NEPTUNE
TECHNOLOGY GROUP

HP Turbine Field Testing Guide

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

Professional Installation

In accordance with section 15.203 of the FCC rules and regulations, the MIU must be professionally installed by trained utility meter installers. Changes or modifications not expressly approved by the party responsible for compliance can void the user's authority to operate the equipment.

HP Turbine Field Testing Guide

Literature No. FT HP Turbine 01.16

Part No.13505-012

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Contents

C Analytical Tool

Glossary

Index

Notes:

Figures

Notes:

Tables

Notes:

1 Introduction

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

Field Testing

The only way to determine whether a specific meter is operating efficiently is to test it. Establishing a meter maintenance program is recommended for all utilities. In a utility, large meters move the most water, so they in turn generate the most revenue. Maintaining the accuracy of these meters means maintaining or improving revenue for the utility.

Testing Best Practices

Consider the following before testing the HP Turbine meter.

- Perform maintenance according to the American Water Works Association (AWWA) schedule.
- Perform at least three flows per meter, starting at the low flow.
- Check to see if a downstream test port is present. The HP Turbine meter does not have a test port built into it and it is required for field testing the meter.
- 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. This can be done by opening and closing the valve several times to break loose any buildup on the valve seat.

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. The following are three common points of reference.

- Volumetric — calibrated tank
- Gravimetric — weight scale
- Master Meter(s) — known good meter(s)

Volumetric

Consider the following.

- Make 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

Master 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 that some reference meters cannot test the full range of a meter.
- 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 the isolation valve is fully sealed off and does 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 reference meter setup recommendations are followed.

Flow Tests

There are three flow tests on the HP Turbine meter.

- Low Flow
- Medium
- High Flow

Consider the following for Low Flow.

- Varies depending on meter size
- Allows the utility to accurately capture a very large flow range moving through the meter

Equipment Needed

This section discusses the equipment needed to test the meter.

Recommended Tools

Figure 1 shows the recommended tools you need to perform the field testing on the HP Turbine meter.

Figure 1 Recommended Tools

Table 1 lists the recommended tools you need to successfully test the HP Turbine.

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		Activate the register LCD.
Ladder		Get into a deep pit.
Safety glasses		Protect eyes.

2 Test Requirements

This chapter provides information on testing requirements.

Required Tests

Testing an HP Turbine meter requires at least three tests.

- One low flow test
- One medium flow test
- One high flow test

Recommended Flow Rates

This section provides recommended flow rates.

Table 2 HP Turbine Test Specifications

Size	Low Flow	Medium Flow	High Flow
1½	4	20	100
2	4	20	160
3	5	30	350
4	10	50	630
6	20	125	1400
8	35	300	2400
10	50	500	3800

- Test numbers are adapted from the *AWWA M6 Fifth Edition* manual.
- 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.

Recommended Volume Per Test

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

Table 3 Recommended Minimum Volume Per Test

Size	Minimum Test Volume			
	Gallon	Cubic Feet	Cubic Meter	Imperial Gallon
1½	100	10	1	100
2	100	10	1	100
3	100	10	1	100
4	100	10	1	100
6	1000	100	10	1000
8	1000	100	10	1000
10	1000	100	10	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.

3 Testing the Meter

This chapter provides information on testing the meter. *AWWA M6 Fifth Edition* manual recommends that a turbine meter tested in the field should have an accuracy of 96% to 102%. The acceptable accuracy range can be determined specifically by each utility. However, potential error during in-field test setup should always be taken into account.

Introduction

The HP Turbine meter is not equipped with a built in test port. A test port must be installed inline with the meter, or a spool piece must be bolted downstream of the meter which contains a test port. See Figure 2.

Figure 2 HP Turbine with Test Tee Installed

The test port allows a reference meter to be connected to the HP Turbine.

Preparing to Test

This section provides steps to prepare an HP Turbine meter for testing.

The meter should be setup like the diagram in Figure 3.

