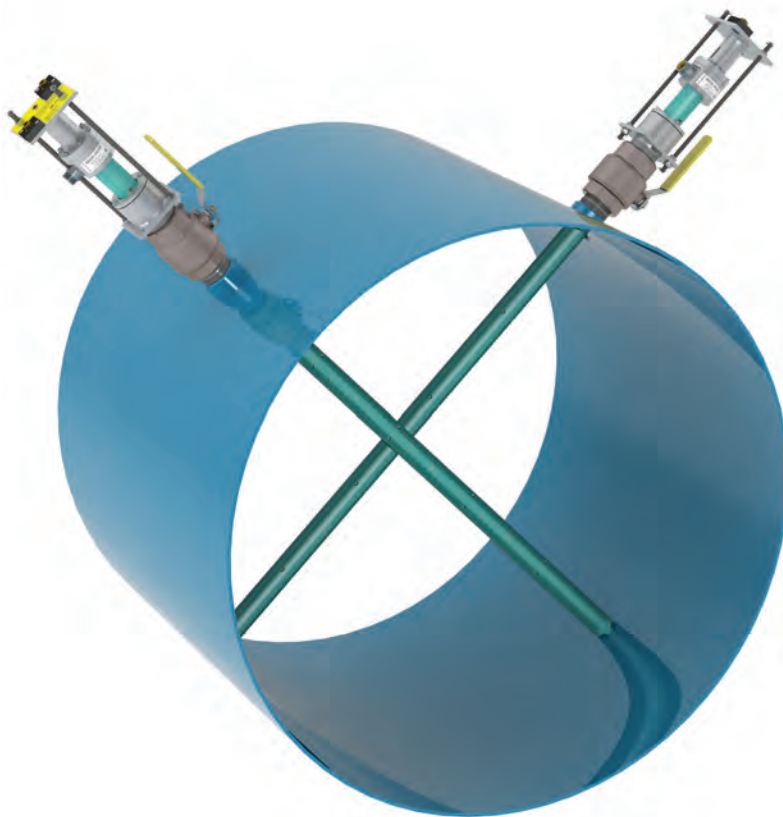




**FPI-X**  
**Full Profile Insertion**  
**Electromagnetic Flow Meters**  
**Models 394L & 395L**

**Sensor Installation, Operation**  
**and Maintenance Manual**

30121-38 Rev. 1.1  
May, 2015



Important Information:

Converter Model Number: \_\_\_\_\_

Converter Serial Number: \_\_\_\_\_

Meter Serial Number: \_\_\_\_\_

**RETAIN THIS MANUAL - DO NOT DISCARD**





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## SAFETY

### Safety Symbols And Warnings

Throughout this manual are safety warning and caution information boxes. Each warning and caution box will be identified by a large symbol indicating the type of information contained in the box. The symbols are explained below:



This symbol indicates important safety information. Failure to follow the instructions can result in serious injury or death.



This symbol indicates important information. Failure to follow the instructions can result in permanent damage to the meter or installation site.

### Safety Warnings

When installing, operating, and maintaining McCrometer equipment where hazards may be present, you must protect yourself by wearing Personal Protective Equipment (PPE) and be trained to enter confined spaces. Examples of confined spaces are manholes, pumping stations, pipelines, pits, septic tanks, sewage digesters, vaults, degreasers, storage tanks, boilers, and furnaces.

You must follow all state and local laws, as well as Occupational Safety and Health Administration (OSHA) regulations concerning Personal Protective Equipment, confined-space entry, and exposure to bloodborne pathogens. Specific requirements can be found in the OSHA section of the Code of Federal Regulations: *29 CFR, 1910.132 - 1910.140, Personal Protective Equipment; CFR Title 29, Part 1910.146, Permit-Required Confined-Spaces; and 29 CFR, 1910.1030, Bloodborne Pathogens.*



#### **WARNING!**

**Incorrect installation or removal of FPI Mag meters can result in serious injury or death.** Read the instructions in this manual on the proper procedures carefully.



#### **WARNING!**

**Never enter a confined space without testing the air at the top, middle, and bottom of the space.** The air may be toxic, oxygen deficient, or explosive. Do not trust your senses to determine if the air is safe. You cannot see or smell many toxic gases.



#### **WARNING!**

**Never enter a confined space without the proper safety equipment.** You may need a respirator, gas detector, tripod, lifeline, and other safety equipment.



#### **WARNING!**

**Never enter a confined space without standby/rescue personnel within earshot.** Standby/rescue personnel must know what action to take in case of an emergency.



#### **WARNING!**

**Pressurized pipes should only be hot tapped, cut, or drilled by qualified personnel. If possible, depressurize and drain the pipe before attempting any installation.**



#### **WARNING!**

**Carefully read all safety warning tags attached to the meter.**



## 1.0 FPI-X FULL PROFILE INSERTION FLOW METER

### 1.1 Instrument Overview

The FPI-X (Full Profile Insertion X Pattern) flow meter provides accurate flow measurement for full-pipe clean water applications. The electromagnetic *sensors* automatically sense and correct for shifting velocity in the pipe by constantly obtaining an area weighted mean velocity. The FPI-X can use either the Model 394L forward and reverse flow measurement *sensors*, or the 395L forward only flow measurement *sensors*. The instrument has all of the features needed to suit a wide variety of applications.

The flow meter is comprised of the innovative FPI Mag® *sensors* and a *converter*. For *converter* installation instructions, see the manual provided for the *converter* purchased with your system.

The *sensors* are easily installed without service interruption, and require no site calibration. Installation without service interruption can be done only when adhering to safe hot-tapping procedures, or in locations already fitted with an appropriate full port ball valve, corporation stop or gate valve.

### 1.2 Shipping Contents

Upon receiving the meter, unpack the contents of the shipping box and verify that the following items are included:

Qty.	Description
2	FPI Mag <i>Sensor</i>
4	Long threaded retaining rods
4	Short threaded retaining rods
1	Converter (M Series or L Series)
1	Calibration Certificate
1	FPI-X Mag Installation Operation and Maintenance Manual
1	Converter Installation Operation and maintenance Manual
2	9/16" or 3/4" reversible ratchet wrench
2	Pipe thread sealant
16	Hex nut (3/8" or 1/2")
8	Locking cotter pin
1	Power cord (8', 115 VAC)
1	<i>Sensor</i> cable with Quick-Connect
2	SS ball valve & SS nipple

**NOTE:** If any of the above-listed items are not present, contact the factory before continuing with installation.

### 1.3 Tools

#### Tools provided:



Two - 9/16" or 3/4" reversible ratchet wrenches. (Size is dependent on the size of the retaining rods supplied with the *sensor* and determined at the time of order.)



2 - tube of pipe thread sealant

#### Tools recommended for installation:



1 - Pipe wrench capable of a 4" span



1 - 7/16" wrench or crescent wrench



1 - Sensor Insertion Tool (3/8" Part Number 75031 or 1/2" Part Number 75032)



#### IMPORTANT

It is recommended that the Sensor Insertion Tool be used for easier and faster installation. See STEP 12.

## 2.0 INSTALLATION

Please read this entire manual before installing the FPI-X *sensors*. Due to size and pressure requirements determined at the time of order, certain FPI-X *sensors* are equipped with more robust 1/2" threaded rods, a heavy springs, larger top plates and compression assemblies designed to accept the larger insertion rods. For these installations, please replace all references to 3/8" rods and nuts with 1/2".

