NEPTUNE
TECHNOLOGY GROUP

TRU/FLO®
Installation and Maintenance Guide

TRU/FLO®
Installation and Maintenance Guide

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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 could void the user's authority to operate the equipment.

TRU/FLO® Compound Meter
Installation and Maintenance Guide
Literature No. IM TRUFLO 04.2022
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Chapter 1: Introduction

This chapter provides a general description of the 2-inch, 3-inch, 4-inch, 6-inch, and 6- inch x 8-inch TRU/FLO® Compound meters.

Product Description

The TRU/FLO meter is designed to register wide-flow ranges where varying flow rates are typical. It combines the low-flow sensitivity of a disc-type meter with the high-flow capacity of a turbine-type meter. Its key features include:

- Minimum loss of accuracy in the crossover range increases revenue.
- Spring-loaded valve that eliminates the need for frequent adjustment and service.
- Combined turbine and disc measuring elements.
- Compact maincase.

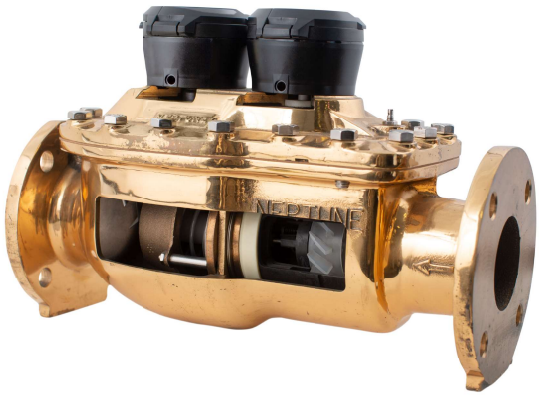


Figure 1 – TRU/FLO® Compound 3-Inch Meter

TRU/FLO® General Information

The following sections provide general information about the TRU/FLO meter.

Operation

The hydraulic valve transfers flow smoothly between the disc section and turbine section of the meter, minimizing the loss of accuracy in the crossover range. The turbine measuring element registers high-flows and the disc measuring element registers low-flows, ensuring accurate measurement at all flow rates.

Construction

The TRU/FLO meter consists of the following:

- A durable lead free, high-copper alloy maincase.
- Neptune® High Performance (HP) or Trident® Turbine measuring element.
- Neptune T-10® chamber, and two magnetic-driven, roll-sealed registers.

The 6-inch x 8-inch TRU/FLO assembly consists of two 6-inch x 8-inch concentric reducers, a 6-inch Neptune strainer, and a 6-inch Neptune TRU/FLO Compound meter.

The lead free, high-copper maincase is corrosion-resistant, lightweight, and easy to handle.

A calibration vane allows field calibration of the Unitized Measuring Element (UME) to lengthen service life and to ensure accurate registration.

The two magnetic-driven, roll-sealed registers simplify the meter's design and reduce long-term maintenance by eliminating complicated, combining drive mechanisms. For reading convenience, the registers can be mounted in any one of four positions on the meter.

Warranty

Neptune provides a limited warranty on its TRU/FLO meters for performance, materials, and workmanship.

You can easily perform maintenance by replacing the in-line major components with a factory-calibrated UME.

Chapter 2: Specifications

This chapter covers the specifications, operating characteristics, and dimensions for the TRU/FLO® Compound meter.

Environmental Specifications

This section contains environmental specifications for the TRU/FLO meter.

Table 1 – Environmental Specifications

Specification	Description
Application	Cold water measurement of flow in one direction.
Maximum Operating Pressure	150 PSI (1034 kPa).
Maximum Operating Temperature of Water	80° F.
Measuring Element	• AWWA Class II Turbine, hydrodynamically balanced rotor. • Nutating disc.

TRU/FLO® Operating Characteristics

This section provides a table of the operating characteristics of the TRU/FLO meter.

Table 2 – Operating Characteristics

TRU/FLO® Meter	Normal Operating Range @ 100% Accuracy (± 1.5 %)	AWWA Standard	Low Flow @ 95% Accuracy
2-inch HP	½ to 200 US gpm 0.11 to 45.4 M^3/h	1 to 160 US gpm .227 to 36.34 m^3/h	⅛ US gpm 0.03 m^3/h
3 inch	½ to 450 US gpm 0.11 to 102.2 m^3/h	2 to 350 US gpm .454 to 79.5 m^3/h	⅛ US gpm 0.03 m^3/h
4 inch	1 to 1000 US gpm 0.23 to 227.1 m^3/h	3 to 600 US gpm .68 to 136.3 m^3/h	½ US gpm 0.11 m^3/h

Table 2 – Operating Characteristics (continued)

TRU/FLO® Meter	Normal Operating Range @ 100% Accuracy (± 1.5 %)	AWWA Standard	Low Flow @ 95% Accuracy
6 inch	1 ½ to 2000 US gpm 0.34 to 454.2 m^3/h	5 to 1350 gpm 1.14 to 306.6 M^3/h	¾ US gpm 0.17 m^3/h
6 inch x 8 inch	1 ½ to 2000 US gpm 0.34 to 454.2 m^3/h	16 to 1600 US gpm 3.63 to 363.4 m^3/h	¾ US gpm 0.17 m^3/h

Table 3 – Dimensions

TRU/FLO® Meter Size	A	B			C	D	E	F	G	Flange Type	Weight
		E-CODER®, Pro--Coder™	ProRead™	E-CODER®) R900/™ ProCoder™) R900/™							
	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)		lbs (kg)
2-inch HP	15 ¼ 387	9 ⅜ 238	9 9/16 243	9 ⅜ 238	2 ½ 64	13/16 21	5 7/8 149	6 152	1 ½ NPT 38	2-inch Oval 150 lb.	32 / 14.5
3 inch	17 432	11 ½ 292	11 ¾ 298	11 ½ 292	3 ¾ 95	⅝ 16	7 ½ 191	8 ½ 216	1 ½ NPT 38	3-inch ANSI 150 lb.	72 / 32.7
4 inch	20 508	13 ⅜ 340	13 9/16 345	13 ⅜ 340	4 ½ 114	11/16 17	9 229	9 ⅛ 232	2 NPT 51	4-inch ANSI 150 lb.	100 / 45.4
6 inch	24 610	16 ⅜ 416	16 9/16 421	16 ⅜ 416	5 ½ 140	1 25	11 279	12 ¾ 324	2 NPT 51	6-inch ANSI 150 lb.	208 / 94.3
6 inch x 8 inch	55 ⅜ 1407	16 ⅜ 416	16 9/16 421	1 6 ⅜ 416	5 ½ 140	1 25	11 279	12 ¾ 232	2 NPT 51	8-inch ANSI 150 lb	460 / 208.50

The following diagrams show the dimensions for the 2-inch TRU/FLO meter.

