



# HP Turbine Meter Installation and Maintenance Guide





HP Turbine Meter  
Installation and Maintenance Guide

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- R900

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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<sup>®</sup> Pit Antenna, part number 12527-XXX.
  - High Gain R900<sup>®</sup> Pit Antenna, part number 13586-XXX.
  - R900<sup>®</sup> 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.
- Types d'antenne approuvé
  - Antenne de puits R900<sup>®</sup>, numéro de pièce 12527-XXX
  - Antenne de puits à gain élevé R900<sup>®</sup>, référence 13586-XXX
  - Antenne murale R900<sup>®</sup>, numéro d'article 13717-00
  - Fil monopôle, numéro d'article 12641-XXX

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The High Performance (HP) Turbine meter is designed for applications where flow rates are consistently moderate to high. To achieve maximum performance in actual service, it is essential that you follow these installation and maintenance instructions. This guide shows figures for the 4-inch HP Turbine meter, unless indicated otherwise. Models may vary.



Figure 1 – HP Turbine

### Options

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This section defines the different size and type options for the HP Turbine.

### Size

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The HP Turbine meter comes in the following sizes.

- 1½ inch.
- 2 inch.
- 3 inch.
- 4 inch.
- 6 inch.
- 8 inch.
- 10 inch.

### UOM

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The HP Turbine meter uses the following units of measure.

- U.S. gallons.
- Imperial gallons.
- Cubic feet.
- Cubic meters.

### Register Types

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The HP Turbine meter can use a Reclaim register, plus the following remote reading systems:

- ARB<sup>®</sup> V.
- E-CODER<sup>®</sup>.
- E-CODER<sup>®</sup>)R900i<sup>™</sup>.
- ProCoder<sup>™</sup>.
- ProCoder<sup>™</sup>)R900i<sup>™</sup>.
- ProRead<sup>™</sup>.
- TRICON<sup>®</sup>/S.
- TRICON<sup>®</sup>/E3.

### Flanges

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The HP Turbine meter has several companion flanges:

- 1½ inch and 2 inch (oval): bronze.
- 3 inch, 4 inch, and 6 inch: bronze or cast iron.
- 8 inch and 10 inch: cast iron.

### Strainer

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The HP Turbine meter uses the following strainers:

- 1½ inch to 10 inch: NSF/ANSI 61 lead-free high copper alloy.
- 1½ inch to 10 inch: NSF/ANSI 61 lead-free Rilsan<sup>®</sup> nylon-coated ductile iron.

Appendix A provides information on cleaning and maintaining the strainer.



## Construction

---

Each HP Turbine meter consists of a rugged, lead free, high copper alloy maincase, an AWWA Class II turbine measuring element, and a roll-sealed register. The maincase is corrosion-resistant, lightweight, and compact. Inlet and outlet connections are flanged. Strainers are available to prevent debris from entering the meter and to reduce the effects of uneven water flow due to upstream piping variations.

The unitized measuring element (UME) allows for quick, easy, in-line interchangeability. The meter measures water velocity accurately at all flows by a specially-designed assembly. The hydrodynamically-balanced, thrust-compensated rotor relieves pressure on the thrust bearings to 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 drive couples the register with the measuring element.

## Warranty

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Neptune® provides a limited warranty with respect to its HP Turbine meters for performance, materials, and workmanship. You can accomplish owner maintenance by inline replacement of major components, or a factory-calibrated UME.

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This chapter describes the specifications, operating characteristics, and dimensions for the HP Turbine meter.

### Environmental Specifications

This section contains environmental specifications for the HP Turbine meter.

**Table 1 – Environmental Specifications**

Specification	Definition
Application	Cold water measurement of flow in one direction.
Maximum Operating Pressure	175 psi (1206 kPa).
Maximum Operating Temperature	80° F.

### Operating Characteristics

The following table provides the operating characteristics of the HP Turbine meter.

**Table 2 – Operating Characteristics**

Meter Size	Normal Operating Range @100% (± 1.5%)	Maximum Intermittent Flow	AWWA Standard
1½ inch	4 to 160 US gpm 0.91 to 35.3 m <sup>3</sup> /h	200 US gpm 45.4 m <sup>3</sup> /h	4 to 120 US gpm 0.91 to 27.3 m <sup>3</sup> /h
2 inch	4 to 200 US gpm 0.91 to 45.4 m <sup>3</sup> /h	250 US gpm 56.8 m <sup>3</sup> /h	4 to 190 US gpm 0.91 to 43.2 m <sup>3</sup> /h
3 inch	5 to 450 US gpm 1.14 to 102.2 m <sup>3</sup> /h	560 US gpm 127.2 m <sup>3</sup> /h	8 to 435 US gpm 1.8 to 98.8 m <sup>3</sup> /h
4 inch	10 to 1200 US gpm 2.27 to 272.5 m <sup>3</sup> /h	1500 US gpm 340.7 m <sup>3</sup> /h	15 to 750 US gpm 3.4 to 170.3 m <sup>3</sup> /h
6 inch	20 to 2500 US gpm 4.55 to 567.8 m <sup>3</sup> /h	3100 US gpm 704.1 m <sup>3</sup> /h	30 to 1600 US gpm 6.8 to 306.6 m <sup>3</sup> /h
8 inch	35 to 4000 US gpm 7.95 to 908.5 m <sup>3</sup> /h	5000 US gpm 1135.6 m <sup>3</sup> /h	50 to 2800 US gpm 11.4 to 635.9 m <sup>3</sup> /h
10 inch	50 to 6500 US gpm 11.36 to 1476.3 m <sup>3</sup> /h	8000 US gpm 1817 m <sup>3</sup> /h	75 to 4200 US gpm 17.0 to 953.9 m <sup>3</sup> /h

## HP Turbine Registration

This section includes tables that define meter registration and register capacity.



In the following table, for the 8-wheel odometer, divide the table values by 100.

Table 3 – Register Resolution (6-Wheel Odometer)

Meter Size	U.S. Gallons	Imperial Gallons	Cubic Feet	Cubic Meters
1½ inch	100	100	10	1
2 inch	100	100	10	1
3 inch	100	100	10	1
4 inch	100	100	10	1
6 inch	1000	1000	100	10
8 inch	1000	1000	100	10
10 inch	1000	1000	100	10

Table 4 – Register Capacity

Meter Size	U.S. Gallons	Imperial Gallons	Cubic Feet	Cubic Meters
1½ inch	100,000,000	100,000,000	10,000,000	1,000,000
2 inch	100,000,000	100,000,000	10,000,000	1,000,000
3 inch	100,000,000	100,000,000	10,000,000	1,000,000
4 inch	1,000,000	1,000,000	1,000,000	1,000,000
6 inch	1,000,000,000	1,000,000,000	100,000,000	10,000,000
8 inch	1,000,000,000	1,000,000,000	100,000,000	10,000,000
10 inch	1,000,000,000	1,000,000,000	100,000,000	10,000,000

## HP Turbine Dimensions

The following table defines the dimensions of the HP Turbine meter.