### STEP 1: Verify Flow Meter Serial Numbers

The FPI-X flow meter is comprised of three primary components: the two *sensors* and the *converter*. The *converter* and *sensors* are supplied as a custom calibrated matched system. Verify the system serial numbers on both the *converter* and *sensors* match. This will ensure a properly calibrated system.

The Meter Serial Number is located on the side of the *sensors* bodies on a silver label. An example is shown below.



Figure 1: Sensor Serial Number Tag

The tag on the side of the *converter* has the *converter* Model Number, the Converter Serial Number and the Meter Serial Numbers. An example is shown below.

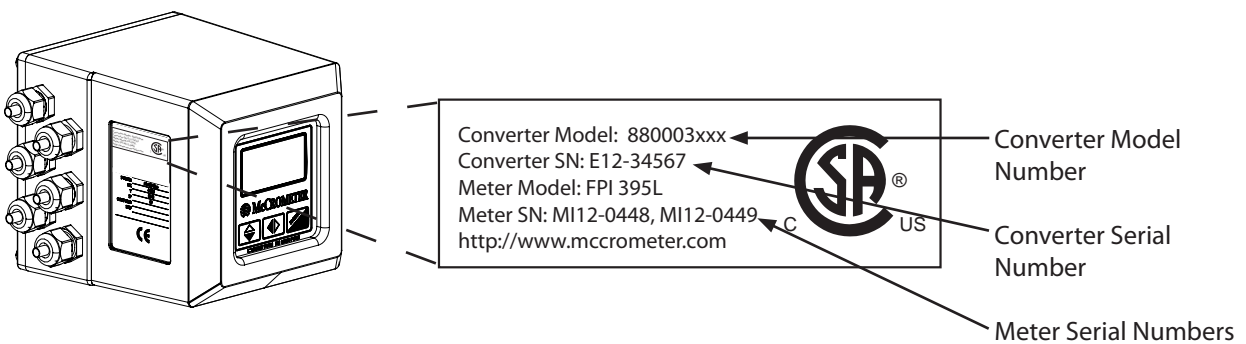


Figure 2: Converter Serial Number Tag



**IMPORTANT:** Verify the meter serial numbers on both the *converter* and *sensors* match. If the Meter Serial Numbers do not match, contact the factory before continuing with the installation.

## 2.0 INSTALLATION - Continued

### STEP 2: Identify Sensor Parts

This manual refers to the part names of the *sensor*. It is important to be familiar with the parts and their names when following the installation instructions.

NOTE: Both sensors supplies with the FPI-X are identical.

The chart below corresponds to the graphic in *Figure 3*.

Diagram Number	Description	Part Number
1	Top Plate for use with 3/8" retaining rods	MIM043
1	Top Plate for use with 1/2" retaining rods	MIM053
2	Sensor Assembly	Contact Factory
3	Set screw (2 ea.)	920001001
4	Spring	920000901
4	Heavy Spring	920000903
5	2" SS Full Port Ball Valve with SS Nipple (Min. 1 7/8" dia. port)	43059-1
6	Compression Seal (3/4" sensor)	MIM017-1
6	Compression Seal (1 -1/4" sensor)	MIM012-1
7	Compression Seal Assembly	Contact Factory
8	3/8" SS Long Threaded Rods (2 ea.)	64006
8	1/2" High Strength SS Long Threaded Rods (2 ea.)	X6743
9	3/8" SS Short Threaded Rods (2 ea.)	64006
9	1/2" High Strength SS Short Threaded Rods (2 ea.)	X6743
10	3/8" SS Nut (8 ea.)	93007
10	1/2" SS Nut (8 ea.)	10755
11	Locking Cotter Pin	921000701
12	Captive Nut	42226
12	Captive Nut Bearing Retainer	42225
12	Captive Nut Bearing	92121



**2.0 INSTALLATION - Continued**

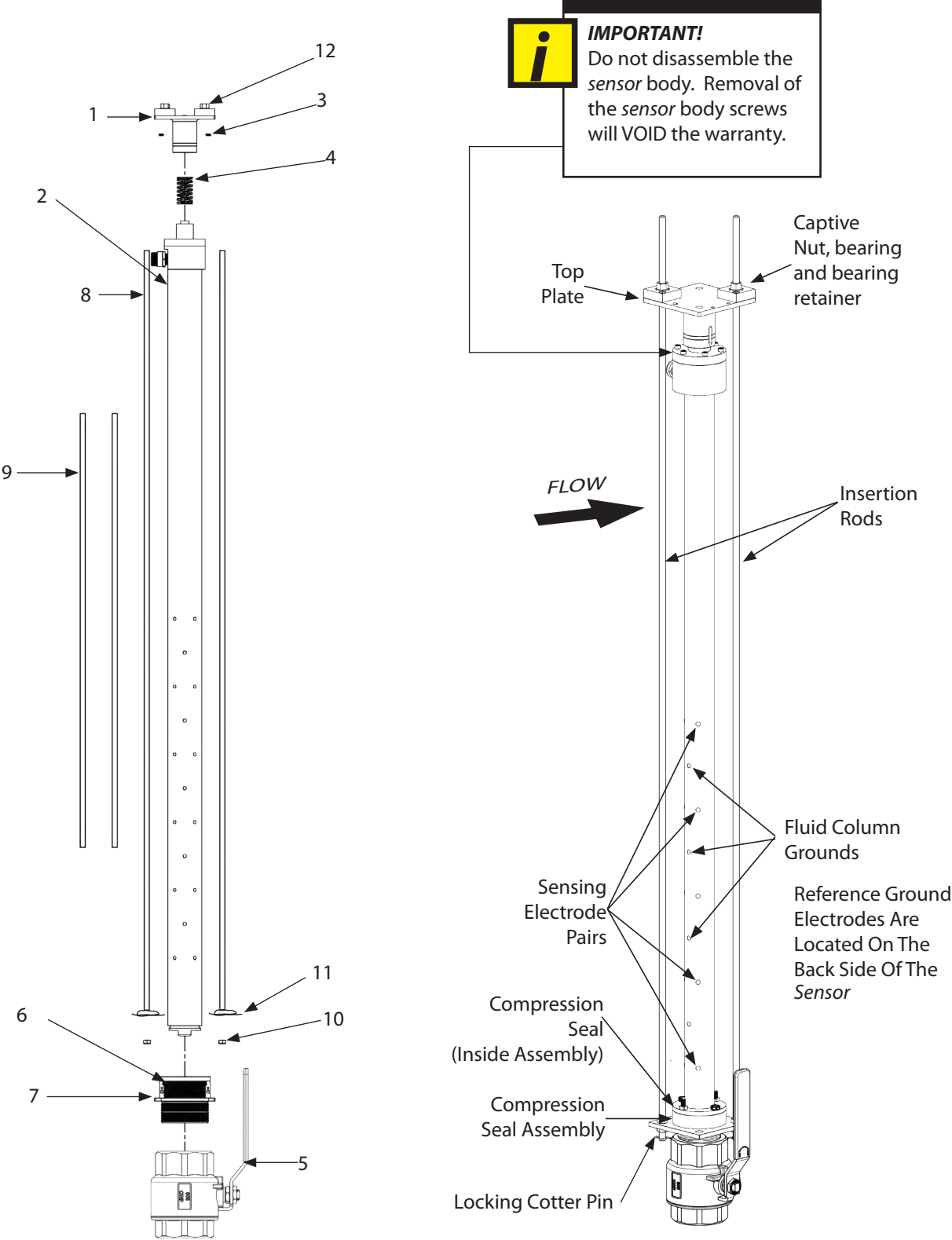


Figure 3: Parts Diagrams



## 2.0 INSTALLATION - Continued

### STEP 3: Verify Information On Cable Tags

The *converter* cable has two tags located near where the cable enters the *converter*. Verify the following information is consistent with the specifications provided at the time of order:

- Meter Serial Number
- Pipe I.D. (inches and millimeters)
- KA Factor
- Total Sensor Length
- Total Cable Length

### STEP 4: Detach The Cable Quick Connect

The *sensor* cable is fitted with an IP68 rated Quick Connect fitting at the *sensor* connection. For ease of installation, remove the cable from the *sensor* and set aside.