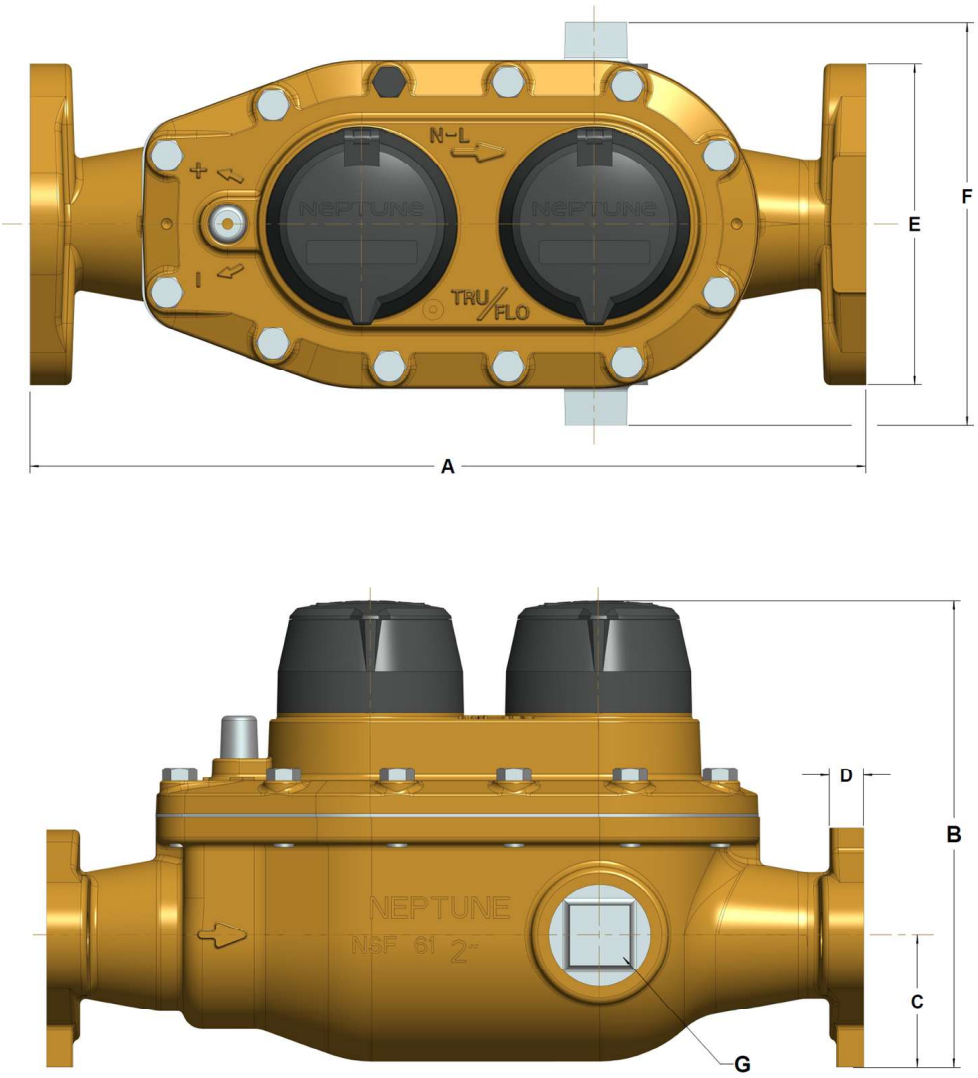
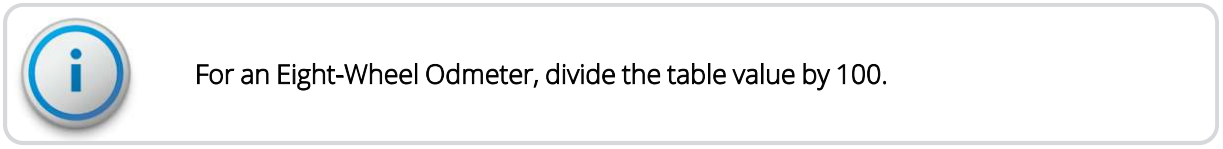


Figure 2 – TRU/FLO® Top and Side Views

Table 4 – Meter Registration (6-Wheel Odometer)

Meter Size	U.S. Gallon	Imperial Gallon	Cubic Feet	Cubic Meters
Turbine Side				
2 inch	100	100	10	1
3 inch	100	100	10	1
4 inch	100	100	10	1
6 inch	1,000	1,000	100	10
6 inch x 8 inch	1,000	1,000	100	10
Disc Side				
2 inch	10	10	1	0.1
3 inch	10	10	1	0.1
4 inch	10	10	1	0.1
6 inch	10	10	1	0.1
6 inch x 8 inch	10	10	1	0.1



For an Eight-Wheel Odmeter, divide the table value by 100.

Table 5 – Maximum Dial Face Capacity

Meter Size	U.S. Gallon	Imperial Gallon	Cubic Feet	Cubic Meters
Turbine Side				
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	100,000,000	100,000,000	10,000,000	1,000,000
6 inch	1,000,000,000	1,000,000,000	100,000,000	10,000,000
6 inch x 8 inch	1,000,000,000	1,000,000,000	100,000,000	10,000,000
Disc Side				
2 inch	10,000,000	10,000,000	1,000,000	100,000
3 inch	10,000,000	10,000,000	1,000,000	100,000

Table 5 – Maximum Dial Face Capacity (continued)

Meter Size	U.S. Gallon	Imperial Gallon	Cubic Feet	Cubic Meters
4 inch	10,000,000	10,000,000	1,000,000	100,000
6 inch	10,000,000	10,000,000	1,000,000	100,000
6 inch x 8 inch	10,000,000	10,000,000	1,000,000	100,000

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Chapter 3: General Installation Guidelines

This chapter describes tools, materials, and general installation information for the 3-inch, 4-inch, and 6-inch TRU/FLO® Compound meters.

Tools and Materials

"Recommended Tools" below shows the recommended tools you need to successfully install or perform maintenance on the TRU/FLO meter.

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

Table 6 – Recommended Tools

Part Number	Description
N/A	Contains standard tools including: • Flathead screwdrivers. • Hammer. • Pliers. • 7/16-inch wrench. • Tool to remove snap ring.
9685-002, 003, 004, 005	Gasket Kit (size dependent).
11097-610, 600, 700, 800	Calibration Vane Assembly (size dependent).
9571-100, 110, 200, 300	Throttle Tube Assembly (size dependent).
9485-011, 006, 003, 008	Magnet Drive Assembly (size dependent).
9681-004, 001, 002, 003	Valve Assembly Kit (size dependent).
N/A	Flashlight.

Safety and Preliminary Checks

Complete the following safety and preliminary checks before and during each installation. Verify that:

- You are at the location specified on the Site Work Order.
- The site is safe for you and your equipment.

Chapter 4: Installing the TRU/FLO®

This chapter covers storage, unpacking, and installation instructions for the TRU/FLO® Compound meter.

Prior to Installation

This section describes tasks to complete before installing the TRU/FLO.

Storage

After receipt, inspect the shipping containers for damage, and inspect the contents of damaged cartons before storing.

After completing the inspection, store the cartons in a clean, dry environment.

Unpacking

The TRU/FLO meter is heavy, so handle it carefully. Lift the assembly out of the box by the meter maincase, and not by the register. Using caution, inspect the meter for damage.

If the meter appears to be damaged, notify your Neptune Territory Manager or Distributor. If one or more items requires reshipment, use the original cardboard box and packing material.

Tools Needed

"Recommended Tools" on page 9 shows the recommended tools you need to successfully install the TRU/FLO meter.

Installing the TRU/FLO®

All TRU/FLO meters operate more accurately and reliably when installed properly. Install the TRU/FLO meter horizontally with the registers facing upward, and the flow running horizontally. The TRU/FLO meter's performance is directly related to the flow conditions of the water stream entering the meter. If the flow conditions are distorted as a result of improperly installed upstream fittings or piping changes, the TRU/FLO meter's performance can be adversely affected.

Installing the Strainer

Neptune recommends that all TRU/FLO meters be installed with a plate strainer at the meter inlet for 3-inch and larger meters. The strainer, in addition to protecting the meter from debris in the line, also corrects the velocity profile of the flow to the meter.

The strainers for the 3-inch, 4-inch, and 6-inch TRU/FLO meters are NSF/ANSI 61 compliant. They are made of a lead free, high-copper alloy.

When installing Neptune meters with a strainer, a minimum of 4-pipe-diameters of straight run pipe is required upstream of the meter and strainer assembly. A minimum of 2-pipe-diameters of straight run pipe is required downstream of the meter and strainer assembly. This can include components that are fully open in their normal operating position.

If a Neptune meter is installed without a strainer, a minimum of 8-pipe-diameters of straight run pipe is required upstream of the meter and strainer assembly. A minimum of 2-pipe-diameters of straight run pipe is required downstream of the meter and strainer assembly. This can include components that are fully open in their normal operating position.

