NEPTUNE
TECHNOLOGY GROUP

HP PROTECTUS® III
Field Testing Guide

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Field Testing Guide

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FCC Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio / TV technician for help.

RF Exposure Information

This equipment complies with the FCC RF radiation requirements for uncontrolled environments. To maintain compliance with these requirements, the antenna and any radiating elements should be installed to ensure that a minimum separation distance of 20 cm is maintained from the general population.

Professional Installation

In accordance with section 15.203 of the FCC rules and regulations, the MIU must be professionally installed by trained meter installers.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Industry Canada (IC) Statements

Section 8.4 of RSS-GEN

This device complies with Industry Canada License-exempt RSS standard(s). Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Cet appareil est conforme aux normes RSS exonérées de licence d'Industrie Canada. L'opération est soumise aux deux conditions suivantes: 1) cet appareil ne doit pas provoquer d'interférence, et 2) cet appareil doit accepter toute interférence, y compris les interférences pouvant entraîner un fonctionnement indésirable de l'appareil.

Section 8.3 of RSS-GEN

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter IC: 4171B-L900M has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

- Maximum permissible gain of +1 dBi and required impedance of 75 ohm.
- Approved Antenna types:
    - R900® Pit Antenna, part number 12527-XXX.
    - High Gain R900® Pit Antenna, part number 13586-XXX.
    - R900® Wall Antenna, part number 13717-000.
    - Wire monopole, part number 12641-XXX.

En vertu de la réglementation d'Industrie Canada, cet émetteur radio ne peut fonctionner qu'avec une antenne d'un type et un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Pour réduire les interférences radio potentielles avec d'autres utilisateurs, le type d'antenne et son gain devraient être choisis de manière à ce que la puissance rayonnée isotropiquement équivalente (e.i.r.p.) ne soit pas supérieure à celle nécessaire à une communication.

Cet émetteur radio IC: 4171B-L900M a été approuvé par Industrie Canada pour fonctionner avec les types d'antennes énumérés ci-dessous avec le gain maximal admissible et l'impédance d'antenne requise pour chaque type d'antenne indiqué. Les types d'antenne non inclus dans cette liste, ayant un gain supérieur au gain maximal indiqué pour ce type, sont strictement interdits pour être utilisés avec ce périphérique.

- Gain maximal admissible de +1 dBi et impédance requise de 75 ohms.
- Type.(s) d'antenne approuvé
    - Antenne de puits R900®, numéro de pièce 12527-XXX
    - Antenne de puits à gain élevé R900®, référence 13586-XXX
    - Antenne murale R900®, numéro d'article 13717-00
    - Fil monopôle, numéro d'article 12641-XXX

HP PROTECTUS® III Installation and Maintenance Guide
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Chapter 1: Product Description

This chapter provides general information on field testing, testing methods and flow tests for the High Performance (HP) PROTECTUS® III Fire Service Meter (subsequently referred as HP PROTECTUS III meter).

Testing Best Practices

Consider the following before testing the HP PROTECTUS III meter.

- Perform maintenance according to the American Water Works Association (AWWA) schedule.
- Perform at least three flows per meter, starting at the low flow.
- Ensure the T-10® bypass is open. It should always be open during the test. The HP PROTECTUS III meter uses the bypass at all flow rates. When operating normally, at medium to high flow rates, the meter uses the turbine and T-10 bypass in unison. They must both be open and active when testing the meter.
- Check to see if a test tee is installed downstream of the meter. If no test tee is present, test the meter out of the test port on top of the knuckle valve housing.
- Ensure the bypass and isolation valves inline with the meter are fully closed. If the meter appears to be under registering, make sure the downstream isolation valve is fully closed. Do this by opening and closing the valve several times to break loose any buildup on the valve seat.
- Calculate the total meter usage by adding the accumulation from the T-10 bypass and mainline turbine.

Factors to Consider

AWWA recommends on-site testing of large meters on a regular basis. Cost of performing maintenance is relatively small compared to the revenue generated from properly functioning large meters.

Testing Methods

Accuracy is determined using a point of reference. Following are three common points of reference:

- Volumetric — calibrated tank.
- Gravimetric — weight scale.
- Reference Meters — known good meters.