Table 5 – HP Turbine Dimensions

Meter Size	A	B	C STD	C ProRead™	C E-CODER® and ProCoder® Products	D	E	F	G	Weight
	inches (mm)	inches (mm)	inches (mm)	inches (mm)	inches (mm)	inches (mm)	inches (mm)	inches (mm)	inches (mm)	lbs (kg)
1½ inch	10 (254)	6 ½ (165)	7 ⅞ (181)	7 9/16 (192)	7 ¾ (197)	1 ¾ (44)	¾ (19)	4 ½ (114)	5 3/8 (137)	19 (8.6)
2 inch	10 (254)	6 ½ (165)	7 ⅞ (194)	8 1/16 (204.8)	8 ¼ (210)	2 ⅞ (54)	13/16 (21)	4 ½ (114)	5 3/8 (137)	20 (9.1)
3 inch	12 (305)	6 (152)	10 (254)	10 7/16 (265.1)	10 ⅝ (270)	3 ¾ (95)	⅝ (16)	6 ¼ (159)	7 ½ (191)	40 (18.1)
4 inch	14 (356)	6 ½ (165)	10 ⅞ (276)	11 5/16 (287.3)	11 ½ (292)	4 ½ (114)	¾ (19)	8 ⅞ (206)	9 (229)	52 (23.6)
6 inch	18 (457)	8 ⅝ (219)	13 (330)	13 7/16 (341.3)	13 ⅝ (346)	5 ½ (140)	1 (25)	10 ¼ (260)	11 (279)	115 (52.2)
8 inch	20 (508)	9 ⅝ (244)	15 ½ (394)	15 15/16 (404.8)	16 ⅞ (409)	6 ¾ (171)	1 ⅞ (29)	10 ¼ (260)	13 ½ (343)	195 (88.4)
10 inch	26 (660)	12 ⅝ (321)	15 ½ (394)	15 15/16 (404.8)	16 ⅞ (409)	8 (203)	1 ¼ (32)	10 ¼ (260)	16 (406)	275 (124.7)

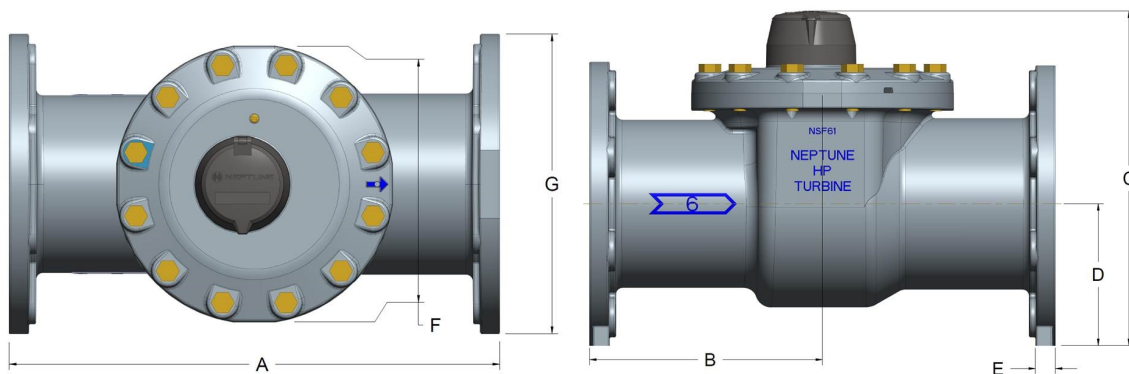


Figure 2 – HP Turbine – Top and Side View

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## Chapter 3: Installing the HP Turbine

This chapter steps you through installing the HP Turbine meter.

### Prior to Installation

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This section defines how to unpack and store the HP Turbine before you install it.

#### Storage

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After you receive the product, inspect the shipping containers for damage and inspect the contents of any damaged cartons before storing. After inspecting, store the cartons in a clean, dry environment.

#### Unpacking

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Do not lift the assembly by a single center strap around the meter body, or by either end alone.

After unpacking the HP Turbine meter, inspect it for damage. If the meter appears to be damaged, notify your Neptune<sup>®</sup> Territory Manager or distributor. If one or more items requires reshipment, use the original cardboard box and packing material.

#### Tools Needed

---

The following table shows the recommended tools you need to successfully install the HP Turbine meter:

- Flathead screwdriver.
- Needle-nose pliers.
- Hammer.
- 7/16 wrench.



Some items may not apply to your specific installation, or the list may not contain all required tools or materials.

### Safety and Preliminary Checks

---

Observe the following safety and preliminary checks before and during each installation:

- Verify that you are at the location specified on the site work order.
- Verify that the site is safe for you and your equipment.
- Notify the customer of your presence and tell the customer that you need access to the water meter.

### Installing the HP Turbine

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The HP Turbine meter operates more accurately and reliably if installed and maintained properly. Install the HP Turbine meter in a horizontal position, with the register facing upward and the flow running in a horizontal direction. The HP Turbine meter performance is directly related to the flow conditions of the water entering the turbine section of the meter. If the flow conditions are distorted because of upstream fittings or piping changes, an HP Turbine meter's performance can be adversely affected.

### Installing the Strainer

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Neptune® recommends that you install all HP Turbine meters with a Neptune strainer at the meter inlet. The strainer, in addition to protecting the meter from debris in the line, also corrects the velocity profile of the flow to the meter and reduces the effects of upstream piping variations or other obstructions in the line.

When installing Neptune meters with a strainer, a minimum of four pipe diameters of straight run pipe (can include components that are fully open in their normal operating position) is required upstream, and two to four diameters of straight run pipe downstream of the meter and strainer assembly.

If you do not use a strainer, a length of straight pipe equal to eight to ten diameters of the nominal pipe size should be allowed immediately upstream of the meter inlet, and two to four diameters downstream.

### Recommended Installation

---

"Recommended Installation – Top View" on the facing page shows the recommended installation of an HP Turbine meter. The installation incorporates a Neptune stainer attached to the inlet of the meter and includes a downstream tee to facilitate field testing. This illustration also shows an optional bypass that provides uninterrupted service capability during periods of meter service.





When installing an HP Turbine meter assembly, follow normal piping practices. Centrally locate all gaskets on the flanges with no overlap or interference with the pipe diameter. This is important at the inlet connection to the meter.

The Neptune strainer located upstream provides protection against meter damage from debris in the lines and virtually eliminates the effects of variations in upstream piping. Neptune specifically recommends using a Neptune strainer of the same line size as the meter.

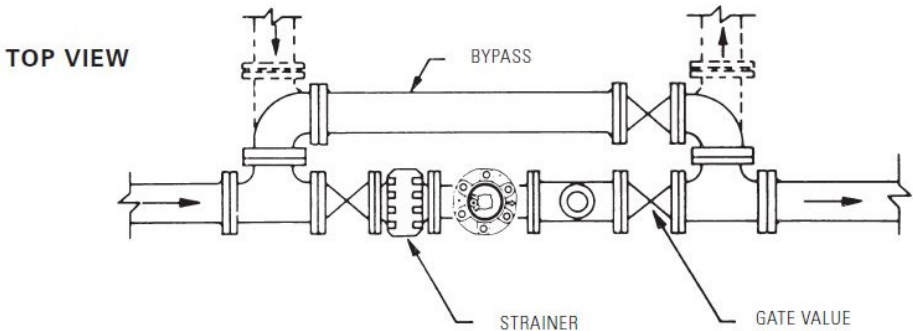


Figure 3 – Recommended Installation – Top View

The strainer design provides optimum velocity profile correction at minimum additional head loss.