New Meter Installation

Chapter 4shows the recommended installation of a TRU/FLO meter. This installation incorporates a plate-type strainer attached to the inlet of the meter. Chapter 4 also shows a bypass which provides uninterrupted service capability during periods of meter service.

The upstream plate-type strainer provides protection against meter damage from debris in the lines and minimizes the effects of variation in upstream piping. Use of a Neptune strainer of the same line size as the meter is recommended. This strainer design provides optimum velocity profile correction at minimum additional head loss.

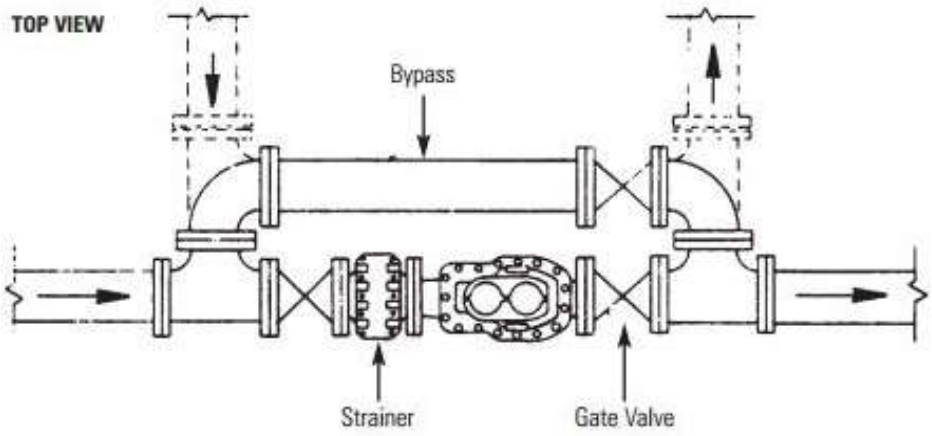

Figure 3 – Installed TRU/FLO® Compound Meter Top View

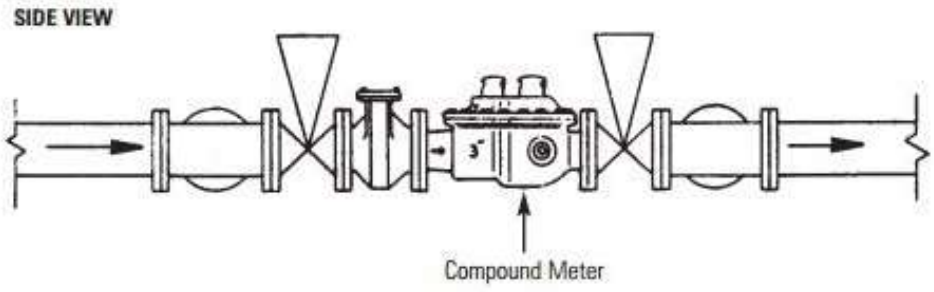

Figure 4 – Installed TRU/FLO® Compound Meter Side View

When installing a TRU/FLO meter, always follow normal good-piping practices. All gaskets need to be centrally located on their flanges with no overlap or interference with the pipe diameter. This is important at the inlet connection to the meter where a gasket protruding into the flow stream causes unpredictable velocity conditions.

The TRU/FLO meter 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.

Ensuring Proper Installation

After the TRU/FLO meter is installed, fill the meter with water and complete the following steps:

1. Make sure the service line has been flushed of any debris before installing the meter.
2. Turn the bleed screw (located on the cover) counter-clockwise one or two turns.

Figure 5 – Bleed Screw

3. With the outlet-side gate valve closed, slowly open the inlet-side valve to pressurize the meter.
4. Using a flathead screwdriver, turn the air bleed screw (located next to the turbine register) to vent air.
5. Close the air bleed screw clockwise when the air is completely vented.
6. Slowly open the outlet-side gate valve until downstream is pressurized.

After installation, put the upstream (inlet) valve to the "full open" position during service. A partially throttled upstream valve causes flow profile distortion which adversely affects meter accuracy.

Chapter 5: Maintaining the TRU/FLO® Compound Meter

This chapter provides instructions for maintaining the TRU/FLO® meter. The 3-inch, 4-inch, and 6-inch meters in the TRU/FLO product line share similar features and functions. TRU/FLO meters are composed of four major components:

- T-10® chamber.
- Turbine measuring assembly.
- Main valve assembly.
- Throttle valve assembly.

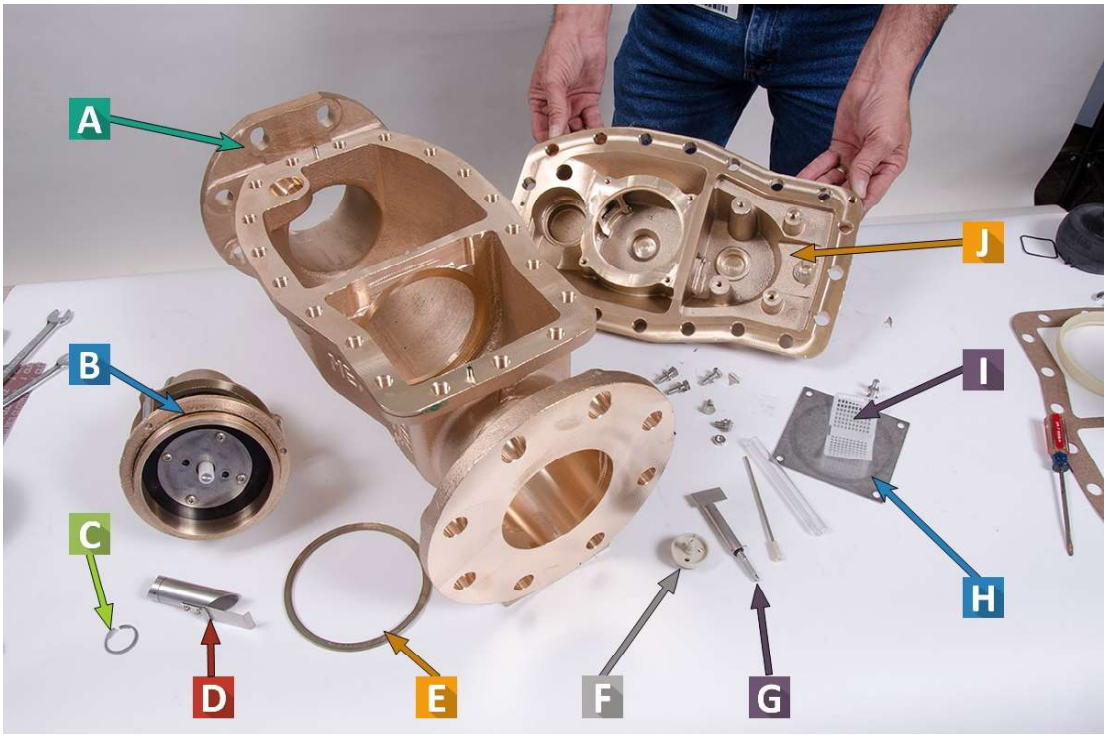

Figure 6 – Reusable Parts

A	Maincase	F	Drive assembly
B	Main valve assembly	G	Calibration vane
C	Snap ring	H	Plate
D	Throttle valve assembly	I	T-10 strainer
E	Main valve snap ring	J	Cover assembly

Neptune® UME Design

Neptune's Unitized Measuring Element (UME) allows for the quickest, most efficient way to service your large meter. It is available for the TRU/FLO, HP Turbine, HP PROTECTUS® III, and Fire Hydrant meters. The UME assembly consists of the meter's cover with all of the measuring components either contained within the cover or attached to it.