Volumetric

Consider the following:

- Be sure to have a calibrated tank.
- Calibrate volumetric tanks annually.
- Wet the tanks prior to conducting initial tests.

Gravimetric

Consider the following:

- Uses a weight scale.
- Calibrates scale annually.
- Does not require a wet tank.

Reference Meter

Consider the following:

- Keep calibration certificates up to date on known good meters.
- Run a volume-to-volume comparison.

Things to Remember

Consider the following:

- Keep in mind the test provides a snap shot only.
- Start at low flow, then medium, and high flow rates.
- Repeat any failed test to verify the result. Keep in mind that isolation valves are fully sealed off and do not allow any unaccounted-for flow to seep through.
- Avoid cavitation (maintain 20-30 psi at reference meter).
- Remember that a reference meter is not always 100% accurate at all flow rates.
- Make sure the reference meter has a calibration certificate.
- Make sure to follow reference meter setup recommendations.

Flow Tests

There are three primary flow tests on the HP PROTECTUS III.

- Low Flow.
- Crossover.
- Medium to High Flow.

Low Flow

Consider the following:

- Varies depending on meter size.
- Captures the flow through the T-10 bypass.
- Allows the utility to accurately capture a very large flow range moving through the meter.

Crossover

AWWA defines crossover as, "the beginning of the crossover is when the accuracy of registration falls below 97% caused by the operation of the automatic valve mechanism (knuckle valve), and the end of the changeover is when the accuracy of registration again reaches 97%" (AWWA C703-11 Section 4.2.6.1).

- Varies depending on meter size.
- Occurs when the flow rate is increasing to a rate that it can begin to open the knuckle valve.
- Allows water to begin to register on the turbine measuring element.

The flow rate through the T-10 begins to be choked by the throttle at the beginning of crossover. This protects the T-10 and helps the meter transition through crossover.

There is a slight accuracy drop when transitioning through crossover.

Medium to High Low

Consider the following:

- Knuckle valve is fully open and water is registering on the turbine measuring element.
- Water is captured through the T-10 bypass.
- T-10 bypass is regulated by the throttle valve.
- Water is still moving through the T-10, but is limited.

Equipment Needed

This section discusses the equipment needed to test the meter.

Recommended Tools

The following figure shows the recommended tools you need to perform the field testing on the HP PROTECTUS III meter.

Figure 1 – Tools Needed

The following table lists the recommended tools you need to successfully test the meter.

Table 1 – Recommended Tools

Item	Description / Recommendation	Use
Tool Kit	Contains standard tools including: • Pipe wrenches. • Crescent wrench. • Hammer. • Pliers.	Perform various installation procedures.
Flashlight	N/A	Activate the register LCD.
Ladder	N/A	Get into a deep pit.
Safety glasses	N/A	Protect eyes.
Retainer Clip	P/N: 5500-153, or 154, or 155 (depends on meter size.	Use for knuckle valve assembly.

Chapter 2: Test Requirements

This chapter provides information on testing requirements.

Required Tests

Testing a fire service meter requires at least three tests.

- One flow test on the low side.
- One medium flow test on the low side above low flow, but below the beginning of crossover.
- One flow test on the high side.

A test performed within crossover range is acceptable, but not always necessary.

Recommended Flow Rates

This section provides in-field testing performance specifications.

Table 2 – HP PROTECTUS® III In-Field Testing Performance Specifications

Size	Low Flow (95 - 101%)	Crossover (no less than 85%)	High Flow (98.5 - 101.5%)
4	¾ GPM	15 – 25 GPM	300 GPM
6	1½ GPM	35 – 45 GPM	625 GPM
8	2 GPM	50 – 65 GPM	1000 GPM
10	2 GPM	55 – 65 GPM	1625 GPM

- Accuracy limits shown in Chapter 1 on page 1 are adapted from the AWWA M6 manual.
- Test numbers are adapted from AWWA manual M6 Fifth Edition.
- Crossover can have slight variations depending on all elements present in the test setup.
- Cavitation is more likely to occur during a high flow test when using a reference meter. Be sure that you are maintaining 20 – 30 psi at the reference meter during the high flow test.
- AWWA allows a minimum accuracy of 90% for repaired meters.

