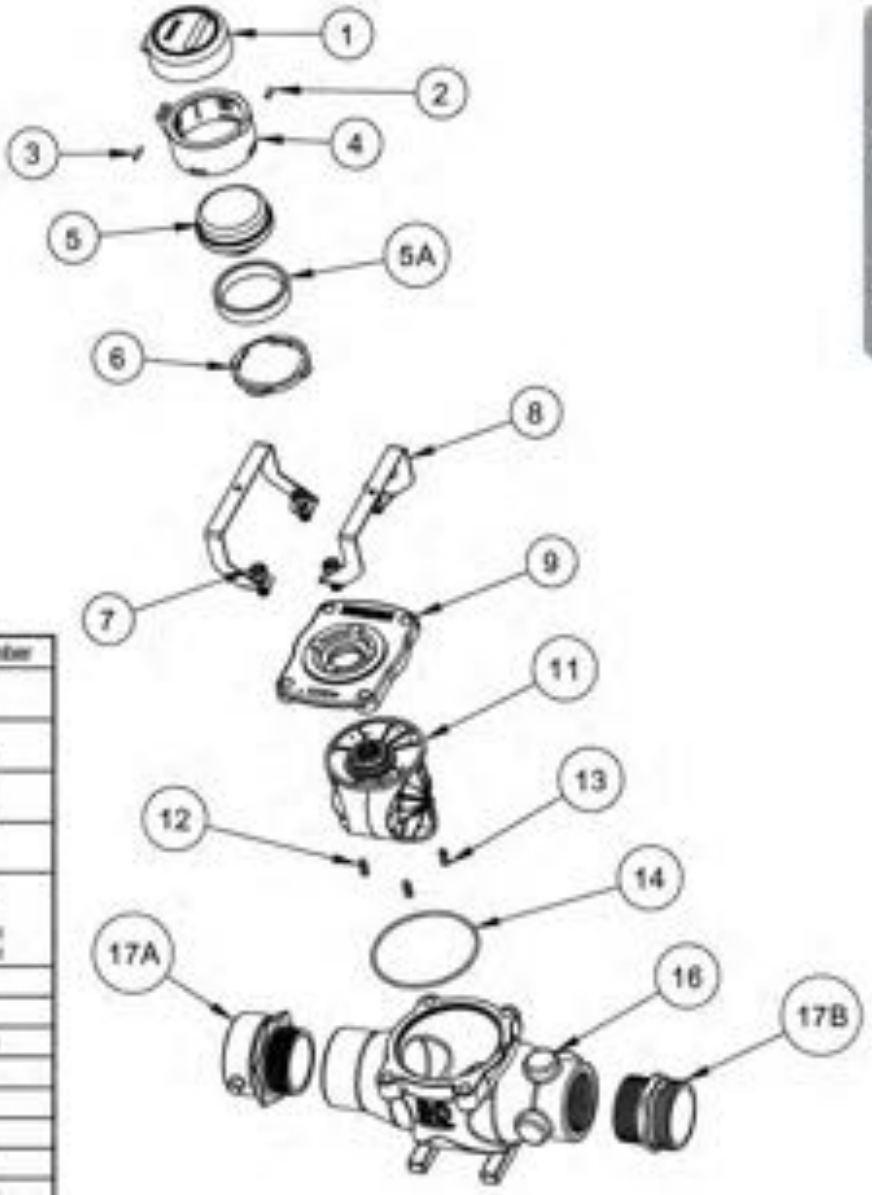
Dimension	
A	16"
B	9-7/8"
C	3-3/8"
E	6-1/2"
Net weight	14.6

NOTE: Meter may be ordered with less couplings, but a restriction orifice is needed. Weight is approximate and in pounds.

Model Hydrant Meter

Size 3"

Mueller SYSTEMS



Ref. No.	Description	Part Number
1	Register Box Lid (Plastic) (Brass)	n/a 50387
2	Locking Flex/Blue Color Plastic) (Brass Color Plastic)	n/a 6026581
3	Lid Pin (Plastic) (Brass Color)	n/a 4041123
4	Register Housing Base (Plastic) (Bronze)	n/a 50386
5	Visual Register (Gallon) (Cubic Feet) Translator Register (Gallon) (Cubic Feet)	036211 036212 036211xx 036212xx
5a	Spacer (not shown)	50382
6	Register Housing Gasket	25770
7	Case Bolt	54002 (4)
8	Handle	54003
9	Top Cone	54016
10	Built-in Strainer	N/A
11	Complete Measuring Element	065986
12	Measuring Element Washer	98155 (3)
13	Measuring Element Screw	98475 (3)
14	Cone Gasket / O-Ring	54602
15	Test Plug	N/A
16	Bottom Cone	54005
17A	2-1/2" MPT x 2-1/2" Female hose swivel adapter	54014
17B	2-1/2" MPT x 2-1/2" Male hose swivel adapter	54015
31	Drop In Measuring (CF) Element (GAL)	54618 54629

*Call Mueller Systems for appropriate Translator Register and AMR/MIR drive-a part number.

FM³

Fire Service Meter with Bypass
Sizes 3", 4", 6", 8", 10"

Mueller SYSTEMS

Features

APPLICATIONS: The Hersey® Meters FMᵌ fire service meter is designed for combined fire service and domestic water where a single supply line supports both fire and domestic or process needs. The meter may be utilized in automatic sprinkler systems and fire service, as a master meter for an entire water system, as a master meter for zoned systems, and for domestic or processed water where accuracy across a broad range of flows is critical. The FMᵌ meter eliminates the need for secondary service lines, saving time and reducing installation expenses and is compliant for all UL®, FM®, NSF®-61 fire service meter applications.

CONSTRUCTION: Every Hersey FMᵌ meter is manufactured with epoxy coated ductile iron construction which eliminates additional gaskets and fasteners, reducing ongoing maintenance costs. The unique, Hersey strainer design protects the horizontal turbine meter measuring element in a unibody construction that reduces meter vault and installation costs due to its compact size and reduced weight while providing four times the inlet pipe diameter of strainer surface area. The unitized horizontal turbine measuring element is easily accessed through the top case of the meter and o-ring seals simplify field service. A Hersey EDCIV™ detector check provides proven backflow protection with a spring loaded clapper assembly that is mounted to the top case of the check valve for ease of service. Bypasses consist of an appropriately sized positive displacement or residential fire line meter for low flow accuracy. Dual ball valves permit isolation of the meter and a swing check prevents backflow through the bypass. Stainless steel and bronze fasteners are used throughout the meter where required.

REGISTER: Separate mainline and bypass registers provide visibility of performance and field testing opportunity. The permanently sealed registers use proven magnetic drive design and the exclusive Hersey triple seal provides clarity and error free meter reading. Internal gears are self lubricating, molded plastic for minimal friction and a long service life. Standard visual read and electronic Translator® registers offer odometer wheels with a totalizing display, 360° degree test circle with center sweep hand and a low flow indicator. All Hersey FMᵌ models are available with electronic meter reading system components to meet any utility AMR/AMI requirement and all registers are protected by the unique Hersey locking pin which requires no special removal tools for field service.

OPERATION: During normal low flow operation, all water flows through the sensitive bypass meter for accurate registration. As flow and pressure loss through the bypass increases, the mainline clapper assembly automatically opens, permitting water to flow through the horizontal turbine measuring element and the bypass meter for accurate combined registration of all flows. The element employs Hersey's unique Retro-Thrust® feature to divide wear across multiple points, increasing accuracy, reducing friction and extending the life of the measuring element. Integral flow straightening vanes on the inlet and outlet sides of the measuring element contribute to the long term accuracy of the meter. As flow and pressure loss through the bypass meter decrease, the clapper assembly once again closes, redirecting all water through the bypass. Higher demand instances include master meter supply applications and fire suppression requirements.

INSTALLATION: Hersey FMᵌ meters are designed for horizontal installation with a minimum of five times the inlet pipe diameter of straight pipe prior to the meter and a minimum of three times the pipe diameter after the meter.

MAINTENANCE: All service components for the FMᵌ are unitized for easy replacement. Access to components is accomplished through the top side of the meter for full in-line service. Drop In Measuring Elements (DIMES) are available in pre-tested configurations which include a new measuring element, top case, register and o-ring for utilities that require quick field replacement. A calibration vane permits field adjustments to ensure accurate registration and extend the service life of the measuring element. The calibration vane is protected by the register and the locking pin for added security. For additional information regarding Hersey's unitized replacement options, please contact the Mueller Systems Sales and Technical Support Group at 800-323-8584.

4" x 1" FMᵌ with Residential Fire Meter

Materials and Specifications

MODEL	FMᵌ Fire Service Meter
SIZES	3" with 3/4" RFM bypass meter 4" with 1" RFM bypass meter 6" with 2" PD bypass meter 8" with 2" PD bypass meter 10" with 2" PD bypass meter
STANDARDS	Manufactured and tested to meet or exceed all applicable parts of AWWA C703, NSF®-61 compliant
INSTALLATION	Horizontal only with 5X pipe diameter of straight pipe (same size as meter) on inlet and 3X on outlet side of meter
OPERATING FLOW RANGE	See Chart on the following page
ACCURACY	See Chart on the following page
PRESSURE LOSS	See Chart on the following page
MAXIMUM WORKING PRESSURE	175 PSI
WATER TEMPERATURE RANGE	33°F to 100°F
MEASURING ELEMENT	Mainline: Horizontal Turbine Element on all sizes Bypass: RFM.....Vertical Turbine Residential Fire Meter on 3" and 4" sizes Bypass: PD.....High Pressure Nutating Disc Meter on 6", 8" and 10" sizes
METER CONNECTIONS	ANSI class 125 standard end flanges
OPTIONS	All AMR/AMI Reading Systems

Mueller SYSTEMS

FM³

Fire Service Meter with Bypass
Sizes 3", 4", 6", 8", 10"

FM³ with Bypass

Meter Registration

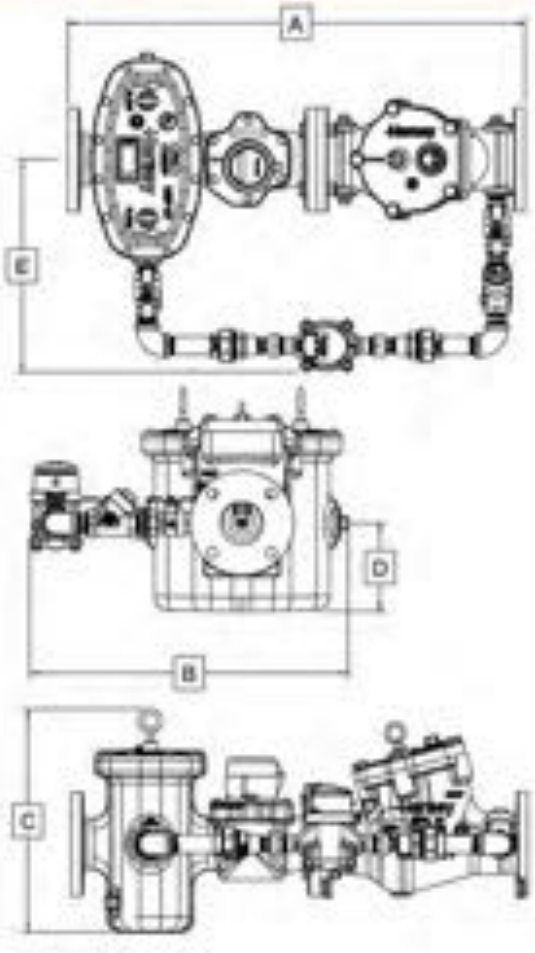
Meter Size	Initial Dial*	Capacity	Initial Dial*	Capacity
3"	100 Gallons	100 Million	10 Cubic Feet	10 Million
4"	100 Gallons	100 Million	10 Cubic Feet	10 Million
6"	1000 Gallons	1 Billion	100 Cubic Feet	100 Million
8"	1000 Gallons	1 Billion	100 Cubic Feet	100 Million
10"	1000 Gallons	1 Billion	100 Cubic Feet	100 Million

*Registration equal to one full revolution of the sweep hand.

Flow Characteristics

Meter Size	Typical Low Flow (95% Min)	Typical Operating Range (100% ± 1.5%)	Maximum Continuous Operation	Maximum Intermittent Flow
3"	1/2 GPM	6 to 600 GPM	600 GPM	750 GPM
4"	1/4 GPM	8 to 1000 GPM	1000 GPM	1250 GPM
6"	2 GPM	15 to 2000 GPM	2000 GPM	2600 GPM
8"	2 GPM	30 to 3500 GPM	3500 GPM	4400 GPM
10"	2 GPM	40 to 5500 GPM	5500 GPM	7000 GPM

Dimensions and Weights



Meter Size	3x3/4	4x1	6x2	8x2	10x2
Dimension					
A	30"	35"	45"	53"	68"
B	23-5/8"	23-5/8"	33-11/32"	33"	39-17/32"
C	18"	19"	24-3/4"	25-15/16"	31-3/16"
D	6-3/8"	9-3/8"	11-1/2"	11-9/16"	14"
E	15-5/8"	15-5/8"	22-11/32"	19-7/8"	22-29/32"
Weight	220	250	590	890	1550

NOTE: Weights are in pounds and are approximate.

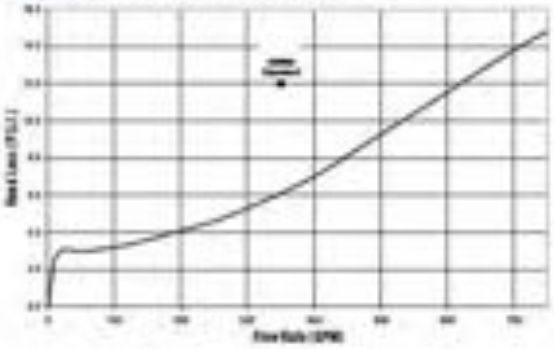
FM³

Fire Service Meter with Bypass
Sizes 3", 4", 6", 8", 10"

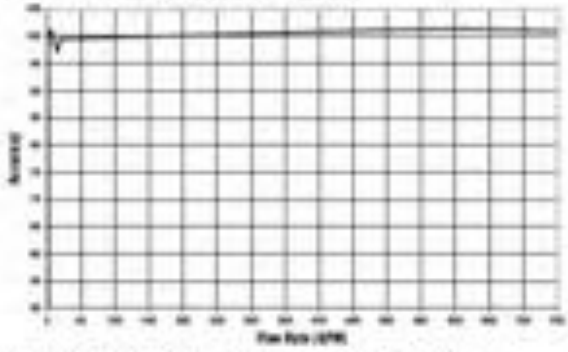
Mueller SYSTEMS

Performance

Head Loss – 3" with 3/4" RFM Bypass

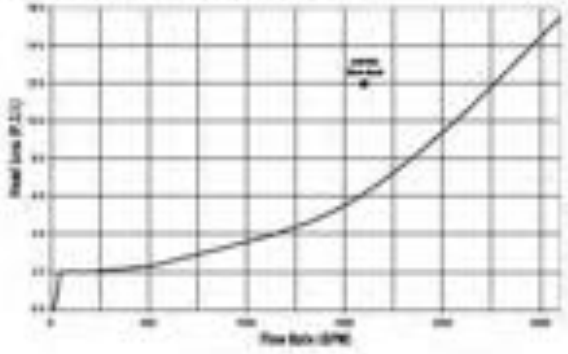


Accuracy – 3" with 3/4" RFM Bypass



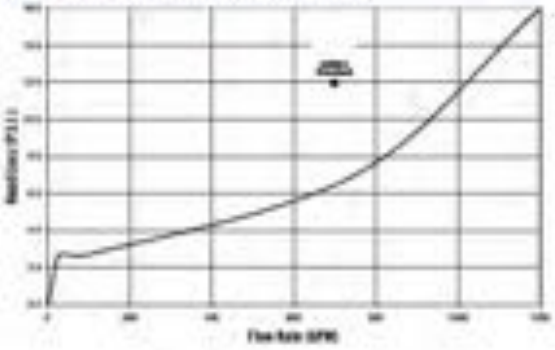
NOTE: Performance curves are typical only and NOT a guarantee of performance.

Head Loss – 6" with 2" PD Bypass

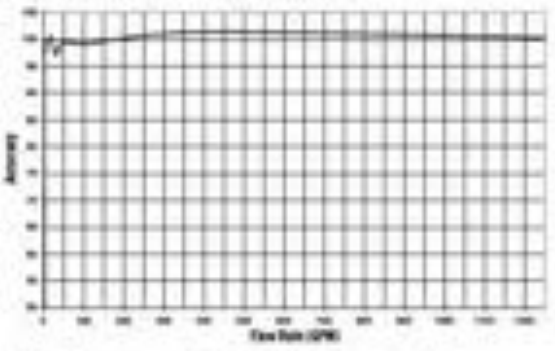


Performance

Head Loss – 4" with 1" RFM Bypass

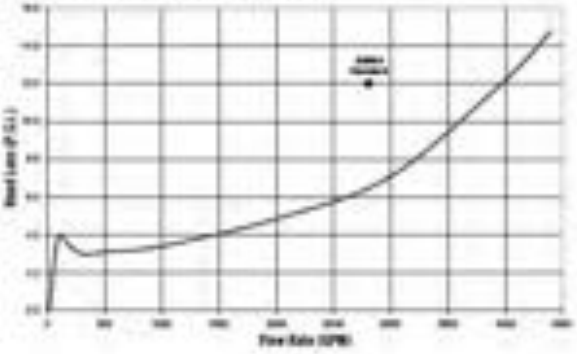


Accuracy – 4" with 1" RFM Bypass



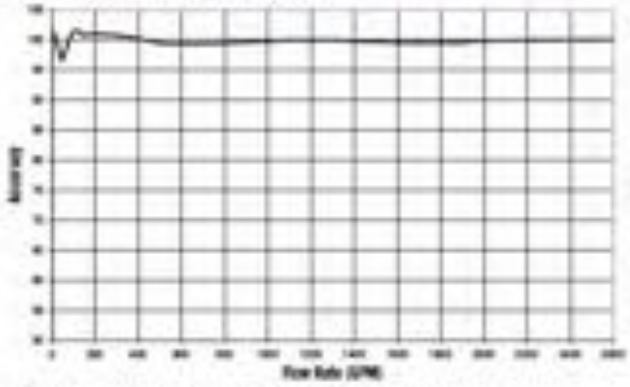
NOTE: Performance curves are typical only and NOT a guarantee of performance.

Head Loss – 8" with 2" PD Bypass



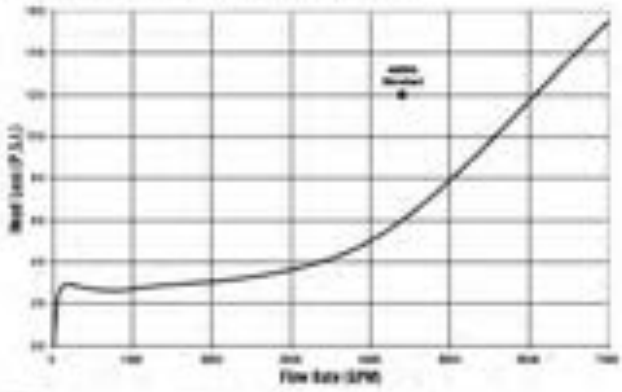
Performance

Accuracy – 8" with 2" PD Bypass



NOTE: Performance curves are typical only and NOT a guarantee of performance.

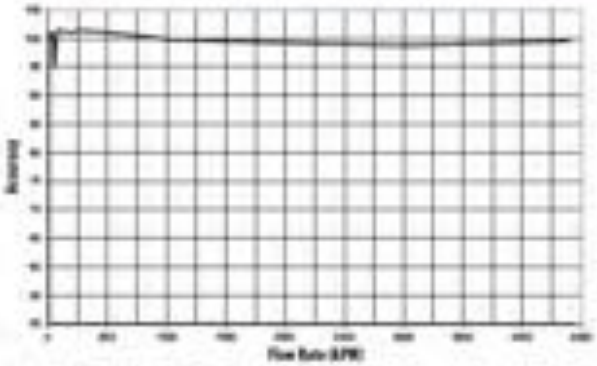
Head Loss – 10 with 2" PD Bypass Meter



NOTE: Performance curves are typical only and NOT a guarantee of performance.