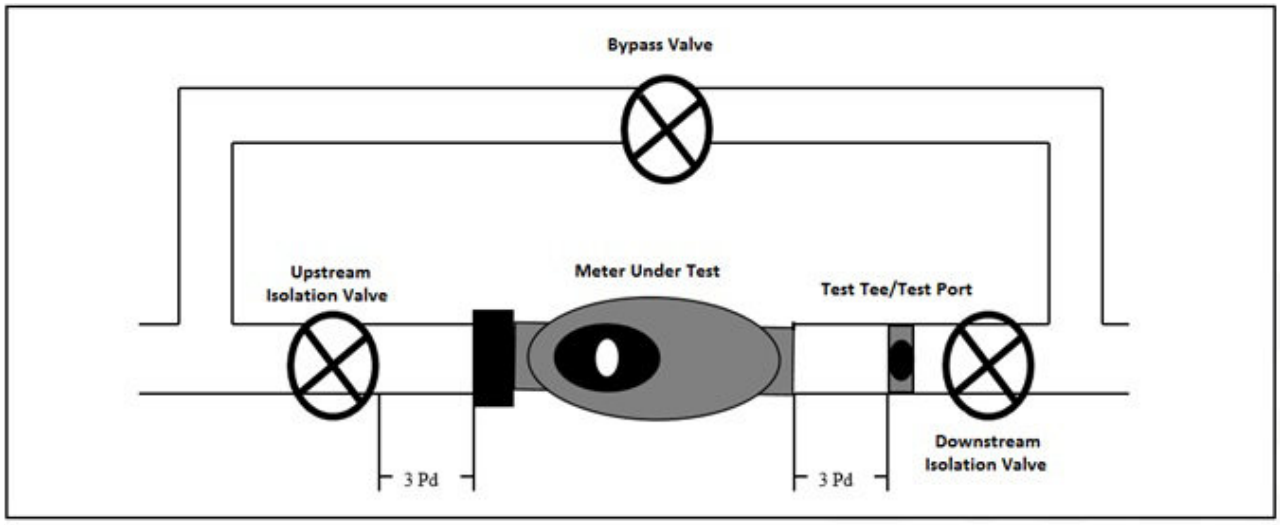


Figure 3 HP Turbine Test Setup

1 Open the bypass valve.

The register on the meter stops registering flow.

All water is moving through the bypass.

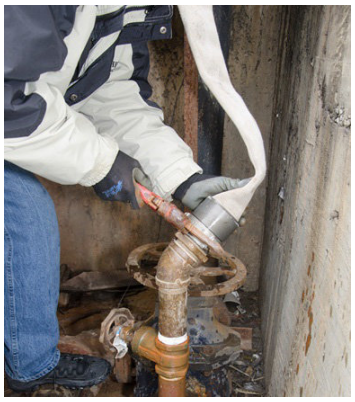
2 Close the downstream isolation valve.

No water can backflow onto the HP Turbine being tested.

Usually, a permanent gate or ball valve is installed in the downstream test port.

3 Keep the valve on the test riser closed, and remove the test plug from the valve. See Figure 4.

Figure 4 Remove Test Plug



4 Connect the fire hose to the test riser of the meter under test. See Figure 5.

Figure 5 Connect Fire Hose to Meter Under Test

5 Connect the other end of the fire hose to the reference meter. See Figure 6.

Figure 6 Connect Fire Hose to Reference Meter

6 Slowly open the valve on the test riser at the meter under test to pressurize the reference meter.

7 Open the high flow side of the reference meter.

8 Purge any air from the test setup before running the first test. See Figure 7.

Figure 7 Purge Air from Test Setup

9 Close the reference meter valve, after the air has been purged.

The meter under test and the reference meter are at equal pressure, and testing can begin.

Testing the HP Turbine Meter

The section provides steps to test the HP Turbine meter.

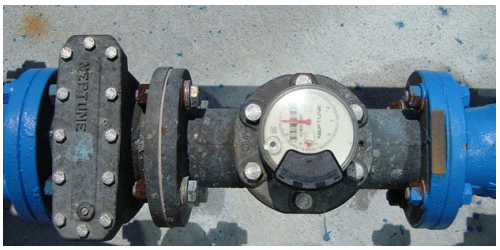


Figure 8 Register on Meter Under Test

1 Record the initial reading from the register on the meter under test. See Figure 8.

Figure 9 Register on Reference Meter

2 Record the initial reading from the register on the reference meter. See Figure 9

3 Run the low flow test first according to Table 2 on page 5.

Proper testing protocol for a meter in the field is to test the low side before testing medium and high flow.

4 Run the test until the volume shown in Table 3 on page 6 has been accumulated. The test should be run for a minimum of 3 minutes.

5 Record the consumption from the meter under test.

6 Record the consumption from the reference meter.

7 Calculate the accuracy by dividing the consumption of the meter under test by the consumption of the reference meter.

8 Repeat these steps for the medium and high flow tests.

After the Test is Complete

Figure 10 Inlet Valve

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. See Figure 10.