Turbine meters must operate in a completely filled line at all times. The downstream piping must always provide sufficient back pressure to maintain a full line at the meter.



Exercise caution to avoid air in the line, sudden flow surges, or excessive flow rates, as these conditions may cause damage to the turbine measuring element.

### Adjusting the Calibration Vane

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Neptune equips all HP Turbine meters with a calibration vane. The calibrating adjusting stem is located under the register mounting ring. If field calibration of the turbine element is required, complete the following steps.

1. Remove the seal pin from the register.
2. Twist the register and lift up to remove it.
3. Turn the lock nut on the adjusting stem counter-clockwise to loosen it.
4. Insert the slotted screwdriver into the slot in the top of the adjusting stem and do one of the following:
  - Turn the adjusting stem toward the plus sign to increase registration.
  - Turn the adjusting stem toward the minus sign to decrease the registration.



Figure 4 – Calibration Vane

### Before Operating the HP Turbine

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Before putting the HP Turbine meter assembly into service, complete the following steps:

1. Open the bleed screw on top of the meter to vent air.
2. Slowly open the inlet-side valve to pressurize the meter while the outlet-side gate valve is closed.
3. Slowly open the outlet-side gate valve until the downstream line is pressurized.



After installation, put the upstream inlet-side valve in the full-open position during service. A partially throttled upstream valve can cause the flow profile distortion that can adversely affect meter accuracy. Perform all throttling only on the downstream outlet-side of the meter.

## Chapter 4: Maintaining the HP Turbine

This chapter provides instructions for maintaining the HP Turbine meter. The 3-inch, 4-inch, 6-inch, 8-inch, and 10-inch meters in the HP Turbine product line share similar features and functions.

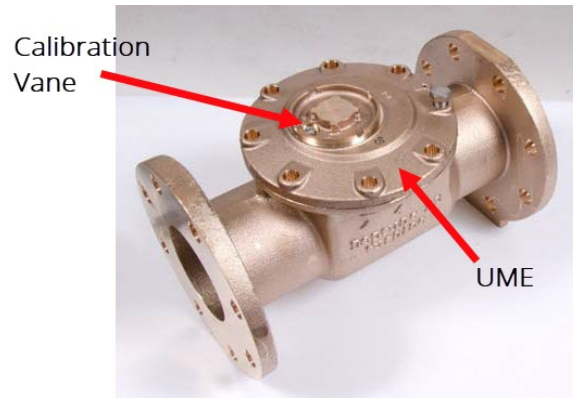


Figure 5 – 4-Inch HP Turbine Meter

### Replacing the UME

When maintenance is necessary, you can quickly and easily interchange the complete UME with a factory-calibrated unit. The UME includes the register, cover, and turbine measuring element. To perform maintenance, complete the following steps:

1. Close all valves (mainline and bypass).
2. Open the bleed screw on top of the meter to vent air.
3. Make sure the meter is de-pressurized.
4. Remove the cover bolts.
5. Remove the UME from the maincase.
6. Install the factory-calibrated UME into the maincase.



Figure 6 – Unitized Measuring Element (UME)

7. Tighten the cover bolts.
8. Open the valves.

All new UMEs have been factory tested and do not require field testing.

If no spare unit is available, you can purchase a factory-calibrated UME directly from Neptune® or one of its authorized distributors. Neptune encourages all customers to purchase a spare UME to avoid service interruptions.

### Performing Meter Maintenance

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This section provides information on maintaining the HP Turbine meter.



Always wear protective eye wear when working with any product.

