

Response to Invitation to BID # 13071
for

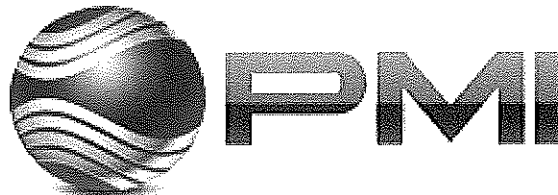
**Purchase of WATER METER REPLACEMENT and
FIXED NETWORK AUTOMATED WATER METER
READING**

Submitted to

Lake County Purchasing Division
18 North County Street, 9th Floor
Waukegan, IL 60085-4350
Phone (847)984-5889

Bid Opening March 14, 2013 2 PM CDT

Submitted by:
Professional Meters, Inc.



3605 North State Route 47
Suite E

Morris, IL 60450

Contact: John Cummings

john.cummings@prometers.com

Office: 815-942-7000 Ext. 203

Cell: 815-405-8558



Professional Meters, Inc.
3605 North Rte. 47 • Suite E
PO Box 506
Morris, IL 60450
P: 815.942.7000 • F: 815.941.1091
www.prometers.com

March 14, 2013

Lake County Purchasing Division
18 North County Street, 9th. Floor
Waukegan, IL 60085-4350
Attention: Larry Wohlheim

**RE: Response to Invitation to Bid #13071 – Automated Meter Reading (AMR)
System Project for Lake county Department of Public Works**

Professional Meters, Inc. (PMI) in conjunction with our team partners Itron, Badger Meter, and United Systems & Software (USS) are pleased to provide the following quotation in response to the above referenced solicitation.

After reviewing the requirements of the Invitation to Bid, PMI takes no exception to the requirements of this solicitation. *In addition, PMI acknowledges receipt of Addendum #1 Dated February 27, 2013.*

PMI's Bid Package includes the following:

- Bid Tables 1-11
- Bid Security
- Cut Sheets for each of the meters being bid
- Itron Choice Connect Literature
- Reference Sheet
- Contractor Qualification Sheet

PROJECT TEAM:

- Professional Meters, Inc. –Prime Contractor (Installation/Data Management)
- Itron, Inc. – AMI Product Vendor
- Badger Meter, Inc. - Water Meter Manufacturer
- United Systems & Software. Inc. – Product Distributor



Delivering Innovative Metering Solutions Nationwide

Network Design

- We are proposing to deploy a fixed network for this AMI system that is described in the following table:

The propagation analysis results indicate a total of 8 CCU 100's and 43 Repeater 100's will be required. The CCU 100 sites are listed below with assumed heights based on the most current information available from the utility. 6 of the CCU 100's will utilize Itron's tower mount collector (TCU). Repeater 100's are assumed to be mounted on utility poles at least 25 feet above ground level.

Itron's network design is optimized by using these identified sites. If these sites or antenna heights change, the design may be impacted.

Site ID	Device Type	Location	Site	Antenna Height (ft)
Site 1	Collector		Utility Pole	25
Site 2	Collector	Pekara Reservoir	Water Tank	50
Site 3	Tower Collector	Hitchens Water Tower	Water Tank	150
Site 4	Tower Collector	Brooks Farm Water Tower	Water Tank	130
Site 5	Tower Collector	John Mogg Water Tower	Water Tank	130
Site 6	Tower Collector	Fox Lake Hills Water Tower	Water Tank	125
Site 7	Tower Collector	Butterfield Water Tower	Water Tank	122
Site 8	Tower Collector	Countryside Manor Water Tower	Water Tank	99
Site 9	Repeater	Bradley Rd Reservoir	Water Tank	41
Site 10	Repeater	W.W. Grainger Reservoir	Water Tank	29
Sites 11-51	Repeaters		Utility Poles	25

- Our price proposal assumes that the County will provide us with access to utility poles to mount the repeaters for Sites 11-51 in the table above.

Notes:

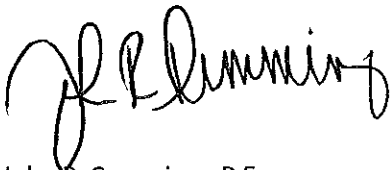
- Rather than using a mag meter for the 2-inch commercial meters, we would recommend using Badger's E-series meter. This would be a cost saving substitution. Optional pricing is provided in Bid Table 2.

Closing

PMI welcomes the opportunity to provide this quotation to Lake County. We believe the costs to perform these services are both reasonable and value-added. Our experience performing meter change-out programs can be brought to bear to help make the execution of this program quick and successful. Should you have any questions regarding this proposal, do not hesitate to contact me at 815-942-7000 (cell 815-405-8558) or via email at: john.cummings@prometers.com.

Respectfully Submitted,

PROFESSIONAL METERS, INC.



John R. Cummings, P.E.
Vice President



Delivering Innovative Metering Solutions Nationwide



Purchasing Division
18 North County St 9th Floor
Waukegan, IL 60085-4350
Phone 847 377 2929
Fax 847 984 5889

February 27, 2013

ADDENDUM #1 (Page 1 of 2)

INVITATION TO BID #13071

Purchase of Water Meter Replacement and Fixed Network Automated Water Meter Reading System for the Lake County Department of Public Works

Bid Opening Date: Thursday, March 14, 2013; 2:00 p.m. Local Time

Please note the following clarifications, revisions, and additions to the bid documents.

REQUESTS FOR INFORMATION

1. **Question:** In the *Invitation to Bid* on Page 20, reference is made to four meter pricing options. Residential meters are classified as being size 5/8" through 2" and commercial meters as being sized 2" through 12". This results in a duplication of the 2-inch size as it is included in both categories. For purposes of filling out the bid tables, it appears that the County is asking us to assume that all 2-inch meters are classified as commercial meters (i.e. a turbine meter for tables 1A and 1B and a magnetic meter for Tables 1C and 1D). Please confirm this is the intent of the County.
Response: All 2-inch meters, whether commercial or residential (multi-family), will be replaced with turbine or magnetic meters, dependent on the chosen bid option.
2. **Question:** As a follow-up to the question above, the original *Statement of Intent (SOI)* refers to a "like for like" exchange of meters (SOI Page 17 under IIIA), however, in the bid tables presented in the *Invitation to Bid* only turbine meters are prescribed for the 2-inch and larger meter sizes. Our team's experience tells us that Lake County has many 2" positive displacement meters as well as compound meters in the 2-inch and a larger size range. Is it the intent of the County to proceed with a like for like meter exchange for bid options 1A or 1B or convert all meters 2-inch and larger to turbine meters?
Response: All 2-inch and larger meters will be replaced with turbine or magnetic meters, dependent on the chosen bid option.
3. **Question:** In the *Invitation to Bid*, the Bid Tables 1C and 1D request that pricing be provided for magnetic meters for commercial meters (defined as meters 2-inches and larger). For the 2-inch meters, an ultrasonic meter would be a more cost effective solution as compared to a magnetic meter. Will the County consider a quote for a 2-inch ultrasonic meter as being responsive to the intended requirements for Bid Table 1C and 1D? The bid has been prepared to include the options of turbine and magnetic meters for meters 2-inch and larger. The Bid was prepared with two options for 2-inch and larger meters – turbine or magnetic.
Response: Bidders are allowed to submit exceptions to their bid. However, the County has the right to accept or reject options and/or exceptions.

PLEASE SIGN THIS FORM AND E-MAIL TO purchasing@lakecountyil.gov or FAX TO 847-984-5889 WITHIN 24 BUSINESS HOURS. RETURN ORIGINAL WITH BID.

I will be submitting a bid ☒ or I will not be submitting a bid because _____

Sincerely,

RuthAnne Hall
Lake County Purchasing Agent

Acknowledged and Accepted 13071-01:

Signature:

Company:

Professional Meters, Inc.
3605 North Route 47
Morris, IL 60450



Purchasing Division
18 North County St 9th Floor
Waukegan, IL 60085-4350
Phone 847 377 2929
Fax 847 984 5889

February 27, 2013

ADDENDUM #1 (Page 2 of 2)

INVITATION TO BID #13071

Purchase of Water Meter Replacement and Fixed Network Automated Water Meter Reading System for the Lake County Department of Public Works

Bid Opening Date: Thursday, March 14, 2013; 2:00 p.m. Local Time

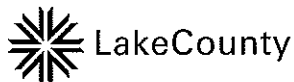
Please note the following clarifications, revisions, and additions to the bid documents.

Addendum #1 continued

REQUESTS FOR INFORMATION

4. **Question:** In the *Invitation to Bid*, Bid Tables 1A, 1B, 1C, and 1D call out a 3/4" meter (Bid Item # 2). Can you clarify whether this is intended to be priced as a full ¾" meter with a 9-inch lay length or if this is a 5/8" x ¾" meter with a 7-1/2 lay length?
Response: The bid item for ¾ -inch meters is intended to be for 5/8 x ¾ inch meters with a 7 ½ inch lay length.
5. **Question:** The issue of plastic meter couplings was raised in the addendum to the *SOI*. Does Lake County have an estimate on the number of plastic meter couplings that are anticipated to be encountered during this project? Does the County have an estimate of quantity and sizes of other meters with non-standard connections?
Response: Our rough estimate of existing meters with plastic meter couplings is 2,500. These 2,500 are probably mostly in the 5/8 x ¾ inch meter size.
6. **Question:** Does Lake County have an estimate of the number of plastic/composite meters currently in its system? This will affect the salvage value of the removed meters.
Response: Our rough estimate of existing plastic/composite meters is 2,500. These 2,500 are probably mostly in the 5/8 x ¾ inch meter size.
7. **Question:** On Page 21 under 5d. (iv.) of the *SOI*, reference is made to installing a stainless steel check valve downstream of turbine meters. Right now, the bid tables show that all meters 2-inch and larger are turbine meters which would lead us to assume that all meters 2-inch and larger should be priced to include the installation of a new check valve. Is this the intent of the County?
Response: The County did not anticipate that new check valves would be installed with the installation of 2 inch and larger meters.
8. **Question:** Is there a cut-off date for questions?
Response: From 19. ADDITIONAL INFORMATION:
Should the bidder require additional information about this bid, please email to purchasing@lakecountyil.gov no less than seven (7) days prior to the bid opening date.

END OF ADDENDUM #1

**SUBMISSION INFORMATION****INVITATION TO BID**

Lake County

Purchasing Division

18 North County Street - 9th floor

Waukegan, Illinois 60085-4350, (847) 377-2929

EMAIL: purchasing@lakecountyl.gov

Access Bid Results:

<http://www.lakecountyl.gov/Finance/purchasing/Pages/BidsRFPs.aspx>

INVITATION#: 13071

BID OPENING DATE: March 14, 2013

TIME: 2:00 p.m. Local Time

LOCATION: Purchasing Division

Submit one (1) original and one (1)
unprotected electronic version of the bid
submission on a CD.

ISSUANCE DATE: February 21, 2013

BUYER: Larry Wollheim

INVITATION TO BID CONTRACTOR INFORMATIONCompany Name: Professional Meters, Inc.Address: 3605 North Route 47, Suite ECity, State, Zip Code: Morris, IL 60450**BID SHEET 1 of 11**

Purchase of WATER METER REPLACEMENT and FIXED NETWORK AUTOMATED WATER METER READING SYSTEM
for LAKE COUNTY DEPARTMENT OF PUBLIC WORKS **February 2013**

Bidders shall sign and complete the section at the bottom of this page, Bid Sheet 1 of 11. In addition, Bidders shall also submit bid prices for all items on the Bid Sheets following this page:

Bid Sheet 2 of 11, Bid Sheet 3 of 11, Bid Sheet 4 of 11, Bid Sheet 5 of 11, Bid Sheet 6 of 11, Bid Sheet 7 of 11, Bid Sheet 8 of 11, Bid Sheet 9 of 11, Bid Sheet 10 of 11, and Bid Sheet 11 of 11.

Bidders shall furnish all materials and labor to provide Water Meter Replacement and Fixed Network Automated Water Meter Reading System in accordance with provisions, instructions, and specifications of Lake County Statement of Intent # 12063.

NOTE TO BIDDERS: Any and all exceptions to these specifications MUST be clearly and completely indicated on the bid sheet. Attach additional pages if necessary. Please be advised that any exceptions to these specifications may cause your bid to be disqualified. If a bid includes any exceptions, Bidders must insert an "X" in the following box indicating a bid submission with exceptions. ☐

Submit bids by SEALED BID ONLY. Fax and e-mail bids are not acceptable and will not be considered.

The undersigned hereby certifies that they have read and understand the contents of this solicitation and agree to furnish at the prices shown any or all of the items above, subject to all instructions, conditions, specifications and attachments hereto. Failure to have read all the provisions of this solicitation shall not be cause to alter any resulting contract or request additional compensation. By signing this bid document, the bidder hereby certifies that they are not barred from bidding on this contract as a result of a violation of either Section 33E-3 or 33E-4 of the Illinois Criminal Code of 1961, as amended.

Prompt payment discount: 0.75% 15 days.**THE SECTION BELOW MUST BE COMPLETED IN FULL AND SIGNED.**

Authorized Signature: _____

Typed/Printed Name: John R. CummingsTitle: Vice PresidentE-mail: john.cummings@prometers.comCompany Name: Professional Meters, Inc.Date: March 14, 2013Telephone Number: 815-405-8558Fax Number: 815-941-1091

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BID #13013		BID SHEET 2 OF 11 / TABLE 1A		BIDDER NAME: <u>PROFESSIONAL METERS, INC.</u>			DATE: <u>March 14, 2013</u>				
AMR Fixed Network System		METER MANUFACTURER: <u>BADGER METER, INC</u>									
TABLE 1A FOR BASE BID for Fixed Network Automated Water Meter Reading System											
Schedule of Unit Prices for Positive Displacement Type Meter / Residential – Brass / Commercial - Turbine											
BID ITEM #	METER SIZE and TYPE	QUANTITY	UNIT PRICE FOR METER WITH REGISTER	COLUMN A TOTAL EXTENDED PRICE FOR METER WITH REGISTER	UNIT PRICE FOR MIU	COLUMN B TOTAL EXTENDED PRICE FOR MIU	UNIT PRICE TO INSTALL METER & MIU	COLUMN C TOTAL EXTENDED PRICE TO INSTALL METER & MIU	DEDUCT UNIT PRICE FOR SALVAGE	COLUMN D TOTAL EXTENDED DEDUCT PRICE FOR SALVAGE	
1	5/8" Model <u>Badger Recordall LP LL</u>	100	\$ 72.60	\$ 7,260.00	\$ 71.17	\$ 7,117.00	\$ 89.60	\$ 8,960.00	\$ (1.00)	\$ (100.00)	
2	3/4" Model <u>Badger Recordall LP LL</u>	18,020	\$ 72.60	\$ 1,308,252.00	\$ 71.17	\$ 1,282,483.40	\$ 89.60	\$ 1,614,592.00	\$ (1.00)	\$ (18,020.00)	
3	1" Model <u>Badger Recordall M55 LL</u>	1,685	\$ 145.20	\$ 244,662.00	\$ 71.17	\$ 119,921.45	\$ 90.00	\$ 151,650.00	\$ (1.00)	\$ (1,685.00)	
4	1-1/2" Model <u>Badger Recordall M120 LL</u>	540	\$ 347.60	\$ 187,704.00	\$ 71.17	\$ 38,431.80	\$ 200.00	\$ 108,000.00	\$ (1.00)	\$ (540.00)	
5	2" Turbine Model <u>Badger Turbo Series LL</u>	185	\$ 562.10	\$ 103,988.50	\$ 71.17	\$ 13,166.45	\$ 325.00	\$ 60,125.00	\$ (1.00)	\$ (185.00)	
6	3" Turbine Model <u>Badger Turbo Series LL</u>	65	\$ 746.90	\$ 48,548.50	\$ 71.17	\$ 4,626.05	\$ 450.00	\$ 29,250.00	\$ (1.00)	\$ (65.00)	
7	4" Turbine Model <u>Badger Turbo Series LL</u>	15	\$ 984.50	\$ 14,767.50	\$ 71.17	\$ 1,067.55	\$ 550.00	\$ 8,250.00	\$ (1.00)	\$ (15.00)	
8	6" Turbine Model <u>Badger Turbo Series LL</u>	2	\$ 2,373.80	\$ 4,747.60	\$ 71.17	\$ 142.34	\$ 800.00	\$ 1,600.00	\$ (1.00)	\$ (2.00)	
9	8" Turbine Model <u>Badger Turbo Series LL</u>	1	\$ 2,836.90	\$ 2,836.90	\$ 71.17	\$ 71.17	\$ 1,200.00	\$ 1,200.00	\$ (1.00)	\$ (1.00)	
10	10" Turbine Model <u>Badger Turbo Series LL</u>	1	\$ 3,995.20	\$ 3,995.20	\$ 71.17	\$ 71.17	\$ 1,400.00	\$ 1,400.00	\$ (1.00)	\$ (1.00)	
11	12" Turbine Model <u>Badger Turbo Series LL</u>	1	\$ 4,400.00	\$ 4,400.00	\$ 71.17	\$ 71.17	\$ 1,800.00	\$ 1,800.00	\$ (1.00)	\$ (1.00)	
TOTAL				\$ 1,931,162.20		\$ 1,467,169.55		\$ 1,986,827.00		\$ (20,615.00)	

NOTES: 1. All residential meters must register a minimum of 1 gallon or less.

2. All meters must be NSF 61 Annex G/F compliant.

3. Bidders shall provide a Cut Sheet for each type of meter being bid in this Invitation to Bid.

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BID #13013 BID SHEET 3 OF 11 / TABLE 1B			BIDDER NAME: <u>PROFESSIONAL METERS, INC.</u>			DATE: <u>March 14, 2013</u>				
AMR Fixed Network System			METER MANUFACTURER: <u>BADGER METER, INC</u>							
TABLE 1B FOR BASE BID for Fixed Network Automated Water Meter Reading System										
Schedule of Unit Prices for Positive Displacement Type Meter / Residential – Composite / Commercial - Turbine										
BID ITEM #	METER SIZE and TYPE	QUANTITY	UNIT PRICE FOR METER WITH REGISTER	COLUMN E TOTAL EXTENDED PRICE FOR METER WITH REGISTER	UNIT PRICE FOR MIU	COLUMN F TOTAL EXTENDED PRICE FOR MIU	UNIT PRICE TO INSTALL METER & MIU	COLUMN G TOTAL EXTENDED PRICE TO INSTALL METER & MIU	DEDUCT UNIT PRICE FOR SALVAGE	COLUMN H TOTAL EXTENDED DEDUCT PRICE FOR SALVAGE
1	5/8" Model <u>Badger Recordall M25 Plastic Disc</u>	100	\$ 79.20	\$ 7,920.00	\$ 71.17	\$ 7,117.00	\$ 89.60	\$ 8,960.00	\$ (1.00)	\$ (100.00)
2	3/4" Model <u>Badger Recordall M25 Plastic Disc</u>	18,020	\$ 79.20	\$ 1,427,184.00	\$ 71.17	\$ 1,282,483.40	\$ 89.60	\$ 1,614,592.00	\$ (1.00)	\$ (18,020.00)
3	1" Model <u>Badger Recordall M40 Plastic Disc</u>	1,685	\$ 133.10	\$ 224,273.50	\$ 71.17	\$ 119,921.45	\$ 90.00	\$ 151,650.00	\$ (1.00)	\$ (1,685.00)
4	1-1/2" Model <u>Badger Recordall M120 LL</u>	540	\$ 347.60	\$ 187,704.00	\$ 71.17	\$ 38,431.80	\$ 200.00	\$ 108,000.00	\$ (1.00)	\$ (540.00)
5	2" Turbine Model <u>Badger Turbo Series LL</u>	185	\$ 562.10	\$ 103,988.50	\$ 71.17	\$ 13,166.45	\$ 325.00	\$ 60,125.00	\$ (1.00)	\$ (185.00)
6	3" Turbine Model <u>Badger Turbo Series LL</u>	65	\$ 746.90	\$ 48,548.50	\$ 71.17	\$ 4,626.05	\$ 450.00	\$ 29,250.00	\$ (1.00)	\$ (65.00)
7	4" Turbine Model <u>Badger Turbo Series LL</u>	15	\$ 984.50	\$ 14,767.50	\$ 71.17	\$ 1,067.55	\$ 550.00	\$ 8,250.00	\$ (1.00)	\$ (15.00)
8	6" Turbine Model <u>Badger Turbo Series LL</u>	2	\$ 2,373.80	\$ 4,747.60	\$ 71.17	\$ 142.34	\$ 800.00	\$ 1,600.00	\$ (1.00)	\$ (2.00)
9	8" Turbine Model <u>Badger Turbo Series LL</u>	1	\$ 2,836.90	\$ 2,836.90	\$ 71.17	\$ 71.17	\$ 1,200.00	\$ 1,200.00	\$ (1.00)	\$ (1.00)
10	10" Turbine Model <u>Badger Turbo Series LL</u>	1	\$ 3,995.20	\$ 3,995.20	\$ 71.17	\$ 71.17	\$ 1,400.00	\$ 1,400.00	\$ (1.00)	\$ (1.00)
11	12" Turbine Model <u>Badger Turbo Series LL</u>	1	\$ 4,400.00	\$ 4,400.00	\$ 71.17	\$ 71.17	\$ 1,800.00	\$ 1,800.00	\$ (1.00)	\$ (1.00)
TOTAL				\$ 2,030,365.70		\$ 1,467,169.55		\$ 1,986,827.00		\$ (20,615.00)

NOTES: 1. All residential meters must register a minimum of 1 gallon or less.

2. All meters must be NSF 61 Annex G/F compliant.

3. Bidders shall provide a Cut Sheet for each type of meter being bid in this Invitation to Bid.

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BID #13013 BID SHEET 4 OF 11 / TABLE 1C			BIDDER NAME: <u>PROFESSIONAL METERS, INC.</u>			DATE: <u>March 14, 2013</u>				
AMR Fixed Network System			METER MANUFACTURER: <u>BADGER METER, INC</u>							
TABLE 1C FOR BASE BID for Fixed Network Automated Water Meter Reading System										
Schedule of Unit Prices for Positive Displacement Type Meter / Residential -- Brass / Commercial - Magnetic										
BID ITEM #	METER SIZE and TYPE	QUANTITY	UNIT PRICE FOR METER WITH REGISTER	COLUMN I TOTAL EXTENDED PRICE FOR METER WITH REGISTER	UNIT PRICE FOR MIU	COLUMN J TOTAL EXTENDED PRICE FOR MIU	UNIT PRICE TO INSTALL METER & MIU	COLUMN K TOTAL EXTENDED PRICE TO INSTALL METER & MIU	DEDUCT UNIT PRICE FOR SALVAGE	COLUMN L TOTAL EXTENDED DEDUCT PRICE FOR SALVAGE
1	5/8" Model <u>Badger Recordall LP LL</u>	100	\$ 72.60	\$ 7,260.00	\$ 71.17	\$ 7,117.00	\$ 89.60	\$ 8,960.00	\$ (1.00)	\$ (100.00)
2	3/4" Model <u>Badger Recordall LP LL</u>	18,020	\$ 72.60	\$ 1,308,252.00	\$ 71.17	\$ 1,282,483.40	\$ 89.60	\$ 1,614,592.00	\$ (1.00)	\$ (18,020.00)
3	1" Model <u>Badger Recordall M55 LL</u>	1,685	\$ 145.20	\$ 244,662.00	\$ 71.17	\$ 119,921.45	\$ 90.00	\$ 151,650.00	\$ (1.00)	\$ (1,685.00)
4	1-1/2" Model <u>Badger Recordall M120 LL</u>	540	\$ 347.60	\$ 187,704.00	\$ 71.17	\$ 38,431.80	\$ 200.00	\$ 108,000.00	\$ (1.00)	\$ (540.00)
5	2" Mag Model <u>Badger M2000</u>	185	\$ 1,355.20	\$ 250,712.00	\$ 71.17	\$ 13,166.45	\$ 325.00	\$ 60,125.00	\$ (1.00)	\$ (185.00)
6	3" Mag Model <u>Badger M2000</u>	65	\$ 1,442.10	\$ 93,736.50	\$ 71.17	\$ 4,626.05	\$ 450.00	\$ 29,250.00	\$ (1.00)	\$ (65.00)
7	4" Mag Model <u>Badger M2000</u>	15	\$ 1,516.90	\$ 22,753.50	\$ 71.17	\$ 1,067.55	\$ 550.00	\$ 8,250.00	\$ (1.00)	\$ (15.00)
8	6" Mag Model <u>Badger M2000</u>	2	\$ 1,772.10	\$ 3,544.20	\$ 71.17	\$ 142.34	\$ 800.00	\$ 1,600.00	\$ (1.00)	\$ (2.00)
9	8" Mag Model <u>Badger M2000</u>	1	\$ 2,049.30	\$ 2,049.30	\$ 71.17	\$ 71.17	\$ 1,200.00	\$ 1,200.00	\$ (1.00)	\$ (1.00)
10	10" Mag Model <u>Badger M2000</u>	1	\$ 2,315.50	\$ 2,315.50	\$ 71.17	\$ 71.17	\$ 1,400.00	\$ 1,400.00	\$ (1.00)	\$ (1.00)
11	12" Mag Model <u>Badger M2000</u>	1	\$ 3,427.60	\$ 3,427.60	\$ 71.17	\$ 71.17	\$ 1,800.00	\$ 1,800.00	\$ (1.00)	\$ (1.00)
TOTAL				\$ 2,126,416.60		\$ 1,467,169.55		\$ 1,986,827.00		\$ (20,615.00)

- NOTES:
1. All residential meters must register a minimum of 1 gallon or less.
 2. All meters must be NSF 61 Annex G/F compliant.
 3. Bidders shall provide a Cut Sheet for each type of meter being bid in this Invitation to Bid.