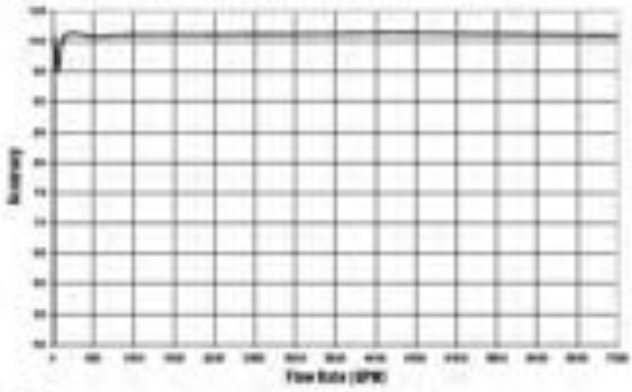
Performance

Accuracy – 8" with 2" PD Bypass



NOTE: Performance curves are typical only and NOT a guarantee of performance.

Accuracy – 10" with 2" PD Bypass Meter

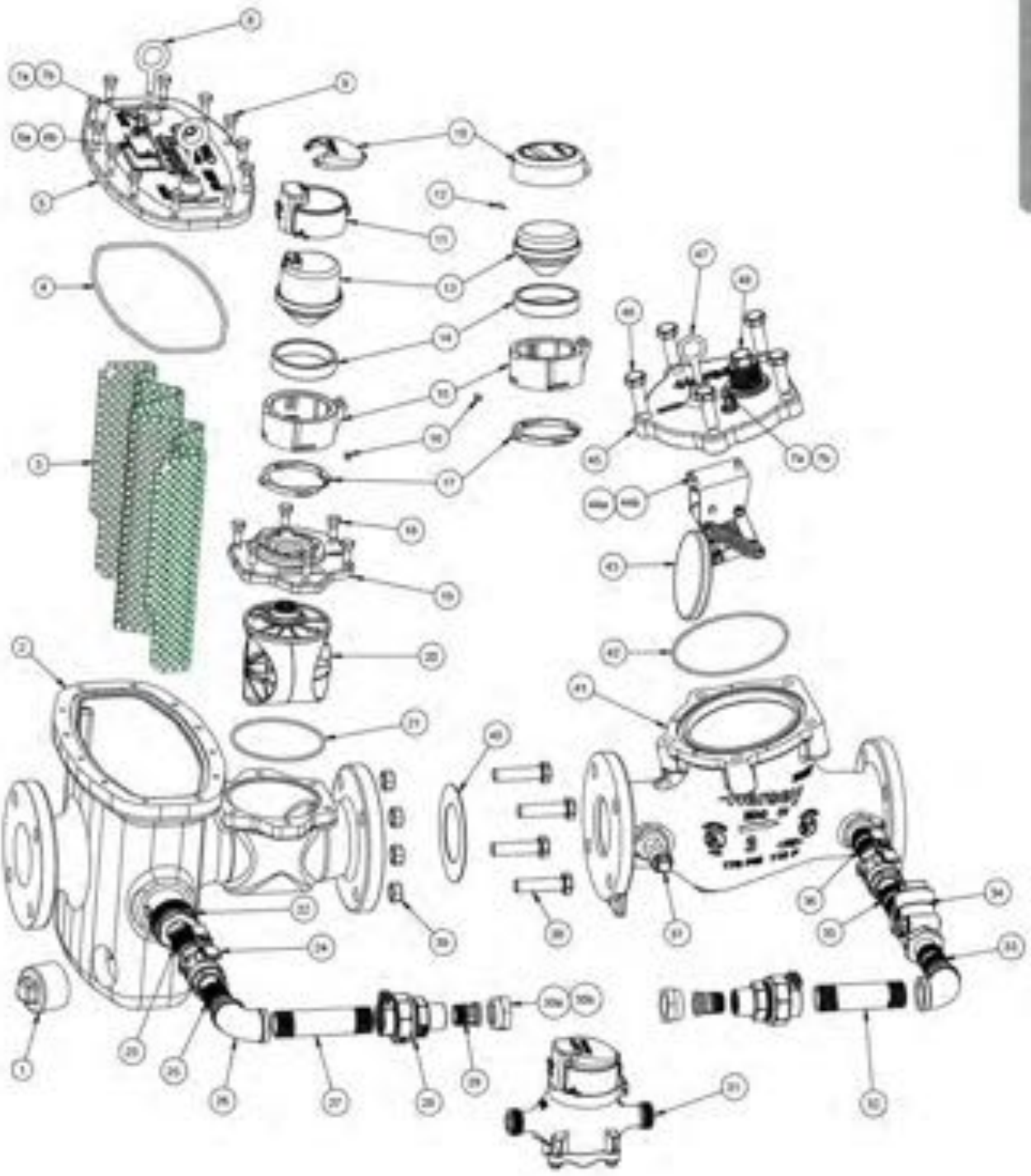


NOTE: Performance curves are typical only and NOT a guarantee of performance.

FM^3

Fire Service Meter with Bypass
Sizes 3", 4", 6", 8", 10"

FM3 WITH BYPASS EXPLODED ASSEMBLY (See parts listing, next page)



3" - 10" FM3 WITH BYPASS PARTS LIST (See exploded assembly diagram for reference)

#	DESCRIPTION	3" x 3/4" with RFM	4" x 1" with RFM	6" x 2" with HP PD	8" x 2" with HP PD	10" x 2" with HP PD
1	TEST PORT PLUG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	FMD BODY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	STRAINER SCREEN	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	STRAINER COVER O-RING	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	STRAINER COVER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5a	NAME TAG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5b	DRIVE SCREW	[illegible]	[illegible]	[illegible]	[illegible] (2)	[illegible] (2)
7a	VENT SCREW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7b	VENT SCREW WASHER	59073	59073	59073	59073	59073
8	EYE BOLT	[illegible] (2)	[illegible] (2)	[illegible] (2)	[illegible] (2)	[illegible] (2)
9	STRAINER COVER BOLT	[illegible] (12)	[illegible] (12)	[illegible] (20)	[illegible] (20)	[illegible] (24)
10	TRANSLATOR LID VISUAL READ LID	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]
11	WIRE EXIT HOUSING	C3624	C3624	C3624	C3624	C3624
12	LID HINGE PIN	A881122	A881122	A881122	A881122	A881122
13	TRANSLATOR REGISTER VISUAL READ REGISTER	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]
14	REGISTER SPACER	50362	50362	50362	50362	50362
15	TRANSLATOR HOUSING BASE VISUAL READ HOUSING BASE	C3637 50360	C3637 50360	C3637 50360	C3637 50360	C3637 50360
16	LOCKING PIN	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	REGISTER HOUSING INSERT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	ELEMENT COVER BOLT	[illegible] (8)	[illegible] (8)	[illegible] (8)	[illegible] (8)	[illegible] (8)
19	ELEMENT COVER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	MEASURING ELEMENT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	ELEMENT COVER O-RING	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	REDUCING BUSHING	[illegible]	[illegible]	N/A	N/A	N/A
23	NIPPLE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24	LOCKING BALL VALVE	[illegible] (2)	[illegible] (2)	[illegible] (2)	[illegible] (2)	[illegible] (2)
25	NIPPLE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26	90° ELBOW	[illegible] (2)	[illegible] (2)	[illegible] (2)	[illegible] (2)	[illegible] (2)
27	CUT NIPPLE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	PACK JOINT	[illegible] (2)	[illegible] (2)	[illegible] (2)	[illegible] (2)	[illegible] (2)
29	CONNECTION TAILPIECE	[illegible] (2)	[illegible] (2)	N/A	N/A	N/A
30a	CONNECTION NUT	[illegible] (2)	[illegible] (2)	N/A	N/A	N/A
30b	CONNECTION WASHER	[illegible] (2)	[illegible] (2)	N/A	N/A	N/A
31	BYPASS METER	SEE RFM SHEET	SEE RFM SHEET	SEE HP PD SHEET	SEE HP PD SHEET	SEE HP PD SHEET
32	CUT NIPPLE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
33	NIPPLE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
34	SWING CHECK VALVE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35	NIPPLE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
36	NIPPLE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
37	TEST PORT PLUG	[illegible] (3)	[illegible] (3)	[illegible] (3)	[illegible] (3)	[illegible] (3)
38	FLANGE CONNECTION BOLT	[illegible] (4)	[illegible] (8)	[illegible] (8)	[illegible] (8)	[illegible] (12)
39	FLANGE CONNECTION NUT	[illegible] (4)	[illegible] (8)	[illegible] (8)	[illegible] (8)	[illegible] (12)
40	FLANGE CONNECTION GASKET	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
41	F x F EDDY BODY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42	EDDY COVER O-RING	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
43	CLAPPER ASSEMBLY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
44a	CLAPPER BRACKET BOLT	[illegible] (3)	[illegible] (3)	[illegible] (3)	[illegible] (3)	[illegible] (3)
44b	CLAPPER BRACKET LOCK WASHER	[illegible] (3)	[illegible] (3)	[illegible] (3)	[illegible] (3)	[illegible] (3)
45	EDDY COVER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46	EDDY COVER BOLT	[illegible] (5)	[illegible] (5)	[illegible]	[illegible]	[illegible]
47	EYE BOLT	[illegible]	[illegible]	[illegible]	[illegible] (2)	[illegible] (2)
48	TEST PORT PLUG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
49	[illegible] (10-17) & (19-21)	CALL M.S. CUSTOMER CARE	CALL M.S. CUSTOMER CARE	CALL M.S. CUSTOMER CARE	CALL M.S. CUSTOMER CARE	CALL M.S. CUSTOMER CARE

FM^3

Fire Service Meter without Bypass
Sizes 3", 4", 6", 8", 10"

Mueller SYSTEMS

Features

APPLICATIONS: The Hersey® Meters FM^3 fire service meter is designed for combined fire service and domestic water where a single supply line supports both fire and domestic or process needs and usage is consistently moderate to high. The meter may be utilized in automatic sprinkler systems and fire service, as a master meter for an entire water system, as a master meter for zoned systems, and for domestic or processed water where accuracy across a broad range of flows is critical. The FM^3 meter eliminates the need for secondary service lines, saving time and reducing installation expenses and is compliant for all UL®, FM®, NSF®-61 fire service meter applications.

CONSTRUCTION: Every Hersey FM^3 meter is manufactured with epoxy coated ductile iron construction which eliminates additional gaskets and fasteners, reducing ongoing maintenance costs. The unique, Hersey strainer design protects the horizontal turbine meter measuring element in a unibody construction that reduces meter vault and installation costs due to its compact size and reduced weight while providing the specified strainer surface area. The unitized turbine measuring element is easily accessed through the epoxy coated top case of the meter and o-ring seals simplify field service.

REGISTER: The permanently sealed registers use proven magnetic drive design and the exclusive Hersey triple seal provides clarity and error free meter reading. Internal gears are self lubricating, molded plastic for minimal friction and a long service life. Standard visual read and electronic Translator® registers offer odometer wheels with a totalizing display and 360° degree test circle with center sweep hand and a low flow indicator. All Hersey FM^3 models are available with electronic meter reading system components to meet any utility requirement and are protected by the unique Hersey locking pin.

OPERATION: During operation, all water flows through the sensitive horizontal turbine measuring element for accurate registration. The element employs Hersey's unique Retro-Thrust® feature to divide wear across multiple points, increasing accuracy, reducing friction and extending the life of the measuring element. Integral flow straightening vanes on the inlet and outlet sides of the measuring element contribute to the long term accuracy of the meter.

INSTALLATION: Hersey FM^3 meters are designed for horizontal installation with a minimum of five times the inlet pipe diameter of straight pipe prior to the meter and a minimum of three times the pipe diameter after the meter.

MAINTENANCE: All service components for the FM^3 are unitized for easy replacement. Access to components is accomplished through the top side of the meter for full in-line service. Drop In Measuring Elements (DIMES) are available in pre-tested configurations which include a new measuring element, top case, register and o-ring for utilities that require quick field change outs. A calibration vane permits field adjustments to ensure accurate registration and extend the service life of the measuring element. The calibration vane is protected by the register and the locking pin for added security. For additional information regarding Mueller Systems' unitized replacement options, please contact the Mueller Systems Sales and Technical Support Group at 800-323-8584.

4" FM^3 Fire Meter

Materials and Specifications

MODEL	FM^3 Fire Service Meter
SIZES	3", 4", 6", 8", 10"
STANDARDS	Manufactured and tested to meet or exceed all applicable parts of AWWA C703. FM® approved; UL® listed; NSF®-61 compliant
INSTALLATION	Horizontal only with 5X pipe diameter of straight pipe (same size as meter) on inlet and 3X on outlet side of meter
OPERATING FLOW RANGE	See Chart on the following page
ACCURACY	See Chart on the following page
PRESSURE LOSS	See Chart on the following page
MAXIMUM WORKING PRESSURE	175 PSI
WATER TEMPERATURE RANGE	33°F to 100°F
MEASURING ELEMENT	Mainline: Horizontal Turbine Element Drop In Measuring Elements (DIME)
METER CONNECTIONS	ANSI class 125 standard end flanges
Options	All AMR/AMI Reading Systems

Mueller SYSTEMS

FM³

Fire Service Meter without Bypass
Sizes 3", 4", 6", 8", 10"

Meter Registration

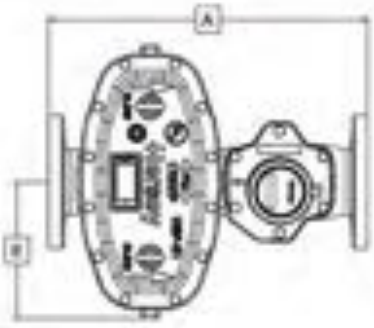
Meter Size	Initial Dial*	Capacity	Initial Dial*	Capacity
3"	100 Gallons	100 Million	10 Cubic Feet	10 Million
4"	100 Gallons	100 Million	10 Cubic Feet	10 Million
6"	1000 Gallons	1 Billion	100 Cubic Feet	100 Million
8"	1000 Gallons	1 Billion	100 Cubic Feet	100 Million
10"	1000 Gallons	1 Billion	100 Cubic Feet	100 Million

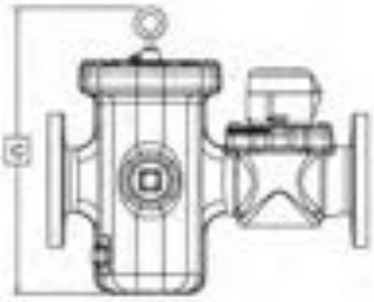
*Registration equal to one full revolution of the sweep hand.

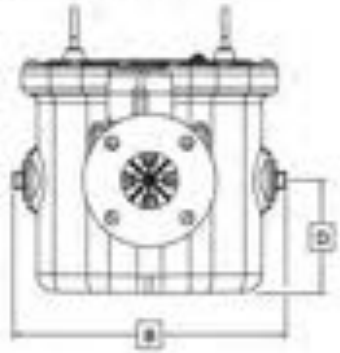
Flow Characteristics

Meter Size	Typical Low Flow (95% Minimum)	Typical Operating Range (100% ± 1.5%)	Maximum Continuous Operation	Maximum Intermittent Flow
3"	3 GPM	6 to 650 GPM	600 GPM	750 GPM
4"	4 GPM	8 to 1000 GPM	1000 GPM	1250 GPM
6"	9 GPM	15 to 2000 GPM	2000 GPM	2500 GPM
8"	18 GPM	30 to 3500 GPM	3500 GPM	4800 GPM
10"	30 GPM	40 to 5500 GPM	5500 GPM	7000 GPM

Dimensions and Weights







Meter Size	3"	4"	6"	8"	10"
Dimension					
A	18"	20"	24"	28"	33-1/4"
B	16"	15-15/16"	22"	26-1/4"	33-1/4"
C	16"	19"	28-1/4"	25-15/16"	31-7/16"
D	6-3/8"	9-3/8"	11-1/2"	13-9/16"	14"
E	8"	8"	11"	13-1/8"	16-5/8"
Weight	120	140	340	465	960

NOTE: Weights are in pounds and are approximate.

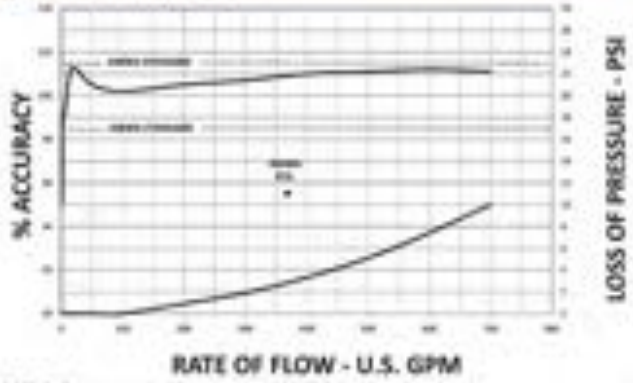
FM³

Fire Service Meter without Bypass
Sizes 3", 4", 6", 8", 10"

Mueller SYSTEMS

Performance

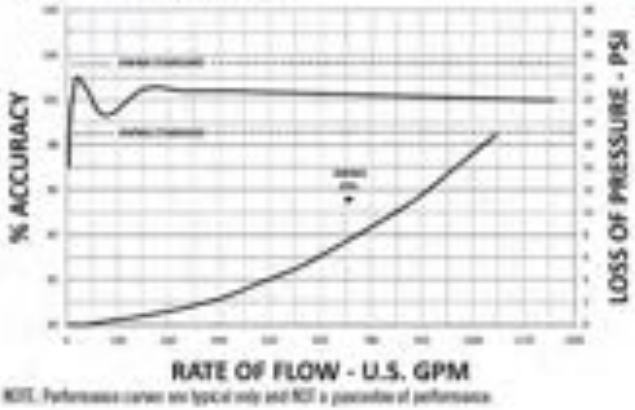
Head Loss and cy – 3"



NOTE: Performance curves are typical only and NOT a guarantee of performance.

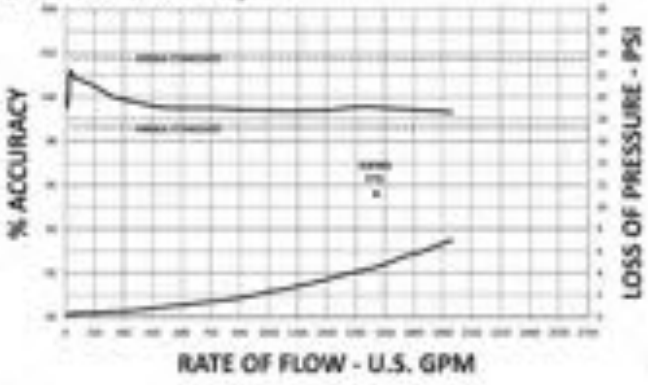
Performance

Head Loss and Accuracy – 4"



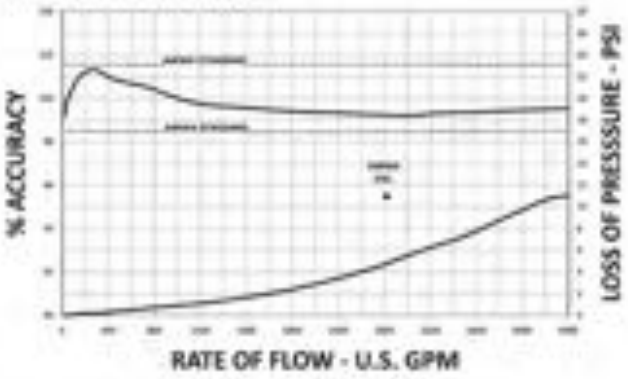
NOTE: Performance curves are typical only and NOT a guarantee of performance.

Head Loss and Accuracy – 6"



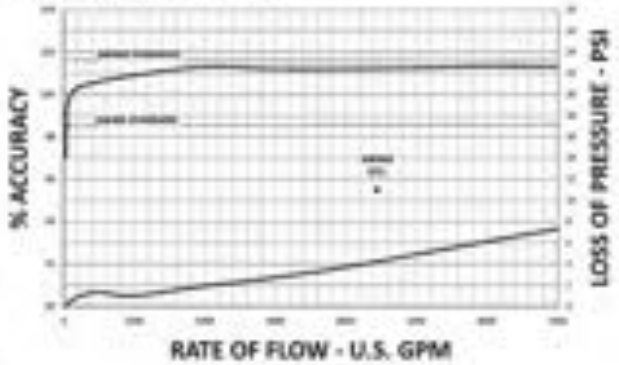
NOTE: Performance curves are typical only and NOT a guarantee of performance.