Figure 11 Back-Flushing the Meter

4 Slowly open the test riser.

5 Open the high side of the reference meter to back-flush the meter. See Figure 11.

Figure 12 Color of Back-Flush Water

6 Run until the water coming out of the reference meter turns from brown to clear. See Figure 12 and Figure 13.

Figure 13 Clear Water After Back-Flush

Breakdown and Cleanup

Complete the following steps:

1 Close the valve at the test riser attached to the meter under test. See Figure 14.

Figure 14 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. See Figure 15.

Figure 15 High Side Valve on Reference Meter

4 Disconnect the fire hose form the test riser and the reference meter and remove it from the test. site.

5 Open the isolation valve downstream of the meter under test. See Figure 16.

Figure 16 Isolation Valve - Downstream of the Meter Under Test

Figure 17 Bypass Valve

6 Close the bypass valve. See Figure 17.

Full service is restored to the meter monitoring the site.

7 Ensure the registers on the meter under test are registering flow.

4 Troubleshooting

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

See the *HP Turbine Installation and Maintenance guide* for instructions on servicing the HP Turbine meter..

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.
- 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.

Poor Low Flow Results

If you achieve poor low flow results, try the following.

- Clean the upstream strainer.
- Make sure your downstream isolation valve is fully sealed and is not allowing the bypass to register on the reference meter. This can be achieved by working the downstream isolation valve open and shut several times.
- Check for signs of wear on older meters.
- Replace the UME. As meters wear over time their low flow can be the first to diminish.

Poor Medium Flow Results

If the low flow test is accurate and you achieve a poor medium flow test, this could be an indication of a test setup issue. Consider the following.

- Check the stainer upstream of the meter and clear any debris.
- Check the meter to make sure the seal tube is present (if needed).
- Make sure you are maintaining pressure at your reference meter and all air is purged from the line.

Poor High Flow Results

If the low flow test is accurate and you achieve a poor high flow test, this could be an indication of a test setup issue. Consider the following.

- Check the stainer upstream of the meter and clear any debris.
- Check the meter to make sure the seal tube is present (if needed).
- Make sure you are maintaining pressure at your reference meter and all air is purged from the line.

Other Sources of Error

The following is a list of possible sources of error.

- 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 is run 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 the resolution on the sight gauge.
  - The error associated with reading the sight gauge is lessened as more water is run through the reference meter and into the tank.
- Human error
- Poor flow profile
  - Is the install correct? Does the meter have the appropriate amount of straight pipe before and after the meter?
  - Are isolation valves fully open or fully closed as required?
- 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.
- 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 test setup checks.

- Make sure the test results are repeatable.
- Check for cavitation or loss of pressure at the reference meter. See “Cavitation” below.
- Check the setup for any leaks.
- Make sure that the downstream isolation valve is closed.
- Make sure at least one full sweep hand of consumption was run.

Cavitation

Cavitation occurs when the water passing through the meter has dropped in pressure to a point where it can “cavitate”. 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.

In order to ensure you are not cavitating, 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.

5 Contacting Neptune Customer Support

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

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:
- Press **1** if you have a Technical Support Personal Identification Number (PIN).
- Press **2** if you do not have a Technical Support PIN number.

3 Enter the six digit **PIN** number and press #.

4 Select one of the following options.
- Press **2** for Technical Support.
- Press **3** for maintenance contracts or renewals.
- Press **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 Fax

To contact Neptune Customer Support by fax, send a description of your problem to (334) 283-7497. Please include on the fax cover sheet the best time of day for a customer support specialist to contact you.

By Email

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

Notes

Appendix A: HP Fire Service Turbine Stainless Steel (S) Meter

This appendix provides information on Neptune's Fire Service meter.

Introduction

The High Performance (HP) Fire Service Turbine Stainless Steel (S) meter offers some of the widest flow ranges on any fire service turbine meters on the market. All HP Fire Service Turbine S meters meet or exceed the latest AWWA Standard C703. Maximum continuous flow rates can be exceeded by as much as 25% for intermittent periods.

Figure 18 6-Inch Fire Service Turbine S Meter

Systems Compatibility

All HP Fire Service Turbine S meters are guaranteed adaptable to our ARB® V, ProRead™ (ARB VI), E-Coder®)R900*i*™, E-Coder®)R450*i*™, E-Coder®, TRICON®/S, TRICON/E®3, and Neptune readings systems without removing the meter from service.