**IMPORTANT:** When the Quick-Connect cable connection is not attached to the *sensor*, ensure that the threaded caps are attached to the *sensor* connection and the cable connection to keep the wire connectors free of dirt and corrosion. When the cable is connected to the *sensor*, connect the end caps together to keep their interior free from dirt and corrosion.



Figure 4: Sensor cable Quick Connect Fitting With End Caps

## 2.0 INSTALLATION - Continued

### STEP 5: Sensor Installation Locations

The FPI-X flow meter is designed for challenging applications. Each FPI-X system goes through an extensive application and design review with McCrometer engineers based on the application configuration provided by the customer. Install the sensors in the locations specified in the application design provided by the factory.

### STEP 6: Verify Sufficient Sensor Clearance From Obstructions

The *sensor* installation hardware will protrude from the pipe during installation and when installed requiring sufficient clearance (distance H, the required installation clearance, in *Figure 6* below) from any obstruction. This distance accounts for the length of the *sensor*, the distance from the outer pipe wall to the top of the valve plus: 18" is recommended; 12" is the minimum.

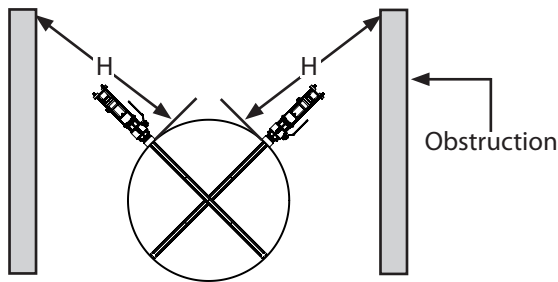


Figure 5: Sensor Clearance Distance

Line Size (Inches)	Distance H		
		42"	83.25"
		48"	89.25"
12"	59"	54"	95.25"
14"	59"	60"	101.25"
16"	59"	66"	107.25"
18"	63"	72"	113.25"
20"	63"	78"-138"	Call Factory
22"	67"		
24"	67"		
30"	71.25"		
36"	77.25"		

### STEP 7: Pipe Valve Installation



#### **WARNING!**

Pressurized pipes should only be hot tapped, cut, or drilled by qualified personnel using high quality saddles, valves and stainless steel nipples. If possible, depressurize the pipe before attempting any installation.

Each FPI-X *sensors* comes standard with a 2" stainless steel ball valve and a 2" x close stainless steel nipple. The 2" x close stainless steel nipple is to be used if the installation site has a female fitting, i.e., a welded coupling. If the installation site has a male fitting, i.e. a 2" nipple, then the supplied 2" x close stainless steel nipple is not required for the *sensor* installation.

Use the supplied pipe sealant or Teflon thread tape when installing the valves onto the pipe.

NOTE: If using an existing valve or corporation stop insure it has a minimum port inside diameter of 1-7/8" (48mm), and a 2" (50mm) NPT female pipe thread output for the *sensor*. Insure that the existing valve and nipple are of high quality.

## 2.0 INSTALLATION - Continued

The valves can be installed onto welded couplings or pipe saddles. See Figure 7. Alternative ball valve or corporation stops sizes may be used or required. Consult factory for alternative configurations.

**i** **IMPORTANT:** The MINIMUM port inside diameter for all installation valves is 1-7/8" (48mm).

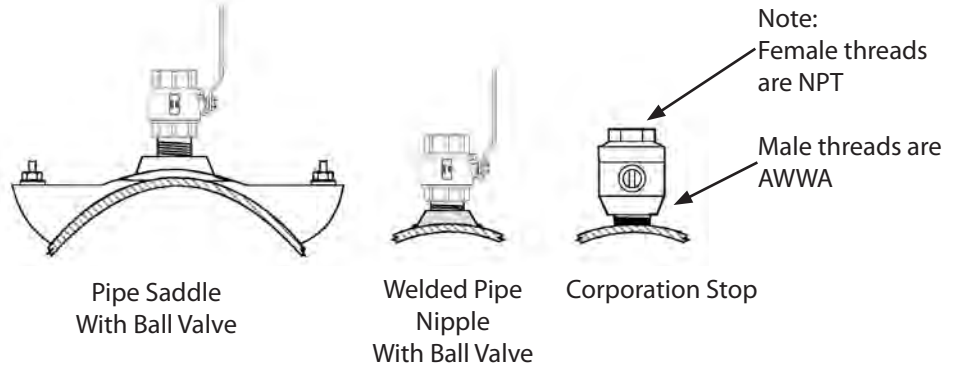


Figure 6: Installation Valve Options

The placement of the valves onto the pipe must be at a 90° angle relative to each other, allowing the sensors to form a perfect "X" pattern inside the pipe. See Figure 7.

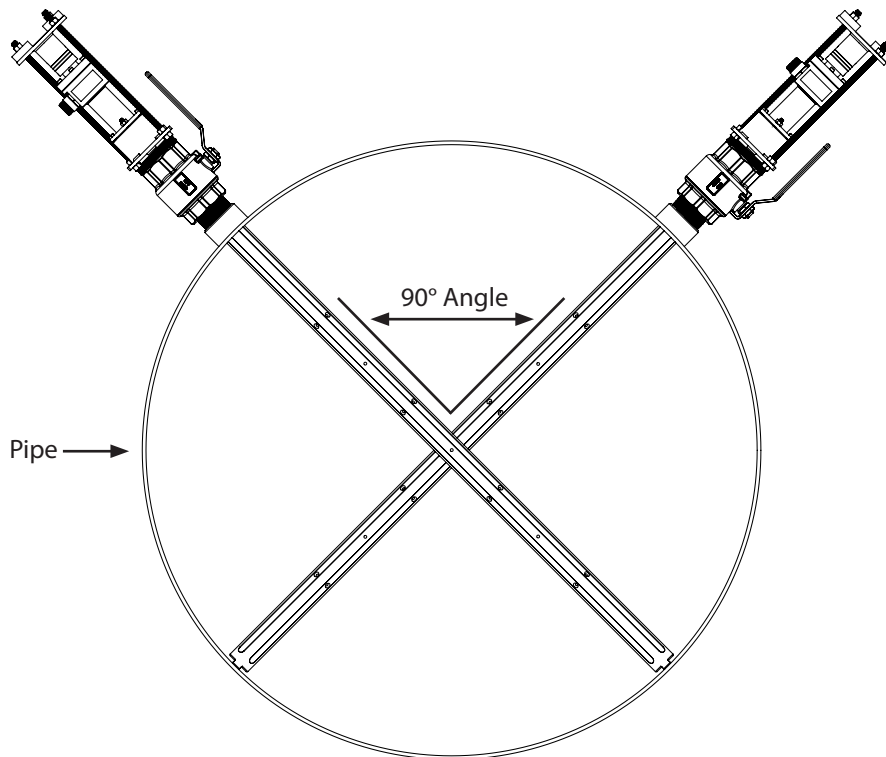


Figure 7: The FPI-X Sensors Installed At A 90° Angle

This distance between the pipe valves shall be such that the sensors don't interfere mechanically with one another. Good practice is to space the pipe nipples 4-6" apart. See Figure 8.