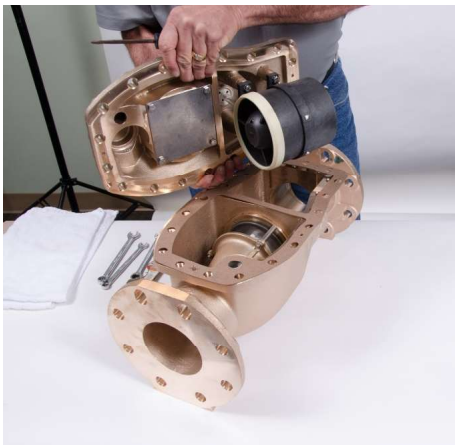

Figure 7 – UME

You can order a precalibrated UME from Neptune.

For a TRU/FLO meter, this includes the bronze cover with the two registers, the T-10 chamber, and the turbine measuring assembly.

For the HP Turbine, HP PROTECTUS III, and Fire Hydrant, this includes the register, bronze cover, and the turbine measuring assembly.

When you order a new UME from Neptune, it has:

- Two new registers attached.
- Completed an accuracy test and receives a new test ticket ensuring its accuracy.

Since the bronze body is warrantied for life, you can replace the UME by:

- Removing the bolts.
- Separating the cover from the maincase.
- Removing the old UME, and dropping in the new UME.

Performing Maintenance on the Meter

This section provides information on maintaining a meter. This includes removing and reinstalling the cover assembly.

Always wear protective eye wear when working with any product.

Removing the Cover Assembly

Complete the following steps to remove the cover assembly.

1. Remove the seal pin from the register using a screwdriver.

Figure 8 – Remove Seal Pin

2. Remove the registers from the TRU/FLO cover assembly.
3. Lay the registers aside in an upright position.

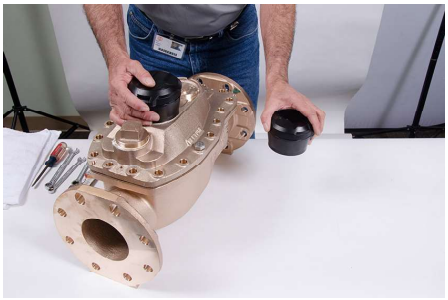

Figure 9 – Remove the Registers

Do not place the cover assembly upside down on top of the registers when removing the cover.

4. Remove the cover bolts attaching the cover assembly to the maincase.
5. The 4-inch and 6-inch TRU/FLOs have two 3/8-16-inch threaded holes to help remove the cover assembly from the maincase. Screw two 3/8-16-inch bolts into the holes to knock the maincase loose. Then you can lift or pry the cover assembly from the body.
6. Remove the cover assembly from the maincase and set it aside on a workbench or on another secure surface.

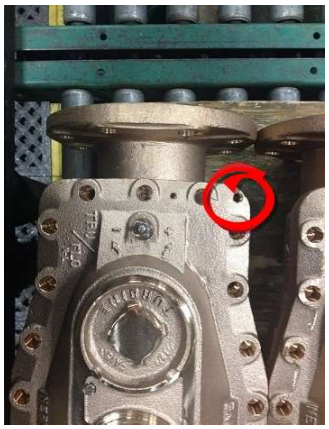

Figure 10 – Remove the Cover

7. Use a flat scraper to remove the old gasket from the maincase and to avoid damaging the maincase.

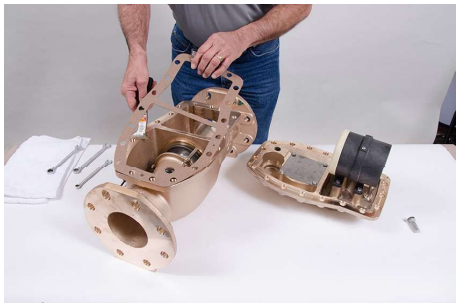

Figure 11 – Remove the Gasket

Reinstalling the Cover Assembly

Complete the following steps to reinstall the cover assembly.

1. Place the maincase gasket on the maincase.

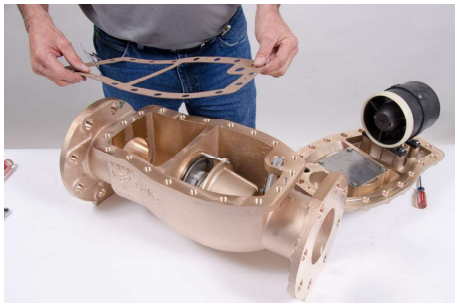

Figure 12 – Replace the Gasket

The maincase gasket does not need to be secured with any adhesive.

2. Place the cover assembly on the maincase, making sure that the cover assembly aligns with the guide pins.

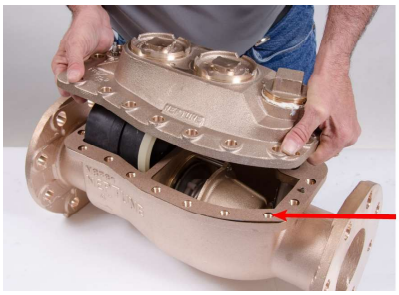

Figure 13 – Guide Pins

3. Add the bolts to the maincase and tighten them from 500 inch-pounds to 800 inch-pounds.

Figure 14 – Secure the Cover

4. Place the turbine register in the location marked "TURBINE" on top of the cover assembly. Place the T-10 register in the location marked "T-10 DISC" on top of the cover assembly. Secure with the seal pin.

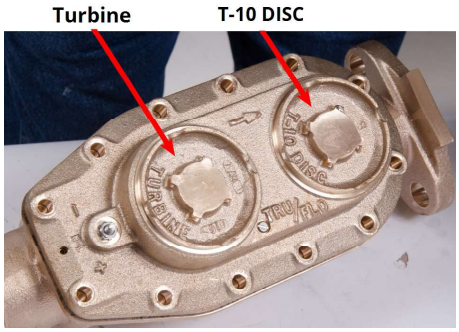

Figure 15 – Top of Cover

Performing Maintenance on the T-10® Chamber

This section provides information on how to maintain the T-10® chamber.

Removing the T-10® Chamber

Complete the following steps to remove the T-10® chamber.

1. Remove the cover assembly. See "Removing the Cover Assembly" on page 17.
2. Remove the T-10 plate.

Figure 16 – T-10® Plate

3. Inspect and remove the T-10 gasket plate.

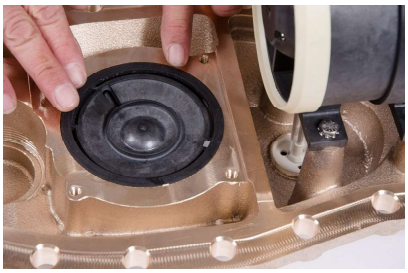

Figure 17 – T-10® Gasket Plate

4. Insert the flathead screwdriver under the T-10 stainer, then lift to remove.

Figure 18 – Remove the T-10® Strainer

The T-10 strainer can be reused if it is not damaged.

5. After removing the strainer, insert the flathead screwdriver under the T-10 chamber, and then lift to remove the chamber.
6. Inspect the chamber for any damage, and if necessary discard the chamber.

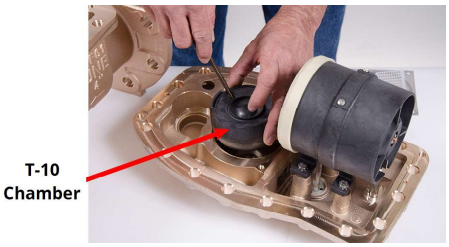

Figure 19 – Remove the T-10® Chamber

Breaking down and rebuilding individual components in the chamber is not recommended.

7. Check the O-ring integrity.

Figure 20 – Square O-Ring

8. Clean the magnet and sealing surfaces:

- Use medium grit wet sandpaper to clean the areas where the T-10 chamber was seated in the cover assembly.
- Lightly rub to remove any collected debris or sediment on the machined surfaces.