- AWWA M6 states that testing of high rates of flow can be achieved by testing the meter at 25% of the meter's rating if the manufacturer's original test certificate indicates a linear curve between 25% and 100% of the rated flow range.

Recommended Volume per Test

This section provides information on the recommended minimum volume (in gallons) for each test.

The following table contains the recommended minimum volume per test for the HP PROTECTUS III meter.

Table 3 – Recommended Minimum Volume (in gallons) Per Test

Size	T-10 Low	T-10 Medium	High Flow
4 inch	10	10	100
6 inch	100	100	1000
8 inch	100	100	1000
10 inch	100	100	1000

- The quantity run should never be less than three minutes running, and should be at least one full revolution of the register's sweep hand.
- The volume indicates one sweep hand revolution of a traditional direct read register. If a sweep hand revolution is complete before three minutes have elapsed, continue running the test to the three-minute mark.
- The high flow volume is the minimum amount that the turbine side of the meter should register during the test.
- The turbine side register should not turn for the T-10® low and T-10 medium flow tests.
- The T-10 and the turbine side register should both be turning during the turbine high flow test.

Chapter 3: Testing the Meter

This chapter provides information on testing the meter. AWWA M6 manual recommends that a fire service meter tested in the field should have an accuracy of 95-103%. Each utility can determine the specific acceptable accuracy range. However, always take into account potential error during in-field test setup.

Preparing to Test

This section gives instructions on how to set up the meter for testing. Test the meter using the test port on top of the knuckle valve housing. The following figure shows a gate valve installed on the extension coming out of the test port.

Figure 2 – HP PROTECTUS® III Test Port

1. Attach the test hose to the test riser.

Figure 3 – Test Hose

2. Attach the fire hose to the reference meter.

Figure 4 – Reference Meter

3. Open the bypass valve around the meter under test to continue servicing.

With the bypass around the meter fully open, you should not see either register on the meter counting flow.

Opening the valve too quickly could cause the hose and reference meter to lurch violently.

4. Slowly open the gate valve at the meter under test to pressurize the reference meter.

Figure 5 – Gate Valve

5. Shut off the downstream isolation valve behind the HP PROTECTUS® III.

Work the valve open and closed several times to ensure a good seal.

Release Trapped Air

1. Slowly open the high side valve of the reference meter to release trapped air from the meter.

Releasing trapped air can cause the reference meter to jerk violently.

Figure 6 – Release Trapped Air– High Side

2. Run the meter for several minutes to vent all air.
3. Slowly open the low side valve of the reference meter to release trapped air in the low side of the meter.

Figure 7 – Release Trapped Air – Low Side

4. Shut off the high side valve and low side valve on the reference meter.
   With the upstream valve in front of the HP PROTECTUS III meter, open and close the downstream valve behind the HP PROTECTUS III off. You should not see any flow through the meter.
5. Record the meter readings from the low side and the high side registers.

Figure 8 – Register – High Side

At this point, neither the low side nor the high side should be running.

6. Add the numbers from the low side and high side to get the total starting volume for the meter.

Figure 9 – Register – Low Side

Low Flow Test

This section provides steps to complete a low flow test.

1. Open the low side valve on the reference meter.
2. Run this test for one full revolution of the sweep hand for a minimum of three minutes.

Figure 10 – Low Flow Test

Test according to Neptune's performance chart. See the table titled "Recommended Minimum Volume (in gallons) Per Test" on page 6.

3. To stop the low side test, shut off the low side valve on the T-10®.
4. Record your results from the reference meter and from the HP PROTECTUS III low side register.

Figure 11 – Record Results

5. To calculate the accuracy, divide the water registered on the HP PROTECTUS III by the water registered on the low side of the reference meter.

You should not see any registration on the HP Turbine side of the HP PROTECTUS III. All the consumption should have been on the T-10 side.

Medium Flow Test

This section provides steps to complete a medium flow test.

1. Record the consumption on the T-10 of the HP PROTECTUS III and the consumption on the turbine side of the HP PROTECTUS III.
   This is your meter reading before beginning the medium flow test.
2. Open the valve on the low side of the reference meter and set the flow at the medium flow rate according to the table titled "Recommended Minimum Volume (in gallons) Per Test" on page 6.