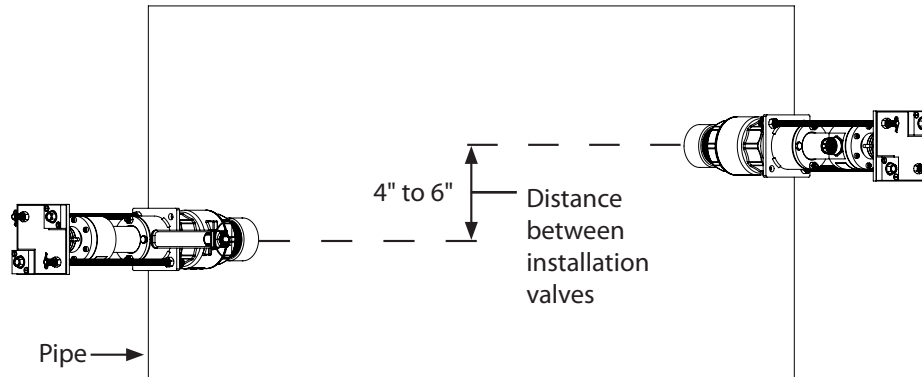


Figure 8: Top View Of The Distance Between The Installation Valves As Determined In The Application Review

### STEP 8: Optional Compression Seal Disassembly For Installation Of Large Sensors

The *sensor* assembly can be installed onto the pipe valve as a whole unit. On larger pipe size installations this can be cumbersome or impractical. In such cases the compression seal assembly can be removed from the *sensor* for easier installation onto the pipe valve. Once the compression seal assembly is installed onto the pipe valve, then the *sensor* can be re-installed into the compression seal assembly.

**NOTE:** if this step is skipped, proceed to STEP 9.

The following steps describe the separation of the *sensor*, *top-plate* and *retaining rods* from the *compression seal assembly*.

1. The *compression seal* has two bolts and two studs with nuts. Loosen the bolts and nuts on the *compression seal* relieving the pressure on the *compression seal*. DO NOT REMOVE THE BOLTS OR NUTS.
2. On the *compression seal assembly*, remove the locking cotter pins from the bottom of the two *retaining rods* under the 3/8" or 1/2" nuts.
3. Remove the lower 3/8" or 1/2" nuts from the retaining rods.
4. Slide the *sensor* out of the compression seal. The retaining rods will also slide out of the *compression seal assembly*. Carefully set the *sensor* and attached hardware to the side.
5. At this point the compression seal assembly can be installed onto the valve.

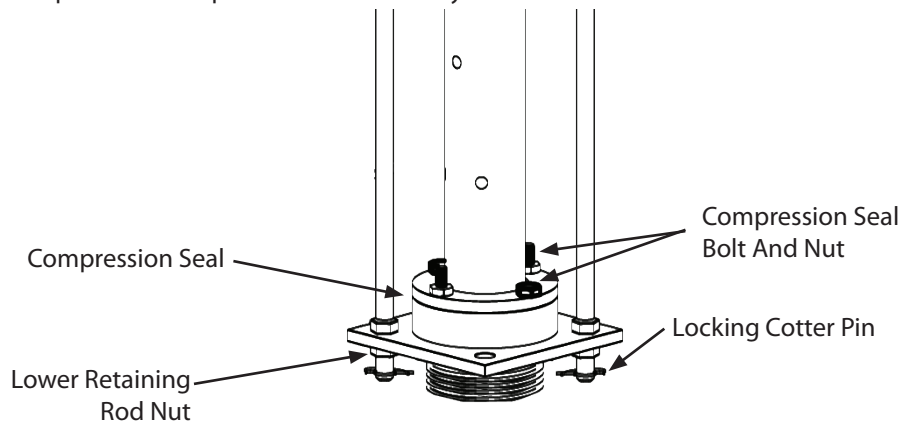


Figure 9: Compression Seal Removal

## 2.0 INSTALLATION - Continued

### STEP 9: Sensor Installation Onto Pipe Valve

**NOTE:** The *sensor* installation instructions that follow are identical for both of the sensors in the FPI-X system.

The *sensor* assembly uses a compression seal, which keeps the *sensor* watertight when the pipe is under pressure. Care must be taken when installing the *sensor* to avoid leaks. Follow the steps below to install the *sensor* onto the pipe valve:

1. Put a generous amount of the supplied pipe sealant on the compression seal threads. Teflon tape may also be used.



#### IMPORTANT

If pipe sealant gets on the *sensor* electrodes the velocity signal may be lost. Use care when applying the sealant to the compression seal threads.

2. Place the compression seal threads over the pipe valve. Turn the entire *sensor* assembly clockwise to secure the assembly to the valve. A large pipe wrench can be used to grip the bottom plate of the compression seal to tighten the assembly into the pipe valve.
3. The seal is secure when a large amount of force is required to turn the assembly.
4. The sides of the bottom plate should be parallel with the pipe.
5. Locate the flow direction arrow on the top plate and align it with the direction of the flow in the pipe.

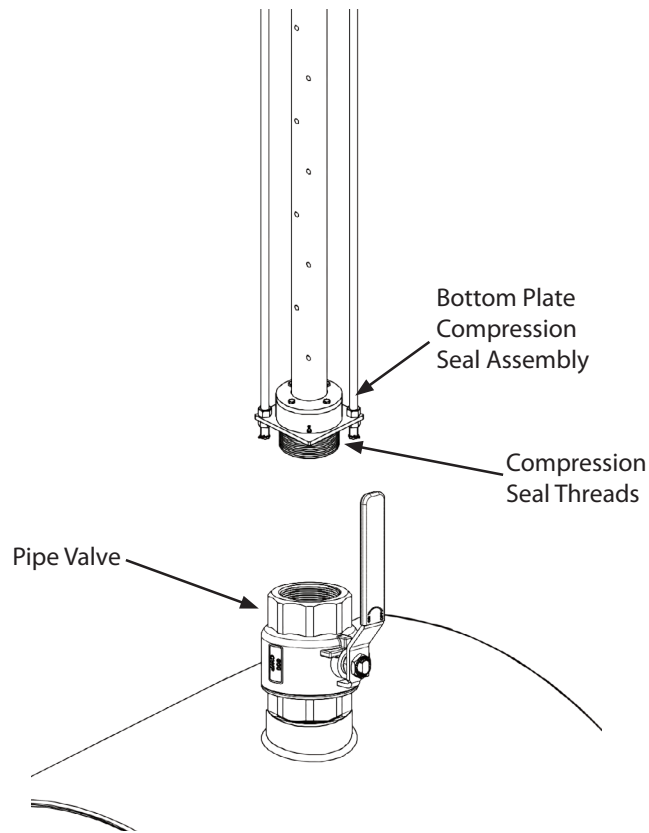


Figure 10: *Sensor* Installation

## 2.0 INSTALLATION - Continued

### STEP 10: Sensor Re-assembly After Optional Compression Seal Assembly Installation

NOTE: use this step if you removed the *compression seal assembly* (STEP 8) and installed it onto the pipe valve separate from the *sensor*. If you installed the sensor without disassembling it, proceed to the next step.