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BID #13013		BID SHEET 5 OF 11 / TABLE 1D		BIDDER NAME: <u>PROFESSIONAL METERS, INC.</u>			DATE: <u>March 14, 2013</u>				
AMR Fixed Network System		METER MANUFACTURER: <u>BADGER METER, INC</u>									
TABLE 1D FOR BASE BID for Fixed Network Automated Water Meter Reading System											
Schedule of Unit Prices for Positive Displacement Type Meter / Residential – Composite / Commercial - Magnetic											
BID ITEM #	METER SIZE and TYPE	QUANTITY	UNIT PRICE FOR METER WITH REGISTER	TOTAL EXTENDED PRICE FOR METER WITH REGISTER	UNIT PRICE FOR MIU	TOTAL EXTENDED PRICE FOR MIU	UNIT PRICE TO INSTALL METER & MIU	TOTAL EXTENDED PRICE TO INSTALL METER & MIU	DEDUCT UNIT PRICE FOR SALVAGE	TOTAL EXTENDED PRICE FOR SALVAGE	
1	5/8" Model <u>Badger Recordall M25 Plastic Disc</u>	100	\$ 79.20	\$ 7,920.00	\$ 71.17	\$ 7,117.00	\$ 89.60	\$ 8,960.00	\$ (1.00)	\$ (100.00)	
2	3/4" Model <u>Badger Recordall M25 Plastic Disc</u>	18,020	\$ 79.20	\$ 1,427,184.00	\$ 71.17	\$ 1,282,483.40	\$ 89.60	\$ 1,614,592.00	\$ (1.00)	\$ (18,020.00)	
3	1" Model <u>Badger Recordall M40 Plastic Disc</u>	1,685	\$ 133.10	\$ 224,273.50	\$ 71.17	\$ 119,921.45	\$ 90.00	\$ 151,650.00	\$ (1.00)	\$ (1,685.00)	
4	1-1/2" Model <u>Badger Recordall M120 LL</u>	540	\$ 347.60	\$ 187,704.00	\$ 71.17	\$ 38,431.80	\$ 200.00	\$ 108,000.00	\$ (1.00)	\$ (540.00)	
5	2" Mag Model <u>Badger M2000</u>	185	\$ 1,355.20	\$ 250,712.00	\$ 71.17	\$ 13,166.45	\$ 325.00	\$ 60,125.00	\$ (1.00)	\$ (185.00)	
6	3" Mag Model <u>Badger M2000</u>	65	\$ 1,442.10	\$ 93,736.50	\$ 71.17	\$ 4,626.05	\$ 450.00	\$ 29,250.00	\$ (1.00)	\$ (65.00)	
7	4" Mag Model <u>Badger M2000</u>	15	\$ 1,516.90	\$ 22,753.50	\$ 71.17	\$ 1,067.55	\$ 550.00	\$ 8,250.00	\$ (1.00)	\$ (15.00)	
8	6" Mag Model <u>Badger M2000</u>	2	\$ 1,772.10	\$ 3,544.20	\$ 71.17	\$ 142.34	\$ 800.00	\$ 1,600.00	\$ (1.00)	\$ (2.00)	
9	8" Mag Model <u>Badger M2000</u>	1	\$ 2,049.30	\$ 2,049.30	\$ 71.17	\$ 71.17	\$ 1,200.00	\$ 1,200.00	\$ (1.00)	\$ (1.00)	
10	10" Mag Model <u>Badger M2000</u>	1	\$ 2,315.50	\$ 2,315.50	\$ 71.17	\$ 71.17	\$ 1,400.00	\$ 1,400.00	\$ (1.00)	\$ (1.00)	
11	12" Mag Model <u>Badger M2000</u>	1	\$ 3,427.60	\$ 3,427.60	\$ 71.17	\$ 71.17	\$ 1,800.00	\$ 1,800.00	\$ (1.00)	\$ (1.00)	
TOTAL				\$ 2,225,620.10		\$ 1,467,169.55		\$ 1,986,827.00		\$ (20,615.00)	

NOTES: 1. All residential meters must register a minimum of 1 gallon or less.

2. All meters must be NSF 61 Annex G/F compliant.

3. Bidders shall provide a Cut Sheet for each type of meter being bid in this Invitation to Bid.

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BID #13013		BID SHEET 6 OF 11 / TABLE 2		BIDDER NAME: <u>PROFESSIONAL METERS, INC.</u>		DATE: <u>March 14, 2013</u>	
AMR Fixed Network System				METER MANUFACTURER: <u>BADGER METER, INC</u>			
TABLE 2 FOR BASE BID for Fixed Network Automated Water Meter Reading System							
Schedule of Unit Prices for EQUIPMENT							
BID ITEM #	DESCRIPTION	QUANTITY Bidder to Provide quantity	UNIT OF MEASURE	UNIT PRICE	COLUMN Q TOTAL EXTENDED UNIT PRICE		
1	Fixed Network Data Collection Units, Including Firmware and Installation.	1	EACH *	\$351,072.09	\$	351,072.09	
2	Fixed Network Repeaters and Installation.	1	EACH *	\$350,450.86	\$	350,450.86	
3	Backhaul Communication from Data Collectors.	1	EACH	\$4,224.00	\$	4,224.00	
4	Field Tester/Reader, Including Cradles, Accessories, Firmware and Software.	1	EACH	\$25,633.81	\$	25,633.81	
5	AMR Control Computer Software.	1	EACH	\$138,676.15	\$	138,676.15	
6	Interface to Billing System.	1	EACH	\$51,594.59	\$	51,594.59	
	TOTAL				\$	921,651.50	
	OPTIONAL EQUIPMENT (PROVIDE A UNIT PRICE)						
7	Data Collector		EACH	\$ 4,834.50			
8	Data Repeater		EACH	\$ 3,624.50			
9	Leak Detention Logger		EACH	\$ 60.50			
10	Control Valve		EACH	NA			
11	Dual Port MIU		EACH	NA			
12	Electric Ground Jumper Strap (4 Gauge Copper), Clamps, and Installation		EACH	\$ 9.90			
13	Badger E-Series Meter 1-1/2"			\$ 390.50			
14	Badger E-Series Meter 2"			\$ 513.70			
15	Badger Recordall M25 5/8"x3/4")			\$ 81.40			
16	OTHER (Describe)			\$			

NOTES: 1. Bidder must provide a full 2-way communication system.

2. Meters and MIU's must be inside unless prior approval by the County.

*Fully functional network, anticipated to be 8 collectors and 43 repeaters

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BID #13013 BID SHEET 7 OF 11 / TABLE 3			BIDDER NAME: <u>PROFESSIONAL METERS, INC.</u>		DATE: <u>March 14, 2013</u>	
AMR Fixed Network System			METER MANUFACTURER: <u>BADGER METER, INC</u>			
TABLE 3 FOR BASE BID for Fixed Network Automated Water Meter Reading System						
Schedule of Unit Prices for TRAINING and MAINTENANCE						
						COLUMN R
BID ITEM #	DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT PRICE	TOTAL EXTENDED UNIT PRICE	
1	Initial and/or Only On-site Training, 8-hour Day, Including all Travel Costs.	1	EACH	\$ 2,799.50	\$	2,799.50
2	Performance & Payment Bond equal to 100% of Contract amount.	1	EACH	\$ 97,700.00	\$	97,700.00
3	Insurance naming Lake County and Water Accountability.	1	EACH	Included	\$	-
	TOTAL				\$	100,499.50
OPTIONAL TRAINING and MAINTENANCE (PROVIDE A UNIT PRICE)						
4	Subsequent Training, 8-hour day, including All Travel Costs.		EACH	\$ 2,799.50		
5	Annual Software Maintenance.		EACH	\$ 5,700.00		
6	Annual Collectors Maintenance.		EACH	\$ 4,668.00		
7	Annual FCC License Fee.		EACH	NA		
8	Web Base Portal.		EACH	Included, No Extra \$		
9	Bidder Hosting. (Annual cost direct from Itron)		EACH	\$ 50,172.00		
10	OTHER (Describe)			\$ -		
11	OTHER (Describe)			\$ -		
13	OTHER (Describe)			\$ -		
14	OTHER (Describe)			\$ -		

NOTES: 1. Certificate of Liability Insurance requires Waiver of Subrogation on Liability and on Workers' Compensation.

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BID #13013		BID SHEET 8 OF 11 / TABLE 4A		BIDDER NAME: <u>PROFESSIONAL METERS, INC.</u>		DATE: March 14, 2013	
AMR Fixed Network System		METER MANUFACTURER: <u>BADGER METER, INC</u>					
TABLE 4A FOR BASE BID for Fixed Network Automated Water Meter Reading System							
COMBINED TOTAL BID SHEET for Positive Displacement Type Meter / Residential – Brass / Commercial - Turbine							
BID ITEM		DESCRIPTION				TOTAL PRICE	
1		Meter & Register Costs (From Table 1A, Total of Column A)				\$ 1,931,162.20	
2		MIU Costs (From Table 1A, Total of Column B)				\$ 1,467,169.55	
3		Install Costs (From Table 1A, Total of Column C)				\$ 1,986,827.00	
4		DEDUCT Salvage (From Table 1A, Total of Column D)				\$ (20,615.00)	
5		Equipment Costs (From Table 2-Total of Column Q.)				\$ 921,651.50	
6		Training and Maintenance Costs (From Table 3-Total of Column R)				\$ 100,499.50	
		TOTAL of Columns (A+B+C+Q+R) - Column D				\$ 6,386,694.75	

BID #13013		BID SHEET 9 OF 11 / TABLE 4B		BIDDER NAME: PROFESSIONAL METERS, INC.		DATE: March 14, 2013	
AMR Fixed Network System		METER MANUFACTURER: BADGER METER, INC					
TABLE 4B FOR BASE BID for Fixed Network Automated Water Meter Reading System							
COMBINED TOTAL BID SHEET for Positive Displacement Type Meter / Residential – Composite / Commercial - Turbine							
BID ITEM		DESCRIPTION				TOTAL PRICE	
1		Meter & Register Costs (From Table 1B, Total of Column E)				\$ 2,030,365.70	
2		MIU Costs (From Table 1B, Total of Column F)				\$ 1,467,169.55	
3		Install Costs (From Table 1B, Total of Column G)				\$ 1,986,827.00	
4		DEDUCT Salvage (From Table 1B, Total of Column H)				\$ (20,615.00)	
5		Equipment Costs (From Table 2-Total of Column Q)				\$ 921,651.50	
6		Training and Maintenance Costs (From Table 3-Total of Column R)				\$ 100,499.50	
		TOTAL of Columns (E+F+G+Q+R) - Column H				\$ 6,485,898.25	

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BID #13013		BID SHEET 10 OF 11 / TABLE 4C	BIDDER NAME: <u>PROFESSIONAL METERS, INC.</u>	DATE: March 14, 2013
AMR Fixed Network System		METER MANUFACTURER: <u>BADGER METER, INC</u>		
TABLE 4C FOR BASE BID for Fixed Network Automated Water Meter Reading System				
COMBINED TOTAL BID SHEET for Positive Displacement Type Meter / Residential – Brass / Commercial - Magnetic				
BID ITEM	DESCRIPTION			TOTAL PRICE
1	Meter & Register Costs (From Table 1C, Total of Column I)			\$ 2,126,416.60
2	MIU Costs (From Table 1C, Total of Column J)			\$ 1,467,169.55
3	Install Costs (From Table 1C, Total of Column K)			\$ 1,986,827.00
4	DEDUCT Salvage (From Table 1C, Total of Column L)			\$ (20,615.00)
5	Equipment Costs (From Table 2-Total of Column Q)			\$ 921,651.50
6	Training and Maintenance Costs (From Table 3-Total of Column R)			\$ 100,499.50
	TOTAL of Columns (I+J+K+Q+R) - Column L			\$ 6,581,949.15

BID #13013		BID SHEET 11 OF 11 / TABLE 4D		BIDDER NAME: <u>PROFESSIONAL METERS, INC.</u>		DATE: March 14, 2013	
AMR Fixed Network System		METER MANUFACTURER: <u>BADGER METER, INC</u>					
TABLE 4D FOR BASE BID for Fixed Network Automated Water Meter Reading System							
COMBINED TOTAL BID SHEET for Positive Displacement Type Meter / Residential – Composite / Commercial - Magnetic							
BID ITEM		DESCRIPTION				TOTAL PRICE	
1		Meter & Register Costs (From Table 1D, Total of Column M)				\$ 2,225,620.10	
2		MIU Costs (From Table 1D, Total of Column N)				\$ 1,467,169.55	
3		Install Costs (From Table 1D, Total of Column O)				\$ 1,986,827.00	
4		DEDUCT Salvage (From Table 1D, Total of Column P)				\$ (20,615.00)	
5		Equipment Costs (From Table 2-Total of Column Q)				\$ 921,651.50	
6		Training and Maintenance Costs (From Table 3-Total of Column R)				\$ 100,499.50	
		TOTAL of Columns (M+N+O+Q+R) - Column P				\$ 6,681,152.65	

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REFERENCES

Purchase of WATER METER REPLACEMENT and FIXED NETWORK AUTOMATED WATER METER READING SYSTEM for LAKE COUNTY DEPARTMENT OF PUBLIC WORKS February 2013

(This section must be completed and returned with bid. Attach additional pages as required to complete required documentation.)

List below current/past customers and local governmental entities similar in size and scope of operation to Lake County where you have provided similar equipment to the equipment specified herein:

1. Entity: City of Madison, WI
Address: 119 East Olin Avenue
City, State, Zip Code: Madison, WI 53713
Telephone Number: 608-266-4656
Description of Services Provided: Deploying 67k services with 40K
services deployed under Itron Fixed Network
Date of Service: / / To / / Deployment is ongoing
2. Entity: City of Greenfield, IN
Address: 41 Meek St.
City, State, Zip Code: Greenfield, IN 46140
Telephone Number: 317-538-3847
Description of Services Provided: 8K Water and 9K Electric Itron Fixed Network
Solution
Date of Service: / / To / / Deployment is ongoing
3. Entity: Douglas County Water & Sewer
Address: 8763 Hospital Drive
City, State, Zip Code: Douglasville, GA 30134
Telephone Number: 770-920-3828

Description of Services: 42,000 water services under Itron fixed/mobile (hybrid)
Date of Service: / / To / / Deployment is ongoing

Company: Itron
Date: March 14, 2013

Authorized Signature: Gary Ziegler
Title: Regional Sales Manager

CONTRACTOR QUALIFICATIONS

Purchase of WATER METER REPLACEMENT and FIXED NETWORK AUTOMATED WATER METER READING SYSTEM for LAKE COUNTY DEPARTMENT OF PUBLIC WORKS

February 2013

(This section must be completed and returned with bid. Attach additional pages as required to complete required documentation.)

A. Name and Address of Office from which this contract will be administered

Name: Professional Meters, Inc.

Address: 3605 North Route 47

Suite E

Phone: 815-942-7000 Fax: 815-941-1091

Project Manager: Tom Guth

Email: tom.guth@prometers.com

Years in Business: 14 Number of Employees: 100+
Annual Sales: \$ 16M+ Dunn & Bradstreet #: 36-4330553

B. List Additional Employees Who Will be Dedicated to Lake County for the Administration of This Contract:

(Attach additional pages as necessary)

NAME	POSITION TITLE	NUMBER OF YEARS	AREA OF RESPONSIBILITY / EXPERIENCE	TASK
<u>Tom Guth</u>	<u>Proj. Mgr</u>	<u>18</u>	<u>Project Management</u>	<u>Overall Job</u>
<u>John Cummings</u>	<u>Contr. Mgr</u>	<u>25</u>	<u>Contracts</u>	<u>Contracts</u>
<u>Stan Kumor</u>	<u>Data Mgr</u>	<u>15</u>	<u>Data Managment</u>	<u>Data</u>
<u>Dennis Brown</u>	<u>Field Mgr</u>	<u>30</u>	<u>Field Managment</u>	<u>Field</u>
<u>Ralph Chapa</u>	<u>Dispatch</u>	<u>35</u>	<u>Call Ctr/Dispatch Management</u>	
<u></u>	<u></u>	<u></u>	<u></u>	<u></u>
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Badger Meter

Recordall® Cold Water Bronze Disc Meter

Size 5/8, 5/8 x 3/4" (DN 15mm) Model LP

NSF/ANSI Standard 61 Certified, Annex G

DESCRIPTION

Badger Meter offers the Recordall Disc meter in a bronze lead-free alloy. The Lead-Free Alloy (Trade Designation: MLP-LL) meter has been certified to comply with NSF/ANSI Standard 61, Annex G and carries the NSF-61 Mark on the housing. All components of the Lead-Free Alloy meter, i.e., disc, chamber, housing, seals, etc. comprise the certified system.

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

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

OPERATING PERFORMANCE: The Badger Meter Recordall Disc meters meet or exceed registration accuracy for the low flow rates (95%), normal operating flow rates (100 ± 1.5%), and maximum continuous operation flow rates as specifically stated by AWWA Standard C700.

CONSTRUCTION: Badger Meter Recordall Disc meter construction, which complies with ANSI/AWWA standard C700, consists of three basic components: meter housing, measuring chamber, and permanently sealed register. The water meter is available in a Bronze Lead-Free Alloy with externally-threaded spuds. A corrosion-resistant engineered polymer material is used for the measuring chamber.

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

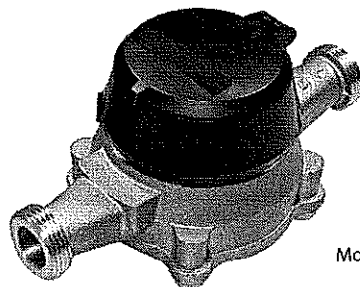
MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

SEALED REGISTER: The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating engineered polymer gears to minimize friction and provides long life. Permanently sealed; dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading systems are available for all Recordall Disc meters. All reading options are removable from the meter without disrupting water service.

TAMPER-PROOF FEATURES: Customer removal of the register to obtain free water can be prevented when the optional tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Both can be installed at the meter site or at the factory.

MAINTENANCE: Badger Meter Recordall Disc meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger Meter offers various maintenance and meter component exchange programs to fit the needs of the utility.

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



Model LP

SPECIFICATIONS

Typical Operating 1/2 - 20 GPM (.057 to 4.5 m³/hr)
(100% ± 1.5%)

Low Flow 1/4 GPM (.028 m³/hr)
(Min. 95%)

Maximum 10 GPM (2.3 m³/hr)

Continuous Operation

Pressure Loss 5/8": 2 PSI at 10 GPM (.14 bar at .23 m³/hr)

at Maximum 5/8"x3/4": 1.5 PSI at 10 GPM (.10 bar at 2.3 m³/hr)

Continuous Operation

Maximum Operating 80°F (26°C)

Temperature

Maximum Operating 150 PSI (10 bar)
Pressure

Measuring Element Nutating disc, positive displacement

Register Type Straight reading, permanently
sealed magnetic drive standard.
Remote reading or Automatic Meter
Reading units optional.

Register Capacity 10,000,000 Gallons,
1,000,000 Cubic Feet, 100,000 m³.
6 odometer wheels.

Meter Connections Available in bronze and Engineered Polymer to
fit 5/8" or 3/4" (DN 15mm) spud thread bore
diameter sizes. See table below.

METER SPUD AND CONNECTION SIZES					
Size Designation	x	"L" Laying Length	"B" Bore Dia.	Coupling Nut and Spud Thread	Tailpiece Pipe Thread (NPT)
5/8"	x	7-1/2"	5/8"	3/4" (5/8")	1/2"
5/8" x 3/4"	x	7-1/2"	5/8", 3/4"	1" (3/4")	3/4"

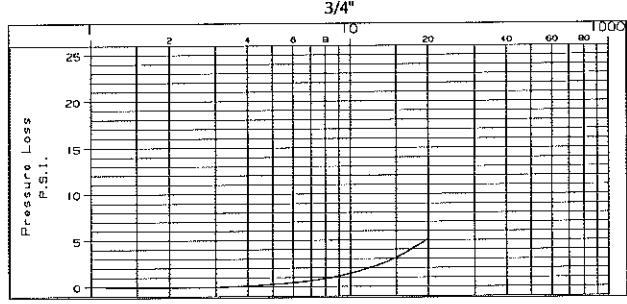
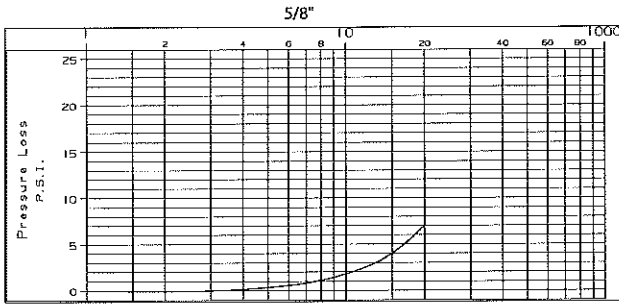
MATERIALS

Meter Housing	Bronze Lead-Free Alloy
Housing Bottom Plates	Bronze Lead-Free Alloy, Cast Iron, Engineered Polymer
Measuring Chamber	Engineered Polymer
Disc	Engineered Polymer
Trim	Stainless Steel, Bronze
Liner/Strainer	Engineered Polymer
Disc Spindle	Engineered Polymer
Magnet	Ceramic
Magnet Spindle	Engineered Polymer
Register Lid and Shroud	Engineered Polymer, Bronze

Technical Brief

PRESSURE LOSS CHARTS

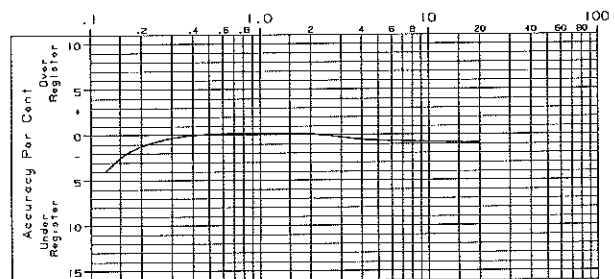
Rate of Flow, in Gallons per Minute



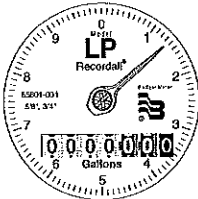
METER SIZE	METER MODEL	A LAYING LENGTH	B HEIGHT REG./RTR*	B HEIGHT ADE*	C CENTERLINE BASE	WIDTH	APPROX. SHIPPING WEIGHT
5/8" 5/8" 3/4" (15mm)	LP	7 1/2" (190mm)	3.70"/4.12"	4.62"	1.26"	3.75"	3 lbs.

ACCURACY CHART

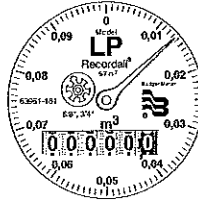
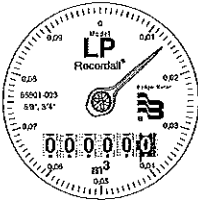
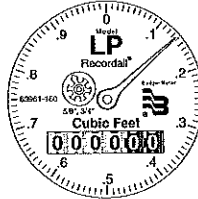
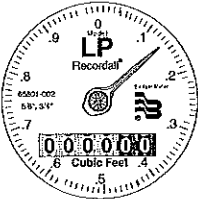
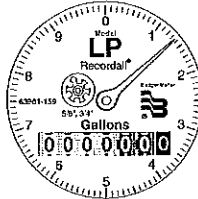
Rate of Flow, in Gallons per Minute



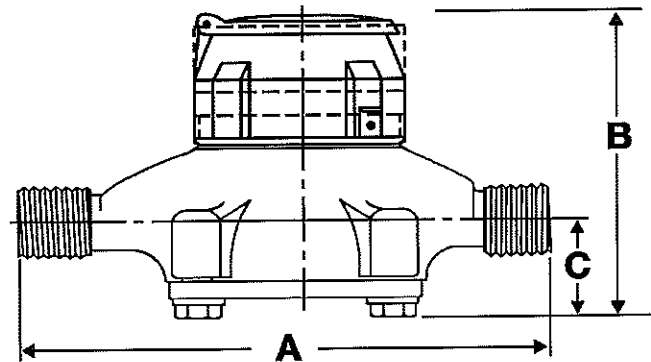
Register with Plastic Lid and Shroud



Register with Bronze Lid and Shroud



Sweep Hand Registration			
MODEL	GALLON	CU. FT.	CU. METER
LP	10	1	.1



ADE, RTR and Recordall are registered trademarks of Badger Meter, Inc.

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Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding contractual obligation exists.

Badger Meter | P.O. Box 245036, Milwaukee, Wisconsin 53224-9536
800-876-3837 | infocentral@badgermeter.com | www.badgermeter.com



Badger Meter

Recordall® Cold Water Bronze Disc Meter Size 1" (DN 25mm) NSF/ANSI Standard 61 Certified, Annex G

DESCRIPTION

Badger Meter offers the Recordall Disc meter in Cast Bronze and a Lead-Free Alloy. The Lead-Free Alloy (Trade designation: M55-LL) version has been certified to comply with NSF/ANSI Standard 61, Annex G and carries the NSF-61 Mark on the housing. All components of the Lead-Free Alloy meter, i.e., disc, chamber, housing, seals, etc. comprise the certified system.