Head Loss and Accuracy – 8"



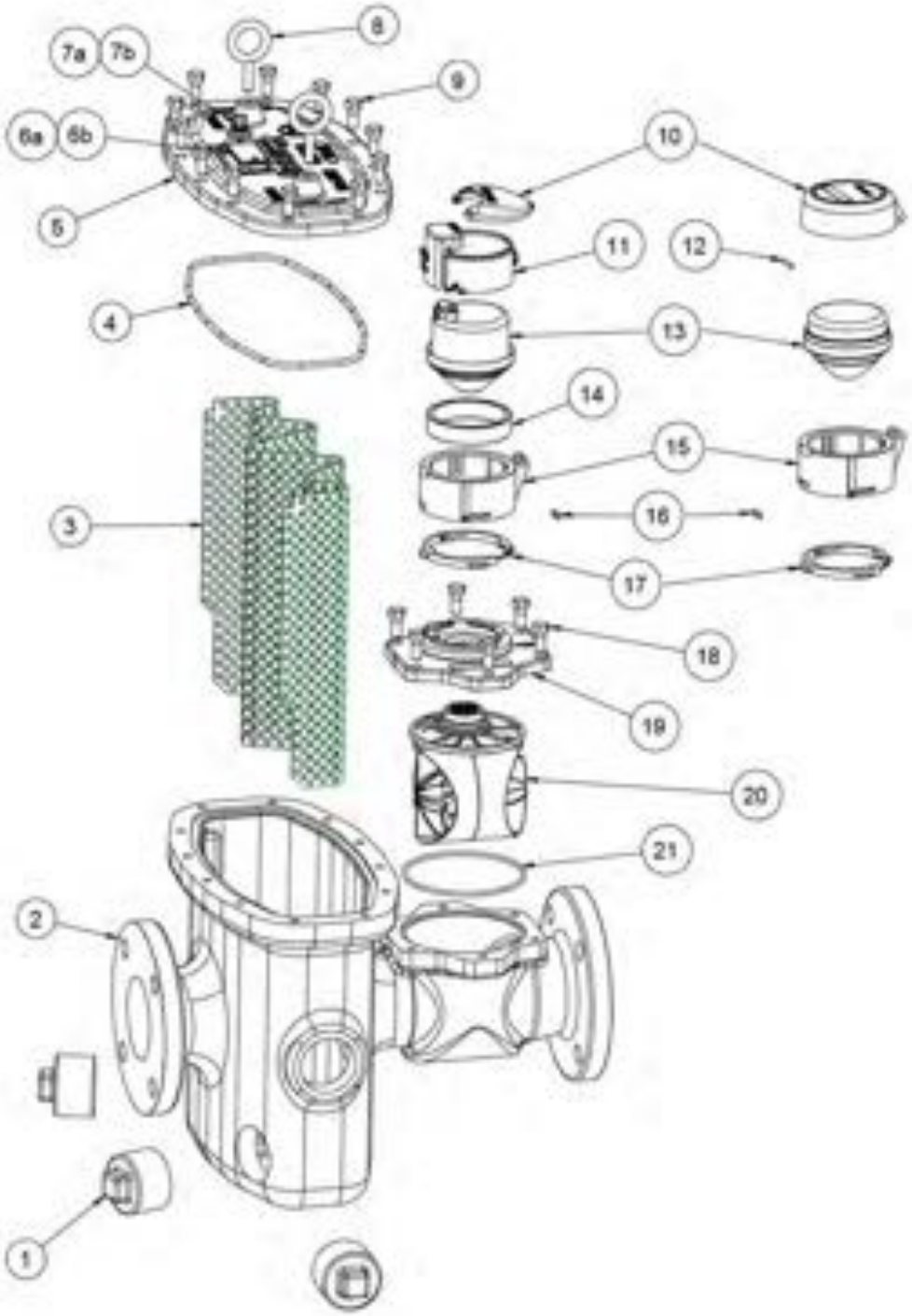
NOTE: Performance curves are typical only and NOT a guarantee of performance.

Head Loss and Accuracy – 10"



NOTE: Performance curves are typical only and NOT a guarantee of performance.

FM3 WITHOUT BYPASS EXPLODED ASSEMBLY (See parts listing, next page)



FM^3

Fire Service Meter without Bypass
Sizes 3", 4", 6", 8", 10"

Mueller SYSTEMS

3" - 10" FM3 WITHOUT BYPASS PARTS LIST (See exploded assembly diagram for reference)

3" - 10" FM3 WITHOUT BYPASS PARTS LIST						
#	DESCRIPTION	3"	4"	6"	8"	10"
1	2" SS NPT FLUG	59010PLA (4)	59010PLA (4)	59010PLA (4)	59010PLA (4)	59010PLA (4)
2	FM3 BODY	D3624	D3603	D3609	D3614	D3618
3	STRAINER SCREEN	B8634	C6628	C6615	C6614	C6616
4	STRAINER COVER O-RING	A13077	A13077	A13078	A13079	A13080
5	STRAINER COVER	C6629	C6629	D3616	D3610	D3625
6a	NAME TAG	A13054	A13054	A13054	A13054	A13054
6b	DRIVE SCREW	7199070109 (2)	7199070109 (2)	7199070109 (2)	7199070109 (2)	7199070109 (2)
7a	VENT SCREW	59003	59003	59003	59003	59003
7b	VENT SCREW WASHER	59073	59073	59073	59073	59073
8	EYE BOLT	A87733 (2)	A87733 (2)	A87731 (2)	A87732 (2)	A87732 (2)
9	STRAINER COVER BOLT	90065 (12)	90065 (12)	90180 (20)	90263 (20)	90264 (24)
10	TRANSLATOR LID VISUAL READ L.D.	B8638 59361	B8638 59361	B8638 59361	B8638 59361	B8638 59361
11	WIRE EXIT HOUSING	C6624	C6624	C6624	C6624	C6624
12	LID HINGE PIN	A541122	A541122	A541122	A541122	A541122
13	TRANSLATOR REGISTER VISUAL READ REGISTER	D365XXXXX D3663X	D365XXXXX D3663X	D365TXXXX D3663X	D365XXXXX D3663X	D365WXXXX D3663X
14	REGISTER SPACER	59362	59362	59362	59362	59362
15	TRANSLATOR HOUSING BASE VISUAL READ HOUSING BASE	C6637 59360	C6637 59360	C6637 59360	C6637 59360	C6637 59360
16	LOCK NO PIN	A12668	A12668	A12668	A12668	A12668
17	REGISTER HOUSING INSERT	C5770	C5770	C5770	C5770	C5770
18	ELEMENT COVER BOLT	90065 (6)	90065 (6)	90264 (6)	90264 (6)	90264 (6)
19	ELEMENT COVER	C6618	C6618	C6612	C6612	C6630
20	MEASURING ELEMENT ASSEMBLY	C6598	C6598	54700	54700	54700
21	ELEMENT COVER O-RING	54602	54602	B8657	B8657	B8636
22	M.E. Includes #'s (16-17) & (19-21)	CALL M.S. CUSTOMER CARE	CALL M.S. CUSTOMER CARE	CALL M.S. CUSTOMER CARE	CALL M.S. CUSTOMER CARE	CALL M.S. CUSTOMER CARE

New Hydroconn™ AMR Series III Connectors

Patent Pending

Features

- Special Manufacturing process designed to vastly improve cable/connectors reliability for rugged field applications
- Post molded strain relief from cable to connector
- Internal/External totally bonded connector
- Hydraplas® extruded cable jacket and molded connector

Nicor Inc. offers a complete line of Hydroconn™ AMR cables specifically designed and manufactured to meet the rugged requirements for in pit, underwater applications. Nicor's unique design insures total moisture sealing for even the toughest underwater applications yet they are easily re-entered for troubleshooting a transponder or for a meter swap out.

Specifications

Connector Material	Flexible Hydraplas®
Contacts	Machined 22 AWG copper alloy
Contact Plating	5µ inches gold per Mil-G-45204 over Ni
Insulator	Glass filled thermoplastic
Current Rating	7.5 amps
Voltage Rating	300 V AC/rms 50Hz
Insulation Resistance	5000 MΩ at 500 vdc
Temperature Rating	-20º to +80º Low temp cable flexibility
Cable Jacket	Hydraplas®
Cable Watrblock	Hydraplas® core
Pressure Rating	Submersible to 1000 psi
Sealing Method	Integral molded O-rings and grooves in male-female arrangement

Nicor Inc. 1083 Vine St #284, Healdsburg, CA 95448
707-484-0835, FAX 707-433-9289 www.nicorinc.net

Patent Pending

MUELLER

THROUGH THE LID HANGER (TTL-H)

FEATURES

Applications: For use in any pit or vault installation where a standard 1-½" or 1-¾" hole exists. The Mueller TTL-H hanger provides a standardized method of installation and provides optimization of radio transmission out of the pits or vaults equipped with plastic or concrete lids. The TTL-H provides a simple method of mounting current Mueller Mi.NET radio modules in an easily accessed installation location under the pit lid without additional hardware or tools.

Compliance: The TTL-H is compliant with the American Disabilities Act Section 4.5 and AASHTO H-20 Heavy Duty.

Construction: The TTL-H consists of three basic parts: TTL-H body, threaded nut, and a rubber washer. The two main components are of a polymer design for optimum weight to strength ratio and minimal environmental impact.

Installation: The TTL-H threads into the top case of the Mi.NET Radio Module. Simply remove the Mi.NET module antenna cover by turning it counter clockwise and insert the TTL-H screwing it clockwise into the Mi.NET module after insertion through the lid. This permits the Radio Module to hang from the pit lid, optimizing the accessibility and performance of the device.

Maintenance: The Mueller Systems TTL-H is designed and manufactured to provide long service life with no maintenance required. In the event the exposed portion of the TTL-H is damaged, the entire assembly can be replaced quickly and easily in the field with no additional tools required.

THROUGH THE LID HANGER (TTL-H)

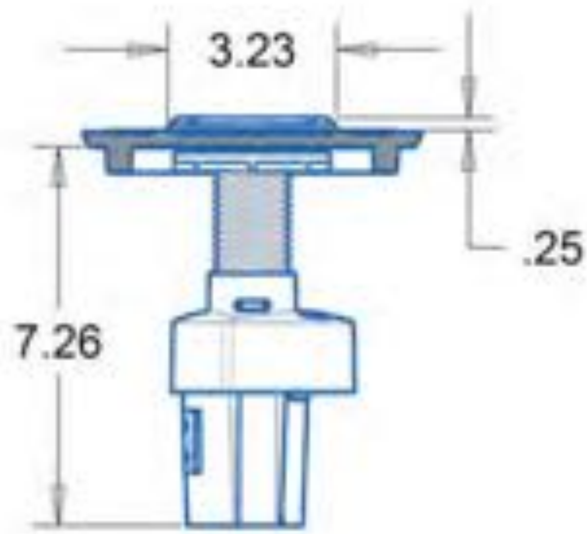
Materials and Specifications:

- MODEL NUMBER .... MS-TTL-H
- COMPATIBILITY .... Pit lids up to 2" thick

All MI.NET Radio Versions with Threaded Top Housing

(The TTL-H is not compatible with MI.Net modules manufactured prior to June 15th, 2019)

- STANDARDS .... Manufactured and tested to meet or exceed AASHTO H-20 Heavy Duty (25,000 lbs.) and ADA Section 4.5
- CONNECTION .... Threaded connection to MI.NET Radios via a 1-½-6 UNC Thread
- MATERIALS .... TTL-H Body – Thermoplastic; Threaded Nut - Thermoplastic; Rubber Washer - Buna-N
- TEMPERATURE RANGE .... Operating Temperature: -40°F to + 158°F (-40°C to + 70°C); Humidity: 0% - 100% condensing



REGISTERS

FERGUSON WATERWORKS

Mueller SYSTEMS

SmartMove

WHERE INTELLIGENCE MEETS INFRASTRUCTURE®

Mueller Systems
Mueller Encoder Eight (ME-8)

ELECTROMECHANICAL REGISTER TECHNOLOGY

The Mueller Systems Mueller Encoder Eight register (ME-8) is now available for use on all current Mueller Systems positive displacement meters in 5/8" through 2" sizes. Utilizing a heat treated tempered, glass lens and corrosion resistant copper can to house the register light tubes, electronics, self-lubricating gearing, and drive magnet, the ME-8 register delivers extraordinary functionality and value when paired with the latest metrology and AMR/AMI solutions available from Mueller Systems.

The ME-8 register provides eight digits of electromechanical odometer wheels for a visual display you can always count on. A label located on the side of the ME-8 register provides additional information specific to the part number, description, and the number of digits being electronically transmitted from the device. A 2D bar code replicates this data so the register information can be obtained from a bar code scanner. Individual customer specifications are maintained on file in the Mueller Systems manufacturing facility to provide specific programming parameters for each customer.

The ME-8 is compatible with all bayonet style locking register designs offered on Mueller Systems current positive displacement meters. The register is mechanically tamper protected by the unique Mueller Systems locking pin making tampering readily apparent to field technicians. The register and housing can be replaced without removing the meter from the service line when required due to vandalism or damage.

Nicor, Itron in-line cable connections or flying lead wire options provide industry standard connections for field installation in convenient 5' and 25' lengths. AMR/AMI units can be ordered with the mating Nicor or Itron connector to simplify installation and facilitate investigation of field issues. The ME-8 register uses no hazardous substances within the electronic equipment. The components and solder are all lead free making the ME-8 register another "green" choice.

Mueller Encoder Eight REGISTER

Materials and Specifications

MODEL	Mueller Encoder Eight Register (ME-8)
REGISTER TYPE	Absolute Encoder Register
SIZES	All 5/8" through 2" Positive Displacement Meters
STANDARDS	Manufactured and tested to meet or exceed all applicable parts of ANSI/AWWA C707 Standard and the American Standard Code for Information Interchange (ASCII)
TEMPERATURE OPERATING RANGE	32°F (0°C) to 158°F (70°C)
STORAGE TEMPERATURE RANGE	-4°F (-20°C) to 158°F (70°C)
CONNECTION OPTIONS	5' or 25' Nicor Connector, 5' or 25' Itron In-Line Connector, 5' or 25' flying lead wire, 5' or 25' wired Hot Rod, or Mi.Node with factory potted connections
MATERIALS	Register housing and lid - thermoplastic, Register lens – glass, Display – 8 digit visual resolution and up to 8 digit electronic resolution with Mueller Systems AMR/AMI systems
AMR/AMI COMPATIBILITY	Mueller Systems Hot Rod AMR system, Mi.Net AMI system, and other AMR/AMI systems that can utilize the Mueller Systems standard encoder protocol output. Touch pad compatibility

Mueller Systems
1210 Statesville Boulevard, Cleveland, NC 27013
Office: (704) 278-2221 Toll Free: (800) 323-8584

The strong register housing is permanently etched with a unique, never duplicated ten digit ID number and the date of manufacture of the meter and register. A plastic lid provides protection from the elements and the tempered glass lens permits installation in the harshest environments.

OPERATIONAL MODE:

The ME-8 register detects the rotation of the four pole drive magnet incorporated into the measuring element of the meter. As the meter measuring element turns, the drive magnet inside the register turns at a one to one ratio, capturing and displaying granular registration to provide exceptional accuracy for billing resolution of the utility's choice. Mueller Systems always recommends you order the ME-8 register with 8 digit electronic resolution to provide the best granularity possible.

When interrogated by an AMR/AMI device, the ME-8 register communicates the unique 10 digit serial number, up to 8 digit electronic reading in ACSII format where it can be recorded and maintained within the reporting structure of the AMR/AMI system and transferred to billing. The eight digit register resolution permits utilities to realize maximum revenue potential, be proactive in leak detection, manage resource conservation, and use event and duration data to manage their systems more effectively. Whether it's dispatching personnel, identifying leaks, theft, billing conflict resolution, or rewarding their customer base for conserving water during difficult times, the granular data provided by the ME-8 register makes tough jobs easier.

FIELD TESTING

The dial indicator on the face of the ME-8 register provides granular resolution regardless of the size of the meter or registration. 5/8" through 2" meters provide resolution down to hundredths of a gallon, thousandths of a cubic foot and ten thousandths of a cubic meter. 1.5" through 2" meters provide resolution down to tenths of a gallon, hundredths of a cubic foot and thousandths of a cubic meter.

CONFORMANCE TO STANDARDS:

Mueller Systems ME-8 encoder register complies with the latest revision of ANSI Standards and C707 for Encoder Remote Reading Systems as well as the American Standard Code for Information Interchange or ASCII.

CONSTRUCTION:

Mueller Systems utilizes a UV stable, molded enclosure and lid made of thermoplastic to permanently house the ME-8 register. A heat treated, tempered glass lens provides a scratch resistant barrier to inhospitable conditions in all environments. A variety of integral and wired AMR/AMI options are available to provide solutions for every application.

MAINTENANCE:

The Mueller Systems ME-8 encoder register is designed and manufactured to provide a 20 year service life with virtually no maintenance required. Register locking pins and lids are available as replacement components in the event of vandalism or the need for meter retrofits on currently manufactured PD meters.

SOLID STATE REGISTER (SSR)

Mueller SYSTEMS

Features

APPLICATIONS: The Mueller Systems™ Solid State Register (SSR) is available for use on all current Mueller Systems positive displacement meters in 5/8" through 2" sizes. The SSR register provides the granular data required for use in the latest AMR and AMI applications without the friction and loss of accuracy associated with electromechanical registers. Improved accuracy and reading resolution make the SSR the sensible choice for improving revenue now and in the future.

The SSR register uses no hazardous substances within the electronic equipment. The PCB, components and solder are all lead free making the SSR register a "green" choice.

The SSR register provides up to 10 digits of visual resolution and up to 9 digits of electronic resolution for outstanding granularity when used in conjunction with current Mueller Systems AMR and AMI systems. Granularity of data and frictionless operation permit customers to capture maximum revenue and be proactive in leak detection and resource conservation. Two new optional magnetic tamper detection features provide notification of register or measuring chamber removal from the meter or interference by external magnetic fields. The combination of proven mechanical meter technology and solid state register design provide the basis for empowered and satisfied utility customers when used in conjunction with Mueller Systems AMR/AMI systems.

The large LCD display provides crystal clear meter reading opportunities during visual verification of radio frequency transmissions or field testing. Intuitive icons on the LCD display provide concise information to assist utility personnel in all field operations. The unique 10 digit serial number on the Mueller Systems SSR register display and housing identify it as the basis for all systems communication. The display provides information specific to the registration units, model, size, date of manufacture, direction of flow, battery status, billing units and tamper indication codes to provide verifiable and retrievable data in the event it is required visually.

CONFORMANCE TO STANDARDS: Mueller Systems Solid State Register complies with the latest revision of ANSI/AWWA Standard and C707 for Encoder Remote Reading Systems as well as the American Standard Code for Information Interchange or ASCII.

CONSTRUCTION: Mueller Systems utilizes a UV stable, molded enclosure and lid made of thermoplastic to permanently house the SSR electronics. A heat treated, tempered glass lens provides a scratch resistant barrier to the elements in all meter box environments. A variety of integral and wired AMR/AMI options is available.

The SSR is compatible with all bayonet style locking mechanisms offered on Mueller Systems meters. The SSR is tamper protected by an integral installation ring making tampering readily apparent to field technicians. The register and installation ring can be replaced without removing the meter from the service line when required due to vandalism or damage.

OPERATION: The SSR encoder register detects the rotation of the drive magnet incorporated into the meter measuring element. As the four pole magnet turns, sensors inside the register capture minimal movements of the magnet to provide exceptional accuracy without the introduction of friction or loss of revenue normally associated with electromechanical devices.

Solid State Register (SSR)[1]

When interrogated by a Mueller Systems AMR/AMI device, the SSR register communicates the unique 10 digit serial number, up to 9 digit electronic reading and all tamper codes in ASCII format where it can be recorded and maintained within the reporting structure of the AMR/AMI system. In the event that field testing is required, the optical port on the face of the display allows the SSR register to be placed into test mode. Test mode permits technicians to conduct valid field tests to determine the accuracy of the meter.

MAINTENANCE: The Mueller Systems SSR encoder register is designed and manufactured to provide a 20 year service life with virtually no maintenance required. Register installation rings and lids are available as replacement components in the event of vandalism or the need for meter retrofits.