1. Remove the seal pin by using a screw driver and hammer.
2. Tap on the seal pin until you hear a popping sound.

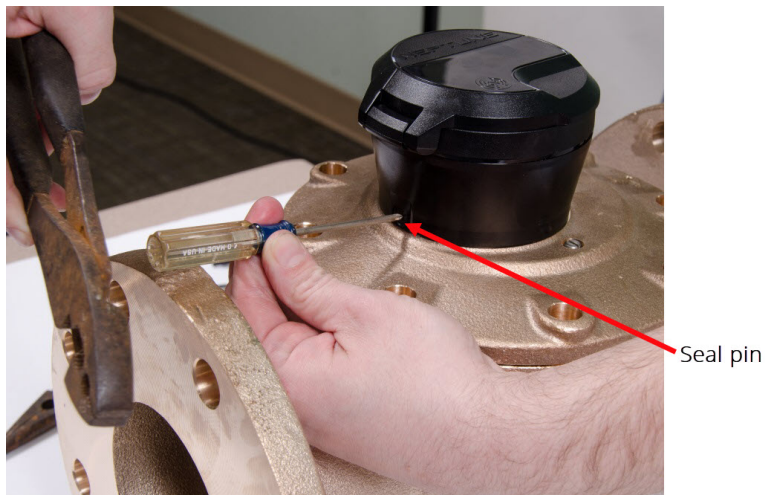


Figure 7 – Tapping the Seal Pin

3. Remove the register.

4. Turn the register over and push the rest of the old seal pin out.



Figure 8 – Removing the Seal Pin

5. Remove the bolts.

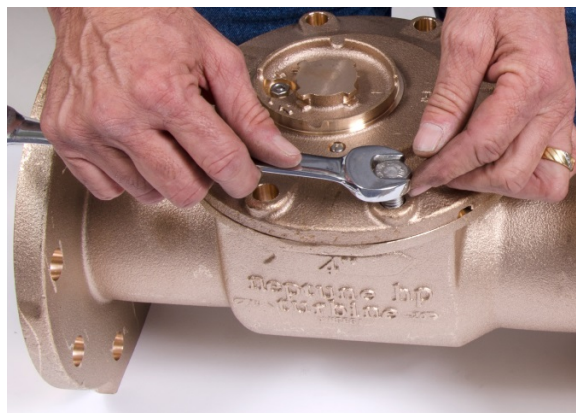


Figure 9 – Removing the Bolts

6. Insert a screwdriver in the slot between top plate and housing and work the top plate loose.

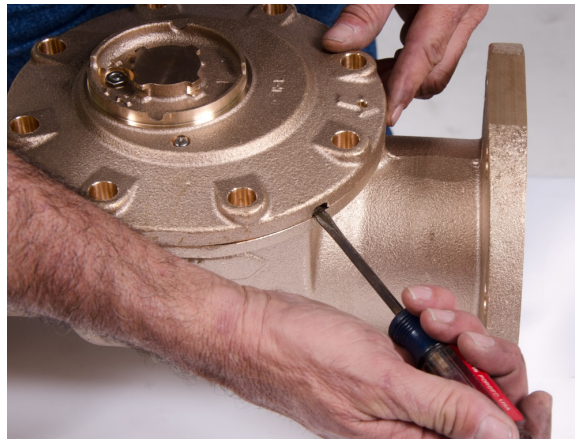


Figure 10 – Top Plate

7. Remove the top plate.  
The UME is exposed.



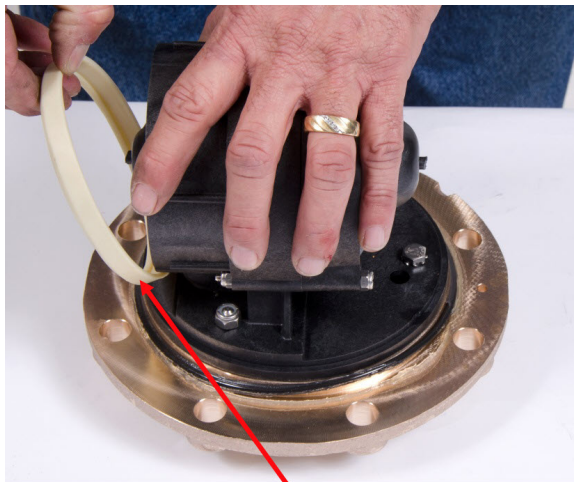
Figure 11 – UME

8. Inspect the O-ring for damage and replace it.



Figure 12 – Inspecting the O-Ring

9. Inspect the turbine seal (if present) for damage and replace it.



Turbine seal

Figure 13 – Turbine Seal



Seal tubes can vary by meter size.

## Installing the UME

---

1. Line up the arrow on the UME / top plate with the guide pin on the HP Turbine housing.

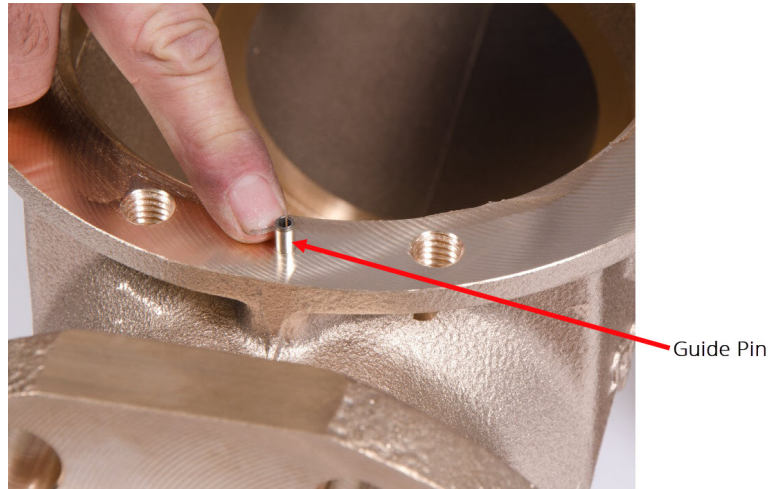


Figure 14 – Guide Pin

The arrow is aligned with the guide pin.

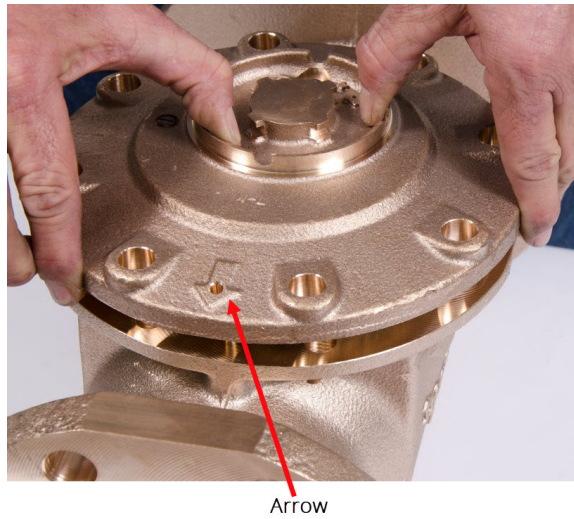


Figure 15 – Top Plate Arrow Aligned with Guide Pin



2. Lower the UME onto the HP Turbine maincase.
3. Push the cover down until it is secure.

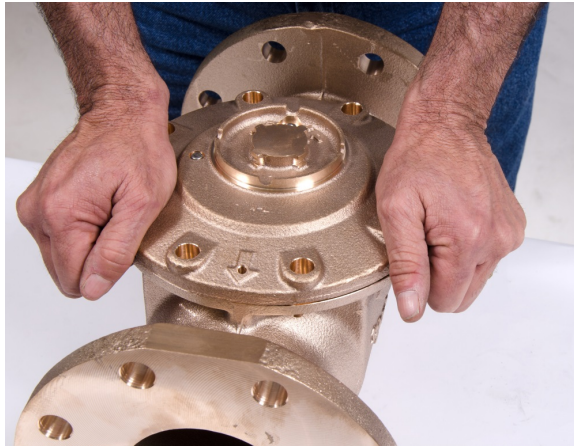


Figure 16 – Pressing Down on the Top Plate

4. Secure the cover to the HP Turbine maincase with bolts.



Figure 17 – Securing the Top Plate with Bolts

## Contact Information

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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

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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, 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

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To contact Neptune Support by email, send your message to [support@neptunetg.com](mailto:support@neptunetg.com).

## Appendix A: Cleaning and Maintaining the Strainer

This appendix provides information on how to clean and maintain the HP Turbine external strainer.

### Cleaning the Strainer

---

To clean the external strainer, complete the following steps:

1. Close the isolation valves.
2. Vent any pressurized air.
3. Remove the cover.
4. Pull the metal strainer out of the body.
5. Clean out any debris from the strainer body.
6. Replace the gasket between the cover and the body, if necessary.



Figure 18 – External Strainer

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## Appendix B: HP Fire Hydrants Parts List

This appendix describes the individual parts that make up the HP Turbine meter, the UME, and the 3-inch Fire Hydrant meter. For the purposes of this document, the 4-inch HP Turbine and the 3-inch Fire Hydrant images are displayed in this section.

### 1½-Inch to 2-Inch HP Turbine

The following diagram is a representative breakdown of the 1½-inch to 2-inch HP Turbine. The table on the following page describes each part of the diagram.