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

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

OPERATING PERFORMANCE: The Badger Meter Recordall Disc meters meet or exceed registration accuracy for the low flow rates (95%), normal operating flow rates ($100 \pm 1.5\%$), and maximum continuous operation flow rates as specifically stated by AWWA Standard C700.

CONSTRUCTION: Badger Meter Recordall Disc meter construction, which complies with ANSI/AWWA standard C700, consists of three basic components: meter housing, measuring chamber, and permanently sealed register. The water meter is available in bronze and Lead-Free Alloy with externally-threaded spuds. A corrosion-resistant engineered polymer material is used for the measuring chamber.

To simplify maintenance, the register, measuring chamber, and strainer can be replaced without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of parts among like-sized meters also minimizes spare parts inventory investment.

MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

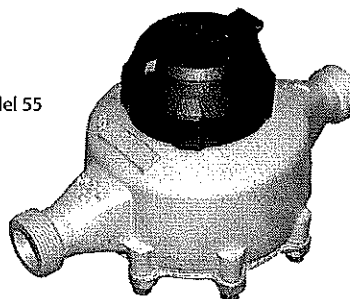
SEALED REGISTER: The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating engineered polymer gears to minimize friction and provides long life. Permanently sealed; dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading systems are available for all Recordall Disc meters. See the back of this sheet for additional information. All reading options are removable from the meter without disrupting water service.

TAMPER-PROOF FEATURES: Customer removal of the register to obtain free water can be prevented when the optional tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Both can be installed at the meter site or at the factory.

MAINTENANCE: Badger Meter Recordall Disc meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger Meter offers various maintenance and meter component exchange programs to fit the needs of the utility.

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

Model 55



SPECIFICATIONS

Typical Operating Range (100% \pm 1.5%)	1-55 GPM (.23 to 12.5 m³/hr)
Low Flow (Min. 95%)	1/2 GPM (.11 m³/hr)
Maximum Continuous Operation	40 GPM (9.1 m³/hr)
Pressure Loss at Maximum Continuous Operation	3.4 PSI at 40 GPM (.23 bar at 9.1 m³/hr)
Maximum Operating Temperature	80°F (26°C)
Maximum Operating Pressure	150 PSI (10 bar)
Measuring Element	Nutating disc, positive displacement
Register Type	Straight reading, sealed magnetic drive standard. Remote reading or Automatic Meter Reading units optional.
Register Capacity	10,000,000 Gallons, 1,000,000 Cubic Feet, 100,000 m³. 6 odometer wheels.
Meter Connections	Available in bronze and engineered polymer to fit 1" (DN 25mm) spud thread bore diameter sizes. See table below.

METER SPUD AND CONNECTION SIZES

Size Designation	x	"L" Laying Length	"B" Bore Dia.	Coupling Nut and Spud Thread	Tailpiece Pipe Thread (NPT)
1"	x	10 3/4"	1"	1 1/4" (1")	1"

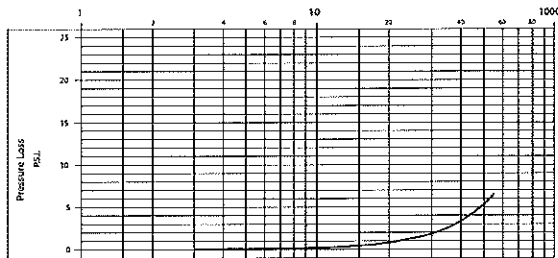
MATERIALS

Meter Housing	Cast Bronze, Lead-Free Alloy
Housing Bottom Plates	Bronze, Cast Iron, Lead-Free Alloy
Measuring Chamber	Engineered Polymer
Disc	Engineered Polymer
Trim	Stainless Steel, Bronze
Strainer	Engineered Polymer
Disc Spindle	Engineered Polymer
Magnet	Polymer Bonded
Magnet Spindle	Engineered Polymer
Register Lid and Shroud	Engineered Polymer, Bronze
Generator Housing	Engineered Polymer

Technical Brief

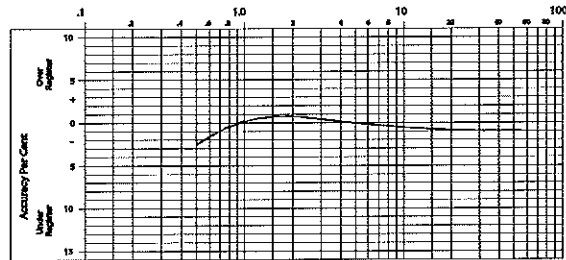
PRESSURE LOSS CHART

Rate of Flow, in Gallons per Minute



ACCURACY CHART

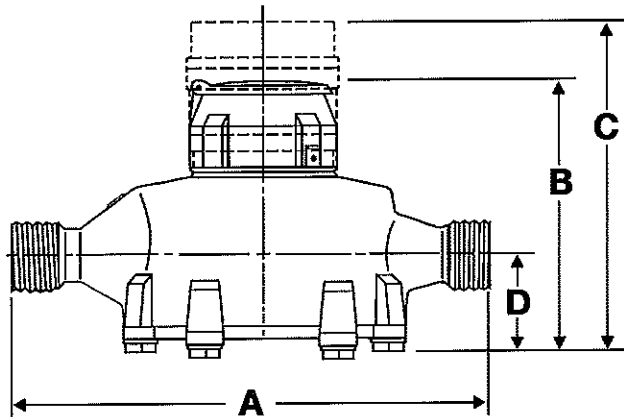
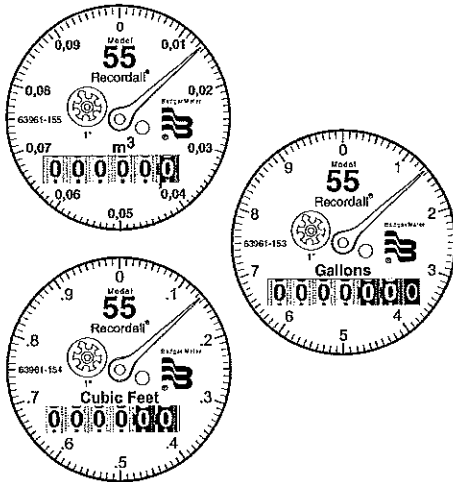
Rate of Flow, in Gallons per Minute



METER SIZE	METER MODEL	A LAYING LENGTH	B HEIGHT REG./RTR	B HEIGHT TO ADE	C HEIGHT GEN.	D CENTERLINE TO BASE	WIDTH	METER WEIGHT
1" (25mm)	55	10 3/4" (273mm)	6" (152mm)	6 1/2" (165mm)	7 3/8" (187mm)	2 1/32" (52mm)	6 1/4" (159mm)	8.75 lbs.

Sweep Hand Registration

MODEL	GALLON	CU. FT.	CU. METER
M55	10	1	.1



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Badger Meter

Recordall® Disc Meter

**Cold Water Top Load Bronze, Size 1-1/2" (40 mm)
NSF/ANSI Standard 61 Certified, Annex G**

DESCRIPTION

Badger Meter Meter offers the Recordall Disc meter in Cast Bronze and a Lead-Free Alloy. The Lead-Free Alloy (Trade designation: M120-LL) version has been certified to comply with NSF/ANSI Standard 61, Annex G and carries the NSF-61 Mark on the housing. All components of the Lead-Free Alloy meter, i.e., disc, chamber, housing, seals, etc. comprise the certified system.

Applications

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

Operation

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

Operating Performance

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

Construction

Badger Meter Recordall Disc meter construction, which complies with ANSI/AWWA standard C700, consists of three basic components: bronze meter housing, measuring chamber, and permanently sealed register. A corrosion-resistant lead-free material is used for the measuring chamber.

To simplify maintenance, the register, measuring chamber, and strainer can be replaced without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of parts among like-sized meters also minimizes spare parts inventory investment.

Magnetic Drive

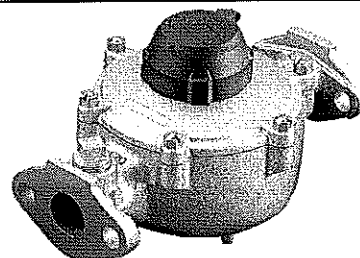
Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading or automatic meter reading options.

Sealed Register

The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating engineered polymer gears to minimize friction and provides long life. Permanently sealed; dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading systems are available for all Recordall Disc meters. All reading options are removable from the meter without disrupting water service.

Tamper-Proof Features

Customer removal of the register to obtain free water can be prevented when the optional tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Both can be installed at the meter site or at the factory.



Model 120 shown with optional 1" Test Plug

Maintenance

Badger Meter Recordall Disc meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger Meter offers various maintenance and meter component exchange programs to fit the needs of the utility.

Connections

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

SPECIFICATIONS

Typical Operating Range	2.5...120 gpm (0.57...27 m³/hr)
(100% ± 1.5%)	
Low Flow (Min. 95%)	1.25 gpm (0.28 m³/hr)
Max. Continuous Operation	80 gpm (18 m³/hr)
Pressure Loss at Max.	4.8 psi at 80 gpm (0.33 bar at 18 m³/hr)
Max. Operating Temperature	80° F (26° C)
Max. Operating Pressure	150 psi (10 bar)
Measuring Element	Nutating disc, positive displacement
Register Type	Straight reading, permanently-sealed magnetic drive standard. AMR/AMI units optional.
Registration	100 gallons, 10 cubic feet, 1 m³, 0.1 m³
Register Capacity	100,000,000 gallons 10,000,000 cubic feet, 1,000,000 m³ 100,000 m³ 6 odometer wheels
Meter Connections	1-1/2" AWWA two bolt elliptical flange, drilled or 1-1/2...1 1-1/2 NPT internal pipe threads.
Test Plugs	1" NPT test plug (TP) available on elliptical long and short versions.

MATERIALS

Meter Housing	Cast Bronze, Lead-Free Alloy
Housing Top Plates	Bronze, Lead-Free Alloy
Measuring Chamber	Engineered Polymer
Disc	Engineered Polymer
Trim	Stainless Steel, Bronze
Strainer	Engineered Polymer
Disc Spindle	Stainless Steel
Magnet	Ceramic
Magnet Spindle	Stainless Steel
Register Lid and Shroud	Engineered Polymer, Bronze
Generator Housing	Engineered Polymer

Technical Brief



Badger Meter

Recordall® Cold Water Engineered Polymer Disc Meter

Size 5/8 x 3/4" (DN 15mm) NSF/ANSI Standard 61 Certified, Annex G

DESCRIPTION

Badger Meter offers a Recordall disc meter line that has been certified to comply with NSF/ANSI Standard 61, Annex G. All components within the Engineered Polymer meter, i.e., disc, chamber, housing, o-rings, etc., comprise the certified system.

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

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

OPERATING PERFORMANCE: The Badger Meter Recordall Disc meters meet or exceed registration accuracy for the low flow rates (95%), normal operating flow rates ($100 \pm 1.5\%$), and maximum continuous operation flow rates as specifically stated by AWWA Standard C710.

CONSTRUCTION: The Recordall Disc meter construction, which complies with ANSI/AWWA standard C710, consists of three basic components: meter housing, measuring chamber, and permanently sealed register. The water meter is thermoplastic with externally-threaded spuds. A corrosion-resistant thermoplastic material is used for the measuring chamber.

To simplify maintenance, the register, measuring chamber, and strainer can be replaced without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of parts among like-sized meters also minimizes spare parts inventory investment.

MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

SEALED REGISTER: The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating thermoplastic gears to minimize friction and provides long life. Permanently sealed, dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading systems are available for all Recordall Disc meters. All reading options are removable from the meter without disrupting water service.

TAMPER-PROOF FEATURES: Customer removal of the register to obtain free water can be prevented when the optional tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Both can be installed at the meter site or at the factory.

MAINTENANCE: Badger Meter Recordall Disc meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger offers various maintenance and meter component exchange programs to fit the needs of the utility.

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

Model 25PN



SPECIFICATIONS

Typical Operating Range (100% \pm 1.5%)	1/2 - 25 GPM (.11 m ³ /hr to 5.7 m ³ /hr)
Low Flow (Min. 95%)	1/4 GPM (.057 m ³ /hr)
Maximum Continuous Operation	15 GPM (3.4 m ³ /hr)
Pressure Loss at Maximum Continuous Operation	2.8 PSI at 15 GPM (0.19 bar at 3.4 m ³ /hr)
Maximum Operating Temperature	80°F (26°C)
Maximum Operating Pressure	150 PSI (10 bar)
Measuring Element	Nutating disc, positive displacement
Register Type	Straight reading, permanently sealed magnetic drive standard. Remote reading or Automatic Meter Reading units optional.
Register Capacity	10,000,000 Gallons, 1,000,000 Cubic Feet, 100,000 m ³ . 6 odometer wheels.
Meter Connections	Available in bronze and engineered polymer to fit 3/4" spud thread bore diameter sizes. See table below.

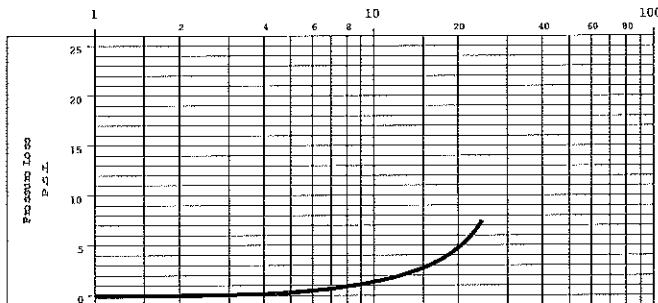
METER SPUD & CONNECTION SIZES

Size Designation	x	"L" Laying Length	"B" Bore Dia.	Coupling Nut and Spud Thread	Tailpiece Pipe Thread (NPT)
5/8" x 3/4"	x	7-1/2"	5/8", 3/4"	1" (3/4")	3/4"

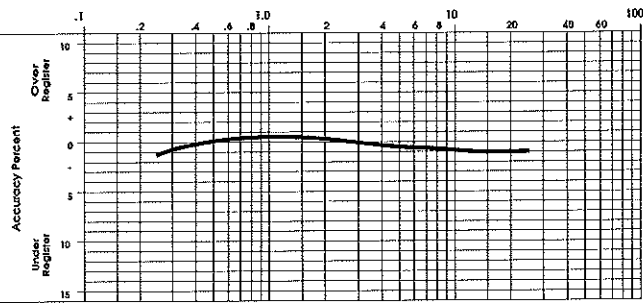
MATERIALS

Meter Housing	Engineered Polymer
Housing Bottom Plate	Engineered Polymer
Measuring Chamber	Engineered Polymer
Disc	Engineered Polymer
Strainer	Engineered Polymer
Disc Spindle	Stainless Steel
Magnet	Ceramic
Magnet Spindle	Stainless Steel
Register Shroud	Engineered Polymer
Register Lid	Engineered Polymer or Bronze

PRESSURE LOSS CHART
Rate of Flow, in Gallons per Minute

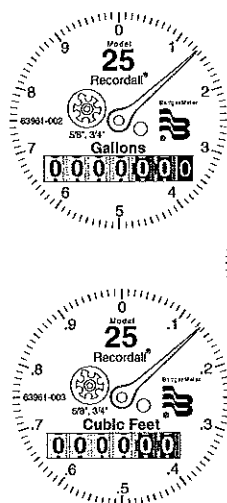


ACCURACY CHART
Rate of Flow, in Gallons per Minute

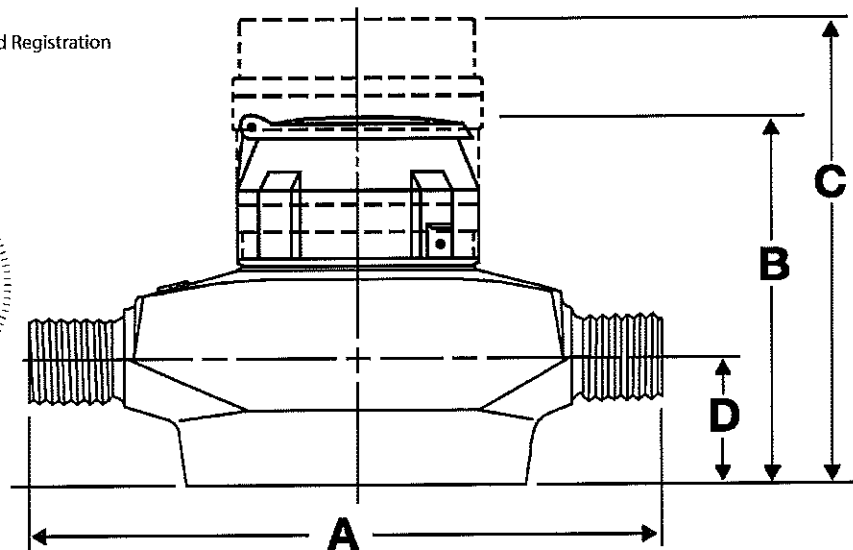


METER SIZE	METER MODEL	A LAYING LENGTH	B HEIGHT REG. / RTR	C HEIGHT GEN.	D CENTERLINE BASE	WIDTH	APPROX. SHIPPING WEIGHT
5/8" x 3/4" (15mm)	25PN	7-1/2" (190mm)	5-1/16" (128mm)	6-7/16" (163mm)	1-3/4" (44mm)	4-13/16" (1221mm)	2-1/2 lbs. (1.0kg)

MODEL	GALLON	CUBIC FOOT	CUBIC METER
M25	10	1	.1/.01



Sweep Hand Registration



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Badger Meter

Recordall® Cold Water Engineered Polymer Disc Meter

Size 3/4" (DN 20mm) NSF/ANSI Standard 61 Certified, Annex G

DESCRIPTION

Badger Meter offers a Recordall disc meter line that has been certified to comply with NSF/ANSI Standard 61, Annex G. All components within the engineered polymer meter, i.e., disc, chamber, housing, o-rings, etc., comprise the certified system.

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

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

OPERATING PERFORMANCE: The 3/4" Recordall Disc meter meets or exceeds registration accuracy for the low flow rates (95%), normal operating flow rates ($100 \pm 1.5\%$), and maximum continuous operation flow rates as specifically stated by AWWA Standard C710.

CONSTRUCTION: Badger Meter Recordall Disc meter construction, which complies with ANSI/AWWA standard C710, consists of three basic components: meter housing, measuring chamber, and permanently sealed register. The water meter is Engineered Polymer with externally-threaded spuds. A corrosion-resistant Engineered Polymer material is used for the measuring chamber.

To simplify maintenance, the register, measuring chamber, and strainer can be replaced without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of parts among like-sized meters also minimizes spare parts inventory investment.

MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

SEALED REGISTER: The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating thermoplastic gears to minimize friction and provides long life. Permanently sealed, dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading systems are available for all Recordall Disc meters. All reading options are removable from the meter without disrupting water service.

TAMPER-PROOF FEATURES: Customer removal of the register to obtain free water can be prevented when the optional tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Both can be installed at the meter site or at the factory.

MAINTENANCE: The Recordall Disc meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger offers various maintenance and meter component exchange programs to fit the needs of the utility.

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

Model 25PN



SPECIFICATIONS

Typical Operating Range (100% \pm 1.5%)	1/2 - 30 GPM (1.0 to 6.8 m ³ /hr)
Low Flow (Min. 95%)	1/4 GPM (.057 m ³ /hr)
Maximum Continuous Operation	15 GPM (3.4 m ³ /hr)
Pressure Loss at Maximum Continuous Operation	2.8 PSI at 15 GPM (0.19 bar at 3.4 m ³ /hr)
Maximum Operating Temperature	80°F (26°C)
Maximum Operating Pressure	150 PSI (10 bar)
Measuring Element	Nutating disc, positive displacement
Register Type	Straight reading, permanently sealed magnetic drive standard. Remote reading or Automatic Meter Reading units optional.
Register Capacity	10,000,000 Gallons, 1,000,000 Cubic Feet, 100,000 m ³ . 6 odometer wheels.
Meter Connections	Available in bronze and thermoplastic to fit 3/4" spud thread bore diameter sizes. See table below.

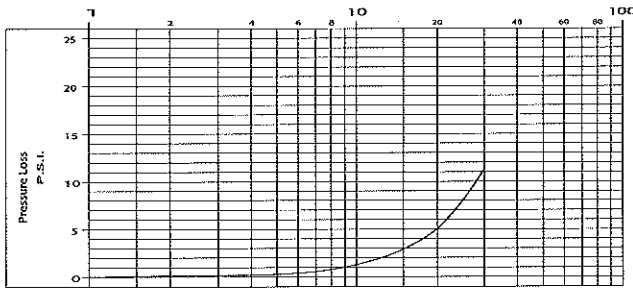
METER SPUD & CONNECTION SIZES

Size Designation	x	"L" Laying Length	"B" Bore Dia.	Coupling Nut and Spud Thread	Tailpiece Pipe Thread (NPT)
3/4"	x	9"	3/4"	1" (3/4")	3/4"

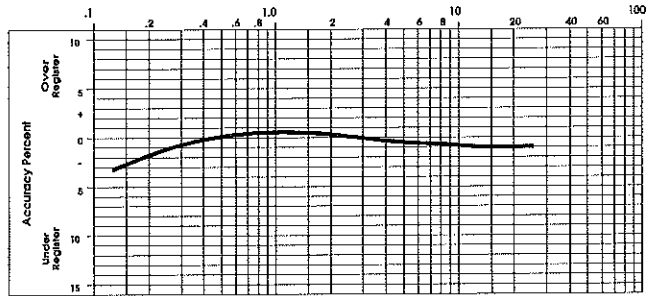
MATERIALS

Meter Housing	Engineered Polymer
Housing Bottom Plate	Engineered Polymer
Measuring Chamber	Engineered Polymer
Disc	Engineered Polymer
Strainer	Engineered Polymer
Disc Spindle	Stainless Steel
Magnet	Ceramic
Magnet Spindle	Stainless Steel
Register Shroud	Engineered Polymer
Register Lid	Engineered Polymer or Bronze

PRESSURE LOSS CHART
Rate of Flow, in Gallons per Minute



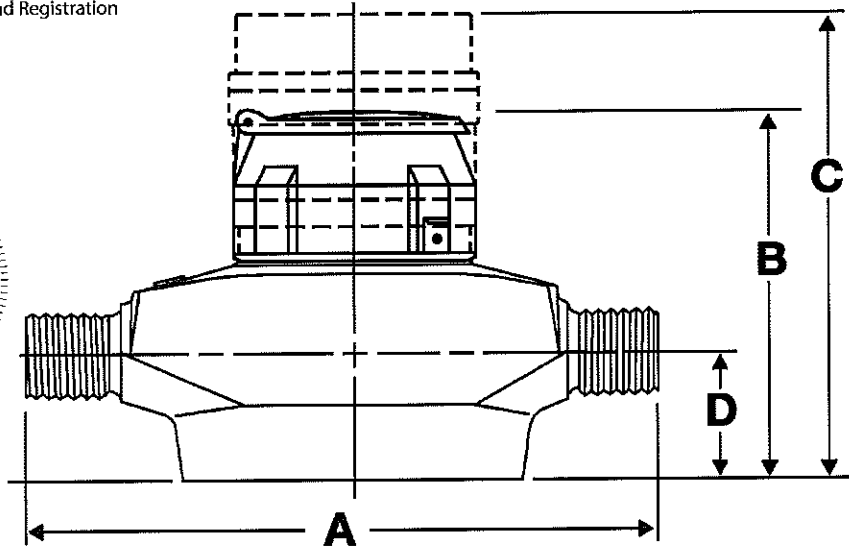
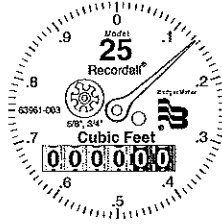
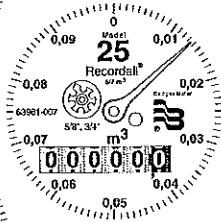
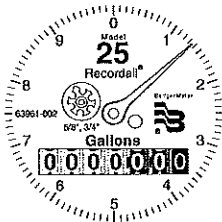
ACCURACY CHART
Rate of Flow, in Gallons per Minute



METER SIZE	METER MODEL	A LAYING LENGTH	B HEIGHT REG. / RTR	C HEIGHT GEN.	D CENTERLINE BASE	WIDTH	APPROX. SHIPPING WEIGHT
3/4" (20mm)	25PN	9" (229mm)	5-1/16" (128mm)	6-7/16" (163mm)	1-3/4" (44mm)	4-13/16" (122mm)	3 lb. (1.4kg)

MODEL	GALLON	CUBIC FOOT	CUBIC METER
M25	10	1	.1/.01

Sweep Hand Registration



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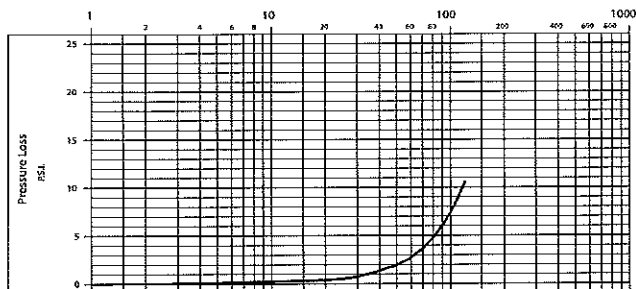


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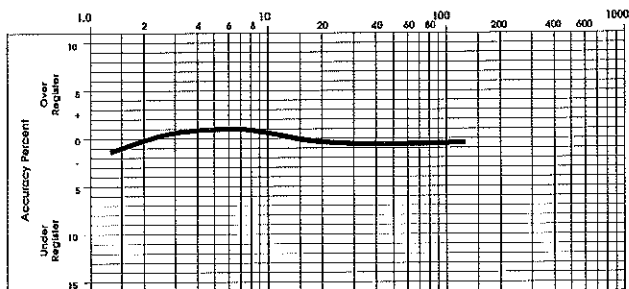
PRESSURE LOSS CHART

Rate of Flow, in Gallons per Minute



ACCURACY CHART

Rate of Flow, in Gallons per Minute



Meter Size	Meter Model	A Laying Length	B Height Reg./ RTR	C Height Gen.	D Centerline to Base	Approx.	Shipping
1-1/2" (40 mm)	120 EL, Hex 120 EL, TP	12-5/8" (321 mm)	7" (178 mm)	8-3/8" (213 mm)	2-3/8" (60 mm)	8-3/4" (222 mm)	19 lb (8.6 kg)
1-1/2" (40 mm)	120 ELL 120 ELL, TP	13" (330 mm)	7" (178 mm)	8-3/8" (213 mm)	2-3/8" (60 mm)	8-3/4" (222 mm)	19 lb (8.6 kg)

EL = Elliptical

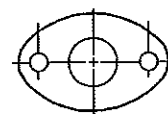
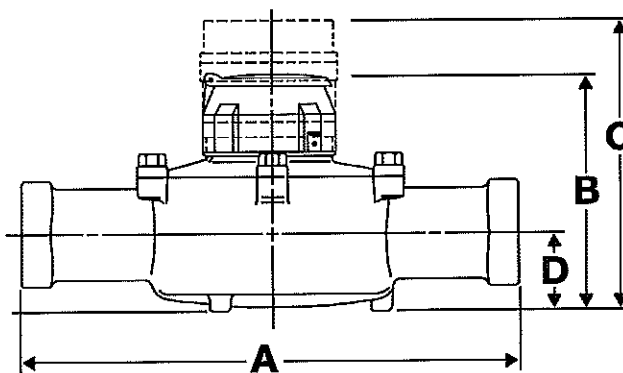
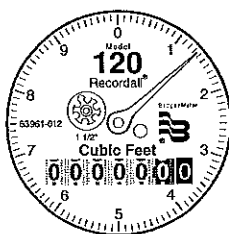
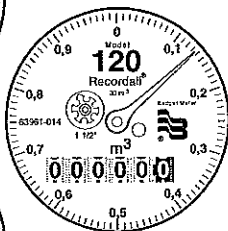
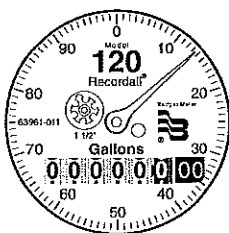
ELL = Elliptical Long

Hex = Hexagon, 1-1/2" - 1 1/2 NPT Thread

TP=Test Plug 1"

Sweep Hand Registration

Model	Gallon	Cubic Feet	Cubic Meter
M120	100	10	1/1



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Badger Meter

Recordall® Cold Water Engineered Polymer Disc Meter

Size 1" (DN 25mm) NSF/ANSI Standard 61 Certified, Annex G

DESCRIPTION

Badger Meter offers a Recordall® disc meter line that has been certified to comply with NSF/ANSI Standard 61, Annex G. All components within the Engineered Polymer meter, i.e., disc, chamber, housing, o-rings, etc., comprise the certified system.