Materials and Specifications

MODEL	Solid State Register (SSR)
REGISTER TYPE	Solid State Absolute Encoder Register
SIZES	All 5/8" through 2" Positive Displacement Meters
STANDARDS	Manufactured and tested to meet or exceed all applicable parts of ANSI/AWWA C707 Standard and the American Standard Code for Information Interchange (ASCII)
TEMPERATURE OPERATING RANGE	14°F (-10°C) to 176°F (80 °C)
STORAGE TEMPERATURE RANGE	-40°F (-40°C) to 185°F (85°C)
CONNECTION OPTIONS	5' or 25' Nicor Connector, 5' or 25' Itron In-Line Connector, Integral Hot Rod or MI.Node with no exposed wire, 5' or 25' wired Hot Rod, or MI.Node with factory potted connections
MATERIALS	Register housing and lid - thermoplastic; Register lens – glass; Battery – Lithium Thionyl Chloride; LCD Display – 10 digit visual resolution and up to 9 digit electronic resolution with Mueller Systems AMR/AMI systems
AMR/AMI COMPATIBILITY	Mueller Systems Hot Rod AMR system, MegaNet AMI system, MI.Net AMI system and other AMR/AMI systems that can utilize the Mueller Systems standard encoder protocol output. The SSR register is not compatible with touch pad technology.

Automated Meter Reading (AMR)

FERGUSON
WATERWORKS

Mi.Net® M System

Mi.Node M Meter Mobile/Fixed transceiver

Mueller SYSTEMS

Features

TWO WAY COMMUNICATIONS: The Mueller Systems Mi.Node M meter transceiver provides a direct connection to all Hersey water meters equipped with a Translator® or SSR encoder register. The primary function of the Mi.Node transceiver is to provide full, two way communications in either the **Mi.Net** mobile system or fixed network environment.

SYSTEM COMPONENTS: Information retrieved from a water meter is stored temporarily within the Mi.Node transceiver's internal memory. As a default, the Mi.Node transceiver will transmit hourly meter data at a predetermined time once per day to the Mi.Hub collector in fixed network mode and bubble up every 6 seconds to be read via a mobile collector. On demand reads to the Mi.Node transceiver can been requested at any point in time and are typically delivered within seconds. For fixed network applications, this data is sent to a Mi.Hub collector via an unlicensed radio frequency and then relayed to the **Mi.Net system** host server for analysis and storage. In a mobile application, the data is retrieved by a mobile collection transceiver and that data is then uploaded to the server back at the office. The Mi.Node transceiver utilizes advanced noise filtering technology that allow the Mi.Net system to maximize range while keeping infrastructure to a minimum. Multiple routing routing options for each Mi.Node transceiver ensure that the data will be retrieved by the server.

CONSTRUCTION: The Mi.Node transceiver incorporates multiple moisture barriers to eliminate concerns over moisture intrusion even in meter box environments. An o-ring sealed thermoplastic enclosure, coated electronic board and potting compound provide a watertight package that permits Mueller Systems to offer a 20 year warranty on the Mi.Node transceiver. A large lithium ion battery provides plenty of power over the life of the transceiver.

SCALABLE AND UPGRADABLE: The various models of Mi.Node meter transceivers allow the **Mi.Net** system to provide robust and efficient AMI, and water conservation solutions for all types of residential and commercial applications.

The Mi.Node transceiver's functionality can be upgraded remotely by issuing a broadcast demand. A firmware upgrade made over the **Mi.Net** system network allows the Mi.Node transceivers to be upgraded autonomously. All system Mi.Node transceivers can be scheduled for an upgrade at one time and the system will notify the user when the process is complete.

The Mi.Node transceiver seamlessly connects directly to the Mueller Remote Disconnect (RDM) meter for easy but secure actuation of the valve through the user interface and can be actuated in the field or through the AMI network.

Materials and Specifications

Interfaces with most domestic meter manufacturers standard encoded protocol
Logs and stores 105 days of hourly data meter data in internal memory
Automatically detects encoder meter type connected
No external power supply required for operation
Notifies the system of low battery level for preemptive maintenance
RF antenna contained inside Mi.Node transceiver enclosure
FCC compliant
Mi.Node wire lengths To Translator 5', 15', or 25'
Power Source D Cell Lithium Battery
Transmit Frequency 902 Mhz – 928 Mhz
Data Integrity Verified with every data message
Temperature Range: -40°F to + 158°F (-40°C to + 70°C)
Humidity 0% - 100% condensing
Dimensions 6-5/8" high x 2-15/16" wide x 3-3/8" deep

EZ Reader™

Route Management Software

Mueller SYSTEMS

Features

APPLICATIONS: A total route management software system solution for handheld and mobile meter reading, the EZ Reader™ system combines state of the art software with a variety of powerful, lightweight and rugged handheld computers. The software is compatible with the Mueller Systems Street Machine™ 2 Mobile Data Collection Device.

EZ Reader Software is the superior alternative for handheld or mobile utility meter reading. Using the latest technology in software development and the most effective price/performance hardware alternative, EZ Reader Software surpasses the competition with superior functionality, unparalleled flexibility, and exceptional performance making it one of the most comprehensive and easy to use tools on the market.

The EZ Reader System is a complete meter reading application capable of interfacing with any host billing system, including custom developed systems. Its efficiency eliminates unnecessary file duplication, maintenance requirements and opportunities for errors common to many other reading systems. Although a powerful and capable tool for larger utilities, the Hot Rod System is affordable to smaller cities, water districts and electric membership cooperatives.

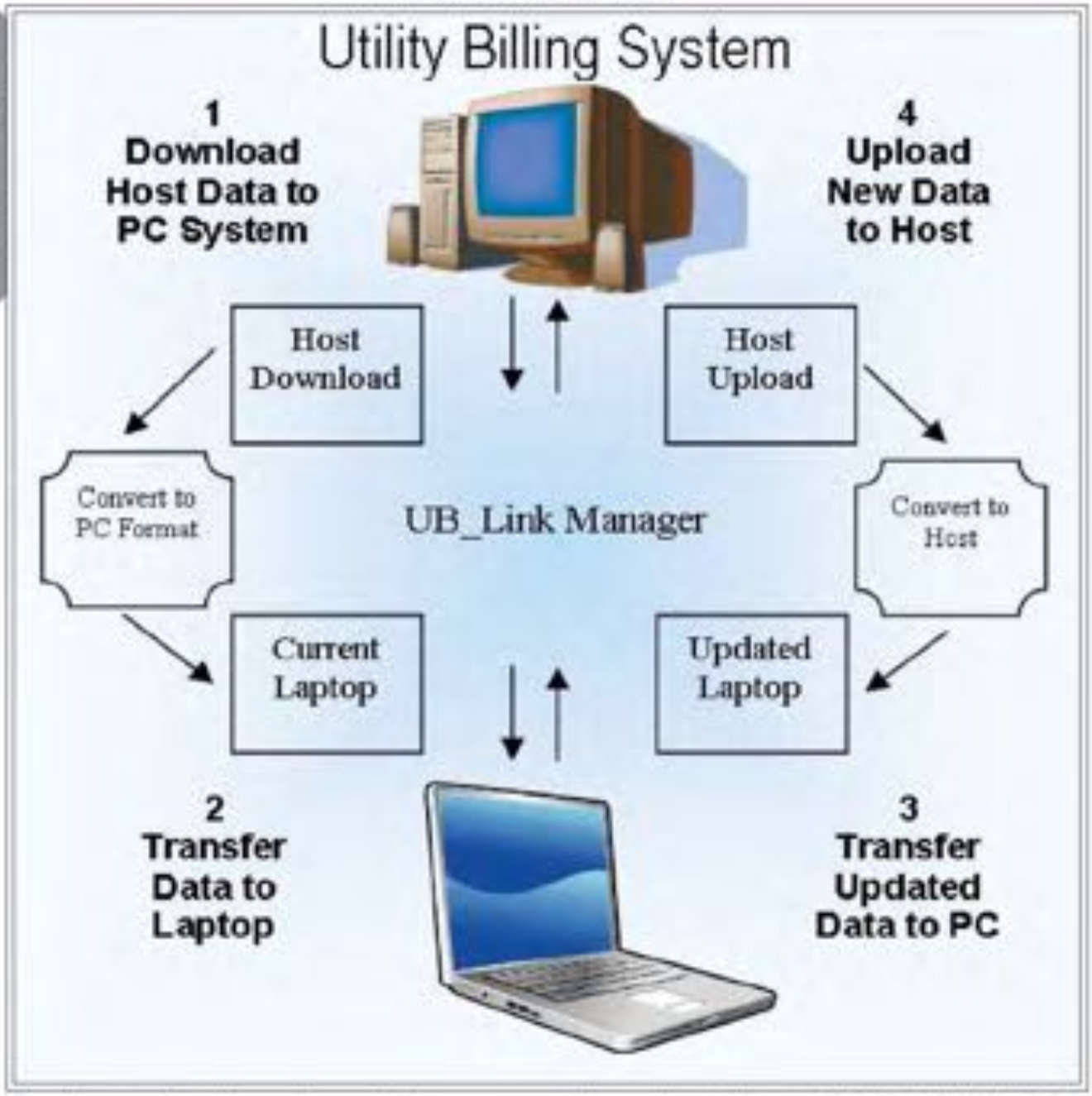
OPERATION: The EZ Reader Software uses standard ASCII file format data from the host billing software computer. This host download file contains route information about customers, meters and previous meter readings. The interface file then downloads the route data to the EZ Reader Software on the PC. This data is prepared for either visual, touch pad, mobile radio meter reading, in just three mouse clicks. The meter reader then reads the pre-determined route and returns with the data which is uploaded to the EZ Reader Software for processing. Reports and statistics can be run, after which the reading data is ready to be uploaded back to the host billing computer.

CONFORMANCE TO STANDARDS: EZ Reader Software meets the Open Systems Foundation Goals and operates on any IBM compatible PC with Microsoft® Windows XP™ or newer.

Materials and Specifications

- Radio-Read ready interface for the Mueller Systems Hot Rod Mobile AMR System.
- Touch-Read ready interface for Northrop Grumman VersaProbe™.
- Visual-Read ready for keyboard entry of meter readings.
- Accesses data by route, customer name, service location or meter number with either sequential or random access.
- Mapping view permits visual verification of route and readings.
- On-read feature can screen out completed readings and scan only the unread accounts.
- Notes feature accepts alpha numeric text allowing comments and instructions to be transferred between meter readers and billing administration.
- On-line, context sensitive help.
- Annual maintenance program includes maintenance and software updates.
- Reports and statistics are open to other Microsoft tools such as Excel or Access programs.
- Automatic Re-Sequencing feature for arranging read order in meter reader's preference.

Systems Overview



Information on routes, meters, customers etc. is downloaded from the current Utility Billing System and converted to a format compatible with the computer database using EZ Reader. The current files are then loaded onto the appropriate reading devices. This creates the current computer database. The current computer database is then updated with new information through routine meter reading operations using EZ Reader hand-held / mobile computer systems. The updated database is then loaded back to EZ Reader. The updated database is then converted back to the proper format for uploading to the Utility Billing System.

Mi.Net® Mueller Infrastructure Network

Mi.Net Mobile Transceiver

Mueller SYSTEMS

Features

APPLICATIONS: The Mueller Systems **Mi.Net** Mobile Transceiver is a high performance, vehicle based AMR/AMI transceiver. It is designed to collect water meter data via radio frequency while driving a meter route at posted speed limits in AMR mode. When used in conjunction with the **Mi.Net** AMI system, the Mobile Transceiver can be used as a disaster recovery device to obtain meter data from stranded assets. The complete **Mi.Net** Mobile hardware package includes the radio transceiver, magnetic antenna, and all cable connections. Implementation of a mobile meter reading solution like **Mi.Net** Mobile ensures significant performance improvements in reading efficiency, data collection, customer satisfaction and cash flow for utilities.

OPERATION: The **Mi.Net** Mobile Transceiver can be temporarily or permanently mounted in any vehicle. Once initialized, it operates quietly in the background and transfers data to a computer of the customer's choice. The **Mi.Net** Mobile Transceiver can also provide full two way communication to actuate remote disconnect meters (RDMs), initiate data logging, and meter right sizing. The **Mi.Net** Mobile Transceiver receives data on multiple discreet frequencies for secure and reliable data processing. During the reading process, the technician can view a number of route progress screens which include route mapping with representations of all meter locations, tabular screens depicting all meters, meters remaining to be read, collected meter readings and route performance overview. At the end of the collection period, the data is uploaded via the EZ Reader™ route management software into the utility's billing software with just a few clicks of a mouse. A standard series of reports are available for viewing performance of the system, the status of all event and duration codes, battery health, and past high leaks and backflow events.

PERFORMANCE: The **Mi.Net** Mobile Transceiver receives power via the vehicle auxiliary power outlet and a USB connection provides data interchange with the laptop. A sensitive magnetic antenna mounted on the vehicle's roof provides the basis for all radio frequency (RF) communication with Mueller Systems radios. Meter information is received and processed as it is transmitted to ensure continuous high performance data capture on multiple receiver channels of the **Mi.Net** Mobile Transceiver. The meter reader collects all RF data by simply driving past the meters equipped with Mueller Systems legacy Hot Rod transmitters or Mi.Node M units. The system also provides the option of a complete two way interface for transmission of commands to Mi.Node M radios.

CONFORMANCE TO STANDARDS: The system is FCC Certified for operation in the United States. It is fully compliant with FCC Part 15 and no FCC license is required for operation.

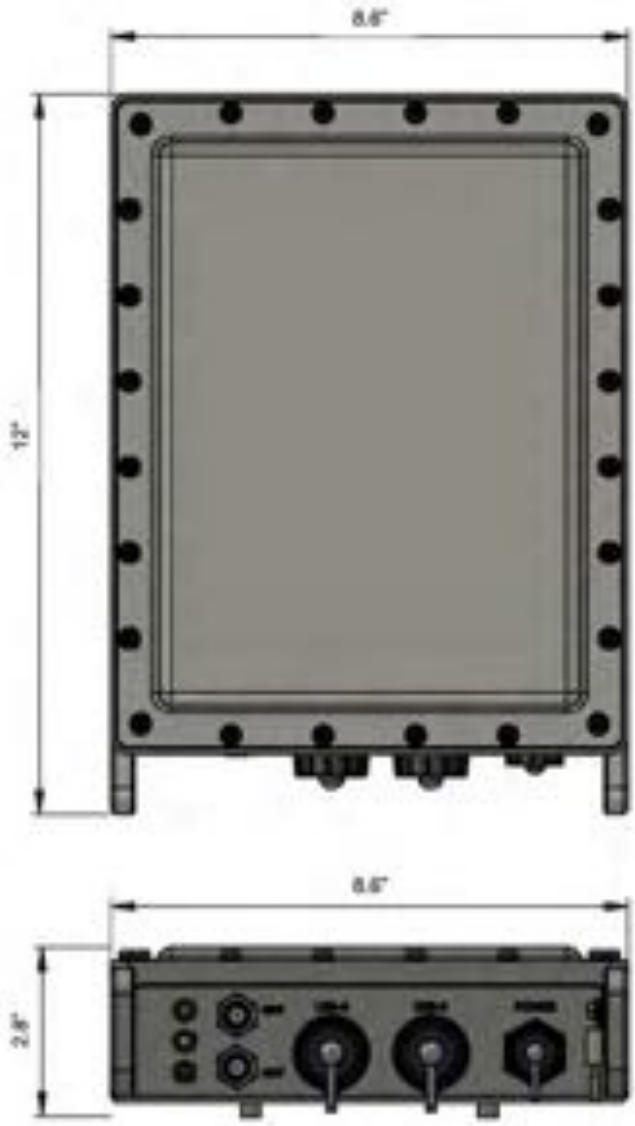
CONSTRUCTION: The **Mi.Net** Mobile Transceiver is small, lightweight and encased in a rugged metal enclosure for protection. All internal electronics are shielded against electro-magnetic interference. Connection to the laptop, antenna, and power are accomplished on the front of the unit. All connections are clearly marked for operational efficiency and ease of installation. LED lights on the front of the unit confirm power, RF reception, and temperature status.

Mi.Net Mobile Transceiver

Materials and Specifications

RADIO FREQUENCY	Operates on 902 to 928MHz (No FCC license required)
PC OPERATING SYSTEM	Windows 7 or newer
OPERATING SOFTWARE	EZ Reader Route Management Suite
STANDARDS	FCC Part 15, CSA, and ROHS
RECEIVER POWER SUPPLY	Powered via vehicle power outlet; 12VDC
RECEIVER DIMENSIONS	L: 9.5" W: 8.4" H: 3.5"
RECEIVER WEIGHT	6 lbs (approximately)
ANTENNA HEIGHT	35" Magnetic Mount
TWO WAY COMMUNICATION	FCC LICENSE EXEMPT
OPTIONS	VESA Vehicle Mounting Bracket
OPERATING TEMPERATURE	-40°F to + 122°F (-20°C to + 50°C)
STORAGE TEMPERATURE	-40°F to + 176°F (-20°C TO + 80°C)

Mi.Net Mobile Transceiver Dimensions



Mi.Net® Mueller Infrastructure Network

Mi.Node M Installation Tool

Mueller SYSTEMS

Features

APPLICATIONS: The Mueller Systems Installation Tool is a high performance Diagnostic Tool designed for use with the **Mi.Net M** system. The tool can also read legacy Hot Rod units. It is compatible with all current Mueller Systems meters utilizing encoder registers, Hot Rod AMR transmitters and Mi.Node M transceivers. The primary function of the Mi.Node M installation tool is to interrogate Mi.Node M or Hot Rod transmitters to obtain the serial number from the register, water consumption, leak detection, backflow, no flow, no communication and duration data via radio frequency transmission. Verification of proper installation and trouble shooting are easy with this simple to use diagnostic tool. The Mi.Node M installation tool can also be used in conjunction with the appropriate EZ Export software to provide small scale, close range meter reading solutions. The software provides a standard export to an EXCEL spreadsheet for apartment and condominium complex reading solutions.

OPERATION: The **Mi.Net M** installation tool is easy to use. The device can be utilized with all Mueller Systems encoder registers connected to any Mi.Node M transceiver or any of the Hot Rod transmitter options available; Metal Pit Option (Yellow), or the Standard Option (Gray). Simply input the appropriate serial number into the device via the keyboard to interrogate individual Mi.Node M transceiver or Hot Rod transmitters via RF transmission. The device ID, meter reading and event and duration data associated with the meter is all displayed on the large backlit black on white LCD screen for easy verification of reading information and data transmission. An integral power management system shuts down the Mi.Net M installation tool after five minutes of inactivity to conserve battery power. Integral rechargeable batteries provide power for a full day of meter installation and verification.

The Mi.Node M installation tool can also be used to capture up to 1000 meter readings at close range for small scale system solutions. The device is used in conjunction with EZ Export software to read meters and create a downloadable EXCEL spreadsheet of the data captured by the installation tool in meter reading mode.

CONFORMANCE TO STANDARDS: FCC compliance: Part 15 certified. The Mi.Node M installation tool complies with Standard C707 for Encoded Remote Reading Systems. No FCC License is required for operation.

CONSTRUCTION: The Mi.Node M installation tool consists of a compact printed circuit board which is encased in a thermoplastic enclosure to provide protection against shock, dust and water intrusion. The replaceable, whip antenna permits communication with nearby AMR/AMI units. A tactile response, twelve key, overlay membrane provides immediate feedback for operation in colder climates with gloved hands. The rechargeable batteries can be connected to any USB equipped laptop computer for charging in the field. The small size and ergonomic shape permit the tool to be carried in a shirt pocket making it an ideal tool for installation and diagnostic work. There are no customer serviceable parts inside the Mi.Node M installation tool.

FCC STATEMENT: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This

Continued on back

Materials and Specifications

Radio Frequency	Operates on 902 to 928MHz
Model	Mi.Node M Installation Tool
Enclosure	UV Stable Thermoplastic
LCD Screen	4 Lines X 20 Characters
Keyboard	Raised 12 Key Tactile Response
Power Source	Integral Rechargeable Batteries
Typical Range	up to 1200 feet
Temperature Range	Operating Temperature: 32°F to + 122°F (0°C to + 50°C) Storage Temperature: 14°F to + 140°F (-10°C to + 60°C) Humidity: 0% - 95% noncondensing
Dimensions	3" W X 4-1/2" L X 1-1/4" D
Weight	1/2 lb
Compatibility	Mi.Node M and Hot Rod modules

equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING: – Changes or Modifications. Any changes or modifications not expressly approved by the party responsible for Compliance could void the user's authority to operate the equipment.