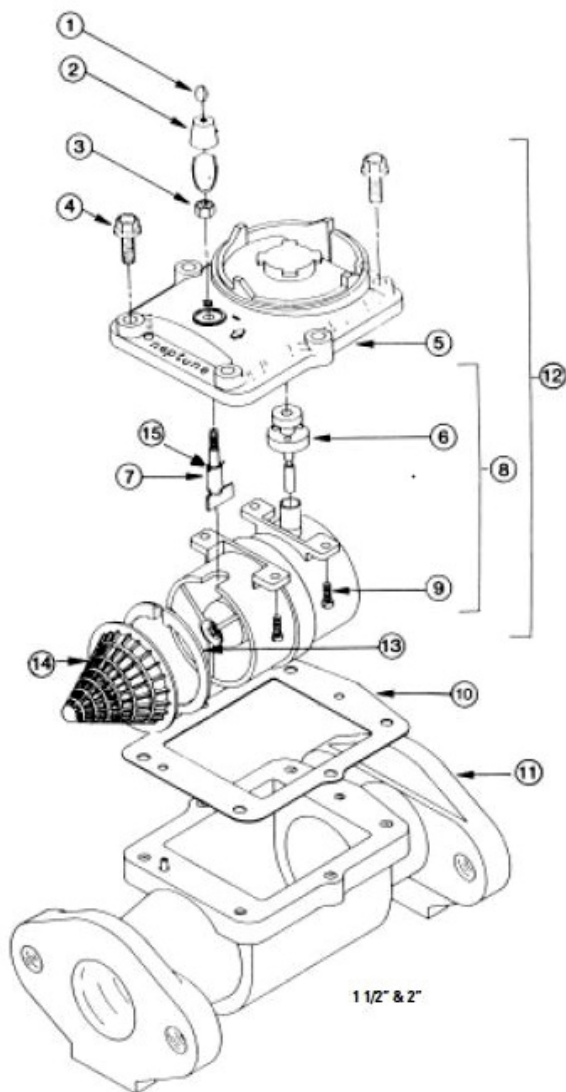


Figure 19 – Representative Breakdown of the 1½-Inch to 2-Inch HP Turbine

Table 6 – 1½-Inch to 2-Inch HP Turbine Parts List

Item	Description	Meter Size and Part Numbers	
		1½ Inch HP	2-Inch HP
1	16-inch Seal Wire with Lead Seal	41110-501	41110-501
2	Seal Cap	11098-001	11098-001
3	Calibration Nut	8545-417	8545-417
4	Maincase Bolts (qty)	N/A	N/A
5	Cover	9860-002	9860-002
6	Drive Spindle Assembly	9485-012	9485-012
7	Calibration Vane Assembly	11097-110	11097-110
8	Measuring Chamber Assembly	9861-200	9861-200
9	Bolts (qty)	8396-605 (4)	8396-605 (4)
10	Maincase Gasket	9857-003	9857-003
11	Maincase	9854-012	9854-011
12	Cover Assembly	9859-200	9859-200
13	Lock Ring	9856-001	9856-001
14	Flow Conditioner / Strainer	9855-001	9855-001
15	O-Ring	8316-022	8316-022
16	Seal Ring (not shown)	8340-062	8340-062

### 3-Inch to 10-Inch HP Turbine

following diagram is a representative breakdown of the 3-inch to 10-inch HP Turbine. The table on the following page describes each part of the diagram.

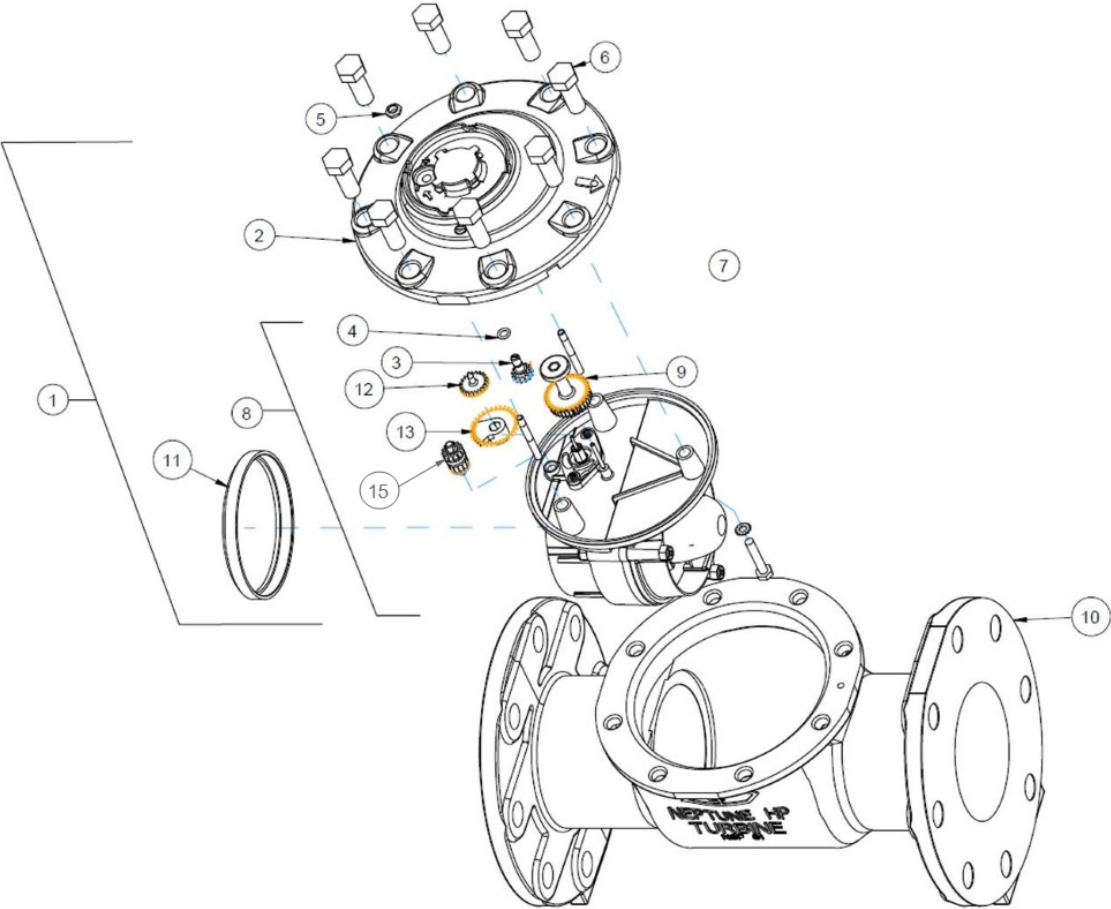


Figure 20 – Representative Breakdown of the 3-Inch to 10-Inch HP Turbine

Table 7 – 3-Inch to 10-Inch HP Turbine Parts List

Item	Description	Meter Size and Part Numbers				
		3 Inch	4 inch	6 Inch	8 Inch	10 Inch
1	Cover Assembly	11328-130	11328-230	11328-330	11328-430	11328-530
2	Cover	11330-002	11330-002	11359-002	11359-002	11359-002
3	Calibration Vane Stem Assembly	11354-000	11354-000	11354-000	11354-000	11354-000
4	Calibration Vane Stem O-Ring	8316-022	8316-022	8316-022	8316-022	8316-022
5	Calibration Vane Stem Nut	8545-417	8545-417	8545-417	8545-417	8545-417
6	Maincase Bolts	8329-405	8329-405	8329-421	8329-421	8329-421
7	Maincase O-Ring	8316-270	8316-271	8316-272	8316-272	8316-272
8	Measuring Chamber Assembly	11329-100	11329-200	11329-300	11329-400	11329-500
9	Magnet Gear Assembly	11347-110	11347-210	11347-310	11347-410	11347-510
10	Maincase	11360-003	11360-002	11356-011	11357-002	11358-002
11	Seal Tube	11335-103	N/A	N/A	N/A	N/A
12	Element Seal (not shown)	N/A	12763-001	N/A	N/A	N/A
13	Drive Pinion	12769-001	12769-002	12769-003	12769-004	12769-005
14	Calibration Vane Gear	12768-001	12768-001	12768-001	12678-001	12768-001
15	Calibration Vane Spindle Assembly	11345-100	11345-200	11345-300	11345-300	11345-300



## Unitized Measuring Element (UME)

The following diagram is a representative breakdown of the unitized measuring element (UME). The following table lists the part numbers.