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

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

OPERATING PERFORMANCE: The Badger Meter Recordall Disc meters meet or exceed registration accuracy for the low flow rates (95%), normal operating flow rates ($100 \pm 1.5\%$), and maximum continuous operation flow rates as specifically stated by AWWA Standard C710.

CONSTRUCTION: The Recordall Disc meter construction, which complies with ANSI/AWWA standard C710 consists of three basic components: meter housing, measuring chamber, and permanently sealed register. The water meter is Engineered Polymer with externally-threaded spuds. A corrosion-resistant Engineered Polymer material is used for the measuring chamber.

To simplify maintenance, the register, measuring chamber, and strainer can be replaced without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of parts among like-sized meters also minimizes spare parts inventory investment.

MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

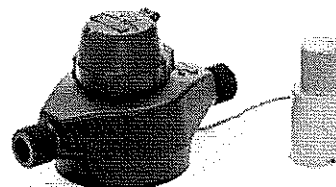
SEALED REGISTER: The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating engineered polymer gears to minimize friction and provides long life. Permanently sealed, dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading systems are available for all Recordall Disc meters. All reading options are removable from the meter without disrupting water service.

TAMPER-PROOF FEATURES: Customer removal of the register to obtain free water can be prevented when the optional tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Both can be installed at the meter site or at the factory.

MAINTENANCE: Badger Recordall Disc meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger Meter offers various maintenance and meter component exchange programs to fit the needs of the utility.

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

Model 40PN



SPECIFICATIONS

Typical Operating Range (100% \pm 1.5%)	3/4-50 GPM (.17 m3/hr to 11.3 m3/hr)
Low Flow (Min. 95%)	3/8 GPM (.085 m3/hr)
Maximum Continuous Operation	25 GPM (5.7 m3/hr)
Pressure Loss at Maximum Continuous Operation	3.1 PSI at 25 GPM (.21 bar at 5.7 m3/hr)
Maximum Operating Temperature	80°F (26°C)
Maximum Operating Pressure	150 PSI (10 bar)
Measuring Element	Nutating disc, positive displacement
Register Type	Straight reading, permanently sealed magnetic drive standard. Remote reading or Automatic Meter Reading units optional.
Register Capacity	10,000,000 Gallons, 1,000,000 Cubic Feet, 100,000 m3. 6 odometer wheels.
Meter Connections	Available in bronze and thermoplastic to fit 1" (DN 25mm) spud thread bore diameter sizes. See table below.

METER SPUD & CONNECTION SIZES

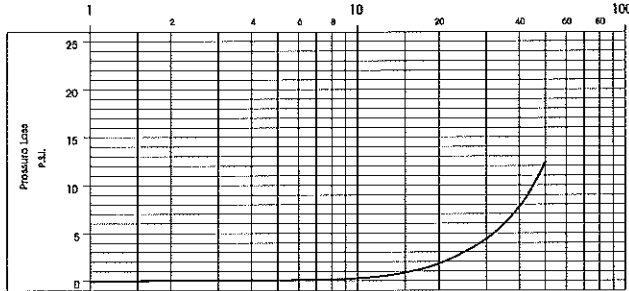
Size Designation	x	"L" Laying Length	"B" Bore Dia.	Coupling Nut and Spud Thread	Tailpiece Pipe Thread (NPT)
1"	x	10-3/4"	1"	1-1/4" (1")	1"

MATERIALS

Meter Housing	Engineered Polymer
Housing Bottom Plate	Engineered Polymer
Measuring Chamber	Engineered Polymer
Disc	Engineered Polymer
Strainer	Engineered Polymer
Disc Spindle	Stainless Steel
Magnet	Ceramic
Magnet Spindle	Stainless Steel
Register Shroud	Engineered Polymer
Register Lid	Engineered Polymer or Bronze

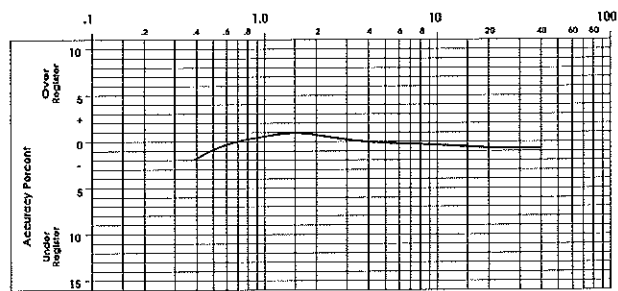
PRESSURE LOSS CHART

Rate of Flow, in Gallons per Minute

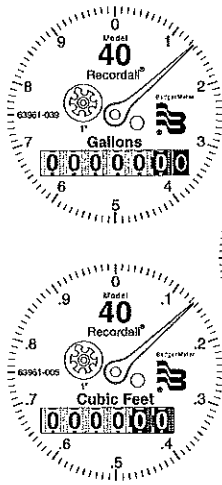


ACCURACY CHART

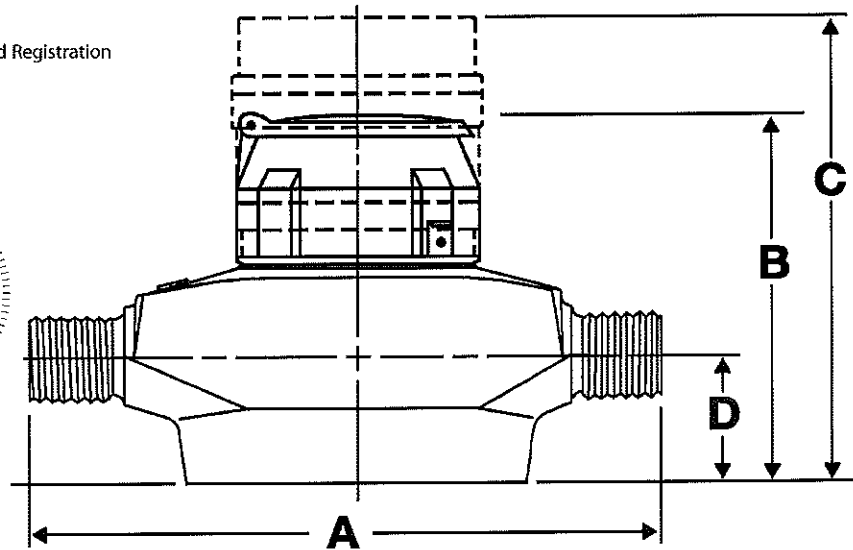
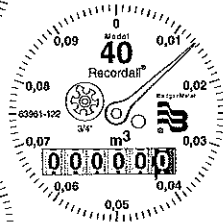
Rate of Flow, in Gallons per Minute



METER SIZE	METER MODEL	A LAYING LENGTH	B HEIGHT REG. / RTR	C HEIGHT GEN.	D CENTERLINE BASE	WIDTH	APPROX. SHIPPING WEIGHT
1" (25mm)	40PN	10-3/4" (273mm)	5-3/4" (146mm)	7-3/16" (183mm)	1-15/16" (49mm)	5-15/16" (151mm)	5 lb. (2.3kg)



Sweep Hand Registration



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800-876-3837 | infocentral@badgermeter.com | www.badgermeter.com

Cold Water Recordall® Turbo 200 Meter

Size 2" (DN 50 mm)

Technical Brief

DESCRIPTION

Badger Meter offers the 2" Turbo Series meter in Cast Bronze and a Low Lead Alloy. The Low Lead Alloy (Trade Designation: Turbo Series LL-NS) version complies with ANSI/NSF Standard 61, Annex G and carries the NSF-61 Mark on the product.

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

OPERATION: Water flows into the meter's measuring element contacting the multi-vaned rotor. Flow readings are obtained by rotor revolutions transmitted by magnetic drive coupling through the meter's cover plate to the sealed register. Magnetic drive is achieved by a right angle worm drive, coupling the rotor to a vertical transmission spindle, driving a gear set rotating the magnet carrier. A ceramic magnet in a carrier rotates around a vertical axis. Through the magnetic coupling, rotor rotation is transmitted to a follower magnet which transmits rotation to the register gearing.

The turbo measuring element is designed to greatly reduce wear by reducing friction potential between the moving parts of the rotor and bearing system. Less wear, in this critical area of the design, provides the utility manager with a lower life cycle cost for meter application. Throughout the normal operating range of the meter, the rotor floats between the thrust bearing system.

OPERATING PERFORMANCE: The Badger® Recordall Turbo 200 meter meets and exceeds registration accuracy for the low flow rate, normal operating flow rate, and maximum continuous operation flow rate as specifically stated in AWWA Standard C701.

CONSTRUCTION: The Badger Recordall 200 Turbo meter construction which complies with ANSI and AWWA C701 standards, consists of three basic components: meter housing, interchangeable measuring element and permanently sealed register. The housing is bronze, with round or elliptical flanges. The measuring element consists of the transmission coupling, measuring element insert, rotor, inlet and outlet straightening vanes with nose cones, and calibration ring assembly. The unique inlet and outlet straightening vanes minimize swirl from piping arrangements upstream as well as downstream.

To simplify maintenance, the register and measuring element can be removed without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of certain parts between 1 1/2" - 4" like-sized meters also minimizes spare parts inventory investment.

MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

SEALED REGISTER: The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating thermoplastic gears to minimize friction and provide long life. Permanently sealed; dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading and close proximity systems are available for all Recordall Turbo meters. (See back of sheet for additional information.) All reading options are removable from the meter without disrupting water service.

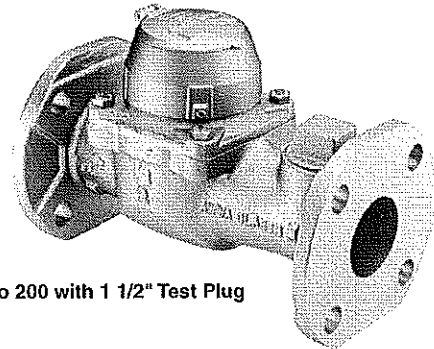
TAMPER-RESISTANT FEATURES: Customer removal of the register to obtain free water can be prevented if the tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Either can be installed at the meter site or at the factory. A tamper resistant calibration plug seal provides protection from unauthorized personnel.

STRAINER: A separate strainer is recommended to protect the measuring element. See Technical Brief PS-T-1 for strainer dimensions.

MAINTENANCE: Badger Recordall Turbo meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger offers various maintenance and meter component exchange programs to fit the needs of the utility.

CONNECTIONS: Companion flanges for installation of meters on various pipe types and sizes are available in cast iron or bronze as an option.

TEST PLUG: An optional 1 1/2" NPT test plug puts an end to removing and reinstalling meters during field accuracy and pressure testing.



Turbo 200 with 1 1/2" Test Plug

SPECIFICATIONS

Typical Operating Range (100% ± 1.5%)	4 - 310 GPM (0.9 to 70.4 m³/h)
Maximum Continuous Operation	200 GPM (45.4 m³/h)
Maximum Intermittent Flow	310 GPM (70.4 m³/h)
Typical Low Flow (Min. 95%)	2.5 GPM (0.6 m³/h)
Pressure Loss at Maximum Continuous Operation	3.1 PSI (.21 bar at 45.4 m³/h)
Maximum Operating Temperature	120°F (49°C)
Maximum Operating Pressure	150 PSI (10 bar)
Meter Flanges	2" Elliptical or Round Flanges, AWWA 125 pound class
Register	Straight reading, permanently sealed magnetic drive standard. Automatic Meter Reading and Close Proximity units optional.
Registration	100,000,000 Gallons 100 gallons/sweep hand revolution. 10,000,000 Cubic Feet 10 cubic ft./sweep hand revolution. 1,000,000 m³ 1 m³/sweep hand revolution. 100,000,000 Imperial Gallons 100 Imperial Gallons/sweep hand revolution.

MATERIALS

Housing	Cast Bronze (B81), Low Lead Alloy
Turbo Head	Cast Bronze (B81), Low Lead Alloy
Nose Cone and Straightening Vanes	Thermoplastic
Rotor	Thermoplastic
Rotor Radial Bearings	Lubricated Thermoplastic
Rotor Thrust Bearings	Sapphire Jewels
Rotor Bearing Pivots	Passivated 316 Stainless Steel
Calibration Mechanism	Stainless Steel and Thermoplastic
Magnet	Ceramic
Register Lid and Shroud	Thermoplastic, Bronze
Trim	Stainless Steel



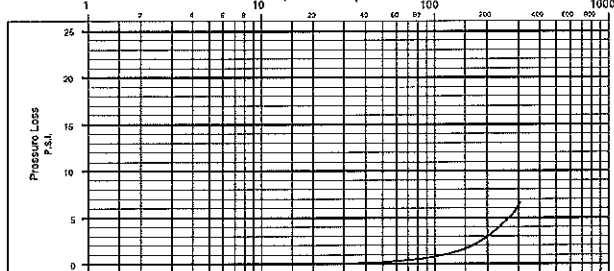
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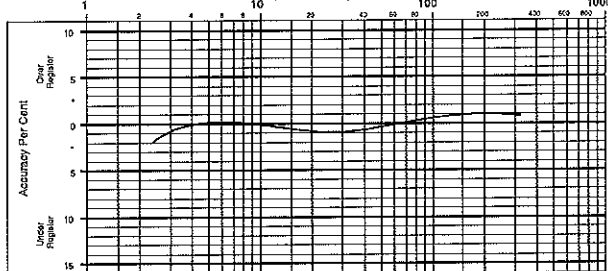
PRESSURE LOSS CHART

Rate of Flow, in Gallons per Minute

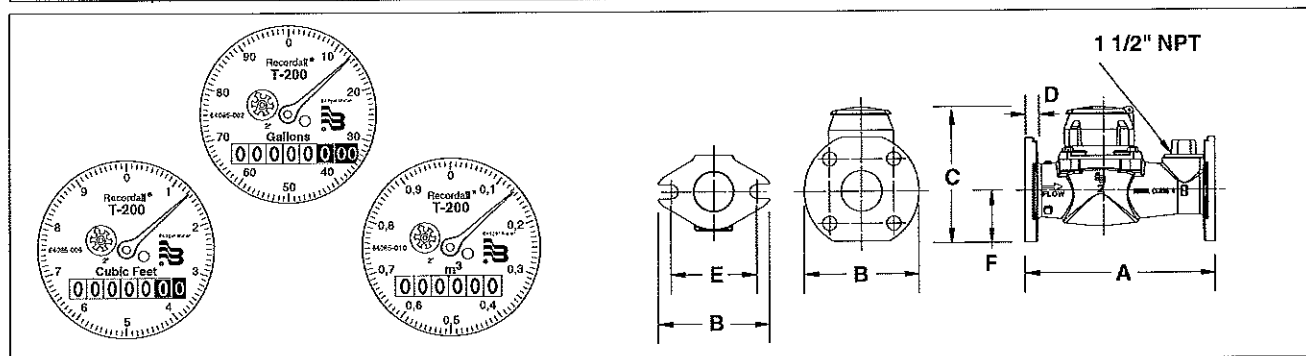


ACCURACY CHART

Rate of Flow, in Gallons per Minute



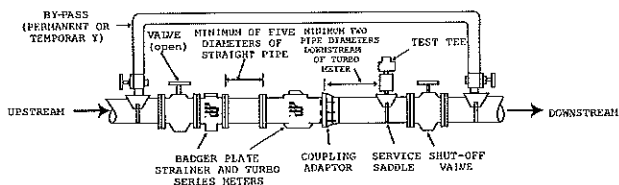
Meter & Pipe Size	DIMENSIONS								
	Length A	Width B	Height C	Flange D	Bolt Circle E	Centerline F	No. Bolts	Net Weight	Shipping Weight
2" EL (DN 50)	10" (254mm)	5 27/32" (148mm)	6 1/2" (165mm)	25/32" (20mm)	4 1/2" (114mm)	2 1/16" (52mm)	2	14.9 lb. (6.8 kg)	16.4 lb. (7.4 kg)
2" RD (DN 50)	10" (254mm)	6" (152mm)	7 3/32" (180mm)	5/8" (16mm)	4 3/4" (121mm)	2 5/8" (67mm)	4	17.4 lb. (7.9 kg)	18.9 lb. (8.6 kg)



PROPER INSTALLATION: The following installation guidelines will insure optimum field performance and reliability when installing a Badger Turbo meter.

1. A strainer is recommended to insure optimum flow conditioning and protection for the turbo meter measuring element.
2. When using a strainer, five (5) diameters of straight pipe separating the strainer upstream of the meter is recommended.
3. ONLY full-open gate valves should be used immediately upstream of the meter. Butterfly valves MUST be five (5) pipe diameters or more upstream of the meter. Full-open gate or butterfly valves can be used downstream.
4. DO NOT install pressure reducing devices or check valves upstream of the meter.

5. Unweighted check valves MUST be located at least three (3) pipe diameters downstream of the meter.
6. Pressure reducing devices and externally weighted check valves MUST be located at least five (5) pipe diameters downstream of the meter.



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Cold Water Recordall® Turbo 450 Meter

Size 3" (DN 80 mm)

Technical Brief

DESCRIPTION

Badger Meter offers the 3" Turbo Series meter in Cast Bronze and a Low Lead Alloy. The Low Lead Alloy (Trade Designation: Turbo Series LL-NS) version complies with ANSI/NSF Standard 61, Annex G and carries the NSF-61 Mark on the product.

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

OPERATION: Water flows into the meter's measuring element contacting the multi-vaned rotor. Flow readings are obtained by rotor revolutions transmitted by magnetic drive coupling through the meter's cover plate to the sealed register. Magnetic drive is achieved by a right angle worm drive, coupling the rotor to a vertical transmission spindle, driving a gear set rotating the magnet carrier. A ceramic magnet in a carrier rotates around a vertical axis. Through the magnetic coupling, rotor rotation is transmitted to a follower magnet which transmits rotation to the register gearing.

The turbo measuring element is designed to greatly reduce wear by reducing friction potential between the moving parts of the rotor and bearing system. Less wear, in this critical area of the design, provides the utility manager with a lower life cycle cost for meter application. Throughout the normal operating range of the meter, the rotor floats between the thrust bearing system.

OPERATING PERFORMANCE: The Badger® Recordall Turbo 450 meter meets and exceeds registration accuracy for the low flow rate, normal operating flow rate, and maximum continuous operation flow rate as specifically stated in AWWA Standard C701.

CONSTRUCTION: The Badger Recordall Turbo 450 meter construction which complies with ANSI and AWWA C701 standards, consists of three basic components: meter housing, measuring element and permanently sealed register. The housing is bronze, with round flanges. The measuring element consists of the transmission coupling, measuring element insert, rotor, inlet and outlet straightening vanes with nose cones, and calibration ring assembly. The unique inlet and outlet straightening vanes minimize swirl from piping arrangements upstream as well as downstream.

To simplify maintenance, the register and measuring element can be removed without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of certain parts between 1 1/2" - 4" like-sized meters also minimizes spare parts inventory investment.

MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

SEALED REGISTER: The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating thermoplastic gears to minimize friction and provide long life. Permanently sealed; dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading and close proximity systems are available for all Recordall Turbo meters. (See back of sheet for additional information.) All reading options are removable from the meter without disrupting water service.

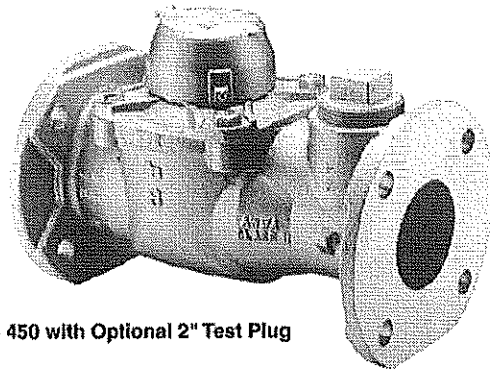
TAMPER-RESISTANT FEATURES: Customer removal of the register to obtain free water can be prevented if the tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Both can be installed at the meter site or at the factory. A tamper resistant calibration plug seal provides protection from unauthorized personnel.

STRAINER: A separate strainer is recommended to protect the measuring element. See Technical Brief PS-T-1 for strainer dimensions.

MAINTENANCE: Badger Recordall Turbo meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger offers various maintenance and meter component exchange programs to fit the needs of the utility.

CONNECTIONS: Companion flanges for installation of meters on various pipe types and sizes are available in cast iron or bronze as an option.

TEST PLUG: An optional 2" NPT test plug puts an end to removing and reinstalling meters during field accuracy and pressure testing.



Turbo 450 with Optional 2" Test Plug

SPECIFICATIONS

Typical Operating Range (100% ± 1.5%)	5 - 550 GPM (1.1 to 124.9 m³/h)
Maximum Continuous Operation	450 GPM (102.2 m³/h)
Maximum Intermittent Flow	550 GPM (124.9 m³/h)
Typical Low Flow (Min. 95%)	4 GPM (0.9 m³/h)
Pressure Loss at Maximum Continuous Operation	1.8 PSI (.12 bar at 102.2 m³/h)
Maximum Operating Temperature	120°F (49°C)
Maximum Operating Pressure	150 PSI (10 bar)
Meter Flanges	3" Round AWWA 125 pound class
Register	Straight reading, permanently sealed magnetic drive standard. Automatic Meter Reading and Close Proximity units optional.
Registration	100,000,000 Gallons 100 gallons/sweep hand revolution. 10,000,000 Cubic Feet 10 cubic ft./sweep hand revolution. 1,000,000 m³ 1 m³/sweep hand revolution. 100,000,000 Imperial Gallons 100 Imperial Gallons/sweep hand revolution.