After the compression seal has been installed onto the pipe valve, follow the steps below to reassemble the *sensor* into the compression seal assembly:

1. Apply water to the interior surface of the rubber seal gland. This will act as a lubricant to facilitate the insertion of the *sensor* and ensure its proper axial loading.
2. Insert the *sensor* into the compression seal in the bottom plate while inserting the two retaining rods into their respective holes in the bottom plate and secure with one 3/8" or 1/2" nut above and one below the bottom plate.
3. Ensure the two nuts above and below the compression seal assembly are sufficiently tightened to prevent the threaded rod from rotating.
4. Insert the locking cotter pins through the small holes in the bottom of the retaining rods, just below the bottom 3/8" or 1/2" nuts.

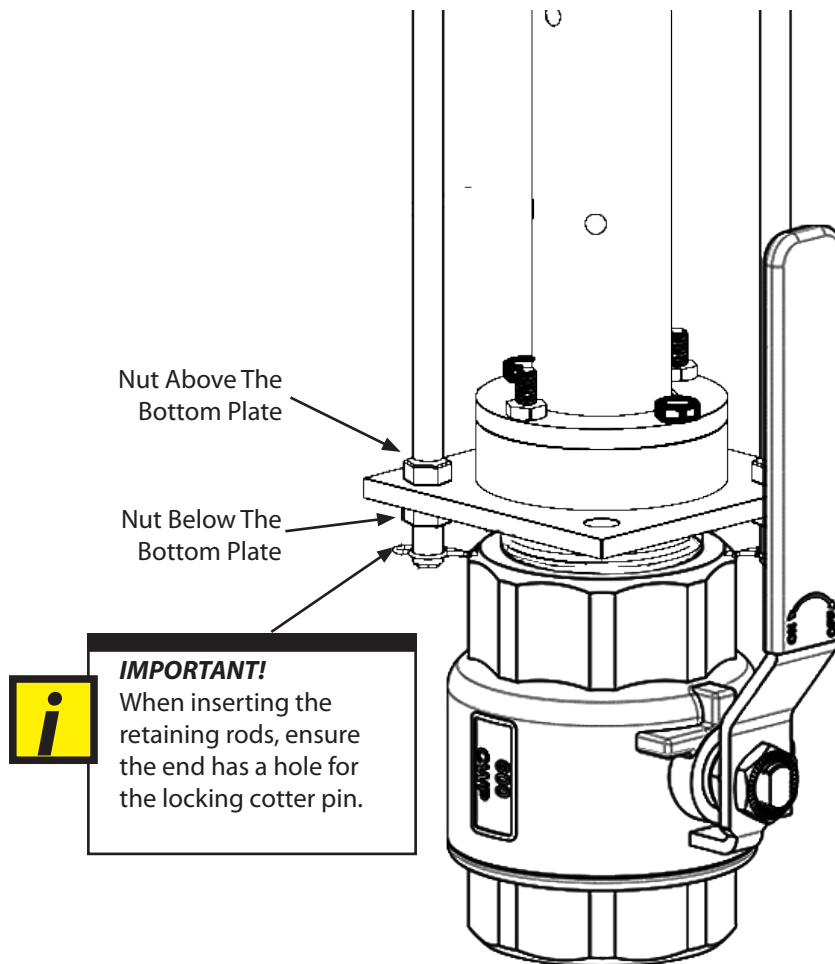


Figure 11: Compression Seal Reassembly

## 2.0 INSTALLATION - Continued

### STEP 11: Inserting The Sensor

The *sensor* can be installed while the line is under flowing conditions. The line water velocity should be as low as possible to prevent *sensor* vibration during the insertion process. The velocity must be under 5 ft/s.

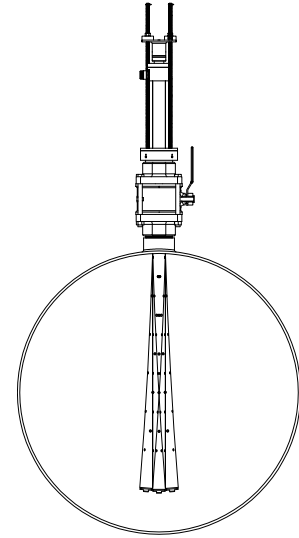


Figure 12: Sensor Vibration



#### **WARNING!**

The *compression seal/sensor* assembly may be under pressure. Serious injury may result if proper procedures are not followed. Do not attempt to install the *sensor* without the retaining rods fully assembled.



#### **WARNING!**

If the meter was disassembled to assist in the installation of the compression seal assembly onto the valve (STEPS 8 and 10) it is important to ensure that the meter is properly reassembled with both retaining rods completely installed with the 3/8" or 1/2" nuts properly tightened.

Follow the steps below to insert the *sensor* into the pipe.

1. Hand tighten the *compression seal* bolts and nuts. **DO NOT FULLY TIGHTEN THE COMPRESSION SEAL BOLTS AND NUTS.**
2. If the *sensor* is being installed under flowing conditions follow this step. If not, proceed to the next step. Barely crack open the valve to allow a little water into the compression seal assembly. Some water will leak from the compressions seal. Lightly tighten compression seal bolts and nuts as required to minimize the amount of water exiting the compression seal. A towel draped around the compression seal can reduce spray if necessary.
3. **Open the valve completely.** Failure to open the valve completely will cause the valve to scrape the *sensor* during insertions and may result in permanent damage to the *sensor*.
4. Insert the *sensor* into the pipe by *simultaneously* rotating the two captive nuts on the top plate clockwise (See Figure 12) with the provided 9/16" ratchet wrenches or the Sensor Insertion Tool (See STEP 12) until the foot of the *sensor* reaches the far wall of the pipe and the load spring starts to compress. Compression of the load spring is indicated by the movement of the set screw on the top plate. See STEP 13.



#### **IMPORTANT**

It is recommended that the Sensor Insertion Tool be used to rotate the captive nuts to ensure the top plate compresses evenly. See STEP 12.



## 2.0 INSTALLATION - Continued



### IMPORTANT

If the captive nuts are not tightened simultaneously, the top plate will become crooked and cause the *sensor* to be inserted at an angle and may cause permanent damage to the *sensor*.