Construction

The HP Fire Service Turbine S meter consists of a stainless steel fire service strainer, a rugged lead free high copper alloy maincase, an AWWA Class II turbine measuring element, and a roll-sealed register.

The Unitized Measuring Element (UME) allows for quick, easy, in-line interchangeability. Water volume is measured accurately at all flows by a specially-designed assembly. The hydrodynamically-balanced, thrust-compensated rotor relieves pressure on the thrust bearing. Stationary stainless steel shafts minimize wear and provide sustained accuracy over an extended operating life. Direct coupling of the rotor to the gear train eliminates revenue loss due to slippage during fast starts and line surges. A calibration vane allows in-field calibration of the UME to lengthen service life and to ensure accurate registration.

The roll-sealed register eliminates leaking and fogging. A magnetic drive couples the register with the measuring element. For reading convenience, the register can be mounted in any one of four positions on the meter.

Key Features

This section provides information on the key features of the HP Fire Service Turbine S meter.

Turbine Measuring Element

The key features of the turbine measuring element are:

- UL listed
- FM approved
- Wide flow ranges available at 98.5% - 101.5% accuracy
- Calibration vane
- Hydrodynamically-balanced rotor
- Reusable O-ring gasket provides superior seal

Lead Free Maincase

The key features of the maincase are:

- Certified NSF/ANSI 61 and 372
- Made from lead free high copper alloy
- Proven lifetime material
- Corrosion-resistant

Stainless Steel Strainer

The key features of the stainless steel strainer are:

- Permits full flow while stopping debris.
- Meets UL/FM fire service requirements.

Roll-Sealed Registers

The key features of the roll-sealed register are:

- Low torque registration, magnetic-driven
- Low-flow indicator
- In-line serviceability
- Tamperproof seal design

Warranty

The stainless steel fire service HP Turbine carries a 10/10 warranty for the strainer body, a lifetime guarantee for the HP Turbine main case, and a one year AWWA performance guarantee for the turbine measuring element.

Specifications

This section provides the specifications of the HP Fire Service Turbine S meter.

- Application: cold water measurement of flow in one direction
- Maximum operating water pressure: 175 psi (1206 kPa)
- Registers: direct reading, center-sweep, roll-sealed magnetic drive with low flow indicator
- Measuring element: hydrodynamically-balanced rotor, AWWA Class II turbine
- Stainer: stainless steel body, stainless steel basket strainer element NSF/ANSI 61 certified, UL listed, and FM approved
- Bolts: 300 series stainless steel bolts

Options

This section provides information on the different options available with the HP Fire Service Turbine S meter.

- Sizes: 3 inch, 4 inch, 6 inch, 8 inch, and 10 inch
- Strainer: 300 series stainless steel or epoxy coated cover
- Units of measure: U.S. gallons, imperial gallons, cubic feet, cubic meters
- Register types:
  - — Remote reading system*: ProRead, E-Coder)R900*i*, E-Coder)R450*i*, E-Coder, TRICON/S, and TRICON/E3
  - — Reclaim
- Companion flanges: cast iron and bronze (3 inch and 4 inch only)

* Consult factory for meter performance specifications when fitted with ARB.

Operating Characteristics

The following table provides information on the operating characteristics of the HP Fire Service Turbine S meter.

Table 4 HP Fire Service Turbine S Operating Characteristics

Meter Size	Normal Operating Range @ 100% Accuracy (+/- 1.5%)	Maximum Intermittent Flow	AWWA Standard
3 inch	5 to 450 US gpm 1.14 to 102.2 m^3/h	560 US gpm 127.2 m^3/h	8 to 350 US gpm 1.8 to 79.5 m^3/h
4 inch	10 to 1200 US gpm 2.27 to 272.5 m^3/h	1500 US gpm 340.7 m^3/h	15 to 630 US gpm 3.4 to 143. m^3/h
6 inch	20 to 2500 US gpm 4.55 to 567.8 m^3/h	3100 US gpm 704.1 m^3/h	30 to 1400 US gpm 6.8 to 317.9 m^3/h
8 inch	35 to 4000 US gpm 7.95 to 908.5 m^3/h	5000 US gpm 1135.6 m^3/h	50 to 2400 US gpm 11.4 to 545 m^3/h
10 inch	50 to 6500 US gpm 11.36 to 1476.4 m^3/h	8000 US gpm 1817 m^3/h	75 to 3800 US gpm 17.0 to 863 m^3/h

Dimensions

This section provides the dimensions of the HP Fire Service Turbine S meter.