MATERIALS

Housing	Cast Bronze (B81), Low Lead Alloy
Turbo Head	Cast Bronze (B81), Low Lead Alloy
Nose Cone and Straightening Vanes	Thermoplastic
Rotor	Thermoplastic
Rotor Radial Bearings	Lubricated Thermoplastic
Rotor Thrust Bearings	Sapphire Jewels
Rotor Bearing Pivots	Passivated 316 Stainless Steel
Calibration Mechanism	Stainless Steel and Thermoplastic
Magnet	Ceramic
Register Lid and Shroud	Thermoplastic, Bronze
Trim	Stainless Steel

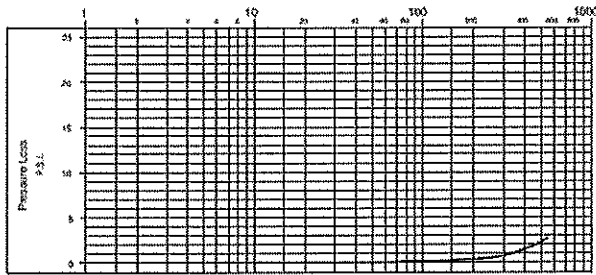


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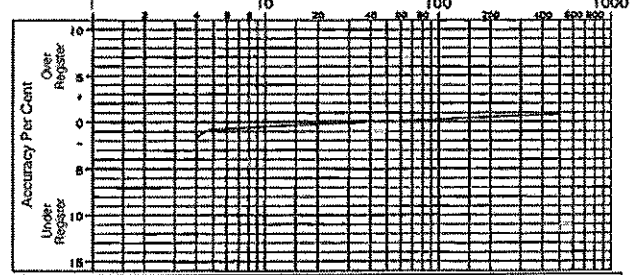
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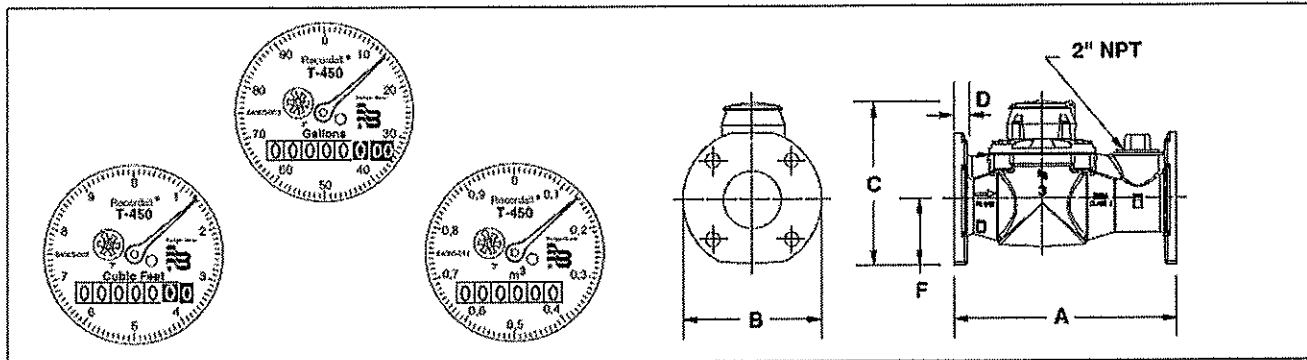
PRESSURE LOSS CHART
Rate of Flow, in Gallons per Minute



ACCURACY CHART
Rate of Flow, in Gallons per Minute



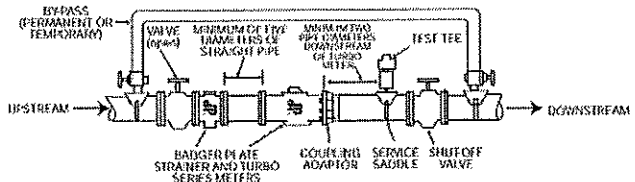
Meter & Pipe Size	DIMENSIONS								
	Length A	Width B	Height C	Flange D	Bolt Circle E	Centerline F	No. Bolts	Net Weight	Shipping Weight
3" RD (DN 80)	12" (305mm)	7 1/2" (191mm)	8 11/16" (220mm)	3/4" (19mm)	6" (152mm)	3 11/32" (85mm)	4	31 lb. (14.1 kg)	34 lb. (15.4 kg)



PROPER INSTALLATION: The following installation guidelines will insure optimum field performance and reliability when installing a Badger Turbo meter.

1. A strainer is recommended to insure optimum flow conditioning and protection for the turbo meter measuring element.
2. When using a strainer, five (5) diameters of straight pipe separating the strainer upstream of the meter is recommended.
3. **ONLY** full-open gate valves should be used immediately upstream of the meter. Butterfly valves **MUST** be five (5) pipe diameters or more upstream of the meter. Full-open gate or butterfly valves can be used downstream.
4. **DO NOT** install pressure reducing devices or check valves upstream of the meter.

5. Unweighted check valves **MUST** be located at least three (3) pipe diameters downstream of the meter.
6. Pressure reducing devices and externally weighted check valves **MUST** be located at least five (5) pipe diameters downstream of the meter.



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Cold Water Recordall® Turbo 1000 Meter

Size 4" (DN 100 mm)

Technical Brief

DESCRIPTION

Badger Meter offers the 4" Turbo Series meter in Cast Bronze and a Low Lead Alloy. The Cast Bronze (Trade Designation: Turbo Series B81-NS) and the Low Lead Alloy (Trade Designation: Turbo Series LL-NS) versions comply with ANSI/NSF Standard 61, Annex G and carry the NSF-61 Mark on the product.

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

OPERATION: Water flows into the meter's measuring element contacting the multi-vaned rotor. Flow readings are obtained by rotor revolutions transmitted by magnetic drive coupling through the meter's cover plate to the sealed register. Magnetic drive is achieved by a right angle worm drive, coupling the rotor to a vertical transmission spindle, driving a gear set rotating the magnet carrier. A ceramic magnet in a carrier rotates around a vertical axis. Rotor rotation is transmitted to the register gearing through this magnetic coupling.

The turbo measuring element is designed to greatly reduce wear by reducing friction potential between the moving parts of the rotor and bearing system. Less wear, in this critical area of the design, provides the utility manager with a lower life cycle cost for meter application. Throughout the normal operating range of the meter, the rotor floats between the thrust bearing system.

OPERATING PERFORMANCE: The Badger® Recordall Turbo 1000 meter meets and exceeds registration accuracy for the low, normal, and maximum continuous operation flow rates as stated in AWWA Standard C701.

CONSTRUCTION: The Badger Recordall Turbo 1000 meter construction which complies with ANSI and AWWA C701 standards, consists of three basic components: meter housing, measuring element and permanently sealed register. The housing is bronze with round flanges. The measuring element consists of the transmission coupling, measuring element insert, rotor, inlet and outlet straightening vanes/nose cones and calibration ring assembly. The unique inlet and outlet straightening vanes minimize swirl from piping arrangements upstream as well as downstream.

To simplify maintenance, the register and measuring element can be removed without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of certain parts between 1 1/2" x 4" like-sized meters also minimizes spare parts inventory investment.

MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

SEALED REGISTER: The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating thermoplastic gears to minimize friction and provide long life. Permanently sealed; dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading and close proximity systems are available for all Recordall Turbo meters. (See back of sheet for additional information.) All reading options are removable from the meter without disrupting water service.

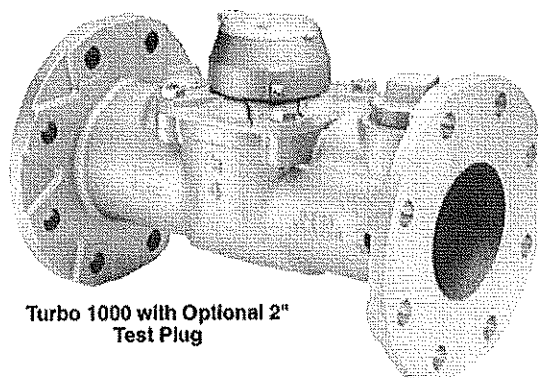
TAMPER-RESISTANT FEATURES: Customer removal of the register to obtain free water can be prevented if the tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Either can be installed at the meter site or at the factory. A tamper resistant calibration plug seal provides protection from unauthorized personnel.

STRAINER: A separate strainer is recommended to protect the measuring element. See Technical Brief PS-T-1 for strainer dimensions.

MAINTENANCE: Badger Recordall Turbo meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger offers various maintenance and meter component exchange programs to fit the needs of the utility.

CONNECTIONS: Companion flanges for installation of meters on various pipe types and sizes are available in cast iron or bronze as an option.

TEST PLUG: An optional 2" NPT test port puts an end to removing and re-installing meters during field accuracy and pressure testing.



Turbo 1000 with Optional 2"
Test Plug

SPECIFICATIONS

Typical Operating Range (100% ± 1.5%)	10 -1250 GPM (2.3 to 284 m³/h)
Maximum Continuous Operation	1000 GPM (227.1 m³/h)
Maximum Intermittent Flow	1250 GPM (284 m³/h)
Typical Low Flow (Min. 95%)	6 GPM (1.4 m³/h)
Pressure Loss at Maximum Continuous Operation	7.3 PSI (.50 bar at 227.1 m³/h)
Maximum Operating Temperature	120°F (49°C)
Maximum Operating Pressure	150 PSI (10 bar)
Meter Flanges	4" Round Flanges AWWA 125 pound class
Register	Straight reading, permanently sealed magnetic drive standard Automatic Meter Reading and Close Proximity units optional
Registration	100,000,000 Gallons 100 gallons/sweep hand revolution 10,000,000 Cubic Feet 10 cubic ft./sweep hand revolution 1,000,000 m³ 1 m³/sweep hand revolution 100,000,000 Imperial Gallons 100 Imperial Gallons/sweep hand revolution

MATERIALS

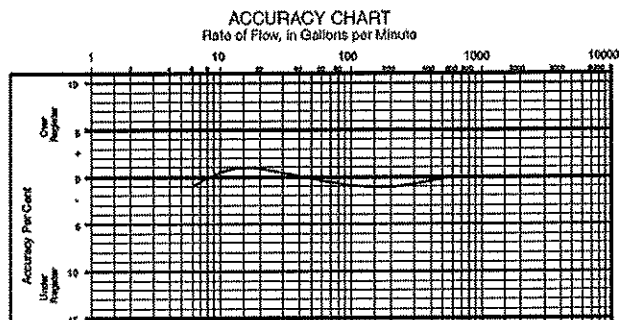
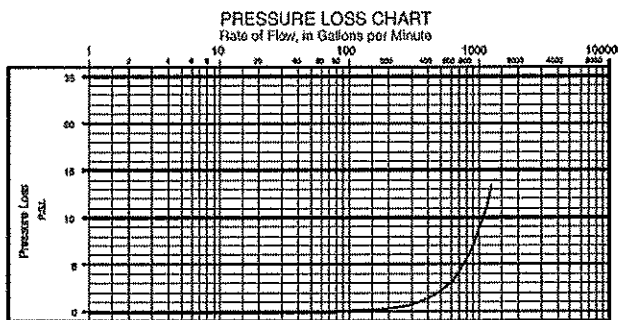
Housing	Cast Bronze (B81), Low Lead Alloy
Turbo Head	Cast Bronze (B81), Low Lead Alloy
Nose Cone and Straightening Vanes	Thermoplastic
Rotor	Thermoplastic
Rotor Radial Bearings	Lubricated Thermoplastic
Rotor Thrust Bearings	Sapphire Jewels
Rotor Bearing Pivots	Passivated 316 Stainless Steel
Calibration Mechanism	Stainless Steel and Thermoplastic
Magnet	Ceramic
Register Lid and Shroud	Thermoplastic, Bronze
Trim	Stainless Steel



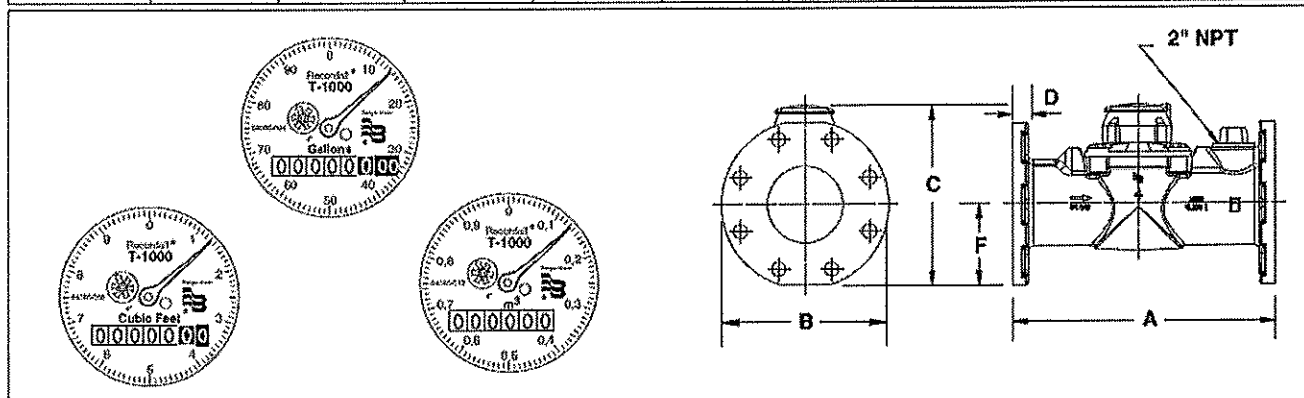
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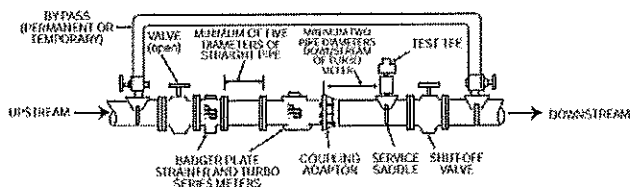
Meter & Pipe Size	DIMENSIONS								
	Length A	Width B	Height C	Flange D	Bolt Circle	Centerline F	No. Bolts	Net Weight	Shipping Weight
4" RD (DN 100)	14" (356mm)	9" (229mm)	9 21/32" (245mm)	13/16" (21mm)	7 1/2" (191mm)	4 5/16" (109mm)	8	40 lb. (18.1 kg)	45 lb. (20.4 kg)



PROPER INSTALLATION: The following installation guidelines will insure optimum field performance and reliability when installing a Badger Turbo meter.

1. A strainer is recommended to insure optimum flow conditioning and protection for the turbo meter measuring element.
2. When using a strainer, five (5) diameters of straight pipe separating the strainer upstream of the meter is recommended.
3. ONLY full-open gate valves should be used immediately upstream of the meter. Butterfly valves MUST be five (5) pipe diameters or more upstream of the meter. Full-open gate or butterfly valves can be used downstream.
4. DO NOT install pressure reducing devices or check valves upstream of the meter.

5. Unweighted check valves MUST be located at least three (3) pipe diameters downstream of the meter.
6. Pressure reducing devices and externally weighted check valves MUST be located at least five (5) pipe diameters downstream of the meter.



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Cold Water Recordall® Turbo 2000 Meter

Size 6" (DN 150 mm)

Technical Brief

DESCRIPTION

Badger Meter offers the 6" Turbo Series meter in Cast Bronze and a Low Lead Alloy. The Cast Bronze (Trade Designation: Turbo Series B81-NS) and the Low Lead Alloy (Trade Designation: Turbo Series LL-NS) versions comply with ANSI/NSF Standard 61, Annex G and carry the NSF-61 Mark on the product.

APPLICATIONS: For use in measurement of potable cold water in commercial and industrial services where flow is in one direction.

OPERATION: Water flows into the meter's measuring element contacting the multi-vaned rotor. Flow readings are obtained by rotor revolutions transmitted by magnetic drive coupling through the meter's cover plate to the sealed register. Magnetic drive is achieved by a right angle worm drive, coupling the rotor to the vertical transmission spindle, driving a gear set rotating the magnet carrier. A ceramic magnet in a carrier rotates around the vertical axis. Rotor rotation is transmitted to the register gearing through this magnetic coupling.

The turbo measuring element is designed to greatly reduce wear by reducing friction potential between the moving parts of the rotor and bearing system. Less wear, in this critical area of the design, provides the utility manager with a lower life cycle cost for meter application. Throughout the normal operating range of the meter, the rotor floats between the bearing system.

OPERATING PERFORMANCE: The Badger® Recordall Turbo 2000 meter meets and exceeds registration accuracy for the low, normal, and maximum continuous operation flow rates as stated in AWWA Standard C701.

CONSTRUCTION: The Badger Recordall Turbo 2000 meter construction, which complies with ANSI and AWWA C701 standards, consists of three basic components: meter housing, interchangeable measuring element and permanently sealed register. The housing is bronze with round flanges. The measuring element consists of the transmission coupling, measuring element insert, rotor, inlet and outlet straightening vanes/nose cones and calibration ring assembly. The unique inlet and outlet straightening vanes minimize swirl from piping arrangements upstream.

To simplify maintenance, the register and measuring element can be removed without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of certain parts between 6", 8", 10" and 12" meters also minimizes spare parts inventory investment.

MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

SEALED REGISTER: The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating thermoplastic gears to minimize friction and provide long life. Permanently sealed; dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading and close proximity systems are available for all Recordall Turbo meters. (See back of sheet for additional information.) All reading options are removable from the meter without disrupting water service.

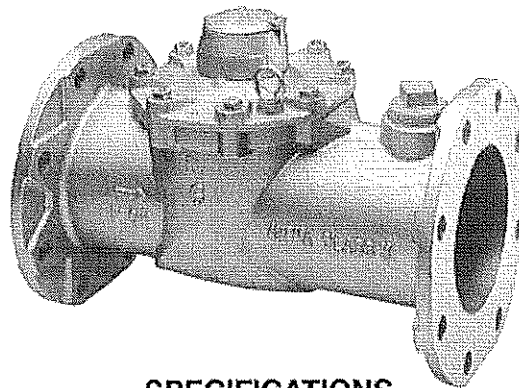
TAMPER-RESISTANT FEATURES: Customer removal of the register to obtain free water is prevented when the tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Either can be installed at the meter site or at the factory. A tamper resistant calibration plug seal provides protection from unauthorized personnel.

STRAINER: A separate strainer is recommended to protect the measuring element. See Technical Brief PS-T-1 for strainer dimensions.

MAINTENANCE: Badger Recordall Turbo meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger offers various maintenance and meter component exchange programs to fit the needs of the utility.

CONNECTIONS: Companion flanges for installation of meters on various pipe types and sizes are available in cast iron or bronze as an option.

TEST PLUG: An optional 2" NPT test port puts an end to removing and re-installing meters during field accuracy and pressure testing.



SPECIFICATIONS

Typical Operating Range (100% ± 1.5%)	20 - 2500 GPM (4.5 to 568 m³/h)
Maximum Continuous Operation	2000 GPM (454 m³/h)
Maximum Intermittent Flow	2500 GPM (568 m³/h)
Typical Low Flow (95%-100%)	12 GPM (2.7 m³/h)
Pressure Loss at Maximum Continuous Operation	4.8 PSI (.33 bar at 454 m³/h)
Maximum Operating Temperature	120°F (49°C)
Maximum Operating Pressure	150 PSI (10 bar)
Meter Flanges	6" Round AWWA 125 pound class
Register	Straight reading, permanently sealed magnetic drive standard. Automatic Meter Reading units optional.
Registration	1,000,000,000 Gallons 1000 gallons/sweep hand revolution. 100,000,000 Cubic Feet 100 cubic ft./sweep hand revolution. 10,000,000 m³ 10 m³/sweep hand revolution. 1,000,000,000 Imperial Gallons 1000 imperial gallons/sweep hand revolution.

MATERIALS

Housing	Cast Bronze (B81), Low Lead Alloy
Turbo Head	Cast Bronze (B81), Low Lead Alloy
Nose Cone and Straightening Vanes	Thermoplastic
Rotor	Thermoplastic
Rotor Radial Bearings	Lubricated Thermoplastic
Rotor Thrust Bearings	Sapphire Jewels
Rotor Bearing Pivots	Passivated 316 Stainless Steel
Calibration Mechanism	Stainless Steel and Thermoplastic
Magnet	Ceramic
Register Lid and Shroud	Thermoplastic, Bronze
Trim	Stainless Steel

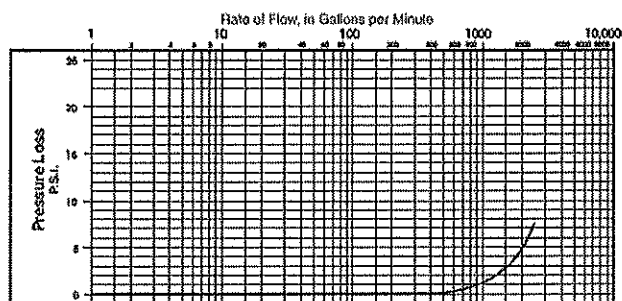


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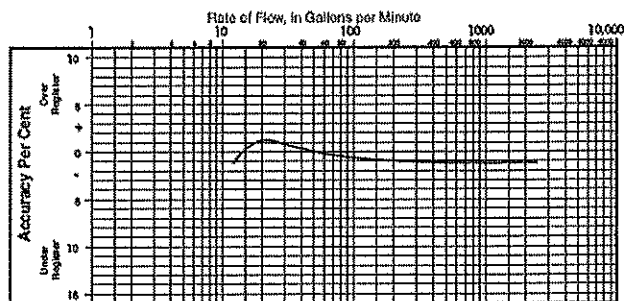
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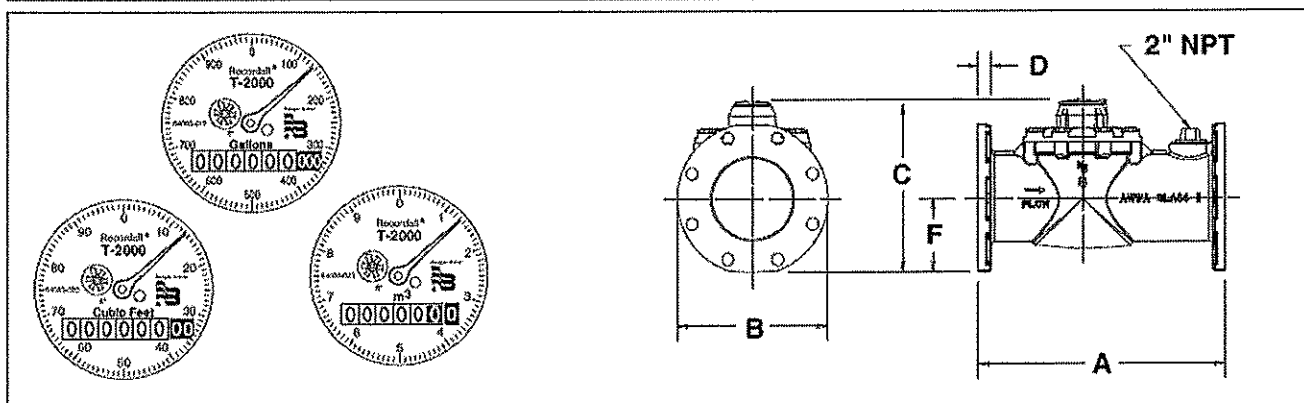
PRESSURE LOSS CHART



ACCURACY CHART



Meter & Pipe Size	DIMENSIONS								
	Length A	Width B	Height C	Flange D	Bolt Circle	Centerline F	No. Bolts	Net Weight	Shipping Weight
6" Meter (DN 150)	18" (457mm)	11" (280mm)	13 5/16" (338mm)	7/8" (22mm)	9 1/2" (241mm)	5 1/4" (133mm)	8	77 lb. (35 kg)	89 lb. (40.4 kg)

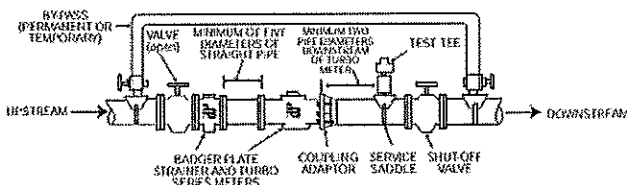


PROPER INSTALLATION: The following installation guidelines will insure optimum field performance and reliability when installing a Badger Turbo meter.

1. A strainer is recommended to insure optimum flow conditioning and protection for the turbo meter measuring element.
2. When using a strainer, five (5) diameters of straight pipe separating the strainer upstream of the meter is recommended.
3. ONLY full-open gate valves should be used immediately upstream of the meter. Butterfly valves MUST be five (5) pipe diameters or more upstream of the meter. Full-open gate or butterfly valves can be used downstream.
4. DO NOT install pressure reducing devices or check valves upstream of the meter.
5. Unweighted check valves MUST be located at least three (3) pipe

diameters downstream of the meter.

6. Pressure reducing devices and externally weighted check valves MUST be located at least five (5) pipe diameters downstream of the meter.



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Cold Water Recordall® Turbo 3500 Meter

Size 8" (DN 200 mm)

Technical Brief

DESCRIPTION

Badger Meter offers the 8" Turbo Series meter in Cast Bronze and a Low Lead Alloy. The Cast Bronze (Trade Designation: Turbo Series B81-NS) and the Low Lead Alloy (Trade Designation: Turbo Series LL-NS) versions comply with ANSI/NSF Standard 61, Annex G and carry the NSF-61 Mark on the product.

APPLICATIONS: For use in measurement of potable cold water in commercial and industrial services where flow is in one direction.

OPERATION: Water flows into the meter's measuring element contacting the multi-vaned rotor. Flow readings are obtained by rotor revolutions transmitted by magnetic drive coupling through the meter's cover plate to the sealed register. Magnetic drive is achieved by a right angle worm drive, coupling the rotor to the vertical transmission spindle, driving a gear set rotating the magnet carrier. A ceramic magnet in a carrier rotates around the vertical axis. Rotor rotation is transmitted to the register gearing through this magnetic coupling.