CAUTION: Exposure to Radio Frequency Radiation. The radiated output power of this device is far below the FCC radio frequency exposure limits. Nevertheless, the device shall be used in such that the potential for human contact during normal operation is minimized.

Panasonic recommends Windows.

Panasonic

TOUGHBOOK 53

- 14" High Definition (720p) LED Display
- Sunlight-viewable Touchscreen with Panasonic CircuLumin™ Technology¹
- Oversized Touchpad with Multi-Touch
- Magnesium Alloy Case with Handle
- Drop and Spill-resistant
- Optional 4G LTE Multi Carrier Mobile Broadband with Satellite GPS

3-FOOT

MIL-STD 810G

ENHANCED PERFORMANCE AND VERSATILITY FROM THE ORIGINAL SEMI-RUGGED LAPTOP MANUFACTURER.

In 1998, Panasonic created the first semi-rugged computer. Today, the Panasonic Toughbook® 53 features a 14" HD LED display, the latest Intel® Core™ processors and an oversized multi-touch touchpad. Options for a sunlight-viewable Panasonic CircuLumin™ touchscreen, backlit keyboard, dedicated GPS, 4G LTE multi-carrier mobile broadband with satellite GPS, integrated webcam and choice of insertable or contactless SmartCard reader, make this the most versatile semi-rugged PC ever.

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panasonic.com/toughbook/53

TOUGHBOOK®

TOUGHBOOK 53

Panasonic

Panasonic recommends Windows.

OPERATING SYSTEM

- Windows® 8.1 Pro 64-bit (available Windows® 7 Professional downgrade option)
- Panasonic Utilities, Recovery Partition

DURABILITY

- MIL-STD-810G certified (5' drop, shock, vibration, dust, altitude, high/low temperature, temperature shock, humidity)
- Spill-resistant keyboard
- Optional hard drive heater
- Magnesium alloy case with handle
- Shock-mounted flex-connect hard drive with quick release
- Pre-installed tempered glass screen film

CPU

- Intel® Core™ i5-3320M vPro™ Processor
  - 2.6GHz with Turbo Boost up to 3.3GHz
  - Intel Smart Cache 3MB

STORAGE & MEMORY

- 4GB or 8GB SDRAM (DDR3L-1600MHz)*
- Shock-mounted flex-connect hard drive with quick release
  - 500GB 7200rpm (Elite model), 320GB 5400rpm (Lite model)*
  - Optional hard drive heater
  - Optional: 128GB, 256GB and 512GB reinforced flex-connect SSD with heaters*

DISPLAY

- 14.0" high Definition (1366 x 768) LED
- Optional touchscreen*
  - Panasonic SunViewView™ technology
  - Anti-reflective and anti-glare screen treatments
- Intel® HD graphics 4000, max. 1792MB shared dynamic video memory
- Convertible mode (configurable)

AUDIO

- Intel® high-definition audio compliant
- Integrated stereo speakers
- Keyboard volume and mute controls

KEYBOARD & INPUT

- Touchscreen with integrated stylus holder*
- 82-key with dedicated Windows® key
- Elantech electrostatic touchpad with multi-touch support
- Optional backlit recessed keyboard

MULTIMEDIA BAY

- DVD Super Multi Drive

EXPANSION SLOTS

- PC Card type 1 or 2
- SD Card (SDXC)
- ExpressCard/54 x 1

INTERFACE

Docking connector	Dedicated 100-pin
eSATA	Type A
VGA	D-sub 15-pin
Headphone/speaker	Mini-jack, stereo
Microphone/line-in	Mini-jack, stereo
Serial	D-sub 9-pin
USB 3.0 (x 2), USB 2.0 (x 2)	4-pin
Optional: IEEE 1394a (FireWire®)*	4-pin
10/100/1000 Ethernet	RJ-45
Optional: 2nd LAN 10/100/1000 Ethernet*	RJ-45
Optional: Dial Modem*	RJ-11

WIRELESS

- Optional: Integrated 4G LTE multi-carrier mobile broadband with satellite GPS
- Optional GPS (Gobi4000)
- Intel® Dual Band Wireless-AC7260 (N+A+B/G/N+BT)
- Bluetooth® v4.0 + EDR (Class 1)
- Security
  - Authentication: LEAP, WPA, 802.1x, EAP-TLS, EAP-FAST, PEAP
  - Encryption: CKIP, TKIP, 128-bit and 64-bit WEP, Hardware AES
- Optional dual high-gain antenna pass-through
- Slide on/off switch

POWER SUPPLY

- Battery operation*
  - Elite model – 10 hours (long life battery)
  - Lite model – 10 hours (lightweight battery)
- Battery charging time: 2.5 hours*
- Long life Li-ion battery pack (10.8V, typical 6750mAh, minimum 6600mAh)
- Lightweight Li-ion battery pack (10.8V, typical 4800mAh, minimum 4700mAh)
- AC Adapter: AC 100v-240v 50/60Hz auto sensing/switching worldwide power supply

POWER MANAGEMENT

- Suspend/Resume Function, Hibernation, Standby, ACPI BIOS

SECURITY FEATURES

- Password Security: Supervisor, User, Hard Disk Lock
- Kensington cable lock slot
- Trusted platform module (TPM) security (Ver 1.2)
- DuPont Biofinger® theft protection agent (v 3007)
- Intel® Anti-Theft Technology
- Optional fingerprint reader*
- Optional smartvalue SmartCard reader
- Optional 13.56MHz contactless SmartCard/graphics/ID reader*
  - ISO 15693 and 14443 A/B compliant

WARRANTY

- 3-year limited warranty, parts and labor

DIMENSIONS & WEIGHT

- 11.7"(L) x 13.6"(W) x 1.8-2.2"(H)
- 5.4 lbs. (Lite model), 5.8 lbs. (Elite model), 6.8 lbs. (Elite model with touch)

INTERFACE OPTIONS*

- 4G LTE multi-carrier mobile broadband with satellite GPS
- GPS (Gobi4000)**
- 720P webcam and digital mic*
- Backlit activation keyboard
- 2nd LAN or FireWire or 3G/4G modem or dual antenna pass-through*
- Insertable SmartCard reader
- Contactless SmartCard/ID reader*,**
- Fingerprint reader**
- Hard drive heater
- 128GB, 256GB and 512GB solid state drives (SSD) with heaters

SELECT ACCESSORIES*

AC Adapter (3-prong)	CF-AA5713AM
Long Life Battery Pack	CF-VZSU71U
Lightweight Battery Pack	CF-VZSU72U
Battery Charger	CF-VCBTL06
LND 3-Bay Battery Charger	FMCH-DBT-1BD7-P
LND Car Adapter 120W	CF-LND5120
ToughMate Always-on ID Case	TBCIDAOC5-P
ToughMate Combination Carrying Case (large capacity)	TBCCOMCAW-P
ToughMate Backpack	TBCBPK-P
Memory Card 4GB (SDXC)	CF-WMBA1004G
Desktop Stick	CF-VEB551U
Vehicle Docks (no pass-through)	
- Gamber-Johnson with LIND power supply	7160-0393-06-P
- Havis with LIND power supply	CF-VDM102U-P
Vehicle Docks (dual pass-through)	
- Gamber-Johnson with LIND power supply	7160-0395-06-P
- Havis with LIND power supply	CF-VDM103U-P
Touchscreen Replacement Option	CF-VNP009U
Tether	CF-VNT002U
14.0" LCD Protector Film	CF-VPF11U

Please consult your Panasonic representative before purchasing.

*Touchscreen model only

*Intel® Core™ i7 processor is also available.

*Data security software will be auto-expanding upon actual system configuration.

*1GB = 1,000,000,000 bytes

*Also available as Lite model.

*The use of the Wi-Fi channel 12 or 13 for user-controlled operating options or with a use of Wi-Fi Windows 7 (or 64-bit) WLAN is LIMITED with CH 1-11 channels.

*GPS comes standard with dual pass. GPS is not available with 3G/4G, 3.1 x 3.0 LAN.

*Battery performance features such as change time and life span can vary according to the hardware configuration which the computer was battery run over. Battery operation and recharge times will vary based on many factors, including screen brightness, applications, features, power management, battery conditioning and other customizable preferences. Battery testing results from Mobilemark 2007.

*Requires software and activation to enable theft protection.

*Fingerprint and contactless SmartCard are mutually exclusive.

*Accessories and Integrated Options may vary depending on your installed configuration. Visit Panasonic website for more accessories and details.

TOUGHBOOK®

LEARN MORE

1.800.662.3537

panasonic.com/toughbook/53

Advanced Metering Infrastructure (AMI)

FERGUSON WATERWORKS

Mi.Net® Mueller Infrastructure Network

Mi.Node Meter Interface Unit

Mueller SYSTEMS

Features

TWO WAY COMMUNICATIONS: The Mueller Systems Mi.Node meter interface unit provides a direct connection to all Hersey water meters equipped with a Translator® encoder register. The primary function of the Mi.Node is to provide full, two way communications between the **Mi.Net** Fixed AMI System and the smart meter.

SYSTEM COMPONENTS: Information retrieved from a water meter is stored temporarily within the Mi.Node unit's internal memory. As a default, the Mi.Node will transmit hourly meter data at a predetermined time once per day to the Mi.Hub collector. On demand reads to the Mi.Node can been requested at any point in time and are typically delivered within seconds. This data is sent to a Mi.Hub collector via an unlicensed radio frequency and then relayed to the **Mi.Net** host server for analysis and storage. The Mi.Node utilizes advanced noise filtering technology that allow the **Mi.Net** System to maximize range while keeping infrastructure to a minimum. Multiple routing routing options for each Mi.Node unit ensure that the data will be retrieved by the server.

CONSTRUCTION: The Mi.Node unit incorporates multiple moisture barriers to eliminate concerns over moisture intrusion even in meter box environments. An o-ring sealed thermoplastic enclosure, coated electronic board and potting compound provide a watertight package that permits Mueller Systems to offer a 20 year warranty on the Mi.Node unit. A large lithium ion battery provides plenty of power over the life of the unit.

SCALABLE AND UPGRADABLE: Other Mi.Node modules provide connectivity to electric meters. The various models of Mi.Node meter interface units allow the **Mi.Net** System to provide robust and efficient AMI, water and energy conservation solutions for all types of residential and commercial applications.

The Mi.Node's functionality can be upgraded remotely. A firmware upgrade made over the **Mi.Net** network allows the Mi.Node to be upgraded autonomously. All system Mi.Node units can be scheduled for an upgrade at one time and the system will notify the user when the process is complete.

The Mi.Node seamlessly connects directly to the Mueller Remote Disconnect (RDM) meter for easy but secure actuation of the valve through the user interface.

Materials and Specifications

Interfaces with water meters that output a protocol similar to the Mueller Systems Translator
Logs and stores meter data in internal memory
Automatically detects encoder meter type connected
No external power supply required for operation
Notifies the system of low battery level for preemptive maintenance
RF antenna contained inside Mi.Node unit enclosure
FCC compliant
Mi.Node Wire Lengths To Translator 3', 15', or 25'
Power Source D Cell Lithium Battery
Transmit Frequency 902 Mhz – 928 Mhz
Data Integrity Verified with every data message
Temperature Range: -40°F to + 158°F (-40°C to + 70°C)
Humidity 0% - 100% condensing
Dimensions 6-5/8" high x 2-15/16" wide x 3-3/8" deep

MUELLER

MI.NET® MUELLER INFRASTRUCTURE NETWORK

Mi.Net Repeaters

FEATURES

Overview: Repeater components of the Mi.Net® Mueller Infrastructure Network for Utilities provide a bridge between Mi.Node devices and the Mi.Hub collector, increasing the maximum distance between the meter and the collector. Multiple repeaters can be installed to further extend the range. Implementing these repeaters reduces the network cost and complexity.

Real Time Data: The repeaters periodically collect data retrieved from each Mi.Node within its range before forwarding the data to an upstream Mi.Hub data collector or to other repeaters. The repeaters can also be instructed to retrieve "On Demand" meter readings in real-time from one or all meters in their range when a user requests them, offering true two-way communication between the user and all meters in the network.

Secure and Robust: The innovative repeater design provides robust multi-path RF coverage and is capable of storing Mi.Node data for surrounding meters in internal memory and transmitting it to other devices within the Mi.Net System, such as the Mi.Hub and other nearby repeaters or nodes. All communications are protected with advanced encryption algorithms to ensure data privacy and prevent intrusion.

BENEFITS

- Enhances access to information about water and electric utilization and increases operational efficiency
- Reduces operating cost and dramatically decreases installation and maintenance expense by reducing backhaul requirements
- Facilitates instant remote access to usage and demand data
- Large data capacity provides weeks of data storage across thousands of meters
- Seamless interoperability with all existing Mi.Net devices
- Backup battery keeps system fully operational even during power outages
- Optional solar photovoltaic module eliminates need for external power

REPEATER PRODUCTS PROVIDE A VERSATILE AND ROBUST NETWORK ACROSS ALL AREAS OF THE COMMUNITY.

MI.NODE OWL: The Owl infrastructure repeater conveniently installs in existing street lights, minimizing installation complexity and cost. The Owl repeater takes advantage of the daylight sensor's available power source and utilizes this existing socket without hindering the sensor's operation. The Owl requires no dedicated wiring for installation and is unobtrusive in appearance, completely blending into the existing neighborhood landscape. The Owl repeater is built in a weatherproof enclosure for robust, all-season operation.

MI.NODE AC REPEATER: This AC-powered repeater installs onto virtually any solid surface, such as a pole, wall or tower. It is powered by an external AC power source. It also contains an internal backup battery pack for operation during short power outages. The repeaters are housed in weather proof enclosures for robust, all-season operation.

MI.NODE DC REPEATER: This DC-powered repeater installs onto virtually any solid surface, such as a pole, wall or tower. It is equipped with a high-capacity battery pack, providing an exceptionally long lifetime between battery replacements. It incorporates multiple vapor barriers such as a weather proof enclosure, coated electronic board and potting compound, all of which eliminate moisture intrusion in even the harshest environments.

MI.HYDRANT XR: The MI.Hydrant XR consists of an enclosed, weatherproof transceiver that s unobtrusively fixed under the rim of the most common fire hydrants. The repeater does not hinder the hydrant's operation and comes equipped with an extended range high-gain antenna, which provides a dual function as a hydrant marker during extreme snow and weather related events. MI.Hydrant XR is equipped with a high-capacity battery pack providing an exceptionally long lifetime. The MI.Hydrant XR unit incorporates multiple vapor barriers such as a weather proof enclosure, coated electronic board and potting compound, all of which eliminate moisture intrusion in even the harshest environments.

SPECIFICATIONS (SUBJECT TO CHANGE)

	MI.MODE ONE	MI.MODE AC POLE MOUNT	MI.MODE DC POLE MOUNT	MI.HYDRANT XR
POWER				
Power Dissipation	.1 W typical, 5 W max	.1 W typical, 5 W max	<0.01 W typical when idle, <3 W typical when transmitting	<0.01 W typical when idle, <3 W typical when transmitting
Power Source	AC Line Voltage: 110-277 VAC, 60 / 50 Hz	AC Line Voltage: 110-277 VAC, 60 / 50 Hz; Internal battery backup for up to 8 hours operation during outage	Sealed Lithium battery pack	Sealed Lithium battery pack
PHYSICAL				
Dimensions	4" x 5.5" x 4.5" (10.2 cm x 14.0 cm x 11.4 cm) Light Sensor: 2" x 5.5" x 4.5" (5.8 cm x 14.0 cm x 11.4 cm)	5.0" x 5.0" (12.7 cm x 12.7 cm) x 3.0" (7.6 cm) Power cable : 3 conductor 18 AWG/RF cable: LMR240 with type N male connectors	10.5" x 5.0" x 3.5" (26.7 cm x 12.7 cm x 8.9 cm) Antenna : 54.0" tall (137.2 cm) x 0.75" diameter (1.9 cm)	10.5" x 5.0" x 3.5" (26.7 cm x 12.7 cm x 8.9 cm) Antenna: 54.0" tall (137.2 cm) x 0.75" diameter (1.9 cm) with a 4.0" diameter spring base (10.2 cm)
Color	Grey polymer	White polymer	Grey powder coating	Grey powder coating
Weight	1.2 lbs (0.5 kg) Light sensor: 0.2 lbs (0.1 kg)	1.0 lb (0.5 kg) (without antenna & bracket) 5.5 lbs (2.5 kg) (with antenna & bracket)	5.0 lbs (2.3 kg) (without antenna & bracket) 9.5 lbs (4.3 kg) (with antenna & bracket).	5.0 lbs (2.3 kg) (without antenna & bracket) 9.5 lbs (4.3 kg) (with antenna & bracket)
I/O	None	Green AC, Power Led	None	None
RF RADIO				
Frequency	915 MHz ISM Band Operation Frequency Hopping / Spread Spectrum Operation			
Output Power	1W Transmit			
Antenna	External 2.5 dBi Antenna, included	External 3.0 dBi Antenna, included	External 2.5 dBi Antenna, included	External 4.0 dBi Antenna, included
ENVIRONMENTAL	-30 to +70°C Operating; -40 to +85°C Storage; 5 to 95% Relative Humidity NEMA 4 Weather Proof Enclosure			
DATA	• Collect and store data from up to 2000 meters, 2MB Solid-state Flash Memory for dedicated storage of readings • Mesh protocol with up to 5 Redundant Links • Infrastructure or ad hoc networking • Remote configuration capability • Packet data up to 28.8 kbps , End-to-end 128bit RC4 encryption • ICMP and SNMP for remote diagnostics and monitoring			
CERTIFICATIONS	• CC 47 Part 15, Unintensional Radiators • ANSI C136.10-2010 • FCC 47 CFR Part 15.247	• UL/TUV 61010, CSA-C22.2 Compliant • IC RSS-210		

For more information about Mueller or to view our full line of water products, please visit muellersystems.com or call Mueller customer service at 1.800.423.1323.

MUELLER

MI.NET®

a MUELLER brand

MUELLER INFRASTRUCTURE NETWORK

Mi.Net Fixed Network Collector

FEATURES

OVERVIEW

The Mueller System Mi.Net Multi-Network Collector enables efficient, robust data acquisition across the Mi.Net™ Mueller Infrastructure Network for utilities by providing for long range wireless communications from originating Mi.Nodes to the utility's Mi.Host software platform. The wide range provides an extended coverage area and dramatically reduces system cost and maintenance. The Collector allows for near simultaneous communication between both of Mueller's proprietary networks as well as a migration path to future technologies.

Reliable

The ability to remotely monitor and diagnose the health of the collectors is a key to keeping the network performing at a very high level. Each collector is monitored by the Mueller network operations center (NOC) to ensure that your network is running at maximum efficiency. In addition, each collector is field serviceable with Field Replaceable Units (FRU's). This allows a service technician to easily upgrade or repair a unit with minimal downtime.

The multi-network collector enables full two-way radio frequency (RF) communication between water meters equipped with encoder registers, radio transceivers and the Mi.Host software application. Collectors are equipped with a large array of non-volatile memory, in addition to the 511 days of hourly data stored in each node. This results in resilient communications, a robust network, and ultimately, peace of mind for the user.

MI.NET MULTI-NETWORK COLLECTOR

TOWER TOP AMPLIFIER AND NEW IMPROVED FILTERS MOUNT ON TOWER LOCATIONS OR POLE LOCATIONS

SECURE COMMUNICATION

A variety of options for collector communication are available. Wired network connections (Ethernet, fiber, DSL), wireless cellular or any existing network infrastructure are all supported to fully utilize available utility assets to communicate to users.

SPECIFICATIONS

BASE UNIT

Power Consumption	AC Line Voltage: 100 240VAC., 50/60Hz, 25W typical, 120W maximum (during battery charging)
Main Enclosure Dimensions	24.0"H x 21.0"W x 9.5"D (60.1 cm x 53.3 cm x 24.1cm) With mounting plate: 24.0"H x 21.0"W x 11.0"D (60.1 cm x 53.3 cm x 27.9cm)
Exterior	Grey durable polycarbonate enclosure NEMA 4 compliant weatherproof enclosure
Weight	Base unit: 33 lbs. (excluding battery) (15 kg) Battery: 23 lbs.(10.4 kg) Mounting plate: 8.2 lbs. (3.7 kg) Total weight: 64.2 lbs. (29.1 kg)
Antennas	External 8 dBi Antenna, included, attaches to Remote Amplifier External 6 dBi Antenna, extra, attaches to Remote Amplifier FCC Approved, 902 928MHz ISM Band Operation Frequency Hopping/Spread Spectrum Operation
Battery Back up	Up to 20 Hours Continuous Operation Without AC Power Battery is recharged when AC power is restored
Certifications	FCC 47 Part 15, Unintentional Radiators UL 60950 Compliant UL/TUV 61010, CSA C22.2 Compliant

REMOTE AMPLIFIER

Dimensions	(Excluding antenna) 15.0"H x 5.75"W x 11.0"D (38.1cm x 14.6cm x 27.9cm)

For more information about Mi.Net solution or to view our full line of water products, please visit muellersystems.com or call customer service at 1.800.423.1323.