Table 5 HP Fire Service Turbine S Dimensions

Meter Size	A in/mm	B in/mm	C in/mm	D in/mm	E in/mm	F in/mm	G in/mm	Width in/mm	Weight lbs/kg
3 inch	14 1/8 359	12 305	10 3/4 273	10 5/8 270	17 1/2 445	26 1/8 664	2 51	13 1/2 343	150 68
4 inch	21 533	14 356	10 3/4 273	10 5/8 270	17 1/2 445	35 889	2 51	13 1/2 343	200 91
6 inch	26 7/8 683	18 457	11 3/8 289	11 1/16 281	21 1/4 540	44 7/8 1140	3 76	19 483	425 139
8 inch	31 5/16 795	20 508	13 29/64 342	11 13/16 300	25 7/8 657	51 5/16 1303	3 76	25 635	600 272
10 inch	30 782	26 660	15 381	14 13/16 376	30 1/16 764	56 1422	3 76	27 1/2 699	750 340

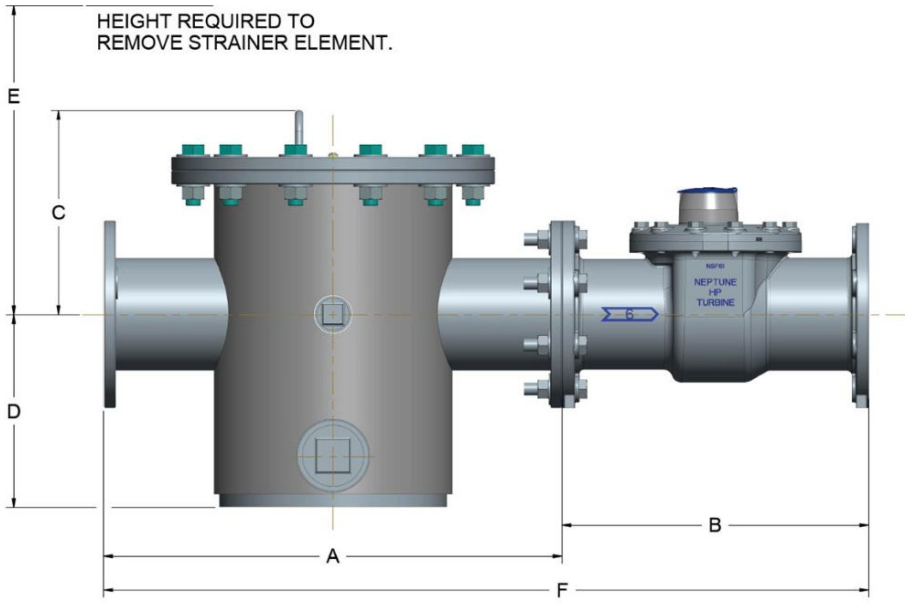


Figure 19 HP Fire Service Turbine Dimensions

Cleaning the Fire Service Strainer

This section provides steps for cleaning the stainer attached to the HP Fire Service Turbine S meter.

Figure 20 HP FS Strainer Cover

1 Remove the cover. See Figure 20.

The cover is very heavy and could cause serious injury if proper precautions are not taken. Be sure to lift the cover with the hook provided.

Figure 21 HP FS Strainer Basket

2 Remove the basket from the strainer housing. See Figure 21.

3 Flush out any debris that has built up inside the strainer housing.

4 Inspect the basket strainer for any defects. See Figure 22.

Figure 22 Inspect Strainer Basket

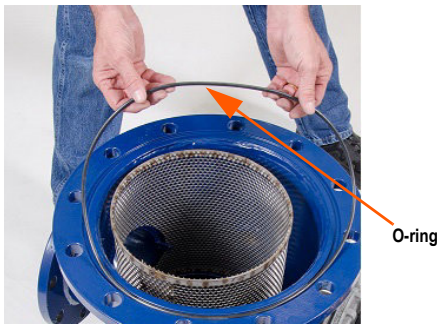


Figure 23 Inspect O-Ring

5 Reinstall or replace the strainer basket.

6 Inspect the O-ring for any signs of nicks or damage. See Figure 23.

7 Reinstall or replace the O-ring.

8 Reinstall the cover to complete maintenance.

Notes:

Appendix B: Reading a Register

It is important to become familiar with the information available on a meter.