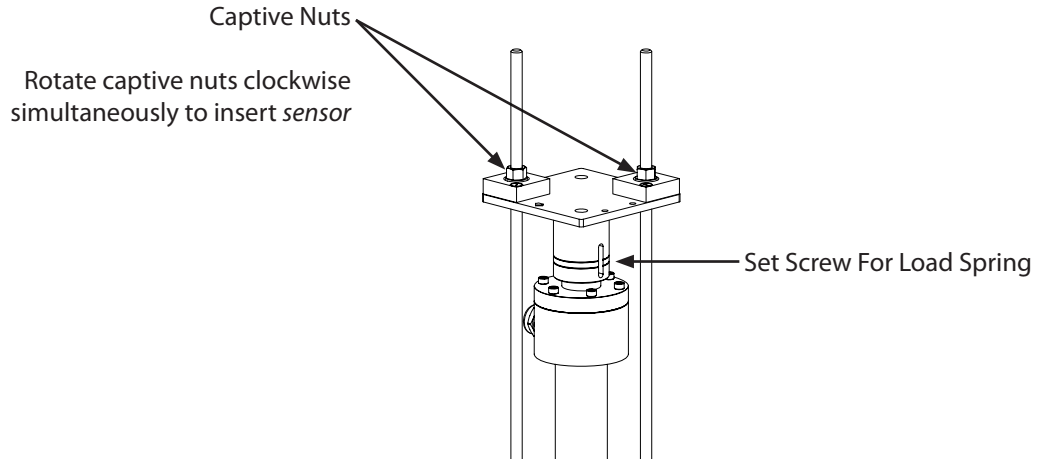


Figure 13: Captive Nuts



### NOTE

If the short retaining rods are not used (see *STEP 14*), run a 3/8" or 1/2" nut down against each captive nut to prevent the captive nut from rotating.

### STEP 12: Using The Sensor Insertion Tool - Optional

McCrometer recommends using a Sensor Insertion Tool (P/N 75031 for 3/8" rods, and P/N 75032 for 1/2" rods) to help with inserting the *sensor* and to avoid any damage to the *sensor*.

Follow the steps below to use the Sensor Insertion Tool:

1. Place the Sensor Insertion Tool over the retaining rods and slide the retaining rods through the holes in the tool until it sits over the captive nuts.
2. Lock it into place with spring locks located on the bottom of the tool.
3. Using the provided wrench rotate the high gear shaft clockwise until the bottom of the *sensor* reaches the far wall of the pipe as indicated in *STEP 11*. The low gear shaft is used to apply pressure to the *sensor* once the *sensor* has reached the far wall of the pipe. See *STEP 13*.

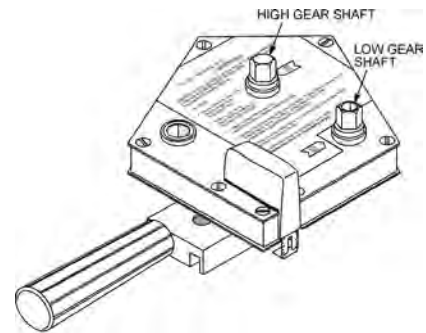


Figure 14: Insertion Tool



### IMPORTANT

Large line size meters or applications with high pressure may use 1/2" retaining rods. When ordering the Sensor Insertion Tool specify the size required. (P/N 75031 for 3/8" or P/N 75032 for 1/2")

## 2.0 INSTALLATION - Continued

### STEP 13: Applying A Compression Load To The Sensor

A compression load is required to be applied at the top of the *sensor* forcing the bottom of the *sensor* to seat firmly against the far wall of the pipe. The amount of load is indicated by the three lines etched into the top plate and the location of the set screw relative to the lines. See Figure 14 and the table below.

Set Screw Location	Compression Load	Recommended Use
At the lowest line	300 lbs.	Low pressure plastic pipes
Between the lowest line and the middle line	450 lbs.	Low pressure metal pipes
Between the top line and the middle line	<b>Consult Factory</b>	Applications other than low pressure. <b>Consult factory before applying a compression load greater than 450 lbs.</b>

For applications other than low pressure the *sensor* load should be increased. Consult factory for the appropriate loading for your application before applying a compression load greater than 450 lbs.

Follow the steps below to apply a compression load to the *sensor*:

1. Rotate the two captive nuts on the top plate simultaneously and evenly until the proper load is indicated by the set screw's relationship to the lines etched on the top plate. See Figure 15.



#### IMPORTANT

If using the Insertion Tool, rotate the two captive nuts using only the **low** gear shaft until the proper load is indicated. DO NOT use the high gears on the insertion tool as this may create too much load too fast and damage the *sensor* or the pipe.

2. Tighten the compression seal bolts and nuts just enough to stop any leaking from the seal. See Figure 16.



#### IMPORTANT

Do not overtighten the compression seal as it may cause damage to the seal itself.

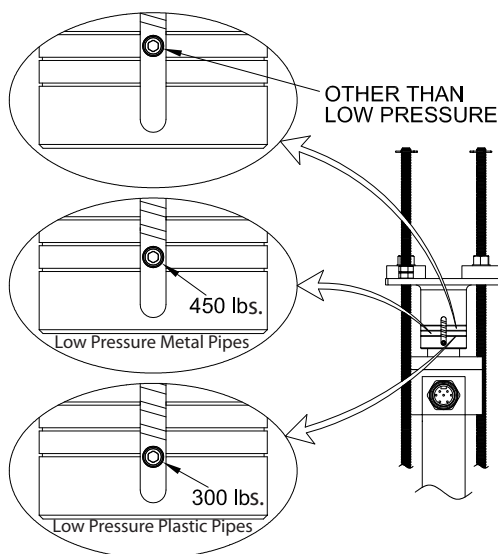


Figure 15: Sensor Load Indicators

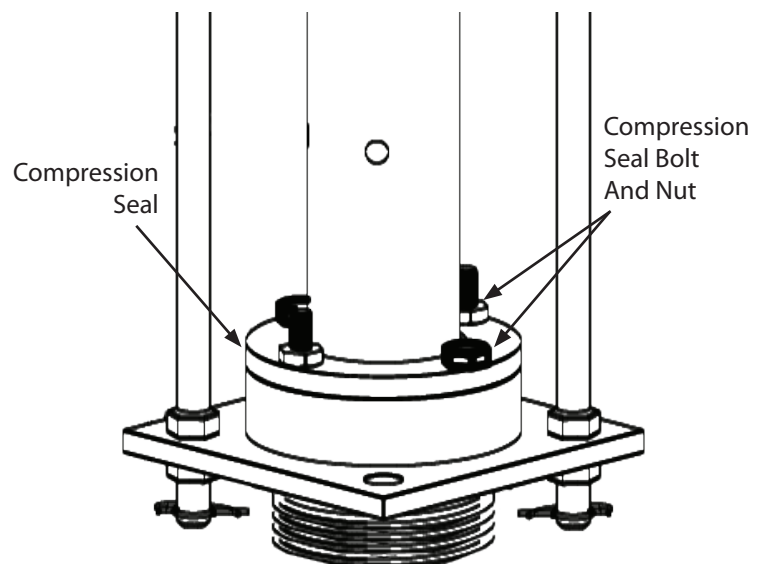


Figure 16: Compression Seal Bolts

## 2.0 INSTALLATION - Continued

### STEP 14: Installing The Short Retaining Rods

After the *sensor* has been inserted and the load adjusted, shorter retaining rods can be installed and the longer ones removed. This will make the sensor assembly more compact.



#### IMPORTANT

The long retaining rods are matched to each *sensor* and are required for removal of the *sensor*. It is important to safely store the long retaining rods and label them with the meter serial number.