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MUELLER

Mi.Net™ Mueller Infrastructure Network

Mi.Tech Field Installation Tool

Mueller SYSTEMS

Mi.Tech

Features

FUNCTIONALITY: The Mueller Systems™ Mi.Tech field installation hand held computer allows the installer to accurately retrieve installation work sheets from the Mi.Net AMI server via mobile internet access. At the time of installation, the hand held computer records the GPS coordinates of the meter and configures, and tests the Mi.Node meter interface units automatically. This ensures that the Mi.Node device is properly installed and associated with the correct account.

CONSTRUCTION: This rugged, industry standard, mobile computer is tough enough to withstand a field environment and the software is intuitive and easy to use. The bright TFT Color screen is easy to read even in direct sunlight. The Touch Screen combined with the keyboard make entering information easy. An internal Lithium Ion battery is powerful enough to last all day and is rechargeable in the base station back at the office or in the truck. All data is secure in the 8 GB non-volatile Flash memory allowing hot swaps of the battery if necessary without data loss.

INSTALLATION AND SCHEDULING: The worksheet for the day's anticipated installation is set up on the Mi.Net AMI Server and then simply downloaded in the office or in the field with the cellular card. At the end of the day, the information is uploaded back to the AMI server just as easily to eliminate key punch errors.

The daily installation worksheet is created in the office to minimize the number of installation options available to the installer. The list can be easily sorted by street and house number, account number, type of Mi.Node MIU to install, or by MIUs already installed. There is a summary page that indicates how many MIUs have been installed, the number left to install and the various types of MIUs to install. The summary page makes it easy for the installer to load the required one day supply of Mi.Node MIUs in the truck and keep track of the day's installation progress.

Once an installer has loaded the daily worksheet, they simply select the appropriate location from the on screen list using the touch screen or the full function key board. The installation computer then uses known GPS coordinates to insure proper location or records the asset coordinates for later use. The installer simply follows the on screen prompts to collect the old meter's reading and scans in the new MIU serial number. After final verification, the software informs the installer that the location was successfully installed. The installation computer software was designed and tested for ease of use and simplicity.

FINAL VERIFICATION: All testing and configuration is done automatically and with as little operator input as possible. The goal, an error free installation, from verifying GPS coordinates, displaying the old meter's serial number, using the integral laser scanner to obtain the new serial number, verifying that the serial number is the correct type of unit, to a final verification prior to accepting the installation as complete and correct.

Microsoft is a registered trademark of Microsoft Corporation in the United States and other countries.

Materials and Specifications

Rugged IP65 sealed construction to work in harsh outdoor environments
4.3" WVGA Sunlight-readable Corning® Gorilla Glass display
Lithium Ion rechargeable pack battery with 27.8 Watt-hour rating ensures extended operating time for full day battery life.
Multi-touch user interface with Capacitive Live Stylus compatibility.
Bluetooth and Wi-Fi b/g/n
Microsoft® Windows Embedded Handheld (WEHH) 6.5
Integrated Laser Scanner for error free installations
Track your inventory from delivery to decommissioning

INTELLIGENT INSIGHT INTO YOUR WATER SYSTEM

The Sentryx™ Water Intelligence platform provides utilities with unique insights into the health of the distribution system. Using Mueller® fire hydrants as a communications backbone and battery powered state-of-the-art sensors, utilities will be able to understand how their distribution system is performing like never before. The Sentryx™ software will record and display important data from water sensing technology including pressure, flow, leak, chlorine and pH. Leveraging over 160 years of industry experience and state-of-the-art machine learning technology, your data will be transformed into insights that can be used to make critical decisions about your operations and maintenance programs.

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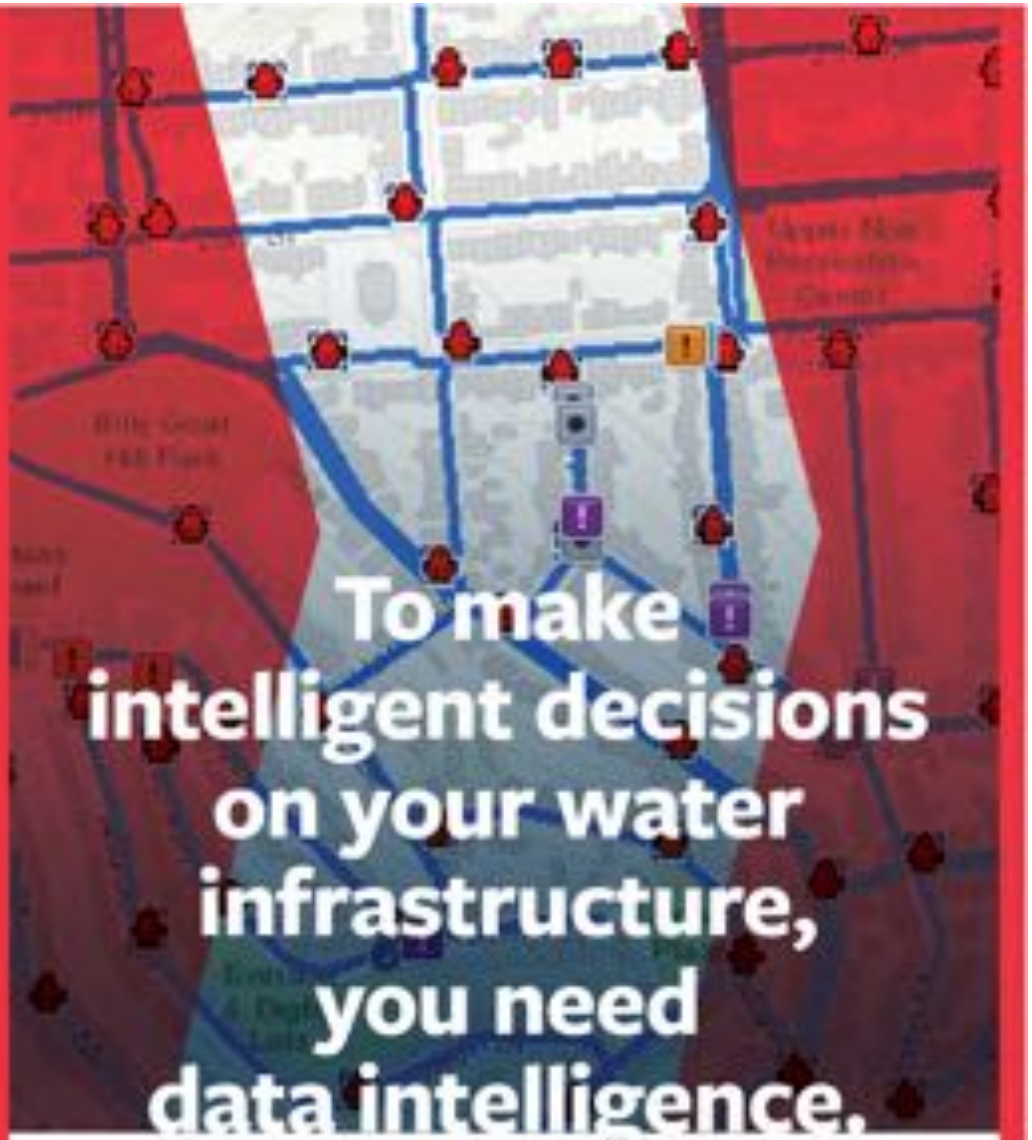

MUELLER

Introducing Sentryx™ Water Intelligence

MUELLER

Welcome to an advanced technology platform that will change the way your utility will look at your water and its infrastructure system. Sentryx™ Water Intelligence is a unique hub of information that helps with analytical and strategic decisions, as well as day-to-day water distribution and utility operation. Together, information and data is true power. Data is easily obtained via any access point along the pipe including sensors, meters, hydrants, valves and more. Using Mueller® products such as the Centurion® fire hydrants, Jones® fire hydrants, Hydro-Guard® smart flushing systems, remote disconnect meters and EchoShore®-DX leak detection, utilities can gain unique insights into the health of their water system which is not available anywhere else in the market. Mueller fire hydrants are used to house communications equipment, eliminating the need for expensive infrastructure installed on the property of other utilities. Sentryx™ Water Intelligence is the technology you need to be proactively in control of your water management system to increase the life of your infrastructure and lower future capital cost.

	SENTRYX™ WATER INTELLIGENCE	LEADING COMPETITORS
Usage	√	√
Leaks	√	√
Pressure	√	
Chlorine Levels	√	
ph Levels	√	
Temperature	√	

Sentryx™ Water Intelligence outperforms all others. It's the one platform for all the data intelligence you need including water quality, leak detection, pressure, increased security and much more.


Leak Detection


Pressure Monitoring


Water Quality


Water Meters

Mi.Net® Mueller Infrastructure

Mueller SYSTEMS

Complete Two Way End-to-End Fixed Network Solution

Features

UNPARALLELED FLEXIBILITY: The Mi.Net® AMI system is the most full featured and flexible two-way, fixed network AMI solution available. The Mi.Net system completely automates smart water, and electric meter readings and billing in its basic form. Mi.Net provides unparalleled advanced functionality such as Mi.Echo leak detection and the ability to remotely actuate the remote disconnect meter (RDM). Supplemental software and hardware modules are available that permit the system to provide a one stop, web based user interface for additional functionality. Utilities are empowered to configure a system that meets the vision of the utility's management team right now.

SYSTEM COMPONENTS: The Mi.Net AMI system facilitates overall improvements in utility management and conservation which result in real revenue generation and improved customer satisfaction. The Mi.Net AMI system is constructed around three major components: the smart meters equipped with meter interface modules or Mi.Nodes, the data collector modules or Mi.Hubs and the host server and user interface software or Mi.Host. Utilizing a single, unlicensed 900MHz network to collect data for various commodities provides an economical and cost effective model for implementing "Smart Metering" and AMI. Additional software/hardware modules permit future expansion of the system to embrace new technology and accommodate future growth.

FUNCTIONALITY: Utilizing state of the art noise filtering technology, the Mi.Nodes can transmit over long range reliably keeping infrastructure at a minimum. The Mi.Node meter interface unit connects to the local smart meter (Water or Electric) and collects data for upload to the system. The Mi.Node unit uploads its data to the system at a predetermined time or "On Demand" through a two way radio frequency link to the Mi.Hub collection unit. After the Mi.Hub collector has received data from the network of Mi.Nodes units assigned to it, this information is sent to the Mi.Host server for processing and storage. Mi.Hub collectors can utilize a number of backhaul methods to the Mi.Host server allowing the utility to optimize existing assets and reduce implementation costs. Standard telephony, cellular, fiber or ethernet and Wi-Fi connections are all supported.

EASE OF USE: An intuitive, web-based, GUI user interface available on the Mi.Host server allows utilities to easily manage and monitor their entire Mi.Net system. The user interface can be accessed from anywhere via virtually any internet capable device. Individual user rights can easily be configured in order to protect and limit access to the system. The user interface can be used to generate billing reports, view demand graphs, assess and map outages and much more. Mueller Systems can also customize the user interface to meet specific customer needs. For instance, billing data obtained from Mi.Net system can be seamlessly integrated into the utilities' existing billing system software.

SYSTEM NOTIFICATIONS: The Mi.Net system is capable of alerting the user of abnormal conditions such as meter communication failure, water theft, leak detection and a host of other user configurable alerts. These alerts can be viewed through the user interface or notification can be sent via email or other means to a specified user(s).

MODULAR DESIGN: The open architecture of the Mi.Net system eliminates the need for proprietary hardware and guarantees the longevity of the system. New hardware and software can be added easily to the Mi.Net system.

SECURITY: Mi.Net technology ensures that all data will remain secure and protected. All data communications are encrypted to provide the highest level of security. Secure connections to the Mi.Host server are employed in addition to user authentication. The Mi.Net fixed network AMI solution is a secure, reliable, expandable, customizable and cost efficient system that satisfies the smart metering and energy management needs of any size utility.

Features and Benefits

Reduces annual operating cost
Enables water conservation
Mi.Data consumer web portal improves customer service and education
Automates all meter readings
Same infrastructure simultaneously supports Water or Electric data collection
Automates all billing
Automated report generation
Automated water loss detection
On demand meter reading allows any meter to be read at any time
Time of use billing
Simple account management
Secure and reliable data communication
Enables a meter to be temporarily flagged as inactive
Aids in tamper, theft and leak detection
FCC and UL Compliant

Mueller SYSTEMS

WHERE INTELLIGENCE MEETS INFRASTRUCTURE®

SmartMove®

Network Operations Center

Providing the assurance of round-the-clock system surveillance

Mueller Systems' Network Operations Center (NOC) is a round-the-clock sentry, providing real-time surveillance of its North American customers' water infrastructure.

Located in Atlanta, GA the NOC is staffed by highly skilled analysts, each of whom is assigned a specific group of customers. Using web-based tools developed by Mueller Systems, analysts access customers' networks and monitor all data sources — including collectors, repeaters and Mi.Echo leak loggers — on the NOC's 9-foot high, live-feed command screen. If an anomaly is detected anywhere, at any time, the customer can be contacted for immediate trouble shooting — before the issue becomes a problem.

All Mueller Systems' contracts include service level agreements, with NOC data monitoring and reporting provided at pre-determined levels, based on customer needs. Mueller customers value the expertise, timeliness and precision of NOC services — and the peace of mind that comes from continuous, real-time surveillance.

Four tiers of industry-leading support are available, including:

- **Phone Support**
- **Live Monitoring**
- **Quality Assurance**
- **Engineering Support**

Mueller Systems also licenses its proprietary technology for customers that wish to self monitor.

Giving residents access to safe, clean drinking water is among the most capital-intensive and operationally-significant services provided by water utilities. From leak detection to billing integrity, ensuring the safety, reliability and cost-effectiveness of water infrastructure requires constant vigilance.

By freeing up resources otherwise required to monitor infrastructure data, customers are able to focus on higher-value activities that improve the efficiency and return-on-investment of their water infrastructure.

Mueller Systems is committed to creating value through an unbeatable combination of industry-leading technology; innovative and reliable water infrastructure products; and laser-focused customer service. All of this comes together at the NOC.

How Our Network Operations Center Benefits Your Utility:

- **Always-on, real-time surveillance of water infrastructure**
- **NOC system monitoring allows your team to focus on higher-value activities**
- **NOC surveillance services are offered at a range of levels, based on your utility's needs**
- **By bringing together Mueller Systems' unrivaled technology, products and service, the NOC unlocks value throughout your water systems**

Learn how Mueller Systems NOC can help safeguard your water infrastructure by calling us today at 877.888.5945 or by visiting us online at www.muellersystems.com

MUELLER SYSTEMS • 1210 STATESVILLE BOULEVARD • CLEVELAND, NC 27013 • OFFICE: (704) 278-2221 • TOLL FREE: (800) 323-8584

WATERSMART SOFTWARE, INC.
PRODUCTS AND SERVICES

With over 100 utilities in 26 states representing over 4 million customer accounts, WaterSmart is the largest and most experienced customer engagement and self-service platform provider in the utility industry with Total Customer Engagement rates of 80%. We serve water suppliers with AMI, AMR, and manual read meter technologies and can accommodate a mix of meter read frequencies (hourly, daily, monthly). Our platform reduces customer support costs, improves operational efficiency and increases customer satisfaction.

Customer Engagement and Self-Service Platform

Utility Analytics Dashboard

The Utility Analytics Dashboard provides powerful analytical insights regarding customer consumption (use by account type, high users, etc.), outbound and inbound communications (outgoing leak or other alerts, incoming emails, etc.), and use of the Customer Portal (visit frequency, device access, most visited pages, etc.) The Dashboard also identifies and notifies Utility staff about suspected leaks in both AMI and non-AMI environments, and allows Utility staff to monitor compliance requirements. The Dashboard delivers information on all customer classes whose data are provided to WaterSmart and integrates external data sources like property records and maps. The Utility Analytics Dashboard is available to all Utility staff, each with their own unique login.

Customer Self-Service Portal

The WaterSmart Customer Self-Service Portal, available to customers through a mobile and web application interface, provides a single place for customers to see consumption, check and resolve leaks, view bills, sign up for paperless billing, complete forms, and receive targeted messages about Utility promoted events and programs. If selected by the Utility, the Customer Portal is available in both English and Spanish. By helping customers resolve the most common issues themselves, Utility staff can reduce low-value calls, reduce costs, and increase customer satisfaction.

Alerts and Notifications

WaterSmart provides alerts to customers to notify of potential high volume or continuous use leaks, to notify a customer that they have reached a self-selected consumption threshold, or to inform customers before the end of the billing cycle that they are likely to have high water use on their upcoming bill. Threshold notifications and leak alerts are further enabled by AMI, though they are also available for non-AMI customers. Alerts can be sent through multiple channels—email, SMS text message, automated voice call, or print. Burst leak alerts are currently targeted at single-family residential accounts and irrigation-only accounts, whereas continuous leak alerts are available for all meter classes. The leak resolution workflow helps customers identify the source of their leak, and resolve the leak on their own.

Bill Explainer

Bill Explainer is a great resource within the Customer Portal, providing automated self-help to customers to identify and resolve concerns over high bills. Bill Explainer analyzes a customer's billing period consumption data in conjunction with their property data and information collected in their Household Profile to provide a personalized assessment of the most likely drivers for their bill amount. Likely causes may include a leak, over-irrigation, a rate increase, or a longer billing period length. Utility staff see the same information as the customer on the Utility Dashboard, supporting their efforts to respond to customer calls about perceived high bills in a faster, more satisfying manner.

Group Messenger & Lists

Group Messenger is a module within the Utility Analytics Dashboard that allows rapid delivery of targeted, timely, and topical messages to groups of customers. The integrated 'Lists' tool allows the Utility to create a custom list of accounts to analyze or communicate with. The Utility can use Group Messenger and Lists to reach out to the highest users, inform a defined geographic region of a boil water notice or service outage, target watering day violators with a message to check their irrigation controller (AMI only), and more. Group Messenger supports multiple communication channels, including email, SMS text, and automated voice.

Electronic Bill Presentment

WaterSmart's Electronic Bill Presentment is a convenient option for Utility customers who want to view their bills online and link seamlessly to their bill payment site. Integrated water consumption and bill information gives Utility customers context on their water use and a better understanding of the value of water services. The Utility will gain persistent savings by avoiding print costs, encouraging on-time payments, and answering fewer billing-related support calls.

Forms

Forms is a simple tool for Utility staff to create and publish any type of electronic form with a three-step process: designate form settings, add form fields, and publish. Some example forms Utility staff may create include start and stop service, reporting water waste, submitting meter reads, and requesting a home audit. Responses are tracked in the Utility Dashboard, where Utility staff can view submissions, reply to submissions via email, manage submission statuses, download attachments, and leave notes for future reference.

Spanish Language Availability

The WaterSmart Customer Portal is available in English and Spanish, and in any other languages specifically noted in the Program at a Glance. A customer can change their preferred language within the Portal. Payment pages may not be available in languages beyond English depending on availability from payment provider. Take Action Recommendations may not be available in languages beyond English. Customer Welcome Letters can be sent with messages in multiple languages (subject to space and character constraints). Translated text must be provided by Utility.

Optional Product Solutions & Services

Customer Letter
Water utilities can optionally send a Customer Letter to explain the WaterSmart program and its benefits to end-use customers. The Customer Letter is branded for the Utility including logo, contact information, and a signature line from an appropriate representative, and informs recipients about the program and what they can expect to receive.

Water Reports
Water Reports are personalized, informative, carefully designed reports that help Utility customers better understand their water use and the cost and effort it takes the Utility to deliver high quality and reliable water services. Water Reports can be sent via mail or email to any account type, and may be targeted to certain accounts, sent to randomly selected accounts as part of a randomized control trial, or sent to all of a Utility's customers. Every Water Report is customized by our proprietary content personalization to tailor messages and recommendations specifically to each end-user.