The medium flow test should be below crossover, but above the minimum T-10 flow rate.

3. Run this test for one full sweep hand of the register for a minimum of three minutes.
4. After the test is complete, close the low side valve on the reference meter.
5. Record the final flow on the low side of the reference meter and the final flow on the T-10 side of the HP PROTECTUS III.
6. To calculate the accuracy, divide the HP PROTECTUS III registration by the reference meter registration.

You should not see any registration on the HP Turbine side of the HP PROTECTUS III. All the consumption should have been on the T-10 side.

High Flow Test

This section provides steps to complete a high flow test.

1. Record the flow from both the low side and high side of the HP PROTECTUS III meter. This is your starting volume.
2. Record the flow from the low side and high side of the reference meter. This is your starting volume.
3. Open the valve on the high side of the reference meter and set the flow at the high flow rate according to "Recommended Minimum Volume (in gallons) Per Test" on page 6.

Figure 12 – Open High Side Valve

When running this test, both the T-10 and the HP Turbine on the HP PROTECTUS III should register flow.

4. Turn off the high side valve on the reference meter.
5. Record the reading on the high side and the low side of the reference meter.
6. Record the readings from both the HP Turbine side and the T-10 side of the of the HP PROTECTUS III.
7. Add the two readings together.
   This is the total flow that went through the HP PROTECTUS III.
8. Calculate the accuracy by comparing this value to the amount consumed on the high side and the low side of the reference meter.

After the Test is Complete

After completing the test, back-flush the line to avoid sending dirty water to the customer.

1. Close the test riser.
2. Shut down the inlet valve of the meter under test.
3. Reopen the inlet valve upstream of the meter under test.
   This breaks up any debris built up on the seat of the isolation valve upstream of the meter.

Figure 13 – Inlet Valve

4. Slowly open the test riser.
5. Open the high side of the reference meter to back-flush the meter.

Figure 14 – Back-Flushing the Meter

6. Run until the water coming out of the reference meter turns from brown to clear.

Figure 15 – Color of Back-Flush Water

Figure 16 – Clear Water after Back-Flush

Breakdown and Cleanup

Follow the steps in this section to perform breakdown and cleanup tasks.

1. Close the valve at the test riser attached to the meter under test.

Figure 17 – Test Riser Valve Attached to Meter Under Test

2. Open the high side valve on the reference meter slowly.

The reference meter and the fire hose running from the meter under test to the reference meter are depressurized.

3. Inspect the pressure gauge at the reference meter to make sure all pressure has been vented before disconnecting the fire hose.
4. Disconnect the fire hose from the test riser and the reference meter and remove it from the test site.

Figure 18 – High Side Valve on Reference Meter

5. Open the isolation valve downstream of the meter under test.

Figure 19 – Isolation Valve - Downstream of Meter Under Test

6. Close the bypass valve.
   Full service is restored to the meter monitoring the site.

Figure 20 – Bypass Valve

7. Ensure the registers on the meter you tested are registering flow.

How to Calculate Overall Meter Accuracy

AWWA recommends that the total meter accuracy is calculated by the average of the accuracy results of the high flow turbine side test, the medium test on the T-10 chamber, and the low flow test on the T-10 chamber.

The recommendations stated above come from the AWWA M6 manual. Utilities use many different methods to calculate the overall meter accuracy, but there is no one method that has to be done. The method used must meet the utility's accuracy standards.

Test Results

This section provides information on possible reasons a test can fail.

Failed Low Flow Test

In the case of a failed low flow test, the meter can be tested directly out of the plug on the T downstream of the T-10. When performing this test, be aware that the throttle valve in the T-10 regulates the amount of flow, so tests above 15 GPM are not possible when testing from the port on the bypass T.