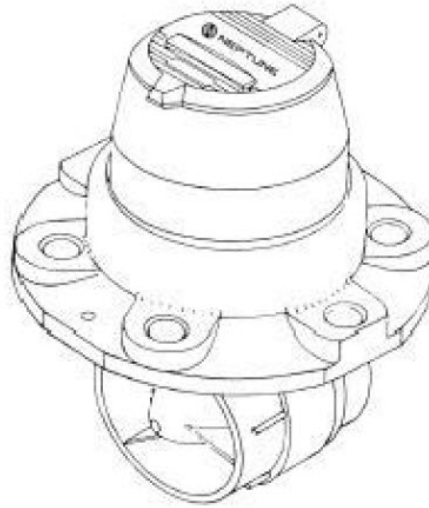


Figure 21 – Representative Breakdown of the UME

Table 8 – UME and Register Part Numbers–E-CODER®

Size	Registration	E-CODER® (Pit)		E-CODER®R900i™ (Pit)	
		Register	UME	Register	UME
1 ½ inch and 2 inch	Cu. Ft.	RH5F11	9700-019	RW5F11	9700-001
	Gal.	RH5G11	9700-029	RW5G11	9700-002
	M <sup>3</sup>	RH5M11	9700-049	RW5M11	9700-004
	Imp. Gal.	RH5I11	9700-039	RW5I13	9700-007
3 inch	Cu. Ft.	RH5F21	9700-119	RW5F21	9700-101
	Gal.	RH5G21	9700-229	RW5G21	9700-102
	M <sup>3</sup>	RH5M21	9700-148	RW5M21	9700-104
	Imp. Gal.	RH5I21	9700-139	RW5I23	9700-107
4 inch	Cu. Ft.	RH5F31	9700-219	RW5F31	9700-201
	Gal.	RH5G31	9700-229	RW5G31	9700-202
	M <sup>3</sup>	RH5M31	9700-249	RW5M31	9700-204
	Imp. Gal.	RH5I31	9700-239	RW5I33	9700-207

Table 8 – UME and Register Part Numbers–E-CODER® (continued)

Size	Registration	E-CODER® (Pit)		E-CODER®R900i™ (Pit)	
		Register	UME	Register	UME
6 inch	Cu. Ft	RH5F41	9700-319	RW5F41	9700-301
	Gal.	RH5G41	9700-329	RW5G41	9700-302
	M <sup>3</sup>	RH5M41	9700-349	RW5M41	9700-304
	Imp. Gal.	RH5I41	9700-339	RW5I52	9700-307
8 inch	Cu. Ft	RH5F51	9700-419	RW5F51	9700-401
	Gal.	RH5G51	9700-429	RW5G51	9700-402
	M <sup>3</sup>	RH5M51	9700-449	RW5M51	9700-404
	Imp. Gal.	RH5I51	9700-439	RW5I53	9700-407
10 inch	Cu. Ft	RH5F01	9700-519	RW5F01	9700-501
	Gal.	RH5G01	9700-529	RW5G01	9700-502
	M <sup>3</sup>	RH5M01	9700-549	RW5M01	9700-504
	Imp. Gal.	RH5I01	9700-539	RW5I03	9700-507



When ordering registers, include change gear combination for the four-digit register code from the dial face.

Fire Hydrant

The following diagram shows the parts of a fire hydrant to which an HP Turbine can attach.

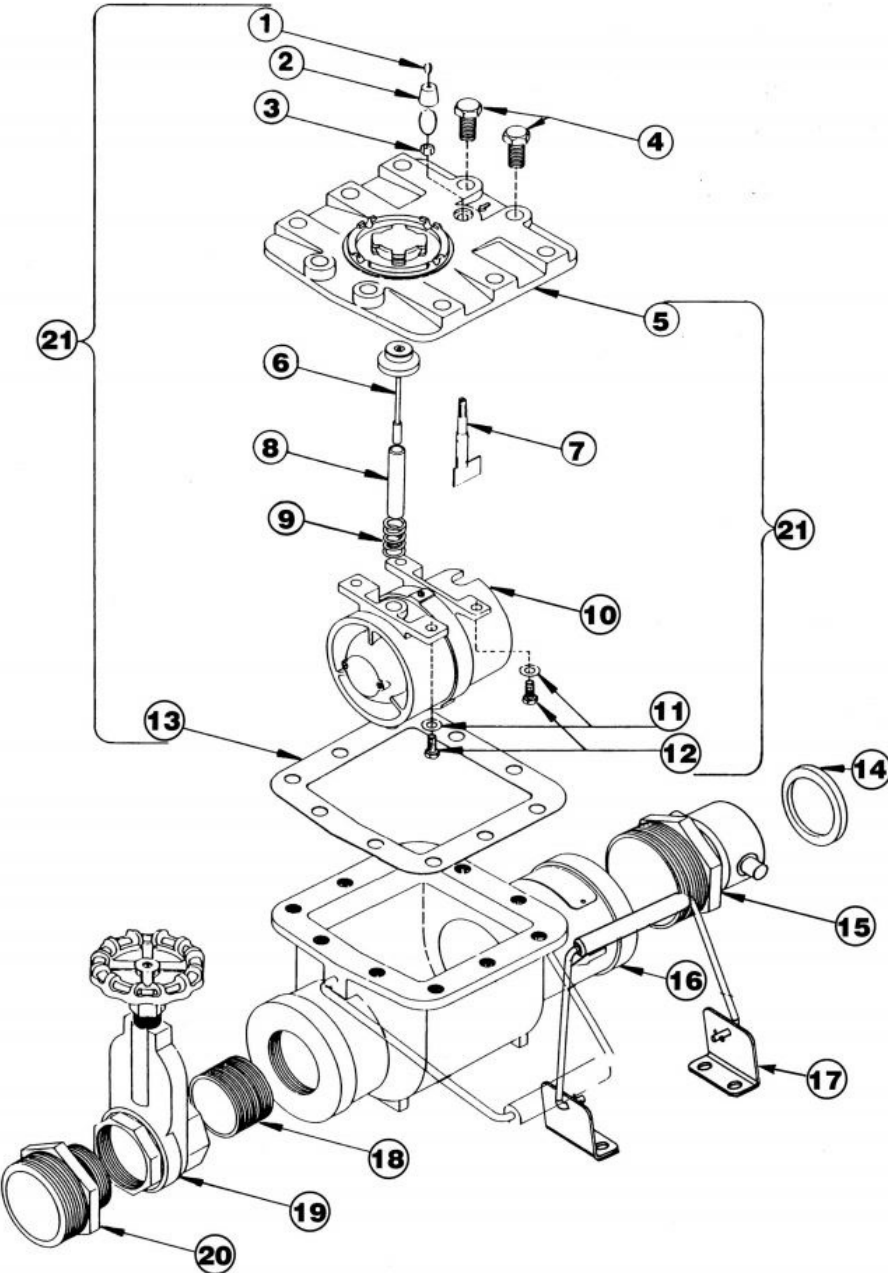


Figure 22 – Representative Breakdown of the Fire Hydrant

Table 9 – Fire Hydrant Part Numbers

Item	Description	Part Number
1	16-inch Seal Wire with Lead Seal	41110-501
2	Seal Cap	11098-001
3	Calibration Nut	8545-417
4	Maincase Bolts	8329-421
5	Cover	9639-104
6	Drive Spindle Assembly	9485-001
7	Calibration Vane Assembly	11097-200
8	Drive Sleeve	9484-006
9	Compression Spring	N/A
10	Measuring Chamber Assembly	9439-021
11	Washer	8568-012
12	Bolts	8329-007
13	Maincase Gasket	8341-304
14	Gasket*	8340-029
15	Fire Hose Coupling Assembly	9631-002
16	Maincase	9630-002
17	Bracket / Handle Assembly	12163-000
18	Nipple	8314-701
19	Gate Valve	8368-011
20	Outlet Nipple	N/A
21	Cover Assembly	9482-003

\* Included in assembly.