Print Leak Alerts
Print Leak Alerts help utilities reduce the amount of time they spend manually contacting customers about leaks. If no email address is on file for a customer, Print Leak Alerts ensure that if a leak has been detected, a print alert is sent via mail to the customer's address. Print Leak Alerts are available to AMI Single Family Residential and Irrigation-Only customers.

Payment Website Integration with Single Sign-On (SSO) or Click-Through Registration

WaterSmart can provide log-in to our customer Portal using third party credentials (i.e. billing provider or other government website registration information) through SSO (Single Sign-On) using the SAML 2.0 or OAUTH2 protocol, as well as Facebook Connect. This provides for bi-directional, seamless registration to multiple portals using a single set of credentials. Optionally WaterSmart supports Click-Through Registration for uni-directional sign-on from a third party site to WaterSmart using a URL redirect with key-based encrypted data[1].

Performance WaterMark

Performance WaterMark is an additional module within the Utility Analytics Dashboard, which provides utility managers with access to benchmark analytic data unavailable elsewhere in the water utility industry. It provides real-time insights into organizational performance over time and a comparative, normalized score on key operational, financial, and customer engagement dimensions compared with all WaterSmart utility partners. By anonymously aggregating key performance data, water managers now have access to an easy-to-understand performance score for each of the following categories: meter data quality, payment performance, revenue stability, electronic billing adoption, and digital transformation.

[1] Click-Through Registration can be configured FROM WaterSmart to 3rd party site (e.g. payments site) if the 3rd party site can provide us with a published, documented protocol.

Insights & Engagement Delivered

WaterSmart Software em
utilities to transform data
insights that drive custom
engagement and lower se

HOW WE DO IT

Our data-driven Software-as-a-Service platform helps utilities understand water use across their customer segments. This allows suppliers to better plan program investments and deliver personalized, multi-channel communications that effectively promote program participation and customer satisfaction.

Customer Engagement
- Cross-channel, digital communications
- Personalized content
- Water-use breakdowns
- Leak alerts and threshold notifications

Program Communications
- Storm water management
- Water quality communications
- Service outages / boil notices
- Low-income programs

Insights
- Demand trends
- Measure program efficiency
- Detect leaks
- Customer service tools

We deliver **2x** CUSTOMER SATISFACTION **2.3x** CUSTOMER ENGAGEMENT

SUCCESS STORIES

With 3 million meters under management from 50 utility partners, WaterSmart Software consistently meets key organizational goals.

TARGET COMMUNICATIONS

"This is a really good opportunity to directly communicate with our customers and be able to customize messages."

Lisa Brown, City of Roseville

REDUCE OPERATIONAL COSTS

"What has improved is the speed, automation, and lower cost of presenting water use information and services to our customers."

Richard Harris, EBMUD

INCREASE CUSTOMER SATISFACTION

"WaterSmart has changed how we build relationships with our customers."

Fiona Sanchez, Irvine Ranch Water District

SELECT UTILITY PARTNERS

East Bay Municipal Utility District (EBMUD)
Fort Collins, CO
Irvine Ranch Water District, CA
Los Angeles Department of Water & Power
Medford, MA
Park City, UT
San Antonio Water System
San Jose Water Company
Scottsdale, AZ
Sharon, MA
Village of Glenview, IL
West Palm Beach, FL

AFFILIATIONS

B Corporation
American Water Works Association
Association of California Water Agencies
Colorado Water Wise
National Association of Water Companies
Smart Approved WaterMark
Take Care of Texas
Texas Water Foundation

AWARDS

2016 World Economic Forum Technology Pioneer
2016 GovTech 100
2015 B Corp Best for the Environment
2015 EBJ Business Achievement Award
Artemis 2012 Top 50 Water Tech
Global CleanTech 100
2013 SXSW CleanWeb Eco
AlwaysOn 2012 Going Green: Silicon Valley Global 200

WARRANTY

MUELLER SYSTEMS
MASTER AGREEMENT

THIS MASTER AGREEMENT (this "**Agreement**") is entered into this _____ day of _____ _____ _____ between MUELLER SYSTEMS, LLC, a Delaware limited liability corporation having its principal offices at 10210 Statesville Blvd, Cleveland, North Carolina 27013 (referred to in this Agreement as "**Mueller Systems**" or "**Provider**"), and _____ (referred to in this Agreement as "**Customer**"). This Agreement governs the sale by Provider and the purchase by Customer for its own use and not for resale of, as applicable, Equipment, Software, Documentation and other items related to advanced metrology infrastructure systems. In the event of any conflict or inconsistency between the terms and conditions of this Agreement and terms and conditions of any other agreement or document, the terms and conditions of this Agreement shall govern and control and the conflicting or inconsistent terms and conditions are hereby rejected. In consideration of the mutual obligations set forth in this Agreement, Customer and Mueller Systems agree as follows:

1. **DEFINITIONS**.

a. "**Content**" means the information developed or legally acquired by Customer which may be used in connection with or accessed by any module of the Software.

b. "**Documentation**" means the user guides, reference manuals, and installation materials provided by Provider to Customer related to the Software and Equipment.

c. "**Equipment**" means the components, devices, products, equipment and related items provided by Provider identified in Appendix A.

d. "**Services**" means activities related to deployment and installation services, repair services, hosting services and technical support/maintenance services as provided by Mueller Systems and as identified in Appendix B.

e. "**Software**" means the object code versions of Mueller Systems' software identified in Appendix A, together with all subsequent authorized updates, replacements, modifications or enhancements.

2. **SOFTWARE**

a. Software on Equipment License. For Equipment purchased by Customer from Mueller Systems, Mueller Systems hereby grants Customer a limited, non-exclusive, non-sublicensable, non-transferable, perpetual, irrevocable license to use and execute the Software embedded in the Equipment for its internal business purposes in connection with such Equipment ("Firmware").

b. Online Software Access. Subject to the terms of this Agreement and the payment of the fees specified in Section 6a herein, Mueller Systems grants to Customer, for its internal business purposes and during the term of this agreement, a limited, non-exclusive, non-sublicensable, non-transferable right to access and use and make available to Customer's utility users, as applicable, and/or employees the online, hosted Software specified herein.

c. Restrictions. Except as specifically and expressly permitted in writing by Mueller Systems, Customer shall not (i) violate any restriction set forth in this Agreement; (ii) modify, translate, de-compile, reverse compile, disassemble, or create or attempt to create, by reverse engineering or otherwise, the source code from the object code of the Software; (iii) adapt the Software in any way for use to create a derivative work; or (iv) include or combine the Software in or with any other software.

d. Ownership. This Agreement does not grant to Customer any ownership interest in the Software or Documentation. Customer has a license to use the Software and Documentation as provided in this Agreement. Customer hereby agrees and acknowledges that Mueller Systems owns all right, title, and interest in the Software and Documentation, and Customer will not contest those rights or engage in any conduct contrary to those rights. Any copy, modification, revision, enhancement, adaptation, translation, or derivative work of or created from the Software and Documentation made by or at the direction of Customer shall be owned solely and exclusively by Mueller Systems, as shall all patent rights, copyrights, trade secret rights, trademark rights and all other proprietary rights, worldwide.

e. Reservation. Mueller Systems reserves all rights not specifically granted under this Agreement.

3. **EQUIPMENT** In consideration of the fees set forth in Appendix D of this Agreement, Mueller Systems will provide the Equipment identified in Appendix A.

4. **SERVICES** In consideration of the fees set forth in Appendix D of this Agreement, Mueller Systems will provide the Services identified in Appendix B.

5. **CONFIDENTIALITY** The Software, Equipment and Documentation, including any ideas, concepts, know-how and technology contained therein, shall be considered the proprietary and confidential information of Mueller Systems and, as such, shall be subject to the confidentiality provisions of this Agreement. If a separate, written non-disclosure agreement exists between Mueller Systems and Customer, such agreement will control and will apply according to its terms and conditions to all confidential information the parties exchange with each other. If no separate, written non-disclosure agreement exists between Mueller Systems and Customer, the terms listed in Appendix C will apply to the confidential information the parties exchange with each other.

6. **FEES AND PAYMENT**

a. Software Fees. Customer shall pay the Software fees set forth in Appendix D of this Agreement.

b. Equipment Fees. Customer shall pay the Equipment fees set forth in Appendix D of this Agreement. Title to the Equipment, except the Software and Documentation that are subject to licenses provided in this Agreement, passes from Mueller Systems to Customer when Mueller Systems ships the Equipment.

c. Service Fees. Customer shall pay the Service fees set forth in Appendix D of this Agreement.

d. Taxes. All prices and fees are in U.S. dollars unless otherwise specified. All amounts payable under this Agreement are exclusive of all sales, use, value-added, excise, property, withholding, and other taxes and duties. Customer will pay all taxes and duties assessed by any authority in connection with this Agreement and with Customer's performance hereunder. Customer will promptly reimburse Mueller Systems for any and all taxes or duties that Mueller Systems may be required to pay in connection with this Agreement or its performance. This provision does not apply to taxes based on Mueller Systems' income, or any taxes for which Customer is exempt, provided Customer has furnished Mueller Systems with a valid tax exemption certificate.

e. Payment. Unless provided otherwise herein, Customer agrees to pay all amounts specified in Appendix D or otherwise due under this Agreement within thirty (30) days after the date of invoice. Past due amounts will shall bear interest from the due date until paid at a rate of (i) one and one-half percent (1.5%) per month or (ii) the maximum rate permitted by law, whichever is less. All payments made under this Agreement shall be nonrefundable, except as specifically provided otherwise in this Agreement.

7. **TERM; TERMINATION**

a. Term. The term of this Agreement is one (1) year commencing upon the date of this Agreement. This Agreement will automatically renew for subsequent, successive one (1) year periods at the then-current Mueller Systems prices unless either party gives the other party written notice of its intent to not renew at least thirty (30) days prior to the expiration of the then current term. Mueller Systems may increase support fees at any time on thirty (30) days prior notice to Customer. Within such thirty (30) days, Customer may terminate the Agreement by providing written notice to Mueller Systems.

b. Termination for Breach. If either party breaches this Agreement, and such breach is not cured within ten (10) days of the breach, after receiving written notice, the non-breaching party may terminate this Agreement, including all licenses provided herein, effective upon written notice to the other party. The breaching party agrees that if it breaches this Agreement, the non-breaching party will be entitled to injunctive or similar equitable relief and that the breaching party will not argue in any proceeding that its breach will not cause irreparable harm to the non-breaching party or that the non-breaching party can be adequately compensated for any such harm by any remedies other than by injunctive relief.

c. Effect of Termination. Termination of this Agreement shall have the effect designated in Appendix B.

d. Non-Exclusive Remedy. Termination of this Agreement or any license granted hereunder shall not limit the remedies otherwise available to either party, including injunctive relief.

e. Survival. Unless otherwise stated herein, any provision that, by its nature or terms, is intended to survive the expiration or termination of this Agreement, will survive.

8. **LIMITED WARRANTIES; REMEDIES**

a. Software. Subject to the exclusions herein, including those in Appendix A, Mueller Systems warrants that commencing from the date of shipment or provision to Customer and continuing for the period set forth in Appendix A (the "**Warranty Period**"), (i) the media on which the Software is furnished will be free of defects in materials and workmanship under normal use; and (ii) the Software will perform substantially in conformance with the applicable Documentation provided to Customer by Mueller Systems. Mueller Systems does not warrant that the Software will operate in combinations with other software, except as specified in the Documentation, that the Software will meet the Customer's requirements or that the operation of the Software will be uninterrupted or error-free. Customer assumes responsibility for taking adequate precautions against damages which could be caused by defects, interruptions or malfunctions in the Software or the hardware on which it is installed. Mueller Systems' entire obligation and Customer's exclusive remedy with respect to the Software warranties set forth above shall be, at Mueller Systems' option, to either (x) repair or replace any Software containing an error or condition which is reported by Customer in writing to Mueller Systems which causes the Software not to conform with the warranty set forth herein; or (y) refund a pro-rated amount paid by Customer to Mueller Systems and terminate this Agreement and all licenses provided herein.

b. Services. Mueller Systems warrants that all services provided by it to Customer under this Agreement shall be performed in a workmanlike manner. Mueller Systems' entire obligation and Customer's exclusive remedy with respect to the Service warranties set forth above shall be the re-performance of the applicable non-conforming Service.

c. Equipment. Subject to the exclusions herein, including those in Appendix A, Mueller Systems warrants to Customer that the Equipment will comply with provided specifications for the periods specified in Appendix A. Claims under this Section will be considered if submitted to Mueller Systems within sixty (60) days following the discovery of any noncompliant Equipment covered by this Agreement and provided Mueller Systems or its agents are permitted a commercially reasonable opportunity to examine and analyze the Equipment claimed to be noncompliant. Mueller Systems' entire obligation and Customer's exclusive remedy with respect to the Equipment warranties set forth herein, at Mueller Systems' option, is repair or replacement of any Equipment found noncompliant, subject to the terms and conditions herein, during the applicable warranty period after such Equipment is properly packaged and returned prepaid to Mueller Systems' designated service center.

d. Costs. Any and all costs associated with uninstalling and shipping noncompliant Equipment and Software and installing replacement Equipment and Software will be the responsibility of Customer.

e. Exclusions. The warranties provided by Mueller Systems shall not apply to Equipment and/or Software which: (i) have been altered, except with the express written consent, permission or instruction of Mueller Systems, (ii) have been used in conjunction with another product resulting in the defect, except for those third party products specifically approved by Mueller Systems, (iii) were other than the most current version of the Software (but only to the extent that any failure of the Software would have been avoided by the use of the most current version), (iv) have been damaged by improper environment, abuse, misuse, accident, negligence, act of God, excessive operating conditions, or unauthorized attachments or modifications, (v) have not been properly installed and operated in accordance with the Documentation, or as otherwise instructed by Mueller Systems, or (vi) any other exclusion set forth in any Appendix hereto.

f. DISCLAIMERS. TO THE EXTENT PERMITTED BY APPLICABLE LAW, THE

WARRANTIES AND REMEDIES STATED ABOVE ARE EXCLUSIVE AND NO OTHER WARRANTIES OR REMEDIES EXPRESS, IMPLIED OR STATUTORY, APPLY TO THE DOCUMENTATION, THE SOFTWARE, THE EQUIPMENT OR ANY SERVICES TO BE PROVIDED BY MUELLER SYSTEMS UNDER THIS AGREEMENT, INCLUDING BUT NOT LIMITED TO WARRANTIES OR CONDITIONS OF TITLE, NON-INFRINGEMENT, MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, QUALITY OR PERFORMANCE, AND ANY IMPLIED WARRANTY ARISING FROM COURSE OF PERFORMANCE, COURSE OF DEALING OR USAGE OF TRADE, ALL OF WHICH MUELLER SYSTEMS EXPRESSLY DISCLAIMS.

9. **INDEMNIFICATION.** Mueller Systems will indemnify and defend Customer from any third party claim that the Software and Equipment infringe on another person's or company's patent, copyright or other intellectual property right as specified in this Section. This indemnity does not cover and specifically excludes (a) intellectual property rights recognized in countries and jurisdictions other than the United States, and (b) claims relating to infringement of intellectual property rights by a third party's products and software. Mueller Systems has no obligation under this Section for any claim to the extent it results from or arises out of Customer's modification of the Equipment or Software or from any combination, operation or use of the Software or Equipment with other third party products or services. Mueller Systems' duty to indemnify under this Section is contingent upon Mueller Systems receiving prompt notice of a claim and Mueller Systems' right to solely control resolution of a claim. Customer's sole remedy for an indemnified claim under this Section is as follows: Mueller Systems will, at its expense and in its discretion either (a) resolve the claim in a way that permits Customer's continued ownership and use of the affected Software and Equipment, (b) provide a comparable, non-infringing replacement at no cost to Customer, or (c) accept return of the Software and Equipment, provide a reasonable depreciated refund and terminate this Agreement and all licenses herein. This Section is the exclusive statement of Mueller Systems' liability and responsibility for indemnifying Customer for infringement of intellectual property rights

10. **LIMITATION OF LIABILITY.**

a. MUELLER SYSTEMS' MAXIMUM LIABILITY HEREUNDER IS EXPRESSLY LIMITED TO THE TOTAL AMOUNT PAID FOR THE SOFTWARE, SERVICES, AND EQUIPMENT IN THE IMMEDIATELY PRECEDING TWELVE (12) MONTHS AND WILL UNDER NO CIRCUMSTANCE EXCEED THE AMOUNT PAID BY CUSTOMER IN THE IMMEDIATELY PRECEDING TWELVE (12) MONTHS FOR THE SOFTWARE, SERVICES AND EQUIPMENT PROVIDED BY MUELLER SYSTEMS UNDER THIS AGREEMENT. Some states do not allow the limitation and/or exclusion of liability for incidental or consequential damages, so the above limitation may not apply.

b. The provisions of this Agreement allocate the risks between Customer and Mueller Systems. Mueller Systems' pricing reflects this allocation of risk and the limitations of liability specified herein.

11. **NOTICE.** All notices required to be given hereunder shall be in writing. Notice shall be considered delivered and effective upon receipt when sent by registered or certified mail, return receipt requested, addressed to the parties as set forth above. Either party, upon written notice, may change any name or address to which future notice shall be sent.

12. **GENERAL.** The Software will not be exported or re-exported in violation of any export provisions of the United States or any other applicable jurisdiction. The rights and obligations of this Agreement are personal rights granted to the Customer only. The Customer may not transfer or assign any of the rights or obligations granted under this Agreement to any other person or legal entity. Any such purported transfer or assignment shall be null and void. Mueller Systems will be free of liability to the Customer where Mueller Systems is prevented from executing its obligations under this Agreement in whole or in part due to force majeure, such as earthquake, typhoon, flood, fire, and war or any other unforeseen and uncontrollable. Any modification or amendment to any of the provisions of this Agreement will be in writing and signed by an authorized officer of each party. This Agreement does not create or imply any relationship in agency or partnership between the parties. Headings are inserted for the

convenience of the parties only and are not to be considered when interpreting this Agreement. The validity of this Agreement and the rights, obligations, and relationship of the parties resulting from same will be interpreted and determined in accordance with the law of the State of Delaware, and applicable federal law, without regard to its choice of law provisions. The parties specifically exclude from application to the Agreement the United Nations Convention on Contracts for the International Sale of Goods and the Uniform Computer Information Transactions Act. If any provision of this Agreement is contrary to and in violation of any applicable law, such provision will be considered null and void to the extent that it is contrary to such law, but all other provisions will remain in effect. The waiver or failure of either party to exercise any right herein shall not be deemed a waiver of any further right hereunder. This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof and supersedes all other prior and contemporary agreements, understandings, and commitments between the parties regarding the subject matter of this Agreement.

[Signatures Appear on the Following Page]

EACH PARTY ACKNOWLEDGES THAT IT HAS READ THIS AGREEMENT, UNDERSTANDS IT, AND AGREES TO BE BOUND BY ITS TERMS AND CONDITIONS.

Mueller Systems

By:_____

Name (Print or Type)

Title

Customer

By:_____

Name (Print or Type)

Title

Appendix A

Mueller Systems – Product Warranty Statement

1. **Limited Warranty**. Mueller Systems, LLC ("Mueller") warrants that, for the duration of the Warranty Period (defined below): (a) each product purchased from Mueller ("Product") will be free from defects in materials and workmanship under normal use, installation and service conditions; (b) the media on which any Software is furnished will be free of defects in materials and workmanship under normal use; and (c) any such Software will substantially conform to the applicable published Mueller functional specifications for such Software. Products will have a warranty period of the greater of (i) one (1) year from date of shipment or (ii) the applicable warranty period for a specific Product stated below in Section 6 ("Warranty Period").

2. **Exclusive Remedy**. Mueller will, at its option, either repair or replace with an equivalent substitute a Product that is in breach of the foregoing warranty during the Warranty Period if Purchaser reports the breach to Mueller within sixty (60) days after Purchaser discovers the breach. At Mueller's request, Purchaser will ship the allegedly defective Product to a repair facility designated by Mueller at Purchaser's expense and risk. If Mueller, in its sole discretion, determines that the Product breached the applicable warranty, Mueller will ship the repaired or replaced Product to Purchaser at Mueller's expense and risk. If Mueller determines that it is unable to repair or replace such Product, it will, at Mueller's sole discretion provide a cash or credit refund to Purchaser. If Mueller repairs or replaces any such defective Product, the Warranty Period for the repaired or replaced Product will continue for the longer of (y) thirty (30) days, or (z) the remainder of the original Warranty Period. Mueller's warranty is subject to exclusions, as set forth in Section 3. This Section 2 sets forth Mueller's entire liability, and the Purchaser's exclusive remedy, for any alleged breach of warranty for any Products.