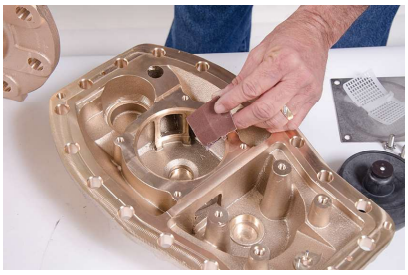

Figure 21 – Clean the Chamber

- Turn the cover assembly over and clean where the registers were seated on the cover.

Figure 22 – Clean Under the Registers

Lightly clean all areas that touch magnetic components. Do not rub too hard or you could permanently damage the machined metal surface.

Replacing the T-10® Chamber

Complete the following steps to replace the T-10® chamber.

1. Replace the chamber O-ring if necessary.
2. Add the T-10 strainer making sure to align the tab of the strainer with the groove in the T-10 chamber. Make sure the screen is flush with the T-10 chamber.

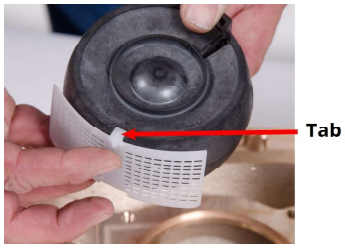

Figure 23 – T-10® Strainer

3. Place the T-10 chamber with the T-10 strainer in the cover assembly with the magnet facing down.

   The strainer holds the chamber in place and seals the chamber O-ring against the mating surface in the maincase.

Figure 24 – Place the T-10® Chamber

4. Add the chamber gasket to the T-10 chamber.

Figure 25 – T-10® Chamber

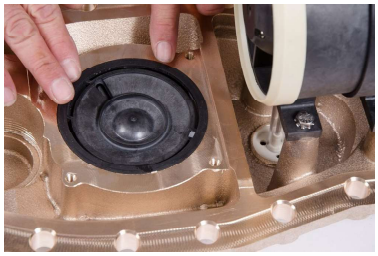

Figure 26 – Replace the Gasket

5. Add the plate and tighten the bolts with the wrench in a cross pattern. Tighten the bolts to 15 inch-pounds or 20 inch-pounds.

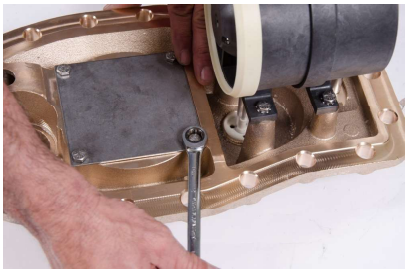

Figure 27 – Add the Plate

Performing Maintenance on the Turbine Measuring Assembly

There are three primary assemblies on the turbine assembly:

- Rotor assembly.
- Calibration vane assembly.
- Magnet drive assembly.

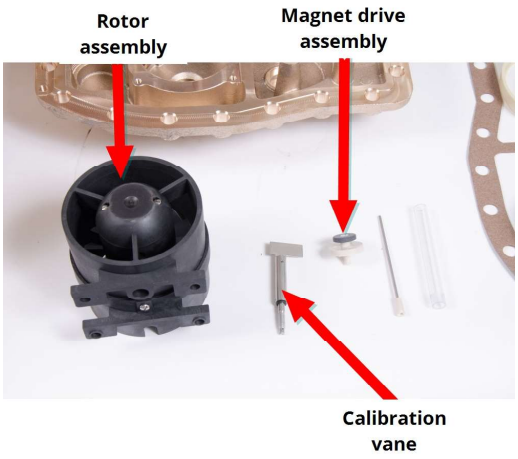

Figure 28 – Turbine Measuring Assembly

Removing the Turbine Measuring Assembly

To remove the turbine measuring assembly, complete the following steps.

1. Place the cover assembly on its side with the turbine measuring assembly facing you.
2. Use the 7/16-inch wrench to remove the calibration vane lock nuts. Keep the bolts for later use.

Figure 29 – Remove the Lock Nuts

3. Place the cover assembly upside down, then remove the seal ring.

4. Inspect the seal ring and if it is damaged or compromised throw the seal away.

Figure 30 – Remove Seal Ring

5. Use the 7/16-inch wrench to remove the four lock nuts and bolts underneath the turbine measuring assembly.

Figure 31 – Remove the Lock Nuts

6. With the calibration vane lock nut loosened, you can lift the calibration vane and rotate it out of the way.
7. Remove the turbine measuring assembly by lifting the magnet drive spindle and the calibration vane assembly.

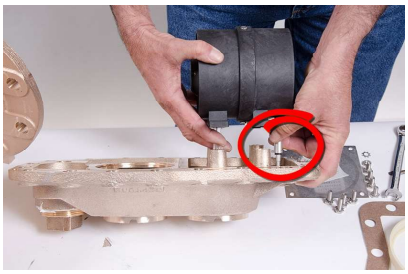

Figure 32 – Remove the Rotor Assembly

8. Use pliers to remove the magnet drive assembly.

Figure 33 – Remove the Magnet Drive Assembly

You can reuse the magnet drive assembly if it is not damaged.

9. Inspect the O-ring on the calibration vane assembly. If it is nicked or damage, it must be replaced.

Figure 34 – Replace the O-Ring

Replacing the Turbine Measuring Assembly

To replace the turbine measuring assembly, complete the following steps.

1. Before proceeding, inspect the magnet drive assembly. If it has been cracked or damaged, replace it.

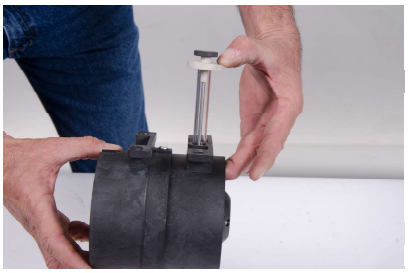

Figure 35 – Magnet Drive Assembly

A replacement drive assembly is available in the magnet drive assembly kit.

2. Return the calibration vane assembly to the turbine measuring assembly.
3. Install the calibration vane so that the large portion of the vane is inside the measuring assembly.
4. Replace or re-install the magnet drive assembly.
5. Lower the turbine measuring assembly into the cover assembly while holding the calibration vane assembly and magnet drive assembly in place.

Figure 36 – Add the Measuring Chamber Assembly

6. Replace and tighten the bolts of the turbine measuring assembly with a wrench from 50 inch-pounds to 55 inch-pounds to secure it.

Figure 37 – Tighten the Locking Nuts

7. Add the seal ring to the turbine measuring assembly.

Figure 38 – Add the Seal Ring

Setting the Calibration Vane Assembly

You can modify the calibration vane assembly to change the registration of the meter. Either turn the calibration vane to the positive side to increase registration or to the negative side to decrease registration.

To properly set the calibration vane assembly, complete the following steps.

1. Turn the cover assembly over, loosen the calibration vane nut.
2. Using a screwdriver, turn the calibration vane to the desired setting.
3. After the calibration vane is in the desired location, tighten the nut to fix the location of the calibration vane.

Figure 39 – Set the Calibration Vane Assembly

4. To increase the registration, turn the calibration vane assembly toward the plus sign.
5. To decrease the registration, turn the calibration vane assembly toward the minus sign.

Performing Maintenance on the Throttle Valve Assembly

The throttle valve assembly consists of two parts:

- Throttle valve.
- Snap ring.

Figure 40 – Throttle Valve Assembly

Removing the Throttle Valve Assembly

Complete the following steps to remove the throttle valve assembly.

1. Lift the throttle valve assembly, then insert the snap ring pliers.
2. Use the pliers to remove the snap ring.

Figure 41 – Remove the Snap Ring

3. Remove the throttle valve assembly by lifting and holding the flap, then pushing down on the valve.

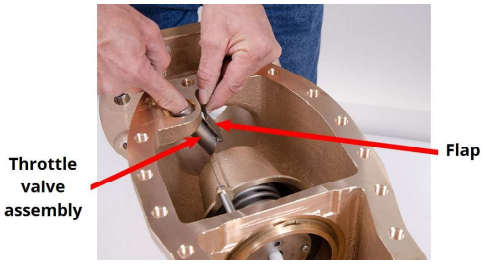

Figure 42 – Remove the Throttle Valve Assembly

Replacing the Throttle Valve Assembly

To replace the throttle valve assembly, complete the following steps.