The turbo measuring element is designed to greatly reduce wear by reducing friction potential between the moving parts of the rotor and bearing system. Less wear, in this critical area of the design, provides the utility manager with a lower life cycle cost for meter application. Throughout the normal operating range of the meter, the rotor floats between the bearing system.

OPERATING PERFORMANCE: The Badger® Recordall Turbo 3500 meter meets and exceeds registration accuracy for the low, normal, and maximum continuous operation flow rates as stated in AWWA Standard C701.

CONSTRUCTION: The Badger Recordall Turbo 3500 meter construction, which complies with ANSI and AWWA C701 standards, consists of three basic components: meter housing, interchangeable measuring element and permanently sealed register. The housing is bronze with round flanges. The measuring element consists of the transmission coupling, measuring element insert, rotor, inlet and outlet straightening vanes/nose cones and calibration ring assembly. The unique inlet and outlet straightening vanes minimize swirl from piping arrangements upstream.

To simplify maintenance, the register and measuring element can be removed without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of most parts between 8", 10", and 12" meters also minimizes spare parts inventory investment.

MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

SEALED REGISTER: The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating thermoplastic gears to minimize friction and provide long life. Permanently sealed; dirt, moisture, tampering and lens fogging problems are minimized. Multi-position register simplifies meter installation and reading. Automatic meter reading and close proximity systems are available for all Recordall Turbo meters. (See back of sheet for additional information.) All reading options are removable from the meter without disrupting water service.

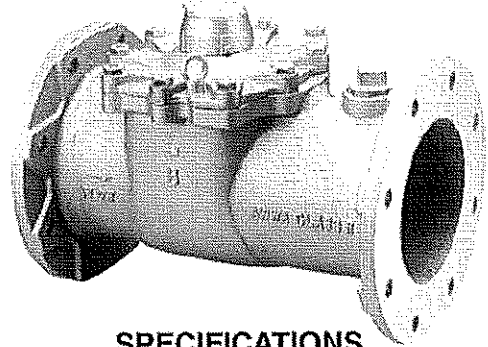
TAMPER-RESISTANT FEATURES: Customer removal of the register to obtain free water is prevented when the tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Either can be installed at the meter site or at the factory. A tamper resistant calibration plug seal provides protection from unauthorized personnel.

STRAINER: A separate strainer is recommended to protect the measuring element. See Technical Brief PS-T-2 for strainer dimensions.

MAINTENANCE: Badger Recordall Turbo meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger offers various maintenance and meter component exchange programs to fit the needs of the utility.

CONNECTIONS: Companion flanges for installation of meters on various pipe types and sizes are available in cast iron or bronze as an option.

TEST PLUG: An optional 2" NPT test port puts an end to removing and re-installing meters during field accuracy and pressure testing.



SPECIFICATIONS

Typical Operating Range (100% ± 1.5%)	30 - 4500 GPM (6.8 to 1,022 m³/h)
Maximum Continuous Operation	3500 GPM (795 m³/h)
Maximum Intermittent Flow	4500 GPM (1022 m³/h)
Typical Low Flow (95%-100%)	20 GPM (4.5 m³/h)
Pressure Loss at Maximum Continuous Operation	2.5 PSI (.17 bar at 795 m³/h)
Maximum Operating Temperature	120°F (49°C)
Maximum Operating Pressure	150 PSI (10 bar)
Meter Flanges	8" Round AWWA 125 pound class
Register	Straight reading, permanently sealed magnetic drive standard. Automatic Meter Reading units optional.
Registration	1,000,000,000 Gallons 1000 gallons/sweep hand revolution. 100,000,000 Cubic Feet 100 cubic ft./sweep hand revolution. 10,000,000 m³ 10 m³/sweep hand revolution. 1,000,000,000 Imperial Gallons 1000 imperial gallons/sweep hand revolution.

MATERIALS

Housing	Cast Bronze (B81), Low Lead Alloy
Turbo Head	Cast Bronze (B81), Low Lead Alloy
Nose Cone and Straightening Vanes	Thermoplastic
Rotor	Thermoplastic
Rotor Radial Bearings	Lubricated Thermoplastic
Rotor Thrust Bearings	Sapphire Jewels
Rotor Bearing Pivots	Passivated 316 Stainless Steel
Calibration Mechanism	Stainless Steel and Thermoplastic
Magnet	Ceramic
Register Lid and Shroud	Thermoplastic, Bronze
Trim	Stainless Steel

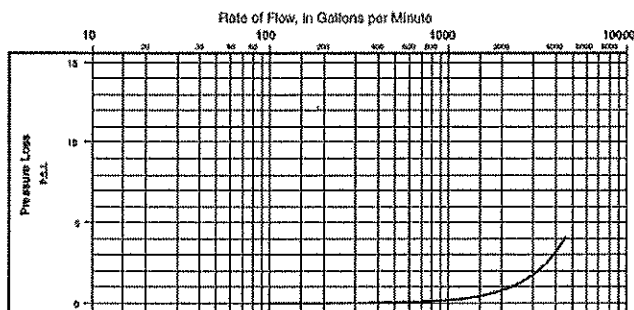


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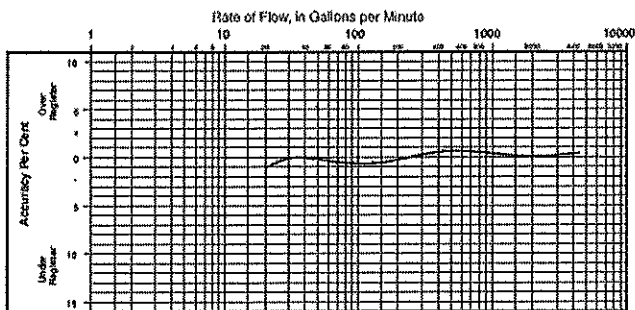
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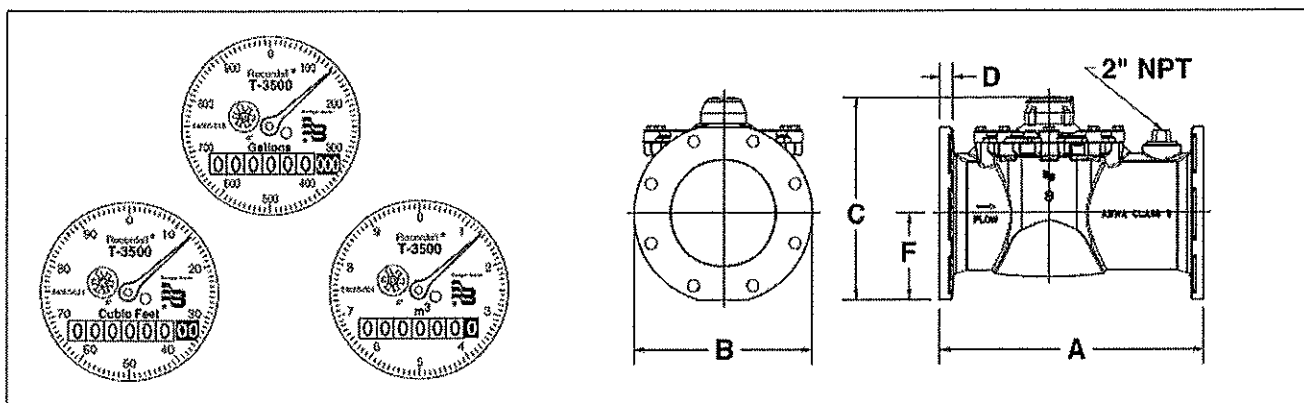
PRESSURE LOSS CHART



ACCURACY CHART



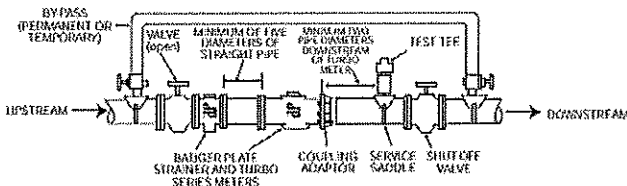
Meter & Pipe Size	DIMENSIONS								
	Length A	Width B	Height C	Flange D	Bolt Circle	Centerline F	No. Bolts	Net Weight	Shipping Weight
8" Meter (DN 200)	20" (508mm)	13 1/2" (343mm)	15 3/16" (385mm)	1" (25mm)	11 3/4" (298mm)	6 3/8" (162mm)	8	123 lb. (55.7 kg)	147 lb. (66.6 kg)



PROPER INSTALLATION: The following installation guidelines will insure optimum field performance and reliability when installing a Badger Turbo meter.

1. A strainer is recommended to insure optimum flow conditioning and protection for the turbo meter measuring element.
2. When using a strainer, five (5) diameters of straight pipe separating the strainer upstream of the meter is recommended.
3. ONLY full-open gate valves should be used immediately upstream of the meter. Butterfly valves MUST be five (5) pipe diameters or more upstream of the meter. Full-open gate or butterfly valves can be used downstream.
4. DO NOT install pressure reducing devices or check valves upstream of the meter.

5. Unweighted check valves MUST be located at least three (3) pipe diameters downstream of the meter.
6. Pressure reducing devices and externally weighted check valves MUST be located at least five (5) pipe diameters downstream of the meter.



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Cold Water Recordall® Turbo 5500 Meter

Size 10" (DN 250 mm)

Technical Brief

DESCRIPTION

Badger Meter offers the 10" Turbo Series meter in Cast Bronze and a Low Lead Alloy. The Cast Bronze (Trade Designation: Turbo Series B81-NS) and the Low Lead Alloy (Trade Designation: Turbo Series LL-NS) versions comply with ANSI/NSF Standard 61, Annex G and carry the NSF-61 Mark on the product.

APPLICATIONS: For use in measurement of potable cold water in commercial and industrial services where flow is in one direction.

OPERATION: Water flows into the meter's measuring element contacting the multi-vaned rotor. Flow readings are obtained by rotor revolutions transmitted by magnetic drive coupling through the meter's cover plate to the sealed register. Magnetic drive is achieved by a right angle worm drive, coupling the rotor to the vertical transmission spindle, driving a gear set rotating the magnet carrier. A ceramic magnet in a carrier rotates around the vertical axis. Rotor rotation is transmitted to the register gearing through this magnetic coupling.

The turbo measuring element is designed to greatly reduce wear by reducing friction potential between the moving parts of the rotor and bearing system. Less wear, in this critical area of the design, provides the utility manager with a lower life cycle cost for meter application. Throughout the normal operating range of the meter, the rotor floats between the bearing system.

OPERATING PERFORMANCE: The Badger® Recordall Turbo 5500 meter meets and exceeds registration accuracy for the low, normal, and maximum continuous operation flow rates as stated in AWWA Standard C701.

CONSTRUCTION: The Badger Recordall Turbo 5500 meter construction, which complies with ANSI and AWWA C701 standards, consists of three basic components: meter housing, interchangeable measuring element and permanently sealed register. The housing is bronze with round flanges. The measuring element consists of the transmission coupling, measuring element insert, rotor, inlet and outlet straightening vanes/nose cones and calibration ring assembly. The unique inlet and outlet straightening vanes minimize swirl from piping arrangements upstream.

To simplify maintenance, the register and measuring element can be removed without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of certain parts between 8", 10", and 12" meters also minimizes spare parts inventory investment.

MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

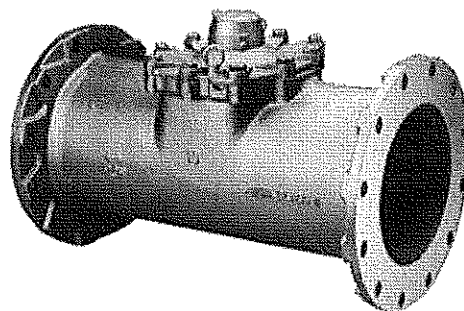
SEALED REGISTER: The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating thermoplastic gears to minimize friction and provide long life. Permanently sealed; dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading and close proximity systems are available for all Recordall Turbo meters. (See back of sheet for additional information.) All reading options are removable from the meter without disrupting water service.

TAMPER-RESISTANT FEATURES: Customer removal of the register to obtain free water is prevented when the tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Either can be installed at the meter site or at the factory. A tamper resistant calibration plug seal provides protection from unauthorized personnel.

STRAINER: A separate strainer is recommended to protect the measuring element. See Technical Brief PS-T-2 for strainer dimensions.

MAINTENANCE: Badger Recordall Turbo meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger offers various maintenance and meter component exchange programs to fit the needs of the utility.

CONNECTIONS: Companion flanges for installation of meters on various pipe types and sizes are available in cast iron or bronze as an option.



SPECIFICATIONS

Typical Operating Range (100% ± 1.5%)	50 - 7000 GPM (11.4 to 1590 m³/h)
Maximum Continuous Operation	5500 GPM (1250 m³/h)
Maximum Intermittent Flow	7000 GPM (1590 m³/h)
Typical Low Flow (95%-100%)	30 GPM (6.8 m³/h)
Pressure Loss at Maximum Continuous Operation	1.6 PSI (.11 bar at 1250 m³/h)
Maximum Operating Temperature	120°F (49°C)
Maximum Operating Pressure	150 PSI (10 bar)
Meter Flanges	10" Round AWWA 125 pound class
Register	Straight reading, permanently sealed magnetic drive standard. Automatic Meter Reading units optional.
Registration	1,000,000,000 Gallons 1000 gallons/sweep hand revolution. 100,000,000 Cubic Feet 100 cubic ft./sweep hand revolution. 10,000,000 m³ 10 m³/sweep hand revolution. 1,000,000,000 Imperial Gallons 1000 imperial gallons/sweep hand revolution.

MATERIALS

Housing	Cast Bronze (B81), Low Lead Alloy
Turbo Head	Cast Bronze (B81), Low Lead Alloy
Nose Cone and Straightening Vanes	Thermoplastic
Rotor	Thermoplastic
Rotor Radial Bearings	Lubricated Thermoplastic
Rotor Thrust Bearings	Sapphire Jewels
Rotor Bearing Pivots	Passivated 316 Stainless Steel
Calibration Mechanism	Stainless Steel and Thermoplastic
Magnet	Ceramic
Register Lid and Shroud	Thermoplastic, Bronze
Trim	Stainless Steel

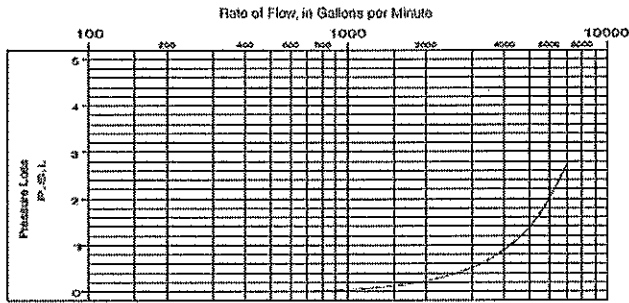


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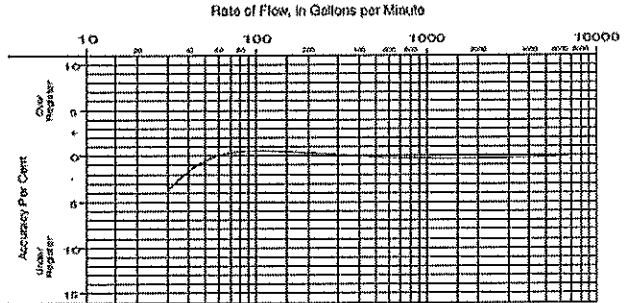
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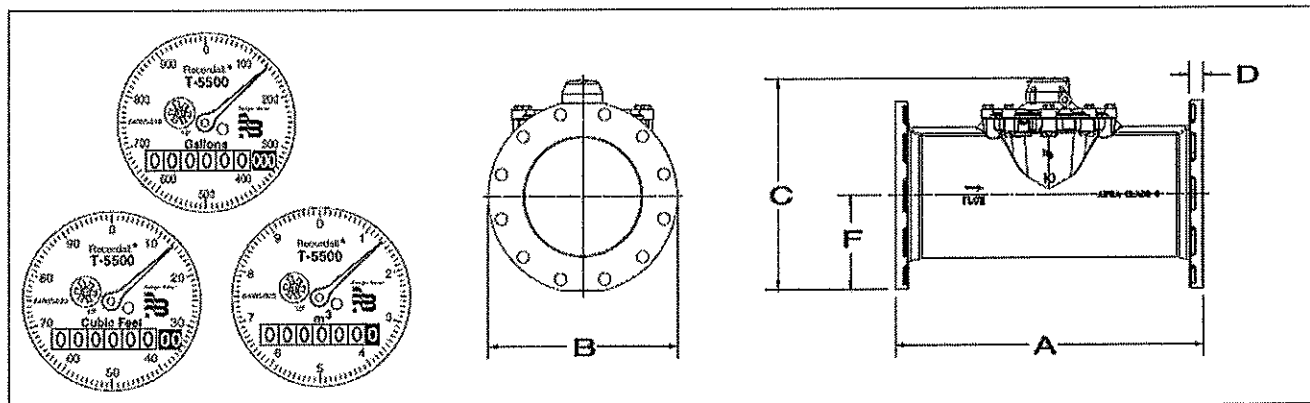
PRESSURE LOSS CHART



ACCURACY CHART



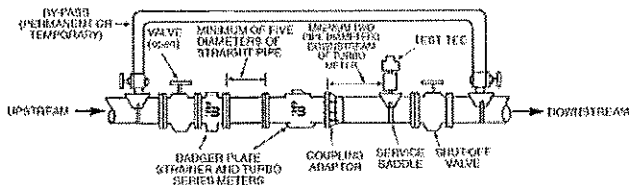
Meter & Pipe Size	DIMENSIONS								
	Length A	Width B	Height C	Flange D	Bolt Circle	Centerline F	No. Bolts	Net Weight	Shipping Weight
10" Meter (DN 250)	26" (660.4 mm)	16" (406.4 mm)	17 15/32" (443 mm)	1 1/16" (27 mm)	14 1/4" (362mm)	7 7/8" (199.4 mm)	12	210 lb. (95.3 kg)	235 lb. (106.6 kg)



PROPER INSTALLATION: The following installation guidelines will insure optimum field performance and reliability when installing a Badger Turbo meter.

1. A strainer is recommended to insure optimum flow conditioning and protection for the turbo meter measuring element.
2. When using a strainer, five (5) diameters of straight pipe separating the strainer upstream of the meter is recommended.
3. ONLY full-open gate valves should be used immediately upstream of the meter. Butterfly valves MUST be five (5) pipe diameters or more upstream of the meter. Full-open gate or butterfly valves can be used downstream.
4. DO NOT install pressure reducing devices or check valves upstream of the meter.

5. Unweighted check valves MUST be located at least three (3) pipe diameters downstream of the meter.
6. Pressure reducing devices and externally weighted check valves MUST be located at least five (5) pipe diameters downstream of the meter.



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**Cold Water
Recordall®
Turbo 6200 Meter**

Size 12" (DN 300 mm)

**Technical
Brief**

DESCRIPTION

APPLICATIONS: For use in measurement of potable cold water in commercial and industrial services where flow is in one direction.

OPERATION: Water flows into the meter's measuring element contacting the multi-vaned rotor. Flow readings are obtained by rotor revolutions transmitted by magnetic drive coupling through the meter's cover plate to the sealed register. Magnetic drive is achieved by a right angle worm drive, coupling the rotor to the vertical transmission spindle, driving a gear set rotating the magnet carrier. A ceramic magnet in a carrier rotates around the vertical axis. Rotor rotation is transmitted to the register gearing through this magnetic coupling.

The turbo measuring element is designed to greatly reduce wear by reducing friction potential between the moving parts of the rotor and bearing system. Less wear, in this critical area of the design, provides the utility manager with a lower life cycle cost for meter application. Throughout the normal operating range of the meter, the rotor floats between the bearing system.

OPERATING PERFORMANCE: The Badger® Recordall Turbo 6200 meter meets and exceeds registration accuracy for the low, normal, and maximum continuous operation flow rates as stated in AWWA Standard C701.

CONSTRUCTION: The Badger Recordall Turbo 6200 meter construction, which complies with ANSI and AWWA C701 standards, consists of three basic components: meter housing, interchangeable measuring element and permanently sealed register. The housing is cast iron with round flanges. The measuring element consists of the transmission coupling, measuring element insert, rotor, inlet and outlet straightening vanes/nose cones and calibration ring assembly. The unique inlet and outlet straightening vanes minimize swirl from piping arrangements upstream.

To simplify maintenance, the register and measuring element can be removed without removing the meter housing from the installation. No change gears are required for accuracy calibration. Interchangeability of certain parts between 8", 10", and 12" meters also minimizes spare parts inventory investment.

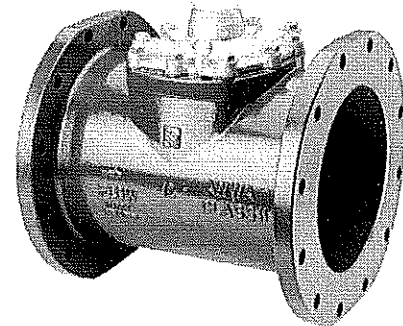
MAGNETIC DRIVE: Direct magnetic drive, through the use of high-strength magnets, provides positive, reliable and dependable register coupling for straight-reading, remote or automatic meter reading options.

SEALED REGISTER: The standard register consists of a straight-reading odometer-type totalization display, 360° test circle with center sweep hand and flow finder to detect leaks. Register gearing consists of self-lubricating thermoplastic gears to minimize friction and provide long life. Permanently sealed; dirt, moisture, tampering and lens fogging problems are eliminated. Multi-position register simplifies meter installation and reading. Automatic meter reading and close proximity systems are available for all Recordall Turbo meters. (See back of sheet for additional information.) All reading options are removable from the meter without disrupting water service.

TAMPER-RESISTANT FEATURES: Customer removal of the register to obtain free water is prevented when the tamper detection seal wire screw or TORX® tamper resistant seal screw is added to the meter. Either can be installed at the meter site or at the factory. A tamper resistant calibration plug seal provides protection from unauthorized personnel.

STRAINER: A separate strainer is recommended to protect the measuring element.

MAINTENANCE: Badger Recordall Turbo meters are designed and manufactured to provide long-term service with minimal maintenance. When maintenance is required, it can be performed easily either at the meter installation or at any other convenient location. As an alternative to repair by the utility, Badger offers various maintenance and meter component exchange programs to fit the needs of the utility.



SPECIFICATIONS

Typical Operating Range (100% ± 1.5%)	90 - 8800 GPM (20.5 to 1998 m³/h)
Maximum Continuous Operation	6200 GPM (1408 m³/h)
Maximum Intermittent Flow	8800 GPM (1998 m³/h)
Typical Low Flow (95%-100%)	65 GPM (14.8 m³/h)
Pressure Loss at Maximum Continuous Operation	0.8 PSI (0.05 bar at 1408 m³/h)
Maximum Operating Temperature	120°F (49°C)
Maximum Operating Pressure	150 PSI (10 bar)
Meter Flanges	12" Round AWWA 125 pound class
Register	Straight reading, permanently sealed magnetic drive standard. Automatic Meter Reading units optional.
Registration	10,000,000,000 Gallons 10,000 gallons/sweep hand revolution. 1,000,000,000 Cubic Feet 1,000 cubic ft./sweep hand revolution. 10,000,000 m³ 10 m³/sweep hand revolution. 10,000,000,000 Imperial Gallons 10,000 Imperial gallons/sweep hand revolution.

MATERIALS

Housing	Cast Iron
Nose Cone and Straightening Vanes	Thermoplastic
Rotor	Thermoplastic
Rotor Radial Bearings	Lubricated Thermoplastic
Rotor Thrust Bearings	Sapphire Jewels
Rotor Bearing Pivots	Passivated 316 Stainless Steel
Calibration Mechanism	Stainless Steel and Thermoplastic
Magnet	Ceramic
Register Lid and Shroud	Thermoplastic, Bronze
Trim	316 Stainless Steel

CONNECTIONS: Companion flanges for installation of meters on various pipe types and sizes are available in cast iron as an option.



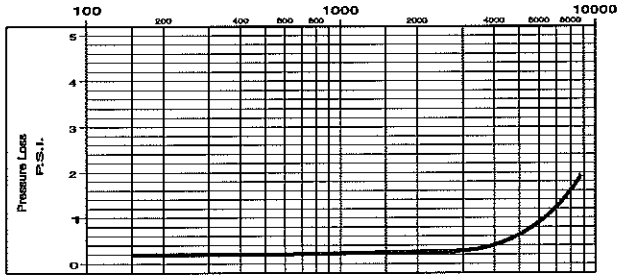
BadgerMeter, Inc.