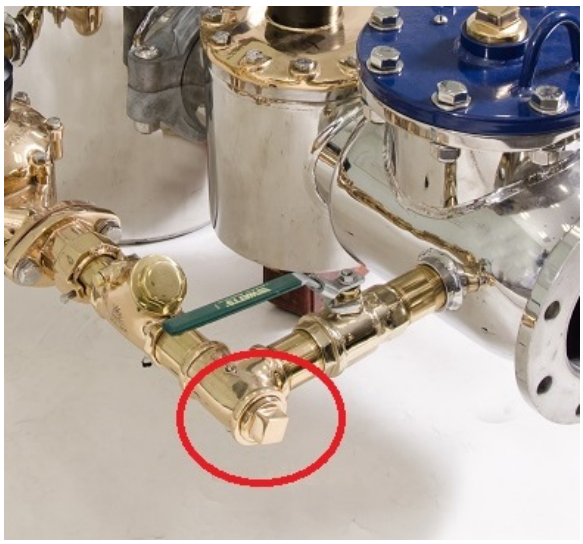

Figure 21 – Port on the Bypass T

Also, consider the following:

- The knuckle valve could be bad, which allows the water to bypass it and flow out of the meter instead of being pushed through the T-10. Open the knuckle valve housing and check to make sure the valve is fully seated against the valve seat. Look for any signs of damage.
- The T-10 chamber needs to be replaced.
- The small white strainer located inside the T-10 needs to be cleaned.
- The large UL / FM basket strainer needs to be cleaned.

Failed Medium Flow Test

Consider the following:

- Make sure you are not in crossover and expecting a different accuracy result.
- Make sure you have sufficient line pressure and are not having cavitation.
- Maintain at least 20 to 30 psi at the reference meter inlet.

Failed High Flow Test

Consider the following.

- Check the turbine measuring assembly to determine whether it needs to be replaced.

If the HP PROTECTUS III turbine assembly is inaccurate, you can replace it with an HP PROTECTUS III UME (P/N 9719-XXX). The UME is factory tested, and comes with a new test ticket and register. The UME allows for quick, and easy maintenance with minimal down time.

- Check the pressure at the reference meter.
- Check the meter for cavitation.
- Maintain at least 20 to 30 psi at the reference meter inlet.
- Close the bypass ball valves so that you are testing the high side of the meter in isolation. This allows you to check the HP Turbine measuring element and verify its performance without bringing the T-10 into the test.

Failed All Tests

Consider the following:

- Does the meter have four to five pipe diameters of straight pipe with no obstruction up stream?
- Does the meter have four to five pipe diameters of straight pipe with no obstruction downstream?
- Does the reference meter have an up-to-date calibration certificate?
- Are the registers located on the high side and low side correct?
  The high side register should have a dial face marking of HPT P3 or HPT PIII, with the appropriate meter size shown. The low side dial face should say T-10 with the appropriate meter size shown.

Chapter 4: Maintenance and Troubleshooting

This chapter provides information on how to run a successful test.

Before and During the Test

Before and during a test, ensure the following:

- Start with low flow then move to high flow for a used meter.
- Start with high flow then move to low flow for a new meter.
- Be aware of an AWWA recognized accuracy dip when testing in crossover.
- Check the pressure gauge at the reference meter to be sure it maintains 20 – 30 psi to avoid cavitation, which causes faulty results.
- Require calibration certificates for all reference meters. If the reference meter is inaccurate, then it shows the meter under test to be inaccurate.
- Check all connections, hoses, and meters for any leaks. Leaks can cause the meter under test to appear inaccurate.

Sources of Error

The following is a list of possible sources of error.

- Signs of Cavitation:
  - Make sure you are not pulling too much water through the 2-inch test port on top of the knuckle valve housing if the error is at high flow.
  - Try slightly decreasing the flow rate.
- Reading resolution of registers on the reference meter and meter under test.
  The error related to reading resolution of the meter is lessened as more water runs through the reference meter and the meter under test.
- Reading resolution of tank / reference unit:
  - A volumetric test consists of capturing the water run through the meter under test in a volumetric tank.
- The water captured in the tank is usually read with a sight gauge. The accuracy of this reading is dictated by resolution on the sight gauge:
  - The error associated with reading the sight gauge is lessened as more water runs through the reference meter and into the tank.
  - Ensure the tanks are wetted before beginning the test.
- Human error.
- Poor flow profile:
  - Is the meter properly installed? Is there an appropriate amount of straight pipe before and after the meter?
  - Is the UL / FM strainer clean or clogged?