Follow the steps below to install the short retaining rods:

1. Insert the two short retaining rods through the two holes in the top plate opposite the two captive nuts with the long retaining rods. Once the short retaining rods are passed through the top plate, thread one nut per rod onto the bottom of the rod about one inch from the bottom.
2. Insert the two short rods end through the corresponding holes on the compression seal bottom plate. Thread a nut onto the bottom of each short retaining rod.
3. Tighten the nuts above and below the compression seal bottom plate to secure the short retaining rods to the bottom plate and to prevent the short retaining rods from spinning.
4. Attach a locking cotter pins to bottom ends of the short retaining rods.
5. Secure the short retaining rods to the top plate with one 3/8" or 1/2" nuts per rod.
6. Remove the long retaining rods and store in a safe, dry location tagged with the meter serial number.
7. Check and adjust the "Sensor Load" as necessary. See STEP 13.
8. Secure the 3/8" or 1/2" nuts on the top plate by running a second jam nut down and tightening it against the first nut.
9. Attach a locking cotter pin to the top ends of the short retaining rods.

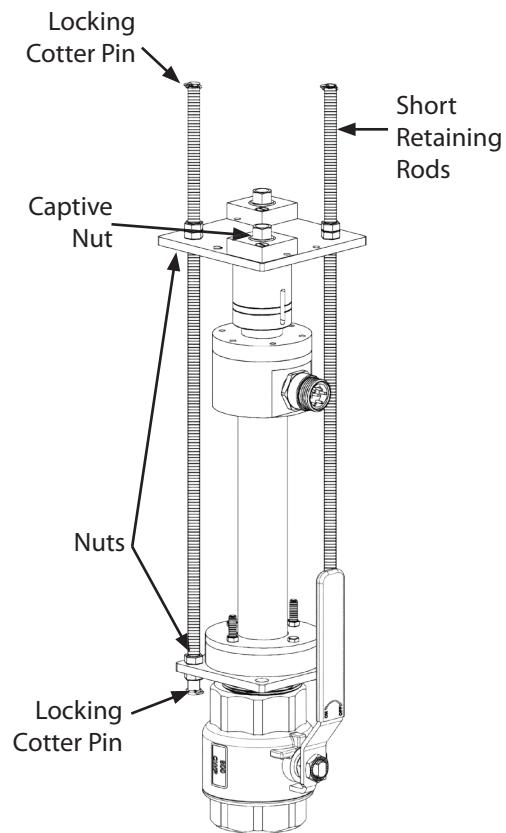


Figure 17: Installed Short Retaining Rods

### STEP 15: Installing The Cable And Junction Box

After the *sensors* have been properly installed, attach the a quick-connect cable end to each the of the cable connectors on the individual *sensors*. The sensor cables are pre-wired into a junction box. The converter cable can then be wired into the converter that was delivered with your FPI-X system.

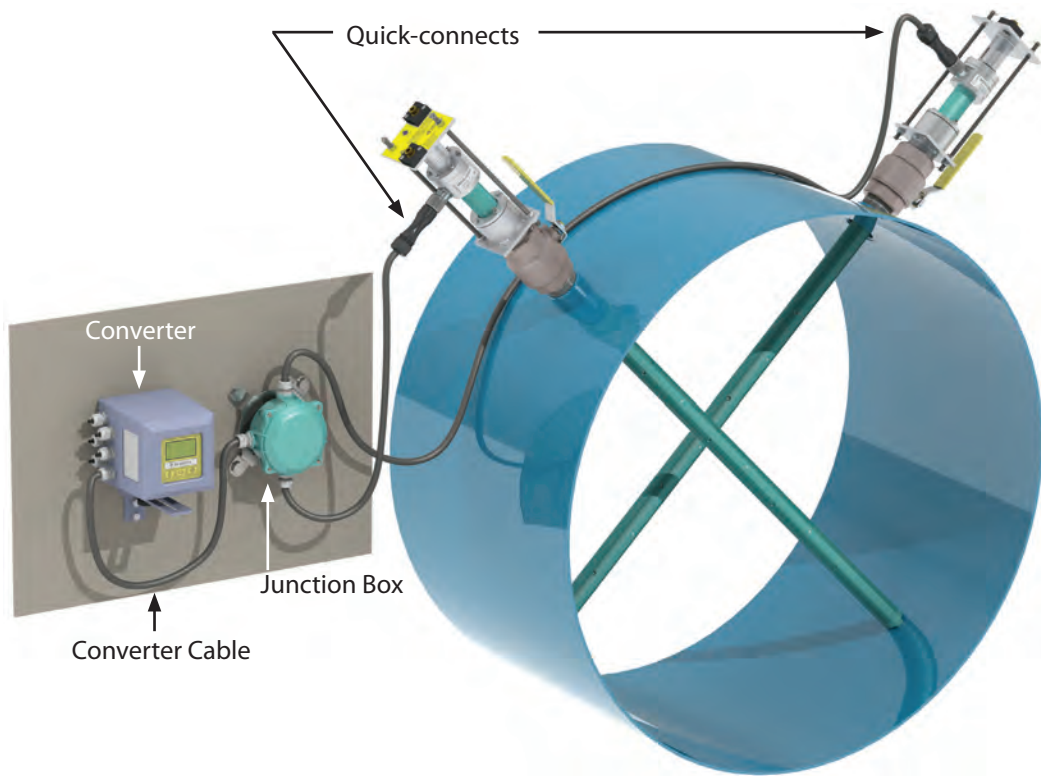


Figure 18: FPI-X Cable And Junction Box

### STEP 16: Electronics Installation

See the Installation, Operation and Maintenance Manual for the *converter* supplied with your system for complete electronics installation and wiring instructions appropriate for the *converter* supplied with your FPI-X system.

### 3.0 Sensor Removal



#### **WARNING!**

The pipe may be under pressure. Serious injury or death may result if proper procedures are not followed. Do not attempt to remove the short retaining rods without the long retaining rods properly installed. Do not attempt to remove the *sensor* with only the short retaining rods.



#### **IMPORTANT**

Use the long retaining rods provided with the meter for removal. If the rods used for removal are shorter than those provided by the factory, the *sensor* cannot be removed without depressurizing the line.

Follow the steps below to safely remove the *sensor*:

1. Visually inspect the pipe and entire assembly for damage or corrosion paying close attention to any nipples and welded couplings. If there is any doubt as to the condition of any element of the pipe or meter, depressurize the line before attempting to remove the meter.
  2. Reduce line velocity to 5 ft/s or less to prevent *sensor* vibration, or depressurize the line.
  3. Thread a long retaining rod through the captive nut until the rod nears the compression assembly. Ensure that the bottom of the rod has the hole for the locking cotter pin.
  4. Thread a 3/8" nut onto the bottom of the long retaining rod about an inch up from the bottom of the rod.
  5. Continue rotating the long retaining rod until the bottom of the rod passes through the holes on the bottom plate.
  6. Thread another 3/8" or 1/2" nut onto the bottom of the long retaining rod until it is flush with the bottom plate. Tighten the nuts above and below the bottom plate securely locking the long retaining rod in place. Attach the locking cotter pin into the hole through the bottom of the long retaining rod.
  7. Repeat the process for the second long retaining rod.
  8. Once both of the long retaining rods are securely in place, completely remove the short retaining rods.
  9. Loosen the compression seal bolts until the seal just begins to leak. This will relieve the pressure on the compression seal allowing the *sensor* to be removed. Draping a towel around the compression seal can reduce any spraying water. NOTE: The compression seal may prevent immediate leakage on *sensors* installed for a long period of time until the *sensor* begins to rise.
  10. Rotate the captive nuts on the top plate simultaneously. The *sensor* insertion tool is recommended. See *Installation, STEP 12*. This will cause the *sensor* to rise out of the pipe. If the line is under pressure do not remove the *sensor* from the compression seal completely. Only raise the *sensor* until it is clear of the valve, but still below the compression seal. See *Figure 19*. Once the *sensor* has cleared the valve mechanism, the valve can then be closed. Do not attempt to force the valve closed while the *sensor* is still passing through the valve as permanent damage to the *sensor* can occur.
- 5.1.11 Once the valve is closed, the entire *sensor* can be removed from the valve.