This appendix provides information about the Neptune<sup>®</sup> Fire Hydrant meter.

### Introduction

---

The Fire Hydrant meter is designed for mobile use in metering flows from a fire hydrant. The meter measures a wide flow range to maximize revenue. It meets or exceeds the latest performance requirements of AWWA. Maximum flow rate may be exceeded by 25% for intermittent flows.



Figure 23 – 3-Inch Fire Hydrant Meter

### Construction

---

The Fire Hydrant water meter consists of a lightweight, aluminum maincase fitted with a 2-inch gate valve, a turbine measuring element, and a roll-sealed register. The aluminum maincase is Xylan<sup>®</sup> coated for corrosion resistance and is lightweight, compact, and easy to handle. This meter features a unique “balanced handle” which makes carrying and installing it easier than any other fire hydrant meter on the market. A 2-inch gate valve enables the user to regulate the water flow without opening and closing the fire hydrant.

The unitized measuring element (UME) allows for quick and easy interchangeability.

Exclusive dual graphite bearings provide equalized rotor loading for accuracy over a broad flow range. The thrust-compensated rotor configuration relieves pressure on the thrust bearings, which minimizes wear and provides sustained accuracy over an extended operating life. A tamper-resistant stainless steel calibration vane allows recalibration of the UME to lengthen service life and to ensure accurate registration.

The roll-sealed register eliminates leaking and fogging. Magnetic drive couples the register with the measuring element.

### Warranty

---

Neptune provides a limited warranty for the Fire Hydrant meter performance, materials, and workmanship.

You can maintain the meter by replacing major components or a factory-calibrated UME.

### Specifications

---

This section provides the specifications of the Fire Hydrant meter.

- Application: cold water measurement of flow in one direction.
- Maximum operating pressure: 150 psi.
- Normal operation range: 5-450 gpm (at accuracy of 100 +/- 1.5%).
- Register type:
  - Direct reading, centersweep, roll-sealed magnetic drive with low flow indicator.
  - Bronze box with locking cover.
- Strainer: plastic.
- Registration (per sweep-hand revolution):
  - 100 gallons.
  - 10 cubic feet.
  - 1 cubic meter.
- Registration capacity (six-wheel odometer):
  - 100,000,000 gallons.
  - 10,000,000 cubic feet.
  - 1,000,000 cubic meters .
- Measuring element: AWWA Class II Turbine.

## Options

This section provides information on the different options available with the Fire Hydrant:

- Size: 2½-inch outlet (with 2½-inch gate valve).
- Strainer: stainless steel (internal).
- Orifice plate: size for application.
- Units of measure:
  - U.S. gallons.
  - Cubic feet.
  - Cubic meters.
- Registration (per sweep-hand revolution):
  - 100,000,000 gallons.
  - 10,000,000 cubic feet.
  - 1,000,000 cubic meters.

## Operating Characteristics

The following table provides information on the operating characteristics of the Fire Hydrant meter.

Table 10 – Fire Hydrant Operating Characteristics

Meter Size	Normal Operating Range @100% Accuracy (± 1.5%)	Maximum Intermittent Flow	AWWA Standard
3 inch	5 to 450 US gpm	560 US gpm	8 to 435 US gpm
	1.14 to 102.2 m <sup>3</sup> /h	127.2 m <sup>3</sup> /h	1.8 to 98.8 m <sup>3</sup> /h

## Dimensions

This section provides the dimensions of the Fire Hydrant meter.

Table 11 – Fire Hydrant Dimensions

3-inch Fire Hydrant	A Inches	B Inches	C Inches	D Inches	E Inches	Weight Lbs.
Without Coupling	15 ½	7 ½	11 ½	3 ⅞	7 ½	23
With Coupling	19 ¼	10	11 ½	2 ⅞	7 ½	29

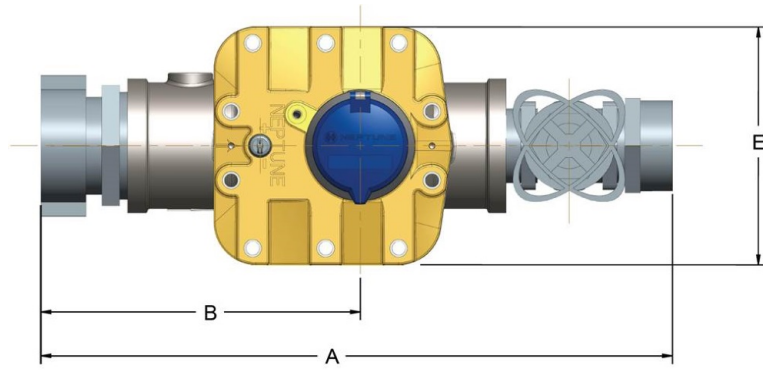


Figure 24 – Fire Hydrant - Top View

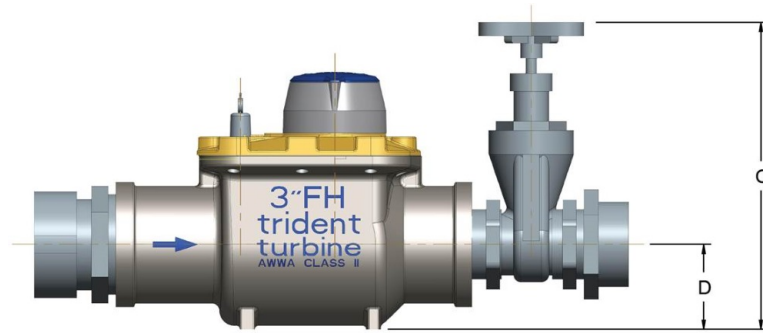


Figure 25 – Fire Hydrant - Side View



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

This appendix provides information on HP Turbine Fire Service meter.

### Introduction

---

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



Figure 26 – 6-Inch Fire Service Turbine S Meter

### Systems Compatibility

---

All HP Fire Service Turbine S meters are guaranteed adaptable to the following Neptune<sup>®</sup> reading systems without removing the meter from service:

- ARB<sup>®</sup> V.
- ProRead<sup>™</sup> (ARB VI).
- E-CODER<sup>®</sup>)R900i<sup>™</sup>.
- E-CODER<sup>®</sup>)R450i<sup>™</sup>.
- E-CODER<sup>®</sup>.
- ProCoder<sup>™</sup>.
- ProCoder<sup>™</sup>)R900i<sup>™</sup>.
- TRICON<sup>®</sup>/S .
- TRICON/E<sup>®</sup>3.