1. Place the throttle valve assembly in the maincase with the flap toward the main valve assembly. The main valve assembly keeps the flap closed.

Figure 43 – Replace the Throttle Valve Assembly

2. Lift the throttle valve up and place the snap ring in the throttle valve groove. The snap ring locks the throttle valve assembly in place and you can reuse.

Performing Maintenance on the Main Valve Assembly

This section provides information on how to maintain the main valve assembly.

Removing the Main Valve Assembly

Before you remove the main valve assembly, remove the throttle valve assembly. See "Performing Maintenance on the Throttle Valve Assembly" on page 30.

1. Place a flathead screwdriver underneath the notch in the snap ring.

Figure 44 – Notch in the Snap Ring

2. Turn the screwdriver ¼ turn to dislodge the snap ring from the groove in the maincase.

Figure 45 – Dislodge the Snap Ring

3. Use your hand or the screwdriver to work around the snap ring, and then remove the snap ring from the meter.

Figure 46 – Remove the Snap Ring

Keep the main valve snap ring for later use.

4. Apply pressure to the back top portion of the main valve assembly.
5. With the main valve assembly removed, you can inspect the integrity of the main valve set and spring.
6. Clean off any machined surfaces in the maincase that might have buildup.

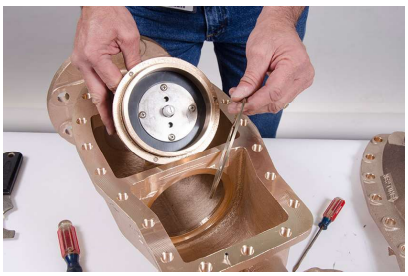

Figure 47 – Remove the Main Valve Assembly

When performing maintenance on the main valve assembly, take appropriate safety measures. The main valve spring is under tension and disassembling the valve assembly can cause bodily harm.

Replacing the Main Valve Assembly

To replace the main valve assembly, complete the following steps.

1. Place the main valve assembly back in the maincase, then push it toward the inlet side of the meter.

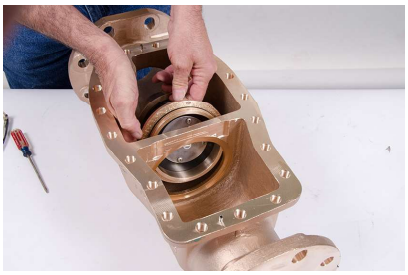

Figure 48 – Replace the Main Valve Assembly

2. Attach the main valve snap ring, turning it within the groove inside the maincase.

Figure 49 – Attach the Main Valve Snap Ring

The brass is sharp. Handle with care or wear durable gloves to avoid cuts and abrasions.

3. Check and make sure the main valve snap ring is in the groove.

For the procedures specific to maintaining the 2-inch meter, see Appendix C: Maintaining the 2-Inch TRU/FLO Maintenance.

Chapter 6: Maintaining the Accuracy of the TRU/FLO® Meter

This chapter provides information about maintaining the accuracy of the TRU/FLO® meter.

Introduction

Like any mechanical device, a meter wears in such a way that its accuracy decreases. This is why creating and maintaining an efficient and reliable meter maintenance program is important for any utility.

Meter performance is driven by three main components:

- Water quality.
- Usage or throughput.
- Routine maintenance.

If a meter is installed in an area where the water has a lot of sediment or debris, maintenance is required more frequently. Similarly, if a meter has a high amount of usage, then routine maintenance can be performed more frequently for several reasons:

- The meter is moving more water.
- Like any mechanical device, the more the mechanical components of the meter are used, the more frequently they need maintenance.
- Routine maintenance increases the overall performance of the meter.

Accuracy Test

The best way to decide if a meter needs maintenance is an accuracy test. Typically, a meter's maintenance schedule is based on size, but any meter that sees a large amount of usage requires maintenance more frequently. Following are some guidelines for performing a meter accuracy test. For more information, consult the *TRU/FLO® Field Testing Guide* or *AWWA's M6* manual.

To run an accuracy test, complete the following steps.

1. Run an accuracy test at low flow. Typically, as a meter deteriorates from use, the low flow accuracy is the first thing to decline.

   If a low flow accuracy test shows poor results, it can indicate:

   - The T-10® strainer is clogged and requires cleaning.
   - The T-10 chamber needs to be replaced.

- The O-ring in the outlet of the T-10 chamber needs to be replaced.
- The mainline valve is damaged or is wearing out and needs to be replaced.

If poor accuracy results are received, verify that there are no errors in the test setup and repeat the test.

Acceptable in-field low flow accuracy test results are reported in the *AWWA M6* manual.

2. Run a test at medium flow or high flow. This ensures that the turbine measuring assembly is working properly.

   A poor accuracy test with high flow can indicate the:

   - Calibration vane needs adjustment based upon the high flow results.
   - Turbine measuring assembly needs maintenance. Examine the:
     - Magnet drive for damage.
     - Calibration vane assembly for damage.
     - Rotor assembly for damage. Clean the bronze strainer.
   - Register is not the correct size.
   - Meter has an up-flow obstruction.
   - Meter is not installed with the proper installation procedures.

   When the meter transitions from low flow to high flow, there is a flow range called crossover. During crossover, the water is measured by both the T-10 chamber and the turbine. A brief dip in accuracy occurs when transitioning through crossover.

When performing an accuracy test, be aware of the crossover range. If an accuracy test results in less than the allowable range for low flow and high flow, you might be testing in the crossover range. Accuracy can not dip below 90% in the crossover range. The crossover range can also cover a small flow range. For more details, see the *AWWA Standard C702 Cold-Water Meters - Compound Type* manual.

For more information, see Neptune's *TRU/FLO Field Testing Guide* and AWWA's *M6: Water Meters - Selection, Installation, Testing and Maintenance* manual.

Appendix A: Maintaining the External Strainer

This appendix provides information on how to clean and maintain the TRU/FLO® external strainer.

Cleaning the External Strainer

To clean the strainer, complete the following steps.

1. Remove the cover.
2. Pull the metal strainer out of the body and clean off any debris build up.
3. If there is any debris in the strainer body, clean out the debris.
4. Replace the gasket between the cover and the body, if necessary.

Figure 50 – External Strainer

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Appendix B: TRU/FLO® Parts List

This appendix contains diagrams of the TRU/FLO® and a description of each part.

2-Inch Meter

The following diagram is a representative breakdown of the 2-inch meter. Table 7 on the next page describes each part of the diagram.