- Leaky test setup.
- Isolation valves allowing water to bypass:
  - Are the isolation valves fully shut off?
  - Has the reference meter registered more water than the meter under test?
  - Has a test failed? You are advised to work the isolation valves fully closed and then open. Doing this helps to break debris from the valve seat of the isolation valve, ensuring complete isolation of the meter under test.
- Isolation valve leaks. To check for leaks:
  - Completely close the upstream valve and the downstream valve on the meter.
  - Leave the gate valve coming out of the test port of the meter under test open.
  - If the upstream and downstream isolation valves are sealed properly, no water is registered on the reference meter.
- Pressure loss between meter under test and reference meter causing cavitation.
- Testing from improper meter plug or port.
- Maximum flow exceeding the test setup capacity.

If erroneous results occur, repeat the test setup checks:

- Make sure the test results are repeatable.
- Check for cavitation or loss of pressure at the reference meter.
- Check the setup for any leaks.
- Make sure that the downstream isolation valve is closed.
- Make sure you ran at least one full sweep hand of consumption.

Cavitation

Cavitation occurs when the water passing through the meter has dropped in pressure to a point that it causes formation of small vapor-filled cavities in the liquid. This can occur at any flow rate if pressure at the inlet is low. In effect, the water is boiling because the pressure has become too low.

To ensure the meter does not experience cavitation, a pressure gauge should be maintained at the reference meter that shows the psi at or above 20-30 psi. If the pressure is close to 30 psi at the reference meter, and has a poor accuracy test, it is recommended to adjust the test setup until the pressure is above 30 psi. You can accomplish this by either adjusting the flow rate of the high flow test or repositioning the reference meter, so that you minimize the pressure loss between the meter under test and the reference meter.

Contact Information

Within North America, Neptune Customer Support is available Monday through Friday, 7:00 A.M. to 5:00 P.M. Central Standard Time, by telephone or email.

By Phone

To contact Neptune Customer Support by phone, complete the following steps.

1. Call **(800) 647-4832**.
2. Select one of the following options:
   - **1** if you have a Technical Support Personal Identification Number (PIN).
   - **2** if you do not have a Technical Support PIN.
3. Enter the six-digit PIN and press #.
4. Select one of the following options.
   - **2** for Technical Support.
   - **3** for maintenance contracts or renewals.
   - **4** for Return Material Authorization (RMA) for Canadian Accounts.

   You are directed to the appropriate team of Customer Support Specialists. The specialists are dedicated to you until the issue is resolved to your satisfaction. When you call, be prepared to give the following information:

   - Your name and utility or company name.
   - A description of what occurred and what you were doing at the time.
   - A description of any actions taken to correct the issue.

By Email

To contact Neptune Support by email, send your message to support@neptunetg.com.

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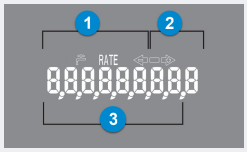
Appendix A: Reading a Register

It is important to become familiar with the information available from the meter. To identify this information, refer to the following icons and displays.

Table 4 – Icons and Displays

Icon	Display	Indicates
	Flow / Leak indicator shows the direction of flow through the meter.	
	ON	Water in use.
	OFF	Water not in use.
	Flashing	Water is running slowly / low flow indication.
	Leak indicator displays a possible leak.	
	OFF	No leak indicated.
	Flashing	Intermittent leak indicated. Water used during at least 50 of the 96 15-minute intervals during the previous 24-hour period.
	Continuous ON	Continuous leak indicated. Water used during all 96 15-minute intervals during the previous 24-hour period.
	Nine-digit LCD displays the meter reading in billing units of measure. The number is shown in odometer style, reading left to right. 1. First four digits – Typical billing digits. 2. Last three digits – Testing units used for meter testing. 3. Fifth and sixth reading digits – Reading units.	

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Glossary

A

AWWA

American Water Works Association.

C

calibrate

Correlated readings of an instrument with those of a standard in order to check the instruments accuracy.

cavitation

Rapid formation and collapse of vapor pockets in a flowing liquid in regions of very low pressure.

crossover range

When the meter transitions from low flow to high flow.

G

gravimetric

Weighted scale.

M

meter under test

Meter at the test side for which you are performing the field test.

R

reference meter

Known good meter. Meter you bring to the test site as a standard that the meter under test is checked against.

U

UME

Unitized Measuring Element.

V

volumetric

Calibrated tank.

Index

V

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