## 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.

## Warranty

---

Neptune provides a 10/10 warranty for the strainer body, a life time warranty for the maincase, 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.
- Strainer: 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 about the different options available with the HP Fire Service Turbine S meter.

Table 12 – Meter Options Table

Sizes	Strainer	Units of Measure	Register Types	Companion Flanges
<ul style="list-style-type: none"> <li>• 3 inch</li> <li>• 4 inch</li> <li>• 6 inch</li> <li>• 8 inch</li> <li>• 10 inch</li> </ul>	300 series stainless steel cover	<ul style="list-style-type: none"> <li>• U.S. gallons</li> <li>• Imperial gallons</li> <li>• Cubic feet</li> <li>• Cubic meters</li> </ul>	<ul style="list-style-type: none"> <li>• Remote Reading system*:                             <ul style="list-style-type: none"> <li>- E-CODER</li> <li>- E-CODER)R900i</li> <li>- ProCoder</li> <li>- ProCoder)R900i</li> <li>- TRICON/S</li> </ul> </li> <li>• Reclaim</li> </ul>	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 13 – 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 <sup>3</sup> /h	560 US gpm 127.2 m <sup>3</sup> /h	8 to 350 US gpm 1.8 to 79.5 m <sup>3</sup> /h
4 inch	10 to 1200 US gpm 2.27 to 272.5 m <sup>3</sup> /h	1500 US gpm 340.7 m <sup>3</sup> /h	15 to 630 US gpm 3.4 to 143. m <sup>3</sup> /h
6 inch	20 to 2500 US gpm 4.55 to 567.8 m <sup>3</sup> /h	3100 US gpm 704.1 m <sup>3</sup> /h	30 to 1400 US gpm 6.8 to 317.9 m <sup>3</sup> /h
8 inch	35 to 4000 US gpm 7.95 to 908.5 m <sup>3</sup> /h	5000 US gpm 1135.6 m <sup>3</sup> /h	50 to 2400 US gpm 11.4 to 545 m <sup>3</sup> /h
10 inch	50 to 6500 US gpm 11.36 to 1476.4 m <sup>3</sup> /h	8000 US gpm 1817 m <sup>3</sup> /h	75 to 3800 US gpm 17.0 to 863 m <sup>3</sup> /h

Dimensions

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

Table 14 – 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

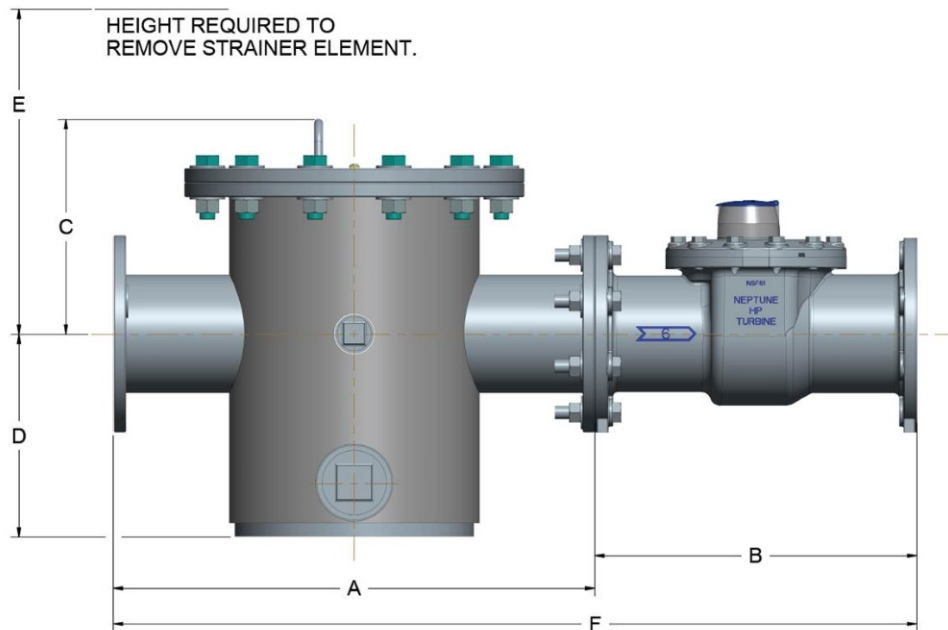


Figure 27 – HP Fire Service Turbine S Dimensions

## Cleaning the Fire Service Strainer

This section defines how to clean the strainer in the HP Fire Service Turbine S meter.

1. Remove the cover from the strainer housing.



The lid can be heavy.

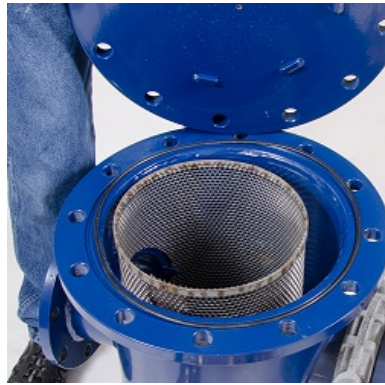


Figure 28 – FS Turbine S Strainer Cover

2. Remove the basket from the strainer housing.



Figure 29 – FS Turbine S Strainer Basket

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

4. Inspect the basket strainer for any defects.



Figure 30 – Checking for Defects

5. Reinstall the basket strainer or replace the strainer if it is damaged.
6. Inspect the O-ring seal for any signs of nicks and damage.

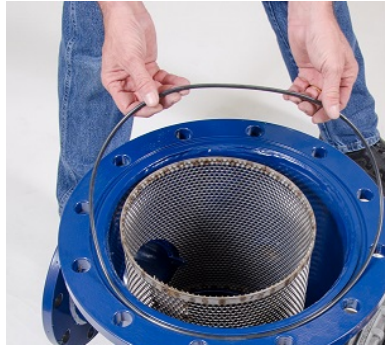


Figure 31 – FS Strainer S Basket O-Ring

7. Reinstall the cover to complete the maintenance.

### A

---

#### AWWA

American Water Works Association.

### F

---

#### FCC

Federal Communications Commission.

#### flange

Ring or collar, usually provided with holes for bolts.

### G

---

#### gasket

Piece of rubber or some other material that is used to make a tight seal between two parts that are joined together.

### H

---

#### HP

High Performance.

### I

---

#### Imperial Gallon

Unit for measuring a volume of liquid or the capacity of a container for storing liquid, not the mass of a liquid. One imperial gallon is equivalent to approximately 1.2 U.S. liquid gallons.

## P

---

### PIN

Personal Identification Number.

### PSI

Pounds per square inch.

## R

---

### RMA

Return Material Authorization.

## S

---

### strainer

Mesh barrier protecting the meter from debris in the line and corrects the velocity profile of the flow to the meter.

## U

---

### U.S Gallon

U.S. liquid gallon is defined as 231 cubic inches and equates to approximately 3.785 liters.

### UL

Underwriters Laboratory.

### UME

Unitized Measuring Element.



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---

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