RTS-T-12

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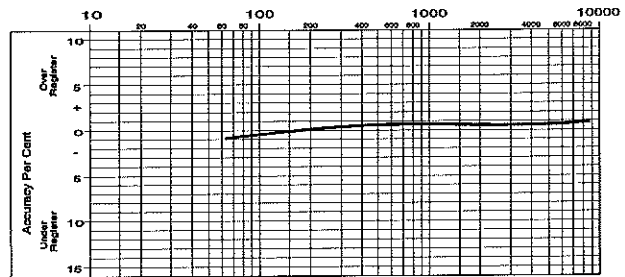
PRESSURE LOSS CHART

Rate of Flow, in Gallons per Minute

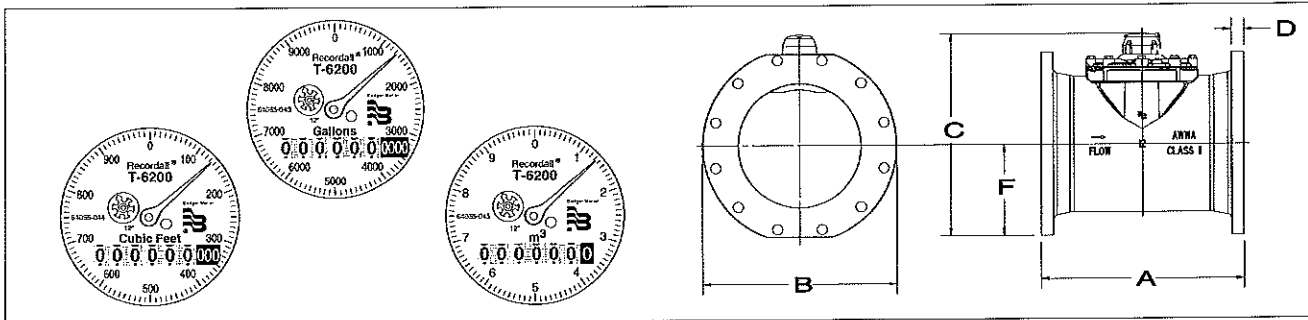


ACCURACY CHART

Rate of Flow, in Gallons per Minute



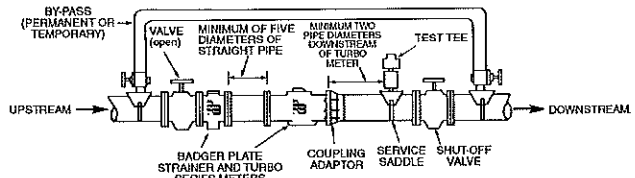
Meter & Pipe Size	DIMENSIONS								
	Length A	Width B	Height C	Flange D	Bolt Circle	Centerline F	No. Bolts	Net Weight	Shipping Weight
12" Meter (DN 300)	19 11/16" (499 mm)	19" (482 mm)	19 11/16" (500 mm)	1.26" (32 mm)	17" (432mm)	8 7/8" (226 mm)	12	262 lb. (118.8 kg)	286 lb. (129.7 kg)



PROPER INSTALLATION: The following installation guidelines will insure optimum field performance and reliability when installing a Badger Turbo meter.

1. A strainer is recommended to insure optimum flow conditioning and protection for the turbo meter measuring element.
2. When using a strainer, five (5) diameters of straight pipe separating the strainer upstream of the meter is recommended.
3. ONLY full-open gate valves should be used immediately upstream of the meter. Butterfly valves MUST be five (5) pipe diameters or more upstream of the meter. Full-open gate or butterfly valves can be used downstream.
4. DO NOT install pressure reducing devices or check valves upstream of the meter.

5. Unweighted check valves MUST be located at least three (3) pipe diameters downstream of the meter.
6. Pressure reducing devices and externally weighted check valves MUST be located at least five (5) pipe diameters downstream of the meter.



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Please see our website at
www.badgermeter.com
 for specific contacts.

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 (800) 876-3837 / Fax: (888) 371-5982
www.badgermeter.com



Badger Meter

M-Series® M2000

Electromagnetic Flow Meter Detector

DESCRIPTION

The Badger Meter M-Series® model M2000 detector is the result of years of research and field use of electromagnetic flow meter technology. Based on Faraday's law of induction, these meters can measure almost any liquid, slurry, or paste that has minimum electrical conductivity.

Designed, developed, and manufactured under strict quality standards, the M-Series meter features sophisticated, processor-based signal conversion with accuracies of ± 0.25 percent. The wide selection of liner and electrode materials helps ensure maximum compatibility and minimum maintenance over a long operating period.

OPERATION

The flow meter is a stainless steel tube lined with a non-conductive material. Outside the tube, two DC powered electromagnetic coils are positioned opposing each other. Perpendicular to these coils, two electrodes are inserted into the flow tube. Energized coils create a magnetic field across the whole diameter of the pipe.

As a conductive fluid flows through the magnetic field, a voltage is induced across the electrodes. This voltage is proportional to the average flow velocity of the fluid and is measured by the two electrodes. This induced voltage is then amplified and processed digitally by the converter to produce an accurate analog or digital signal. The signal can then be used to indicate flow rate and totalization or to communicate to remote sensors and controllers.

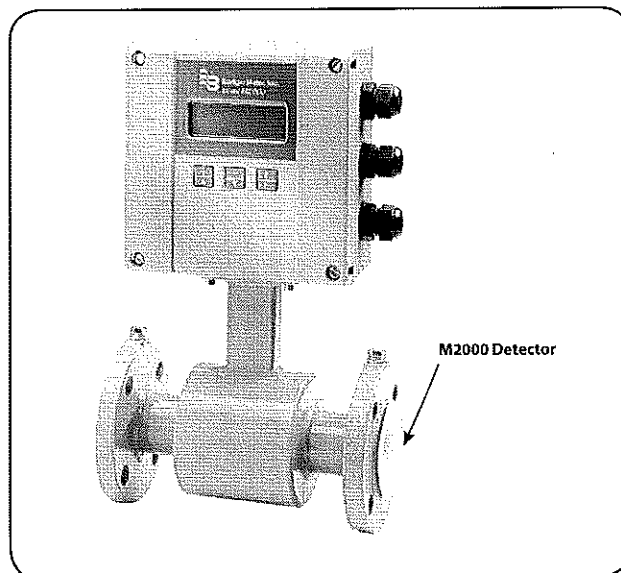
With no moving parts in the flow stream, there is no pressure lost. Also, accuracy is not affected by temperature, pressure, viscosity, density or flow profile. There is practically no maintenance required.

APPLICATION

The M2000 has many advantages over other conventional technologies. It can be used in a majority of industrial flow applications. The M2000 meter can accurately measure fluid flow—whether the fluid is water or a highly corrosive liquid, very viscous, contains a moderate amount of solids, or requires special handling. Today, magnetic meters are successfully used in industries including food and beverage, pharmaceutical, water and wastewater, and chemical.

ELECTRODES

When looking from the end of the meter into the inside bore, the two measuring electrodes are positioned at three o'clock and nine o'clock. M2000 mag meters have an "empty pipe detection" feature. This is accomplished with a third electrode positioned in the meter between twelve o'clock and one o'clock.

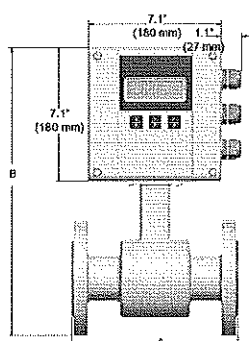


If this electrode is not covered by fluid for a minimum five-second duration, the meter will display an "empty pipe detection" condition, send out an error message if desired, and stop measuring to maintain accuracy. When the electrode again becomes covered with fluid, the error message will disappear and the meter will continue measuring.

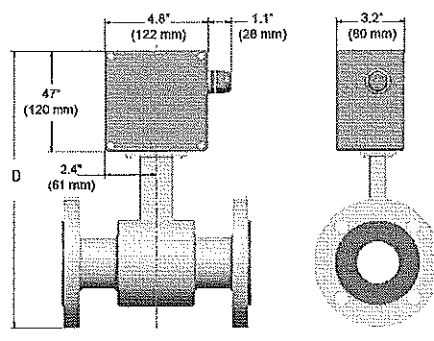
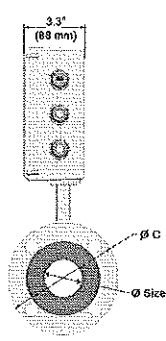
As an option to using grounding rings, a grounding electrode (fourth electrode) can be built into the meter during manufacturing to assure proper grounding. The position of this electrode is at five o'clock.

FEATURES

- Pulsed DC magnetic field for zero point stability
- Corrosion resistant liners for long life
- Calibrated in state-of-the art facilities
- Optional grounding rings or grounding electrode
- Measurement largely independent of flow profile
- NSF listed
- Integral and remote signal converter availability
- Available in sizes 0.25...54" (6...1400 mm)



Meter with M2000 amplifier



Meter with junction box for remote M2000 amplifier

Size		A		B		C		D		Est. Weight with M-2000		Flow Range			
												LPM		GPM	
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	lb	kg	min	max	min	max
1/4	6	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.063	20	0.02	5
5/16	8	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.114	34	0.03	9
3/8	10	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.177	53	0.05	14
1/2	15	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.416	125	0.11	33
3/4	20	6.7	170	14.2	361	3.9	99	11.5	293	13	5.5	0.75	225	0.2	59
1	25	8.9	225	14.4	366	4.3	108	11.7	298	18	8.0	1.20	350	0.3	93
1-1/4	32	8.9	225	15.2	386	4.6	117	12.5	318	20	9.0	2.00	575	0.5	152
1-1/2	40	8.9	225	15.4	390	5.0	127	12.7	322	21	9.5	3.00	900	0.8	239
2	50	8.9	225	15.9	403	6.0	152	13.2	335	26	11.5	4.70	1400	1	373
2-1/2	65	11.0	280	17.1	434	7.0	178	14.4	366	52	23.5	8	2400	2	631
3	80	11.0	280	17.3	440	7.5	191	14.7	372	54	24.5	12	3600	3	956
4	100	11.0	280	18.4	466	9.0	229	15.7	398	56	25.5	19	5600	5	1493
5	125	15.8	400	19.6	498	10.0	254	16.9	430	58	26.0	30	8800	8	2334
6	150	15.8	400	20.6	524	11.0	279	17.9	456	60	27.0	40	12700	11	3361
8	200	15.8	400	22.5	572	13.5	343	20.4	518	86	39.0	75	22600	20	5975
10	250	19.7	500	26.8	681	16.0	406	24.1	613	178	81.0	120	35300	30	9336
12	300	19.7	500	28.9	734	19.0	483	26.2	666	207	94.0	170	50800	45	13444
14	350	19.7	500	30.8	782	21.0	533	28.2	716	258	117	230	69200	60	18299
16	400	23.6	590	33.7	856	23.5	597	31.0	788	306	139	300	90400	80	23901
18	450	23.6	590	35.0	890	25.0	635	32.4	822	400	181	380	114000	100	30250
20	500	23.6	590	38.2	969	27.5	699	35.5	901	493	224	470	140000	125	37346
22	550	23.6	590	39.6	1005	29.5	749	36.9	937	523	237	570	170000	150	45188
24	600	23.6	590	42.2	1071	32.0	813	39.5	1003	552	251	680	200000	180	53778
28	700	23.6	590	46.2	1173	36.5	927	44.0	1118	648	294	920	275000	240	73100
30	750	31.5	800	48.3	1228	39.0	984	45.7	1161	702	319	1060	315000	280	84000
32	800	31.5	800	52.2	1325	41.4	1015	49.5	1257	768	349	1200	361000	320	95600
36	900	31.5	800	55.3	1405	46.0	1168	54.1	1374	848	385	1500	457000	400	121000
40	1000	31.5	800	60.0	1525	50.2	1230	57.4	1457	922	419	1900	565000	500	149300
42	1050	36.0	914	66.0	1675	53.0	1346	63.4	1610	1198	499	2100	620000	550	164600
48	1200	39.4	1000	69.9	1775	59.4	1455	67.2	1707	1208	549	2700	814000	720	215100
54	1400	39.4	1000	78.5	1995	68.4	1675	75.9	1927	1362	619	3700	1100000	980	292700

SPECIFICATIONS

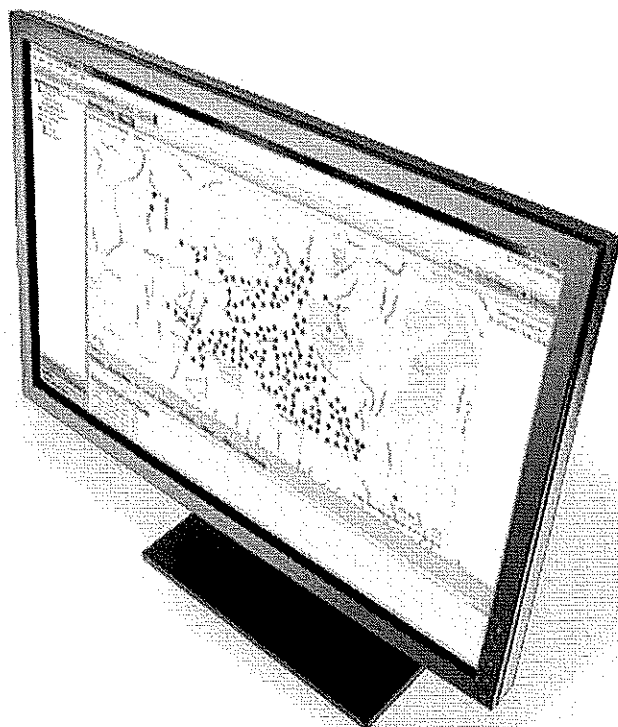
Flow Range	0.1 ... 39.4 fps (0.03 ... 12 m/s)	Pipe Spool Material	316 stainless steel
Min. Conductivity	≥ 5 micromhos/cm	Meter Housing Material	Carbon steel welded
Accuracy	± 0.25 percent of rate for velocities greater than 1.64 ft/s (0.50 m/s), ± 0.004 ft/s (± 0.001 m/s) for velocities less than 1.64 ft/s (0.50 m/s)	Flanges	Standard (ANSI B16.5 Class 150 RF): Carbon steel Optional: 316 stainless steel
Electrode Materials	Standard: Alloy C Optional: 316 stainless steel, gold/platinum plated, tantalum, platinum/rhodium	Meter Enclosure Classification	NEMA 4X (IP66) Optional: Submersible NEMA 6P (remote amplifier required)
Liner Material	PFA up to 3/8", PTFE 1/2 ... 24", soft and hard rubber from 1 ... 54" Halar* from 14 ... 40"	Junction Box Enclosure Protection	For remote amplifier option: Powder coated die-cast aluminum, NEMA 4 (IP65)
NSF Listed	Models with hard rubber liner 4" size and up; PTFE liner, all sizes.	Cable Entries	1/2" NPT Cord Grip
Fluid Temperature	With Remote Amplifier: PFA, PTFE & Halar 311° F (155° C) With Meter Mounted Amplifier: Rubber 178° F (80° C), PFA, PTFE & Halar 212° F (100° C), Rubber 178° F (80° C)	Optional Stainless Steel Grounding Rings	Meter Size Thickness (of one ring) Up through 10 inches 0.135" 12 ... 2" 0.187"

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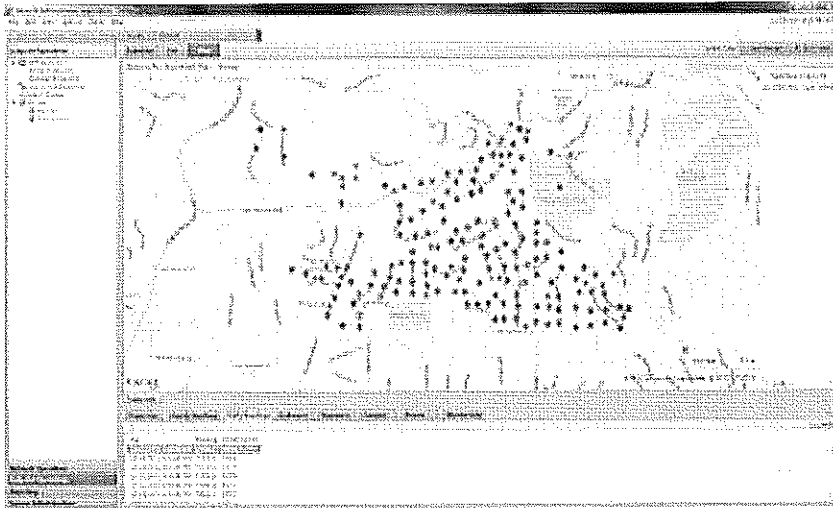
ChoiceConnectTM AMI Network Software

Comprehensive network data collection and system management

Itron's Network Software offers water providers the ability to transform their business through the analysis of meter data collected over the ChoiceConnect network. Network Software is a powerful tool that maximizes the fixed network system's performance and delivers granular data collected by the network into actionable intelligence that today's water providers require.

NETWORK SOFTWARE COMPONENTS

- » Network Administrative Application (NAA)
Administrative application that monitors the health of the entire fixed network system and exports defined reports.
- » Network Performance Application (NPA)
Web-based installation tool with long-term trending and analysis of fixed network performance.
- » Network Web Application (NWA)
Web-based window allows analysis capabilities of up to 400 days of collected data.



NETWORK ADMINISTRATIVE APPLICATION OVERVIEW

NAA runs automatic diagnostics on the current status of the ChoiceConnect fixed network and allows the system administrator to keep the system running smoothly. The application enables the utility to quickly assess the health of the fixed network by accessing reports on system conditions for ERT® communication modules and network collectors and repeaters. NAA also manages the network data collection, collecting consumption reads and time synchronized hourly interval reads for data logging and alarms, as well as data presentment and export options of the collected data.

Features and Benefits

NAA is a rich-client application designed primarily to collect and export consumption and event data and to allow the utility's system administrator to address and handle data processing exception and fault conditions as they are encountered.

NAA manages and executes:

» Network Status

- Visualization of collector, repeater and ERT location and status using integrated mapping technology
- Event notification capability for delivery of time critical system status information
- Over a dozen standard reports with capability to customize reports for specific utility needs including:
 - Leak Report
 - Tamper Report
 - Reverse Flow Report
 - Usage on Inactive Account
 - No Usage on Active Account
- ERT Properties
 - Monitor the status and operation of every ERT module in the network
 - See the hour-by-hour read rate of each ERT
 - Filter and search for a particular ERT, group or all ERTs that the system reads

» Data Collection Management

- Register and interval consumption data with 400-day storage
- Two-way communications to the ERT that enables:
 - On-Demand Consumption Read — to extract a specific read from a single ERT or from a specified group of ERTs
 - On-Demand Interval Data — to extract a specified range of historical interval data reads from a single ERT or specified group of ERTs
- ERT Readings
 - View readings for a specific ERT in the system
- ERT Tamper and Alarms
 - View tamper information for a specific ERT

NETWORK PERFORMANCE APPLICATION

Long-term network performance data is provided via the web based NPA. NPA measures network performance during deployment activities to ensure proper read requirements are met. It also provides a comprehensive analysis of long term performance and health of the network using graphs, charts and mapping to articulate critical, device specific information for effective network management.

Features and Benefits

NPA is a deployment tool for use by Itron Professional Services staff during initial rollout of a fixed network system. NPA allows the Project Manager to input a baseline schedule of when ERTs should be installed according to the overall project schedule, and as these ERTs come on-line and are heard by the network. Their actual installation date is shown on a graph superimposed on the original baseline. Thus, NPA allows project managers the ability to track actual project progress against planned. Once deployment has been completed, the customer retains access to NPA.

NPA software provides additional value to customers over the life of the system by allowing customers to trend and analyze system performance beyond the 18 months that is available via the NAA diagnostic tools.

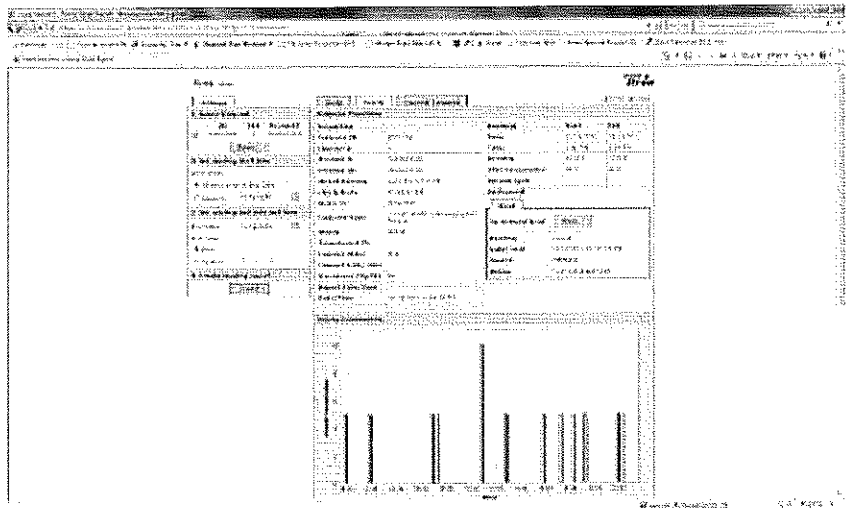
A principal benefit of NPA is to increase the read rate reliability of the network. This is done with the Adaptive Channel Planning. This feature resides in NPA and uses a variety of mathematical and statistical methodologies to detect when and/or if certain RF channels may be suffering degraded performance within the ISM band. Once pre-selected performance thresholds are crossed, Adaptive Channel Planning uses two-way communication (as described in NAA) to transmit a channel plan that blocks suspect channels from further use, therefore increasing overall read rate reliability. Should the suspect channel later be detected as available (hysteresis window is typically about one month), a new channel plan will be issued again via two-way making that channel once again available for use.

NPA enables:

- » Ability to analyze network performance by route, region, city or other configurable group
- » Long-term network performance trending
- » Delivery of daily read and interval data statistics
- » Acquisition of meter read redundancy reports
- » Visualization of Cellular Control Unit's (CCU's), repeaters and communication modules (100W & 60W ERT modules) in map view
- » Scalable network expansion to support future needs

NPA provides utilities with a comprehensive set of CCU performance analysis that allows users to view:

- » Collector Properties
Review CCU configuration and change assigned WAN type and grouping.
- » Communications
The CCU Detail read-only tab displays the collector's current communication settings.
- » Scan Schedule
Show the scan schedule properties inherited from the configuration group the CCU is currently assigned to.
- » ERT Type
Summary view of the ERT type.
- » ERT Type Exclusions
Summary view of the ERT type exclusion properties inherited from the configuration group that the collector is currently assigned to.
- » CCU Alarms
Shows reported alarms for a specific time period.
- » CCU Data Update Log
Monitor communication status for the system devices as well as view communication statistics for the selected CCU over a specified time period.



NETWORK WEB APPLICATION

NWA allows you to quickly access and analyze up to 400 days of collected daily and hourly data in an easy-to-use web browser interface — without the necessity of loading and managing rich-client software and without the inconvenience of wading through numerous system administration functions simply to access consumption information for a selected account.

Features and Benefits

- » Account Search
Offers the ability to search on specific parameters including Account#, City, State, Zip, ERT ID, Meter ID, Premise ID, and Transformer ID. Wildcards are permissible.
- » Daily Consumption Tab
Once an account is selected, all associated properties information is displayed as well as the most current read date, time, and reading.
- » Hourly Consumption Tab
Clicking on the HOURLY tab presents all the same information as the DAILY tab, but the daily line graph changes to a bar chart showing hourly consumption for each of the 24 hours of the selected day.
- » On-Demand Read
In either the Daily or Hourly tab, there is a button labeled "ON DEMAND READ". This button when clicked delivers the same functionality as the "On-Demand Consumption Read" feature described in NAA.
- » Current Tamper Tab
By clicking on the current tamper tab all active tampers will show including cut cable and reverse-flow.

FEATURE SET

Fixed Network Software

Network Administration Application (NAA)

» Endpoint Operations Domain

- Summary Page
 - Active Endpoint Count
- Endpoint List Page
 - Endpoint Properties Tab
 - Daily Readings Tab
 - Hourly Readings Tab
 - Collectors Tab
 - Repeaters Tab
 - Tamperers Tab
 - Alarms Tab
 - Membership Tab

- Collector/Repeater List Page
- Diagnostic Map Page
- System Status Summary Page
- » Operational Reports
 - Leak Report
 - Tamperers Report
 - Reverse Flow Report
 - Usage On Inactive Report
 - No Usage on Active Report
 - Endpoints Reporting Alarms Report
 - Collectors Reporting Alarms Report

Network Web Application (NWA)

- » Daily Consumption - Single Account (400 Day View)
- » Hourly Consumption - Single Account (24 Hour View)
- » Compare 400 days of data (i.e. Daily - same month, previous year)
- » On-Demand Read (Up To 40 Days)
- » On-Demand Read (Up To 40 Days)

Network Performance Application (NPA)

- » Measure network performance against baseline ERT installation schedule
- » Comprehensive performance analysis tool using graphs, charts, mapping



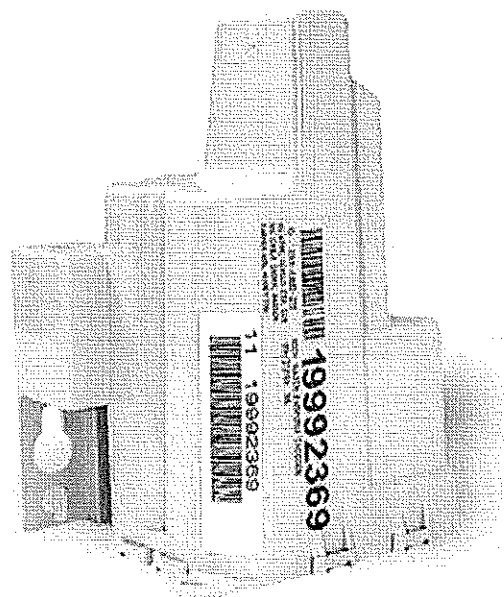
At Itron, we're dedicated to delivering end-to-end smart grid and smart distribution solutions to electric, gas and water utilities around the globe. Our company is the world's leading provider of smart metering, data collection and utility software systems; with over 8,000 utilities worldwide relying on our technology to optimize the delivery and use of energy and water.