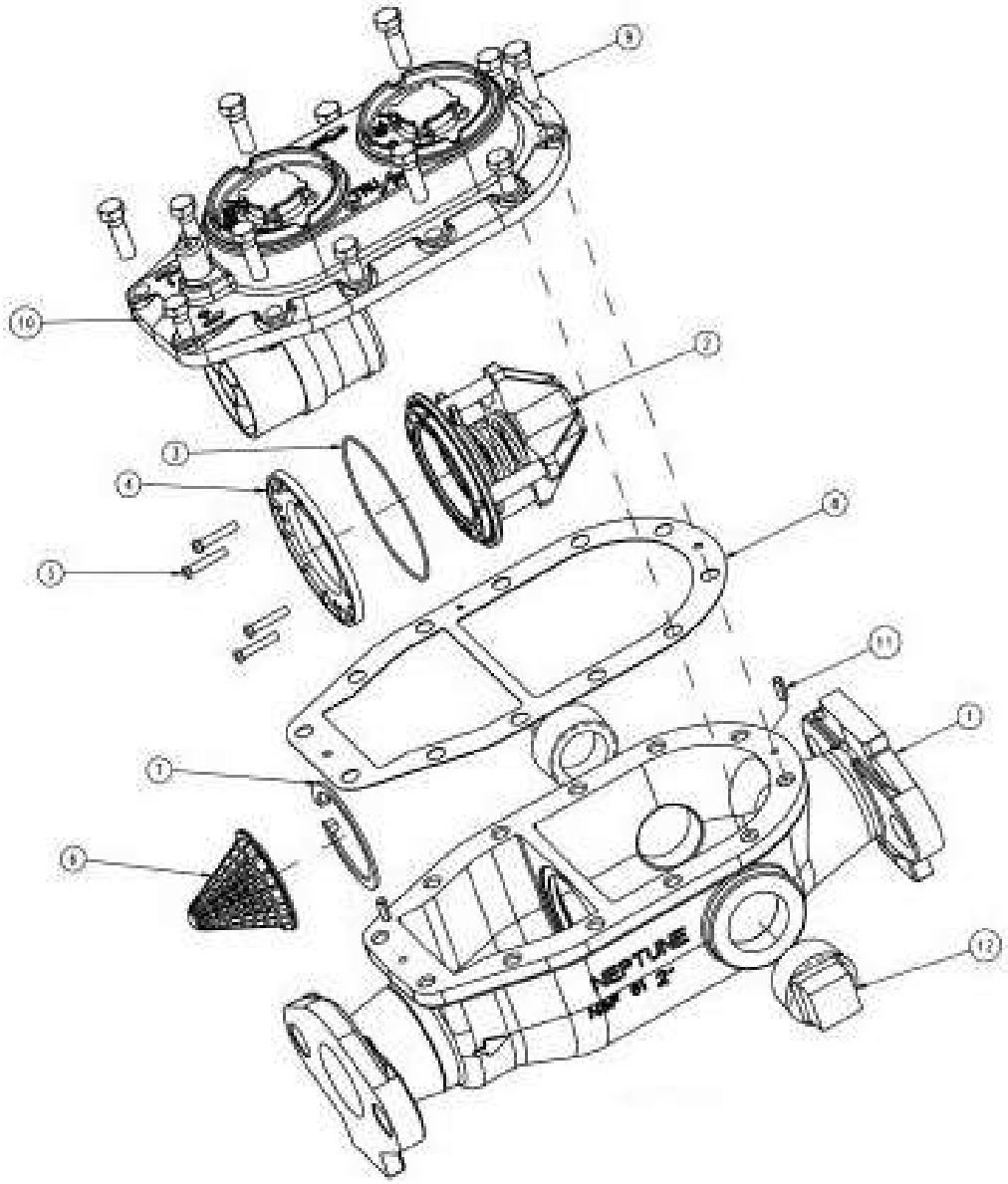

Figure 51 – Representative Breakdown of the 2-Inch TRU/FLO® Meter Components

Table 7 – 2-Inch TRU/FLO® Parts List

Item	Description	Item	Description
1	Maincase	7	Lockring
2	Main Valve Assembly	8	Gasket, Maincase
3	O-ring	9	Bolt, 3/8 - 16 UNC - 2A x 1¼-inch LG., SS 316
4	Retainer Ring	10	Cover Assembly
5	Screw, #10 - 24 x 1-inch, Pan Recessed, SS 18-8	11	Roll Pin
6	Strainer	12	Pipe Plug - 1½-inch

3-Inch, 4-Inch and 6-Inch Meters

The following diagram is a representative breakdown of the 3-inch, 4-inch, and 6-inch meters. Table 8 on the next page describes each part of the diagram.

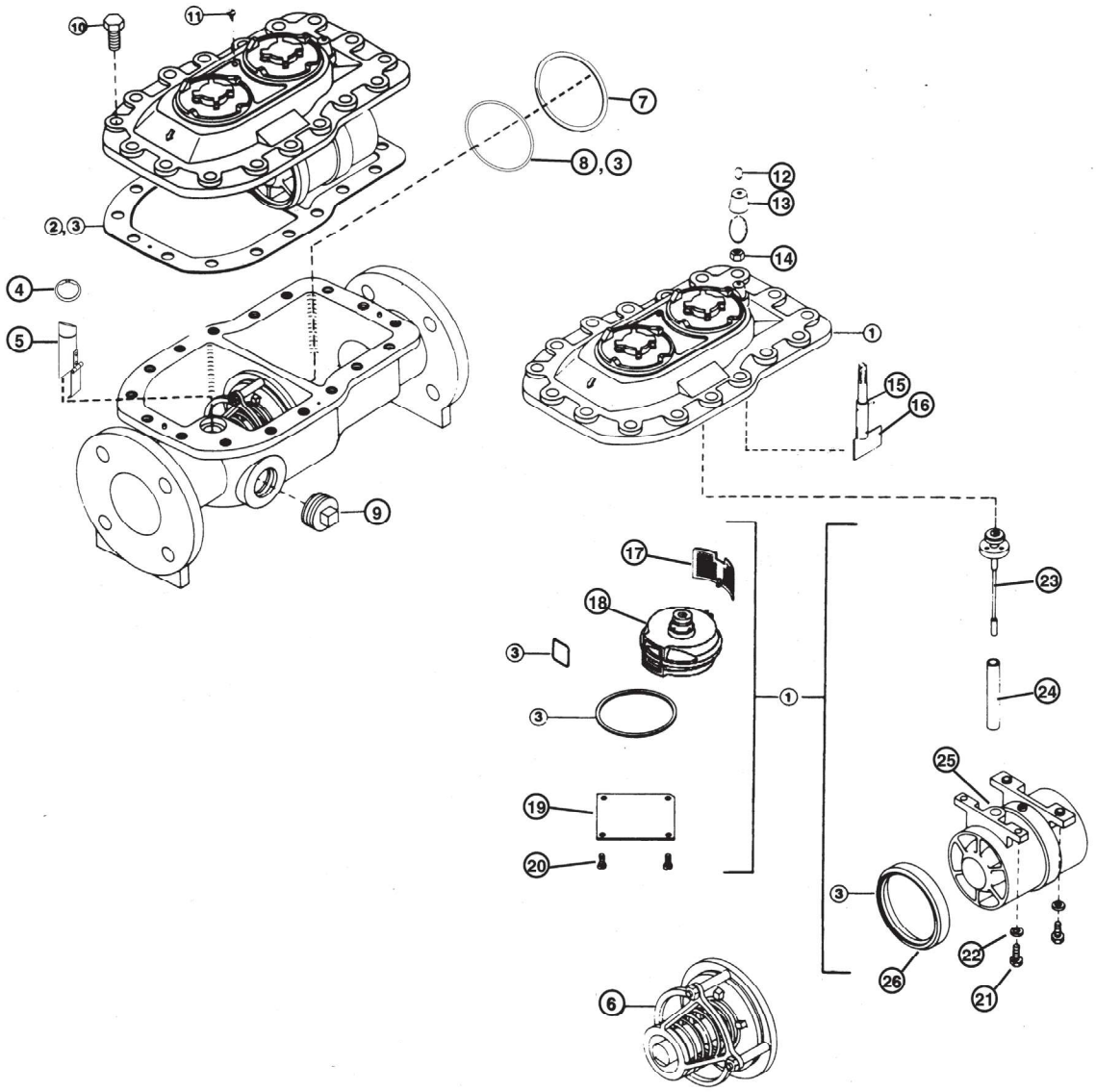

Figure 52 – Representative Breakdown of the 3, 4, and 6-Inch TRU/FLO® Meter Components

Table 8 – 3-Inch, 4-Inch, and 6-Inch TRU/FLO® Parts List

Item	Description	Item	Description	Item	Description
1	Cover Assembly	10	Bolt Cover	19	Plate
2	Maincase Gasket	11	Vent Screw	20	Screw
3	Maincase Gasket Kit	12	Seal Wire with Lead Seal	21	Bolt
4	Snap Ring	13	Seal Cap	22	Washer, Lock
5	Throttle Valve Assembly	14	Calibration Nut	23	Drive Assembly
6	Main Valve Assembly	15	O-ring	24	Drive Sleeve
7	Main Valve Snap Ring	16	Calibration Vane Assembly	25	Measuring Chamber Assembly
8	O-ring	17	T-10® Strainer	26	Seal Ring
9	Pipe Plug	18	T-10 Chamber	27	Washer, Lock

Appendix C: Maintaining the 2-Inch TRU/FLO® Meter

This appendix provides information on maintaining the 2-inch TRU/FLO® meter.