E-Coder Register

To read your Neptune E-Coder® register, expose the solar panel to sunlight or shine a bright light (flashlight or cell phone flashlight), and the display activates.

Figure 24 E-Coder Register

When activated, the LCD display first shows a segment test:

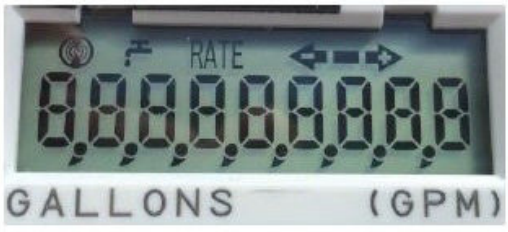


Figure 25 E-Coder LCD Display

This screen is followed by the display of the E-Coder's manufacturing configuration, and two reading screens.

Figure 26 Reading Value

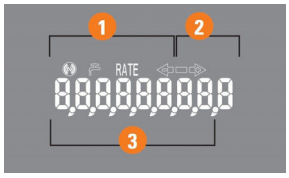
The LCD display shows the current read with comma separators and a decimal place. After initial activation, this screen displays for 20 seconds before toggling to the rate screen. Each additional read screen displays for 8 seconds. Figure 26 shows a reading value of 179.21 (one hundred, seventy-nine) U.S. gallons.

Figure 27 Rate Flow

When the screen toggles, the rate of flow is visible and shows gallons per minutes for 4 seconds. Then it toggles back to the read screen. Figure 27 shows a flow rate of 50.7 gpm.

The following table shows icons and information displayed on the LCD screen.

Table 6 Icons and Displays

	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.	

Appendix C: Analytical Tool

This appendix discusses Neptune's analytical tool called Statistical Evaluation for Enhancement of Revenue (SEER®).

SEER

During its more than 15 years in operation, the Neptune Technology Services Group tested over 10,000 large meters of various makes, sizes, and ages. Neptune ran these test results through a multiple linear regression analysis to determine which factors affected meter accuracy. This analysis showed key variables that impact water meter accuracy.

The result of this study is Neptune's analytical tool called SEER. The SEER model can determine meter accuracy to within a 95% confidence interval. This allows the utility to quickly determine which meters to replace first and how quickly the resulting increase in revenue pays for the cost of installing a new meter.

Key Features

SEER has several key features.

- Provides analysis for large meters and residential positive displacement meters
- Offers meter accuracy to within a 95% confidence interval
- Highlights misapplication of meters
- Provides reporting functions
- Offers importing and exporting features

Key Benefits

SEER has several key benefits.

- Identifies which meters need attention
- Establishes priorities based on revenue gain and payback
- Allows implementation of targeted revenue enhancement program.
- Indicates possible meter failures, wrong-sizing, and theft

Benefits to the Utility

Increased revenue can be used by the utility to focus on:

- Changing out meters
- Managing operating costs
- Improving infrastructure
- Handling rising water demands
- Preventing increases in water rates
- Reducing water loss
- Increasing meter reading efficiencies
- Recovering revenue
- Implementing effective meter maintenance programs
- Increasing resources
- Replacing an aging meter population
- Updating meter databases

Reporting Function

Often utilities know that their meters are inaccurate but are not sure of the level of inaccuracy. SEER makes it easy for the utility manager to determine meters that need to be replaced and to set replacement priorities. SEER allows for easy presentation of the information gained from the program. The program allows you to import meter data and capture and import screens into a presentation or a text document. Analysis results can also be exported and printed using the reporting function within SEER.

Software

The SEER software can be found on-line at www.neptunetg.com. Each user is required to complete an on-line registration form. Upon approval, the user is granted a level of access to features within the program. Features include SEER data entry, storing of SEER reports, import and export, serial number look-up tables, as well as charting and graphing capabilities.

All registered users have access to the latest desktop version of SEER and it can be obtained at the following link on the Neptune website.

http://www.neptunetg.com/water-meters/online-tools/

Glossary

AWWA	American Water Works Association
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
gravimetric	Weighted scale
master meter	Known good meters
meter under test	Meter at the test side for which you are performing the field test
reference meter	Meter you bring to the test site as a standard that the meter under test is checked against
SEER	Statistical Evaluation for Enhancement of Revenue
UME	Unitized Measuring Element
volumetric	Calibrated tank

Notes:

Index

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