To realize your smarter energy and water future, start here: www.itron.com

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100W

Water Communication Module

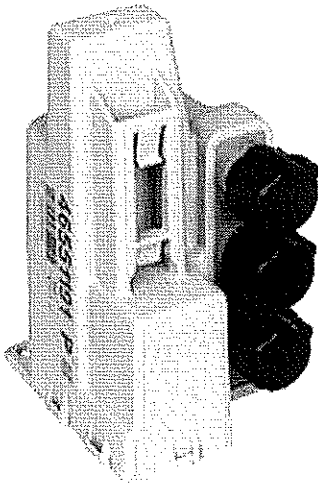
The 100W ERT® communication module is the latest addition to Itron's portfolio of advanced metering devices for water utilities. Featuring a compact design, industry-leading battery life and technology designed to adapt and grow with your business, the 100W module can help you streamline your operations and maximize your resources today and into the future.

100W ERT modules are available in two housing designs, supporting both water pit and remote installations. The different 100W ERT modules are identified as follows:

- » 100W is to be utilized with encoder registers in a pit environment
- » 100WP for pulser registers in a pit environment
 - All new 100W ERT modules for pit applications will come standard with a red integral connector port to utilize the optional 100W Through-The-Lid (TTL) antenna
- » 100W-R for encoder registers in remote applications
- » 100WP-R for with pulser registers in remote applications

These modules offer advanced two-way meter data collection designed specifically for Itron collection systems using handheld, mobile, fixed network and combination hybrid solutions. 100W ERT modules differentiate themselves from other devices on the market by providing true two-way

communications capabilities. Engineered from the ground up to leverage the benefits of ChoiceConnect™ collection systems, 100W ERT modules enable easy migration from mobile to fixed network operations as your business needs evolve. With Itron's complementary communications technology, fixed and mobile network systems can be deployed side-by-side in hybrid configurations to ensure maximum efficiency and reliability in both high and low-density meter populations.



100W

Water Meter Compatibility

The 100W ERT module is compatible with industry-leading water meters from Itron—as well as those from all major manufacturers such as Badger, Elster AMCO, Hersey, Master Meter, Neptune and Sensus—enabling water utilities to consolidate all their water meters under a single reading system. Powered by proven, advanced lithium battery technology; the module is designed for 20 years of battery life in both fixed network and mobile modes.

Data Logging

The 100W ERT module stores 40 days of hourly consumption information, which can be collected by the fixed network system to leverage real time data collection or can be read by mobile or handheld systems. This data is presented in four basic use cases:

- » Any hourly reading within the last 40 days
- » A set of 24 consecutive hourly readings
- » A set of 40 daily readings
- » A set of 40 days of hourly interval data are available even in mobile mode

Superior Performance

The 100W ERT module utilizes 120 radio channels in Fixed Network and 50 radio channels in mobile and handheld modes, randomly selecting one channel for each data message. This multi-channel approach delivers higher read integrity over competing products by reducing the effect of interfering signals from other radio frequency (RF) signals in the area. The 100W ERT module will transmit the Fixed Network consumption messages at peak radiated power greater than 1 Watt.

Reliability

100W ERT modules feature a circuit assembly and battery pack that are fully encapsulated within a specially-formulated potting material to completely protect internal components from water, contaminants, corrosion, rough handling and temperature cycling. With their straight forward, rugged design, 100W ERT modules use substantially fewer components than most competing products, resulting in greater reliability. The advanced, integrated antenna operates effectively in a wide range of meter box installations. The 100W ERT module offers peace of mind with a 20 year limited warranty.

Lower Cost of Ownership

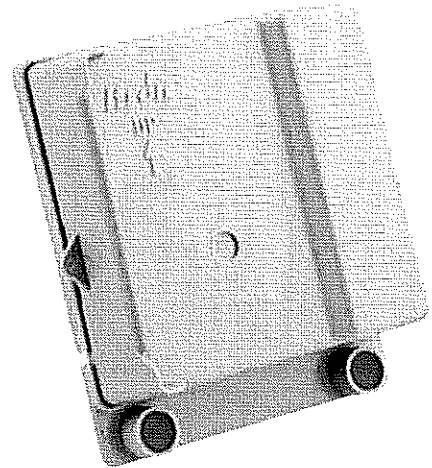
100W ERT module devices feature industry-leading battery life, ensuring your meter data collection investment achieves substantially better financial returns than competing products with batteries that typically last only ten or twelve years. When one considers the advancements in leak, reverse flow (absolute encoder version only) and tamper detection, 100W modules necessitate fewer field investigations and substantially lower expenditures for installation, meter reading, customer service and field service. And with a low battery alarm, these modules help utilities better plan and manage the replacement of units in the field.

Leak Management

Water loss management is critical to any water utility's success. 100 Series modules can be paired with Itron's advanced acoustic Leak Sensor. The Leak Sensor collects and analyzes changes in pipe acoustics that indicate probable leaks in the distribution system environment to detect both new and pre-existing leaks automatically. Leak Sensor technology, coupled with the module's internal customer-side leak detection algorithm and the option to use data from groups of 100W ERT modules (District Metering) provide the utility with a highly accurate picture of the overall health of the water distribution system.

Leak Data

The 100 Series collects and stores the data from the Leak Sensor. The Leak Sensor samples the pipe conditions every 22.5 minutes or 64 times daily. The 100 Series stores the 8 quietest analyses daily and will hold 20 days worth of data. This data is picked up during normal meter reading operations and seamlessly transfers the data to our hosted web based solution (mlogonline).



100WR

100W ERT MODULE SPECIFICATIONS

Functional

- » Power Source: Two "A" cell lithium batteries warranted for 20 years
- » Maximum meter register pulse frequency (pulse version only): 4 Hertz
- » Operating temperature:
 - -40°C to +70°C for remote applications
 - -20°C to +60°C for pit applications
- » Storage temperature: -40°C to + 75°C for maximum of 1,000 hours
- » Humidity limits: 0 to 100% (submersible)
- » Maximum register cable dimension: 300 feet with Itron-approved cable and splice connectors
- » Meter compatibility: See Water Module Meter Compatibility Guide (PUB-0063-002)

Transmission Parameters

- » Data message:

Multiple RF channel transmissions of meter register value, cut cable and or communication error tamper(s), reverse flow (encoder version only) and system leak status messages, as well as low battery indicator is transmitted every nine seconds in mobile mode. All this information and last 7 time synchronized consumption intervals is transmitted every five minutes along with a contingency SCM (Standard Consumption Message) every 60 seconds in fixed network mode
- » Transmitter frequencies:
 - 908 - 924 MHz (Standard Power) in mobile mode
 - 903 - 926.8 MHz (High Power) in fixed network mode
- » Operates in bubble-up mode and does not require a license from the Federal Communications Commission (FCC) or Industry Canada (IC)
 - FCC Part 15.247
 - Industry Canada RSS-210

Approved Reading Devices for Collecting Datalogging Reads

- » Network system: Itron Fixed Network 100 Collectors and Repeaters (CCU 100 and Repeater 100) which offer full two-way communication capability.
- » Drive-by system:
 - MC3 with MV-RS v8.0 or higher and FCS with v2.2 or higher
 - MC Lite with MV-RS v8.1 or higher and FCS with v2.3 or higher
- » Walk-by system:
 - FC300 with SRead handheld computers with MV-RS v8.1 or higher and FCS with v2.3 or higher
 - FC200SR (part number FC2-0005-004 or FC2-0006-004 will support datalogging) handheld computer with MV-RS v8.1 or higher and FCS with v2.3 or higher

Approved Reading Applications

- » Multi Vendor Reading System (MV-RS) v8.1 or higher or FCS v2.2 or higher software can read the 100W ERT module Standard Consumption Message (SCM) and Datalogging with the following reading devices: MC3 v3.3 or higher
- » Multi Vendor Reading System (MV-RS) v8.2 or higher can read the 100W ERT module Standard Consumption Message (SCM) and Datalogging with the following reading devices: MC3 v3.3 or higher, FC300SR, FC200SR, and MCLite

Approved Programming Devices

- » FC200SR with Field Deployment Manager (FDM) version 1.1 or higher software
- » FC300SR with Field Deployment Manager (FDM) version 1.1 or higher software
- » 900 MHz Belt Clip Radio Field Deployment Manager (FDM) version 1.1 or higher software

The 100W encoder version does not require any programming—it automatically detects the register type within one hour of being connected. 100W ERT modules do not require a FCC license.

Programmable Mode Options

- » Mobile/Handheld Mode
 - This is the standard mode in which all 100W ERT modules will be shipped. This mode should be utilized when mobile or handheld meter reading will be the primary method of collecting the Standard Consumption Message (SCM) or datalogging reads.
 - The SCM will bubble-up in this mode every 9 sec. at standard power optimized for mobile read rate performance.
 - The battery life for this mode is 20 years
- » Fixed Network (FN) Mode
 - This mode is to be utilized when fixed network will be the method of meter data collection
 - A high power Network Interval Message (NIM) will be transmitted every 5 minutes with a contingency SCM message transmitted every minute at standard power
 - FN mode can be programmed at the factory, during installation with an approved handheld device or through mobile application after initial installation and programming
 - The battery life for this mode is 20 years
- » Hard-to-Read Mobile/Handheld Mode
 - This mode should only be used when communication modules are installed in difficult to read locations where standard mobile mode is not sufficient for satisfactory reading performance
 - This mode will bubble-up an SCM at 30 seconds with high power output to optimize performance of these unique applications
 - The battery life of this mode is greater than 10 years

» High Power Mobile Mode

- This mode should be used when communication modules are installed in difficult to read environments where there is a high concentration of unfriendly RF and where standard mobile mode is not sufficient for satisfactory reading performance
- This mode will bubble-up and SCM at 60 seconds with a higher power output to optimize performance of these unique applications
- Battery life for this mode is 20 years

100W & 100WP Pit Dimensions

- » Height: 4.5 inches
- » Maximum diameter:
 - Lower: 3.90 inches
 - Upper: Approx. 1.70 inches
- » Weight: Approx. 9.6 oz.
- » Module cable length without integral connector: 5 feet and 20 inches (for register direct mounting)

- » In-line connector register cables: 5 feet and 25 feet (ordered separately)
- » Pit models can be installed up to 300 ft. from meter

100WR & 100WP-R Remote Dimensions

- » Height: 4.5 inches
- » Width: 5.05 inches
- » Depth: 1.47 inches
- » Weight: Approx. 9.6 oz.
- » Module cable length 10 inches
- » Remote models can be installed up to 300 ft. from meter

Mounting Options

The 100W and 100WP models have a compact housing and features specifically designed for water pit mounting options

- » Direct-mount for Badger, Elster and Hersey meters
- » Rod-mount on a ½ inch diameter fiberglass or other non-metallic rods

- » Shelf-mount for pit lid manufactures that contain recessed cavity on the underside of the pit lid

- » Through-the-lid mounting with a pre-drilled 1.75 inch hole and up to 2.5-inch maximum lid thickness

- » Direct-mount to any flat surface with screw kit

The 100W-R and 100WP-R models are designed for remote mounting applications

- » Wall-mount for installation to the side of residence or building using screw kit
- » Pipe-mount for installation on pipe sizes from ¾ inch up to 4 inch
- » Direct-mount for Badger and Elster meters

Regulatory and Standards

- » FCC Part 15.247
- » Industry Canada RSS-210



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FC300

Ultra-Rugged Handheld Computer

In today's rapidly evolving utility landscape, energy and water providers need reliable, proven technology that helps them operate as efficiently as possible. Itron's latest handheld computer—designed specifically for the utility industry helps them do exactly that.. Built from the ground up and backed by Itron's 30 years of handheld experience, the Field Collector 300 (FC300) handheld computer offers fast and efficient production from the field with state-of-the-art mobile processing power. Able to withstand the rigors of continuous field work, the FC300 is built to military specifications for ultra-ruggedness. Communications flexibility is built into the FC300 by integrating multiple wireless communication technologies or fast ethernet. GPS and an imager/ barcode reader are additional features that set the FC300 apart.

When looking for a handheld computer that excels at maintenance and reading of all electric, gas and water meters as well as other tasks, the FC300 is truly an all- in-one utility automation tool.

SPECIFICATIONS

Operating System

- » Windows CE 5.0 Professional
- » Non-volatile storage of resident drivers, applications and settings

Processor

- » Marvel PXA320 @ 800 MHz

Memory

- » SD card expansion slot, 1 GB, standard
- » 128 MB SDRAM
- » 128 MB Flash

Display

- » 3.7" (93.98 mm) color QVGA
- » ¼ VGA 320 X 240 pixel LCD Color TFT capable of 16-bit color (65,536 colors)
- » Outdoorreadable,transflective

Touchscreen

- » Resistive touchscreen allows the use of finger or passive stylus (included)

Keypad

- » Backlit 51 key alphanumeric keypad, including navigation keys
- » Large primary numeric keys GPS
- » Built-in GPS receiver (optional)

Integrated SRead Radio

- (order option for North America)
- » 16 MHz wide receiver for receiving Itron ERTs and meters with RF technology
- » Advanced interference rejection technology for noisy RF environments
- » 80 channel receiver for improved reading performance

Integrated RF Master 433

RADIAN Radio

(order option for Europe and Australia)

- » RADIUM protocol compatible
- » 433.82 MHz receiver for receiving Itron RADIUM ERTs and meters with RF Technology, Modulation: FSK
- » ERP < 10mW

Flashlight

- » Built-in LED flashlight located at the top of the handheld

Interfaces

- » USB host and client port
- » Serial port (Hirose connector for probing)
- » Powered RS-232 port
- » 10/100 Ethernet port

Batteries

- » Lithium Ion rechargeable battery pack (2500 mAh)
- » Internal clock backup battery (5 year life)
- » Back-up battery included for hot swapping of batteries
- » Full shift life with typical usage
- » Fast recovery backup power for data retention
- » Main battery low warning
- » Action power management (configurable)

Audio

- » Integrated speaker with adjustable volume control
- » Built-in microphone

Integrated Wireless Data Communications

- » GSM/GPRS wireless WAN (optional)
- » 802.11b/g wireless LAN (optional)
- » Bluetooth 2.0 + EDR Class 2 Radio (standard)

Feedback and Status Indicators

- » Built-in vibration device for warning notifications
- » Large system status LEDs and power status LEDs

Imager/Barcode Scanner

(order option)

- » Built-in imager for linear and 2D barcode scanning
- » Monochrome imager for image capture

Case

- » Impact resistant plastic case
- » Rubberized over mold on all impact areas for added protection

Dimensions

- » Length: 9.94"(25.2cm)
- » Width: 3.86"(9.8cm)
- » Depth: 2.79"(7.1cm)

Weight

- » FC300 (base configuration): 31 oz (879 g) including batteries

Docking Stations

- » Single desk dock (ethernet, USB client, USB Host and serial connectivity, additional spare battery charger)
- » Multi-dock (5 unit)- ethernet connection only (daisy chain capability)

- » Vehicle dock - I/O connectors
- » Vehicle power charging adapter
- » Carry case for FC300 with SRead radio
- » Carry case for FC300 without SRead radio
- » Holster for FC300 with storage for optical probe

Environmental

- » Shock resistance exceeds Mil. Std. 810F
- » Vibration immunity to Mil. Std. 810F
- » Sealing for dust and water - IP 67 (with and without battery installed)
- » Operating temperature: -4°F to 122°F (-20°C to 50°C)
- » Storage temperature: -4°F to 158°F (-20°C to 70°C)
- » Humidity: 5 to 95% non-condensing
- » Drop: 6 feet (1829 mm) to concrete
- » Tumble: 2000 1m tumble test
- » Immunity: (EMC) EN 55204:1998
- » Emissions: (EMI) FCC Part 15, Subpart B, Class A; EN 55022, Class A (CISPR 22)
- » Safety: UL 60950-1, CSA C22.2 No. 60950-1, EN 60950, IEC 60950
- » Laser safety: 21 CFR 1040.10, IEC 60825-1
- » Battery safety: UL 2054, IEEE 1725
- » Radio: FCC Part 15 subpart C, IC RSS210, 102, EN 300 328, China SRRC, Singapore IDA, Malaysia SIRIM
- » Radio safety: FCC O.E.T. Bulletin 65 Industry Canada RSS 102, EN 50360

Warranty

- » 1 year comprehensive warranty
- » Annual maintenance program available



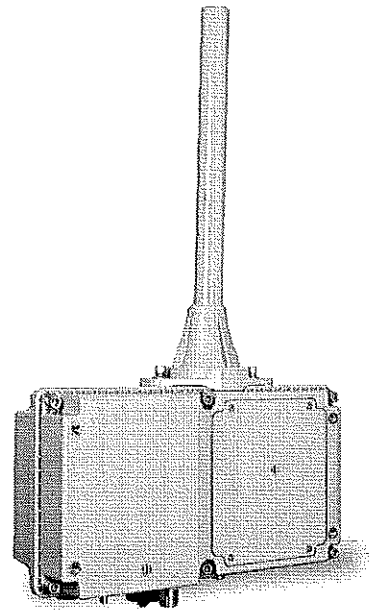
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CCU 100

Acquiring meter data is one half of the equation in a successful fixed network system. The other half is delivering that information back to the utility. With the onset of advanced metering initiatives and more robust collection of interval and event data, ensuring your information arrives where and when it should becomes critical. Devices that transport data across the network are a critical link, connecting utility and consumer.

Itron's new CCU 100 makes that link stronger than ever. The CCU 100 (also known as a collector) reads data from Itron electricity meters, gas and water endpoints, and repeaters. Data is forwarded from the collector to the utility over a public wide area network (cellular-based WAN or broadband) or a private WAN supporting IP-addressable packet data. Data is automatically uploaded to the Itron Fixed Network Software and can be used for billing as well as advanced applications and analysis in a meter data management system. Data uploads occur at scheduled intervals. The CCU 100 can also facilitate on-demand requests when needed.

Collectors operate on a 120/240 auto-sensing volt service and are equipped with a backup battery. In the event of an outage, the collector sends an alarm to the Itron Fixed Network Software with information describing various events, including power loss, restoration, and low-battery conditions.

FEATURES AND BENEFITS

Itron's latest fixed-network collector, the CCU 100, supports the needs of today's evolving utility by providing:

- » Two-way communication to endpoints and to the repeater to collect on-demand reads and issue network commands
- » Robust collection of time-synchronized interval data, when coupled with a meter data management system, helps utilities:
 - Improve customer service
 - Refine forecast consumption
 - Manage and control tamper and theft
 - Develop new rate-based and customer incentive programs
 - Better respond to customer "what-if" questions
- » Time-synchronization of endpoint clocks, ensuring data collected territory-wide is accurately time-stamped
- » Retrieval of missing interval data in the event of a network outage
- » A compact device footprint that is lightweight and unobtrusive
- » Flexible and easy installation including tower, building or utility pole-mount options
- » Low power consumption
- » Solar-powered configurations for locations where hard-wired power is not readily available
- » Multiple communication options for public and private WAN backhauls. Public and private technologies can be combined in a deployment, providing a hybrid approach best suited to the communication strengths of a given area

SPECIFICATIONS

Functional

» Power Requirements

- Power source: 90VAC to 265VAC/ 47 Hz to 63 Hz
- Power consumption: 12 Watts
Maximum 7.5 Watts Typical
- Power cable with photocell adapter for street light mount
- Power connectors: watertight and keyed
- Backup battery: 6 VDC, 4.5 AH lead-acid, 1.5 hour operating duration

» Operating Environment

- Operating and storage temperatures: -40C to +60C (-40F to 140F) ambient
- Operating humidity: 0 to 95% non-condensing relative humidity

» Product Details

- Product life: 15 years
- Product identification: numeric and bar code serial number
- Certification: meets or exceeds applicable ANSI C12.1 or equivalent standards

Operational

» Endpoint Transceiver Operating Frequency

- 903.0-926.8 MHz

» Backhaul Specifications

- Ethernet
- Flexible Private LAN options via Ethernet connection
- HSPA/UMTS
- EDGE/GPRS/GSM
- CDMA EV-DO Rev A
- CDMA 1xEV-DO Rev 0
- CDMA 1xRTT
- CDMA IS-95

Regulatory and Standards

» FCC, CFR 47, Part 15 Class B certified

Physical

» Dimensions

11.6" x 6.3" x 3.9" (29.5 cm x 16.0 cm x 9.9 cm)

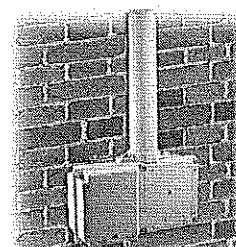
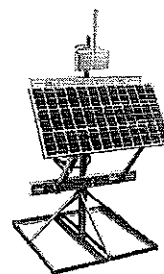
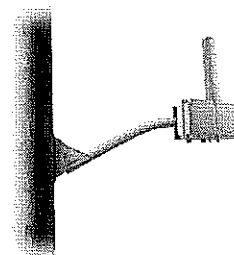
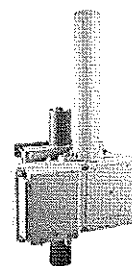
» Weight - 6.3 lbs. (2.9 kg) with battery

Installation Methods

- » Utility pole mount
- » Street light pole mount, optional photocell power adapter
- » Roof mount
- » Wall mount
- » Tower configuration

Host Processing Software

- » Itron Network Software
- » Optional Hosted Services



Mounting Options



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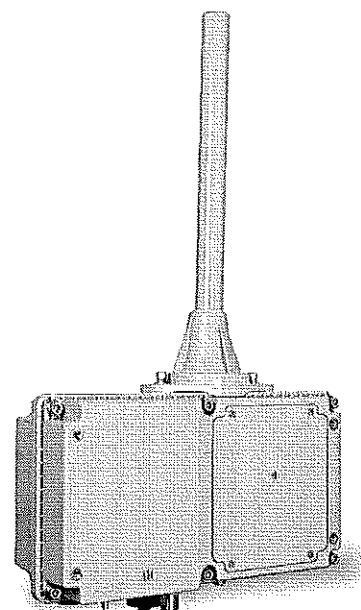
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Repeater 100

There are a variety of factors that play into a network's performance and reliability. Buildings, vegetation, RF interference and more can all impact data collection and transport. When collecting meter reading data, ensuring that you have the proper network coverage is mission-critical.

The Repeater 100 collects meter data from Itron electricity meters, gas and water endpoints and relays it to collectors within the network. Operating in the 900 MHz radio band, repeaters are used to extend the range of the network and add reliability and redundancy to the communication path between endpoints and collectors. This makes the ChoiceConnect network much more cost-effective by reducing the number of required collectors.

Repeaters can be installed on towers, buildings, poles or other structures. Once installed, repeaters automatically discover and connect to collectors and endpoints within range. The Repeater 100 also provides two-way communication capabilities with 2-way enabled endpoints, allowing for on-demand reads throughout the network.

FEATURES AND BENEFITS

The Repeater 100 helps to:

- » Expand network coverage in hard-to-read areas due to topography or other signal disturbances
- » Expand network coverage without additional backhaul costs
- » Low power requirements enable cost effective solar deployment
- » Enable auto-discovery of endpoints beneath the repeater footprint. Collectors discover repeaters in a similar process
- » Forward positive out notification (PON) and positive restoration notification (PRN) messages for timely and accurate outage detection
- » Facilitate a cost-effective and flexible fixed network solution
- » Provide multi-channel frequency hopping that:
 - Scans for endpoint transmissions
 - Decodes and validates packets
 - Filters packets—reduces transmissions of recent and frequently heard meters
 - Retransmits packets on a new channel away from endpoint channels
- » Status message delivery to collectors for network troubleshooting
- » Offer increased reading redundancy at a lower cost

SPECIFICATIONS

Functional

- » Power source:
 - Single-phase 120-240V AC auto-ranging
 - Optional solar power configuration
- » Power consumption: 5 Watts typical
- » Operating and storage temperatures: -40°C to +60°C (-40°F to +140°F)*
- » Operating humidity: 5 to 95% non-condensing relative humidity
- » Product identification: Numeric and bar-coded repeater module serial number
- » FCC compliance: Part 15 certified
- » ANSI compliance: C12.1 standards

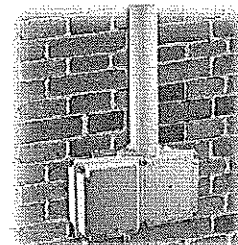
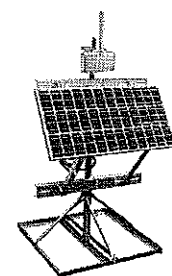
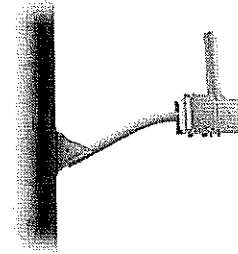
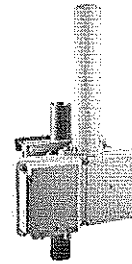
Operational

- » Receive/transmit frequency range: 904-924 MHz
- » Data integrity: Verified in every message

Dimensions

- » Height: 6.3" (16 cm) without antenna
- » Width: 11.6" (29.5 cm)
- » Depth: 3.9" (9.9 cm)
- » Weight: 6.31 lbs with battery

Mounting Options



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