Removing the UME

To remove the Unitized Measuring Element (UME), complete the following steps.

1. Remove the bolts around the perimeter of the cover.
2. Separate the cover assembly from the maincase.

Figure 53 – Remove the UME

Maintaining the Internal Strainer

To maintain the internal stainer, complete the following steps.

1. Before servicing, remove the strainer from the inlet side of the main valve.
2. Make sure the strainer is not damaged or clogged.

Figure 54 – Internal Strainer

If you can clean the strainer, you can reuse it.

Maintaining the Main Valve Assembly

To maintain the main valve assembly, complete the following steps.

1. Remove the four screws that secure the retainer ring to the inlet of the main valve assembly.

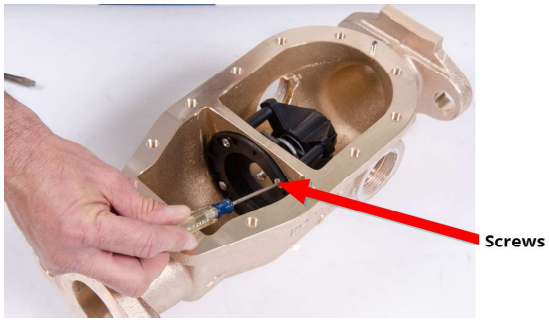

Figure 55 – Remove the Screws from Retainer Ring

2. Remove the retainer ring from the inlet of the main valve assembly.
   Inside you can see an O-ring that seals the main valve assembly.

Figure 56 – Remove the Retainer Ring

3. Make sure the O-ring is in good condition and does not have any nicks or cuts.

If the O-ring is damaged, a failed low flow test could result.

4. Replace the O-ring if needed.
5. After checking the retainer ring, the O-ring, and the integrity of the main valve, you can reinstall the parts.

Figure 57 – Reinstall the Parts

6. Reinstall the retainer ring on the main valve and tighten the four screws.

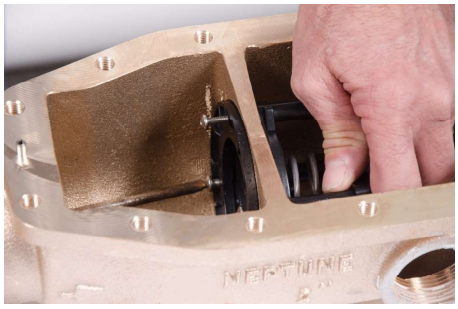

Figure 58 – Secure the Retainer Ring

Maintaining the Throttle Valve

The throttle valve is located on the cover of the meter.

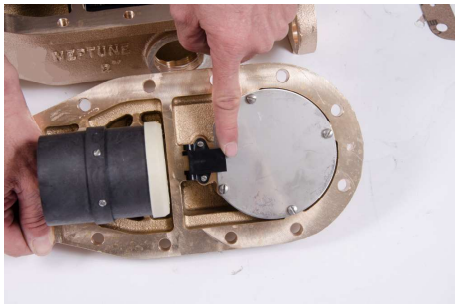

Figure 59 – Throttle Valve

To maintain the throttle valve, complete the following steps.

1. Perform a visual inspection of the throttle valve.

   The valve should open to approximately a 45-degree angle and close freely.

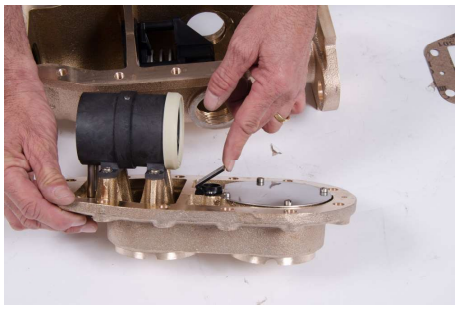

Figure 60 – Throttle Valve Angle

2. If maintenance is required, you can replace the valve by removing the two flathead screws on the side of the valve.

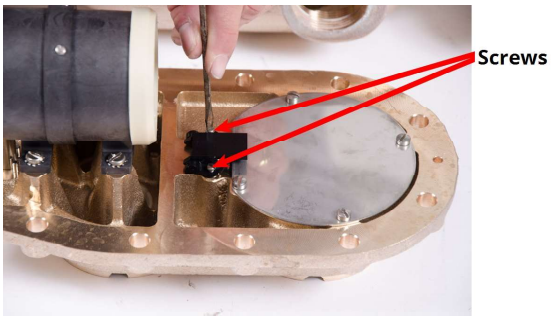

Figure 61 – Remove the Throttle Valve

If you need to replace the entire throttle valve, you can fit the throttle valve door into the throttle valve with two snaps.

A failed low flow test can indicate that the throttle valve needs to be replaced.

Maintain the turbine and disc side of the meter in the same manner shown previously in this document for the 3-inch, 4-inch, and 6-inch meters.

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Glossary

A

AWWA

American Water Works Association.

C

calibration vane assembly

Allows field calibration of the Unitized Measuring Element (UME) to lengthen service life and to ensure accurate registration.

crossover range

Meter transitions from low flow to high flow.

D

disc measuring assembly

Registers low flows.

G

gasket

Shaped piece or ring of rubber or other material sealing the junction between two surfaces.

H

hydraulic valve assembly

Transfers flow smoothly between the disc section and turbine section of the meter, minimizing the loss of accuracy in the crossover range.

M

magnet drive assembly

Two magnetic-driven, roll-sealed registers simplify the meter's design and reduce long-term maintenance by eliminating complicated combined drive mechanisms.

main valve assembly

Spring-loaded assembly used to divert low flow rates through the T-10 measuring chamber. Primarily composed of a stainless steel spring and an 85% copper lead free, bronze housing. As the flow rate increases, the spring in the main valve assembly is overcome allowing the turbine assembly to capture larger flow rates.

maincase

Consists of a durable lead free, high-copper alloy. It is corrosion-resistant, lightweight, and easy to handle.

N

nutating disc meters

Meters that have a round disc located inside a cylindrical chamber. The disc nutates, or wobbles, as it passes a known volume of liquid through the cylindrical chamber. The rotating motion of the disc is then transmitted to the register that records the volume of water that flowed through the meter.

nutation

Rocking, swaying, or nodding motion in the axis of rotation of a largely axially-symmetric object.

R

registration

Volume of water that flowed through the meter, per a sweep hand revolution.

S

strainer

Protects the meter from debris in the line and corrects the velocity profile of the flow to the meter.

T

throttle valve assembly

Stainless steel assembly found on the outlet of the T-10 measuring chamber. It is used to regulate the flow that moves through the T-10 chamber as the TRU/FLO's overall flow rate increases. As the flow increases through the TRU/FLO, the main valve assembly seals off the throttle valve. This helps regulate the amount of flow moving through the T-10 measuring chamber.

TRU/FLO meter

Designed to register wide flow ranges where varying flow rates are typical. It combines the low flow sensitivity of a disc-type meter with the high flow capacity of a turbine-type meter.

turbine measuring assembly

Registers high flows.

turbine meters

Meters that have a rotating element that turns with the flow of water. The volume of water is measured by the number of revolutions by the rotor.

U

UME

Unitized Measuring Element.

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