3. **Exclusions**. Mueller has no obligation under this Product Warranty Statement if (a) a Product has been subject to misuse, neglect or accident or has been damaged through abuse, alternation, installation or application inconsistent with AWWA guidelines or Mueller specifications, including but not limited to Mueller propagation studies, failure to follow Mueller's operation or maintenance instructions or negligence in transportation, handling, or storage, or repaired by anyone other than Mueller or its authorized personnel, (b) with respect to software, there has been a change to the software's operating environment not made or authorized by Mueller or if Purchaser fails to install any correction or enhancement provided by Mueller, or if a virus is introduced through no fault of Mueller, or (c) if any Product fails to satisfy the applicable warranty as a result of any force majeure event. Mueller's Product Return process can be found at www.muellersystemsreturns.com .

4. **Important Disclaimer**. EXCEPT AS EXPRESSLY SET FORTH HEREIN, MUELLER DISCLAIMS ALL OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE AND NON-INFRINGEMENT AND WARRANTIES ARISING FROM A COURSE OF DEALING, USAGE OR TRADE PRACTICE. TO THE EXTENT ANY IMPLIED WARRANTY CANNOT BE EXCLUDED, SUCH WARRANTY IS LIMITED IN DURATION TO THE EXPRESS WARRANTY PERIOD.

5. **Limitation on Liability**. Mueller has no liability with respect to damage or destruction of property or the personal injury or death of persons resulting from defects in Products or from improper installation, use, maintenance or operation of any Products. In all cases, Mueller's liability shall not exceed the total amount paid by Purchaser to Mueller under this Order.

6. **Product Warranties**. The following provisions in this Section 6 modify the limited warranty in Section 1 with respect to the specific Products identified below:

Automated Meter Reading (AMR) / Advanced Metering Infrastructure (AMI) Products		
Product	**Description**	**Warranty Period**
AMR / AMI Software	These items of Software will perform in accordance with Mueller's published specifications for the duration of the Warranty Period.	One (1) year from date of shipment to Purchaser.
AMR / AMI Hardware – unless otherwise expressly specified herein	During the Warranty Period, these Products will be free from defects in materials and workmanship.	One (1) year from date of shipment to Purchaser.
AMR / AMI Radio Modules – AMI water module endpoints and AMR water module endpoints	During the Warranty Period, these Products will be free from defects in materials and workmanship.	Ten (10) years from date of shipment to Purchaser. Additionally, the unit is covered by a prorated warranty for years eleven (11) through fifteen (15) at a fifty-percent (50%) discount, and years sixteen (16) through twenty (20) at a twenty-five-percent (25%) discount from the date of shipment to Purchaser. All discounts will be calculated on the then current published price of the original product. All prorated warranty discounts are to be used towards the purchase of replacement units.
Encoder Register Products, Wall Pads and Pit Pads.	During the Warranty Period, these Products will be free from defects in materials and workmanship.	Ten (10) years from date of shipment to Purchaser. Additionally, the unit is covered by a prorated warranty for years eleven (11) through fifteen (15) at a fifty-percent (50%) discount, and years sixteen (16) through twenty (20) at a twenty-five-percent (25%) discount from the date of shipment to Purchaser. All discounts will be calculated on the then current published price of the original product. All prorated warranty discounts are to be used towards the purchase of replacement units.
Water Metering Products		
Product	**Description**	**Warranty Period**
All Meter Products not otherwise specified herein	During the Warranty Period, these Products will be free from defects in materials and workmanship.	One (1) year from date of shipment to Purchaser.
Remote Disconnect Meters (RDM) valve and solenoid assembly	During the Warranty Period, these Products will be free from defects in materials and workmanship.	Five (5) year warranty or two-thousand (2,000) actuations of the valve, whichever comes first, from the date of shipment to Purchaser.
Bronze Maincases	During the Warranty Period, these Products will be free from defects in materials and workmanship.	Twenty-Five (25) years from date of shipment to Purchaser.
Composite Maincases	During the Warranty Period, these Products will be free from defects in materials and workmanship.	Fifteen (15) years from date of shipment to Purchaser.
Standard registers for the above listed mechanical meters	During the Warranty Period, these Products will be free from defects in materials and workmanship.	Ten (10) years from date of shipment to Purchaser.

<table>
<tr><td rowspan="2">Models 400 and 500 Series Meters</td><td>AWWA[1] New Meter Accuracy</td><td>5/8” – Five (5) years from the date of shipment to Purchaser or the registration of 500,000 U.S. gallons, whichever comes first;
3/4” – Five (5) years from the date of shipment to Purchaser or the registration of 750,000 U.S. gallons, whichever comes first;
1” – Five (5) years from the date of shipment to Purchaser or the registration of 1,000,000 U.S. gallons, whichever comes first;
1-1/2” – Two (2) years from the date of shipment to Purchaser or the registration of 1,600,000 U.S. gallons, whichever comes first;
2” – Two (2) years from the date of shipment to Purchaser or the registration of 2,700,000 U.S. gallons, whichever comes first.</td></tr>
<tr><td>AWWA Repaired Meter Accuracy (AWWA M6 Manual)</td><td>5/8” – Fifteen (15) years from the date of shipment to Purchaser or the registration of 1,500,000 U.S. gallons, whichever comes first;
3/4” – Fifteen (15) years from the date of shipment to Purchaser or the registration of 2,250,000 U.S. gallons, whichever comes first;
1” – Fifteen (15) years from the date of shipment to Purchaser or the registration of 3,000,000 U.S. gallons, whichever comes first;
1-1/2” – Ten (10) years from the date of shipment to Purchaser or the registration of 5,000,000 U.S. gallons, whichever comes first;
2” – Ten (10) years from the date of shipment to Purchaser or the registration of 8,000,000 U.S. gallons, whichever comes first.</td></tr>
<tr><td>Model HbMAG electromagnetic cold-water meters</td><td>During the Warranty Period, these Products will be free from defects in materials and workmanship.</td><td>Two (2) years from date of shipment to Purchaser.</td></tr>
<tr><td>Solid State Meters</td><td colspan="2">During the Warranty Period (ten (10) years from date of shipment to Purchaser) these Products will meet or exceed accuracy of +/- 1.5% between the specified minimum flow rate to the specified maximum. Additionally, the unit is covered by a prorated warranty for years eleven (11) through fifteen (15) at a fifty-percent (50%) discount, and years sixteen (16) through twenty (20) at a twenty-five-percent (25%) discount from the date of shipment to Purchaser. All discounts will be calculated on the then current published price of the original product. All prorated warranty discounts are to be used towards the purchase of replacement units for the following sizes:
5/8” Meter — 0.1 gpm to 20 gpm
5/8” x ¾”, ¾” Short, and ¾” Long Meter — 0.1 to 30 gpm
1” Meter — 0.4 to 55 gpm
1 ½” Meter — 0.25 to 100 gpm
2” Meter — 1.5 to 160 gpm</td></tr>
</table>

Appendix B
Services

1. Software Services and Support Obligations

[1] American Water Works Association ("AWWA")

(10.2019)

a. "Update" to the Software means a subsequent release of the Software that Provider makes generally available to its current customers for the Software. Updates include changes and corrections to the Software as are required to keep the Software in substantial conformance with the applicable Documentation and that are created by Provider as corrections for defects in the Software. Updates shall not include any release, option or future product that Provider licenses separately. Provider shall in its sole discretion determine the nature, content, timing and release of any Updates.

b. Web-based support, consisting of information on the most current release of the Software through Provider's web site.

c. Phone support in the form of advice and counsel via telephone regarding Customer's use of the most current release of the Software, as well as Customer's connectivity and ability to access Content. Phone Support is provided from 8:00 AM to 7:00 PM Eastern Time, Monday through Thursday and 8:00 AM to 5:00 PM Eastern Time on Fridays. All hours and days exclude recognized U.S. holidays observed by Mueller Systems.

2. Software Hosting Services

a. Except as specifically permitted in this Agreement, Customer shall have web-based access the Software hosted by Provider pursuant to this Agreement.

b. Provider shall provide Customer with access and related hosting services to the Software installed on Provider's servers. Provider will also install the Content provided by Customer. Provider will define the appropriate performance specifications and will host the server at a Provider's location. Provider will monitor and perform routine maintenance on the server, and if the server is not operating properly, will make a good faith effort to operate Customer's system on a backup server, if available. Access to Customer's server is restricted to authorized Provider information technology and support personnel only. Differential and full server backups are performed when reasonably practicable.

c. Customer shall be responsible for installing, operating and maintaining the equipment, software, and/or facilities at Customer location recommended by Provider for effective access to and use of the Software installed on Mueller Systems server. Customer shall be responsible for providing and maintaining its own Internet access and all necessary telecommunications equipment at Customer's location necessary for accessing the Software.

d. Upon termination, for any reason, of the Agreement or any license(s) granted herein, Provider shall immediately cease providing access to the Software and Hosting Services. Customer shall (i) immediately stop access and use of all such Provider confidential information (including Software); (ii) shall return all copies of the Software, Documentation, and any Provider confidential information to Provider; and (iii) delete all Software, Documentation, and other confidential information off of any and all storage media possessed or controlled by Customer. Customer shall provide Provider with written certification signed by an officer of Customer that Customer has complied with the provisions of this Section. Customer shall immediately pay all amounts due to Provider.

Appendix C

Confidential Information

For purposes of this Attachment, "party" or "parties" shall mean Provider and Customer, including their respective subsidiaries and affiliates who are providing information under this Agreement. The parties agree to maintain confidential information as follows:

1. Definition of Confidential Information. The parties understand and agree that confidential information is any and all current and future Equipment, Documentation and/or Software information, roadmap, technical or financial information, customer names, addresses and related data, contracts, practices, procedures and other business information, including software reports, strategies, plans, documents, drawings, machines, tools, models, patent disclosures, samples, materials and requests for proposals that may be disclosed between the parties, whether written, oral, electronic or otherwise, however and wherever acquired ("Confidential Information"). Confidential Information excludes any information which would otherwise fall in the definitions above, but which was (a) known to the recipient of the information ("Recipient") before receipt from the disclosing party; (b) publicly available through no fault of Recipient; (c) rightly received by Recipient from a third party without a duty of confidentiality; (d) disclosed by disclosing party to a third party without a duty of confidentiality on the third party; (e) independently developed by Recipient without breach of this or any other confidentiality agreement; or (f) disclosed by Recipient after prior written approval from the disclosing party.

2. Obligations of Confidentiality and Remedies. Recipient agrees to protect the disclosing party's Confidential Information with the same degree of care, but no less than a reasonable degree of care, as Recipient uses with respect to its own Confidential Information. Neither party has any obligation to exchange Confidential Information. Both parties acknowledge and agree that the disclosure of the other party's Confidential Information could cause irreparable harm. Therefore, an injured party is entitled to applicable equitable relief, including injunctions, in addition to other remedies, for such wrongful disclosure of Confidential Information. In addition, disclosure of Confidential Information required by a government body or court of law is not a violation of this Section if the Recipient gives prompt notice of the required disclosure to the disclosing party.

3. Term of Confidentiality Obligations. Recipient's duty to protect Confidential Information expires three (3) years from the date of disclosure of the particular Confidential Information.

4. No Warranties on Confidential Information. Neither party warrants or guarantees the accuracy of any Confidential Information transferred between the parties.

CERTIFICATE OF INSURANCE

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 05/07/2020

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

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

PRODUCER Willis Towers Watson Northeast, Inc. fka Willis of Pennsylvania, Inc. c/o 26 Century Blvd P.O. Box 305191 Nashville, TN 372305191 USA	CONTACT NAME: Willis Towers Watson Certificate Center PHONE (A/C, No, Ext): 1-877-945-7378 FAX (A/C, No): 1-888-467-2378 E-MAIL ADDRESS: certificates@willis.com	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A: Liberty Mutual Fire Insurance Company	23035
INSURED Ferguson Enterprises, LLC and Subsidiaries (See Attached Named Insured Schedule) 12500 Jefferson Avenue Newport News, VA 23602	INSURER B: ACE American Insurance Company	22667
	INSURER C: Liberty Insurance Corporation	42404
	INSURER D: Indemnity Insurance Company of North Ameri	43575
	INSURER E:	
	INSURER F:	

COVERAGES CERTIFICATE NUMBER: W14430867 REVISION NUMBER:

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

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY X PRO-JECT X LOC OTHER:			TB2-691-468654-018	05/01/2020	05/01/2021	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 2,000,000 $ 1,000,000 $ 10,000 $ 2,000,000 $ 5,000,000 $ 2,000,000
B	AUTOMOBILE LIABILITY X ANY AUTO OWNED AUTOS ONLY X HIRED AUTOS ONLY X SCHEDULED AUTOS X NON-OWNED AUTOS ONLY X			ISAH25301855	05/01/2020	05/01/2021	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 5,000,000
C	X UMBRELLA LIAB X OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION $			TH7-691-468654-028	05/01/2020	05/01/2021	EACH OCCURRENCE AGGREGATE	$ 5,000,000 $ 5,000,000
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N No If yes, describe under DESCRIPTION OF OPERATIONS below	N/A		WLRC64921402	05/01/2020	05/01/2021	X PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 2,000,000 $ 2,000,000 $ 2,000,000
B	Workers' Compensation & Employers Liability- CA/MA Per Statute			WLRC64921340	05/01/2020	05/01/2021	E.L. Each Accident E.L. Disease -Pol Lmt E.L. Disease-Each Emp	$2,000,000 $2,000,000 $2,000,000

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

Workers Compensation Policy WLRC64921402 provides coverage for AL, AK, AR, AZ, CO, CT, DC, DE, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, ME, MD, MI, MN, MO, MS, MT, NC, NE, NH, NJ, NM, NV, NY, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WV.

SEE ATTACHED

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

AGENCY CUSTOMER ID: _____

LOC #: _____

ADDITIONAL REMARKS SCHEDULE

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

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,

FORM NUMBER: 25 FORM TITLE: Certificate of Liability Insurance

INSURER AFFORDING COVERAGE: ACE American Insurance Company NAIC#: 22667

POLICY NUMBER: RWCC66921281 EFF DATE: 05/01/2020 EXP DATE: 05/01/2021

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

As of 5/7/2020

FERGUSON ENTERPRISES, LLC

ACTIVE DBA SUBSIDIARY LIST

Entity Name	Entity Name
AC Wholesalers	Ferguson Parts & Packaging
Action Automation, a Wolseley Industrial Group company (eff 8/20/2018)	Ferguson Valve & Automation
Action Plumbing Supply (effective 7/15/2019)	Ferguson Waterworks
ADL (effective 7/16/2018)	Ferguson Waterworks - Municipal Pipe
Alaska Pipe & Supply	Ferguson Waterworks - Red Hed
Andrews Lighting & Hardware Gallery	Ferguson Waterworks EPPCO
The Ar-Jay Center	Ferguson Waterworks International
Atlantic American Fire Equipment Company	Galleria Bath & Kitchen Showplace
Avallon Global	Grand Junction Pipe (effective 9/24/2018)
BAC Appliance Center	HM Wallace, Inc.
Bath + Beyond	H. P. Products Corporation
Bayport Partners, LLC	HP Logistic, Inc.
Blackman Plumbing Supply, LLC (effective 12/11/2018)	Improvement Brands Holdings, Inc.
Brock-McVey (effective 7/30/2018)	Industrial Hub of the Carolinas
Bruce-Rogers Company	Innovative Soil Solutions LLC (effective 7/29/2019)
Build.com, Inc. (fka Improvement Direct, Inc.)	James Martin Signature Vanities, LLC (effective 1/28/2019)
Cal-Steam	J&G Products
Capital Distributing (effective 10/29/2018)	Jones Stephens Corp. (effective 8/13/2018)
City Lights Design Showroom	Jones Stephens Global Sourcing (Wuxi) Ltd. (effective 8/13/2018)
CFP	J.D. Daddario Company
Clawfoot Supply, LLC	Joseph G. Pollard Co.
Cline Contract Sales	JWIT Hydrotherapy Bath Solutions (effective 3/16/2020)
Columbia Pipe & Supply Co. (eff 3/13/2020)	Karl's Appliances
Custom Lighting & Hardware	Kitchen Art (effective 2/4/2019)
Davies Water	Lakeland Plumbing Supply, LLC
DBS Holdings, Inc.	Lighting Design Center
Dealernet	Lighting Unlimited
Duhig Stainless (effective 3/12/2018)	Lincoln Products
Energy & Process Corporation	Linwood Pipe and Supply
Equarius Waterworks, Meter & Automation Group	Living Direct, Inc.
Factory Direct Appliance	Louisiana Utilities Supply Company
Ferguson Bath & Kitchen Gallery	LUSCO
Ferguson Bath, Kitchen & Lighting Gallery	Mahwah Realty, LLC
Ferguson.com	Maskir Properties Inc.
Ferguson CESCO, Inc.	Matera Paper Company, Inc.
Ferguson Direct	Max Industries, Ltd. (effective 1/28/2019)
Ferguson Enterprises, Inc.	McFarland Supply
Ferguson Facilities Supply (FEI)	MFP Design (effective 3/25/2020)
Ferguson Facilities Supply (for Matera Paper -TX only)	Michigan Meter
Ferguson Facilities Supply, Dogwood Building Supply Division (eff 10/22/18)	Millennium Lighting, Inc. (effective 8/27/2018)
Ferguson Fire & Fabrication, Inc.	Mission Valley Pipe (effective 6/3/2019)
Ferguson Fire & Fabrication International	Mississippi Utility Supply Co. (MUSCO)
Ferguson Heating & Cooling	Myers HVAC Supply
Ferguson Hospitality Sales	National Fire Products
Ferguson HVAC – Air Cold	New Jersey Plumbing Group, LLC
Ferguson HVAC – EastWest Air	New York Plumbing Designs, LLC
Ferguson HVAC – Lyon Conklin	North Point Plumbing Supply, LLC
Ferguson Integrated Services	Orange County Plumbing Group, LLC
Ferguson International	Palm Designs LLC
Ferguson Panama, S.A.	PCS Industries

As of 5/7/2020

FERGUSON ENTERPRISES, LLC

ACTIVE DBA SUBSIDIARY LIST

PAGE 2 - DBA & SUBSIDIARY LIST

Entity Name	Entity Name
PL Sourcing	Wolseley Integrated de Mexico S.A. de C.V.
Plumb Source	Wolseley Investments North America, Inc.
Plumbing Décor	Wolseley Investments, Inc.
Plumbing Holdings Corp.	Wolseley NA Construction Services, LLC
Pollardwater	Wolseley NA Finance, Inc.
Powell Pipe & Supply Co.	Wolseley Staffing de Mexico S.A. de C.V.
Power Equipment Direct Inc.	WPCC Forwarding
Process Instruments & Controls, LLC (effective 9/9/2019)	Wright Plumbing Supply
Professional's Bath Source	
PV Sullivan Supply	
Ramapo Wholesalers	
RB Huntington Realty, LLC	
Rencor Controls (effective 3/16/20200	
Robertson Supply (effective 11/19/2018)	
Rocky Hollow Realty, LLC	
Renwes Sales	
Redlon & Johnson	
Reese Kitchen, Bath & Lighting Gallery	
S.W. Anderson Sales Corporation (effective 11/11/2019)	
Safe Step Walk in Tub, LLC (effective 7/31/2018)	
SG Supply Co.	
Ship-Pac	
Signature Hardware	
SimplyPlumbing, LLC	
SOS Sales	
Southhampton Realty Corp.	
Stock Loan Services, LLC	
Supply.com	
Tarpon Wholesale Supplies	
The Davidson Group	
The Plumbing Source	
The Stock Market	
Tinkar Realty, LLC	
TotalFab, LLC	
TPW Kitchen & Bath	
Wallwork (effective 12/10/2018)	
Wanlyn Realty Corp.	
Waterworks Industries	
Webb Distributors	
Western Air Supply	
Westfield Lighting	
Wholesale Group	
Wholesale Group Operations, Inc.	
Wolseley (Barbados) Ltd	
Wolseley de Puerto Rico, Inc.	
Wolseley Financial Services	
Wolseley Industrial Group	