### 3.0 Sensor Removal - Continued

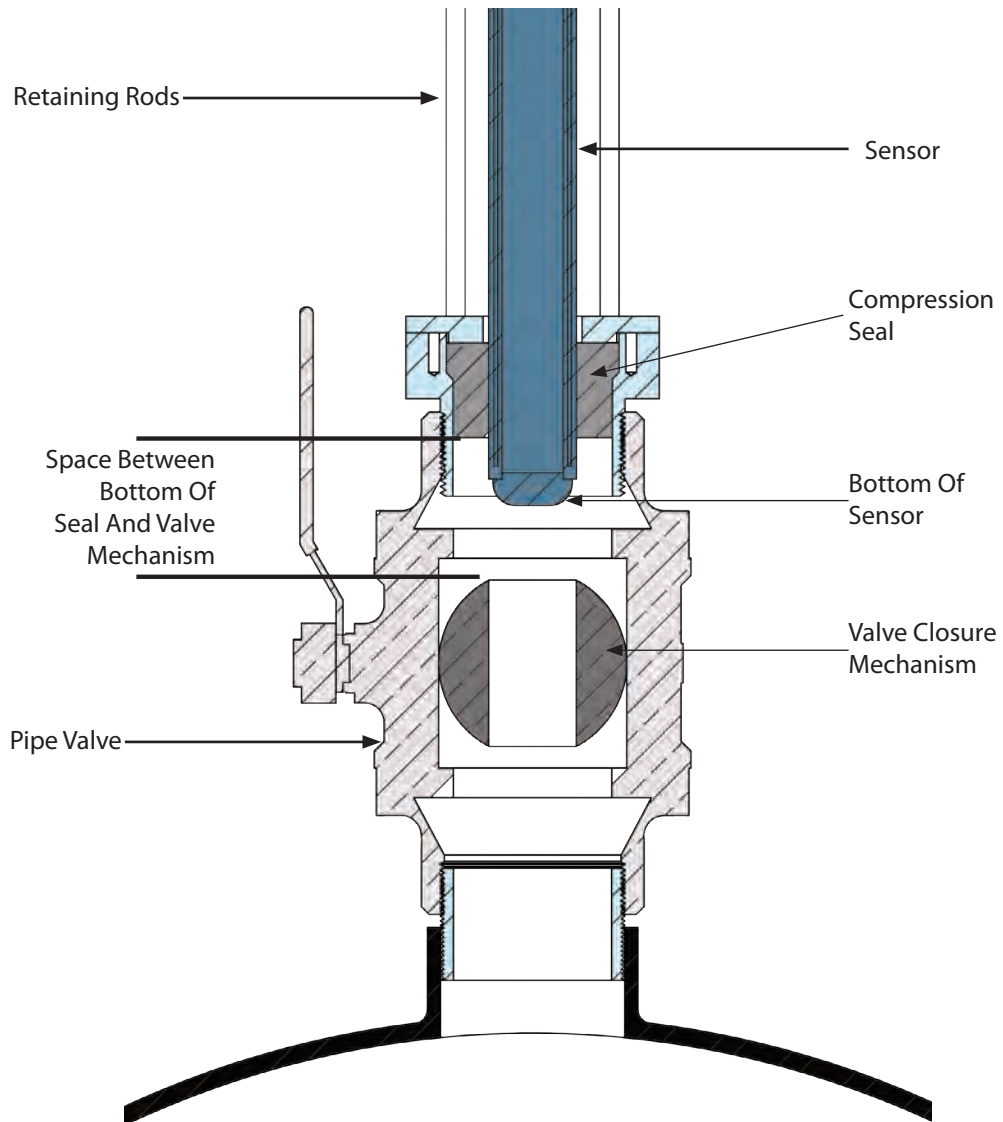


Figure 19: Cross-Section Of Meter Showing Sensor Removal

## 4.0 Maintenance

The FPI Mag is essentially a maintenance free meter with no user serviceable parts. However, the metered fluid may contain solids or other contaminants which may coat the *sensor* electrodes. A periodic inspection may be recommended to ensure the *sensor* electrodes are clean. To clean the unit, remove the *sensor* following all of the instructions and safety warnings contained in *Section 5.0*. When the *sensor* is removed from the pipe, carefully wipe down the *sensor* with a soft cloth and rubbing alcohol.

## 5.0 Specifications

### MEASUREMENT

Volumetric flow in filled flow conduits 4" (100 mm) to 138" (3500 mm) utilizing insertable electromagnetic averaging *sensor*. Flow indication in English Std. or Metric units.

### FLOW MEASUREMENT

Method: Electromagnetic

Accuracy: for Forward and Bidirectional *sensors* (with either a McCrometer L-Series or M-Series *converter*).

+/- 0.5% from 1 ft/s to 32 ft/s (0.3 m/s to 10 m/s)

+/- 1% from 0.3 ft/s to 1 ft/s (0.1 m/s to 0.3 m/s)

Linearity: 0.3% of Reading

Repeatability: 0.2% of Reading

395L *sensor* has forward flow measurement and reverse flow indication.

394L *sensor* has bidirectional flow measurement.

### CONDUCTIVITY

Minimum conductivity of 5µS/cm

### MATERIALS

Fusion bonded epoxy (NSF 61 approved) coated 316 stainless steel

Insertion Hardware: 316 stainless steel

Compression Seal: Silicone Rubber

*Sensor* Electrodes: 316 stainless steel

### ELECTRICAL CONNECTIONS

Quick-connect (IP68 rated)

### ENVIRONMENTAL

Pressure/Temperature Limits: *Sensor*: Flow Temperature Range 14° to 170° F (-10° to 77° C) @ 250 PSI

*Sensor* is submersible (IP68)

### CERTIFICATIONS

Safety: Listed by CSA to 61010-1: Certified by CSA to UL 61010-1 and CSA C22.2 No.61010-1-04

ISO 9001:2008 certified quality management system

## 6.0 Returning A Unit For Repair

If the unit needs to be returned to the factory for repair, please do the following:

- Prior to calling for a return authorization number, determine the model number, serial number (located inside the front panel of the *converter*), and reason for return.
- Call the McCrometer Customer Service Department and ask for a Return Authorization (RA) number.
- Ship the meter in the original packaging, if possible. Do not ship manuals, power cords, or other parts with your unit unless required for repair.
- Please make sure the meter is clean and free from foreign debris prior to shipping.
- Write the RA number on the outside of the shipping box. All return shipments should be insured.
- Address all shipments to:

McCrometer, Inc.  
RMA #  
3255 W. Stetson Avenue  
Hemet, CA 92545







## WARRANTY STATEMENT

Manufacturer warrants all products of its manufacture to be free from defects in workmanship and material under normal use and service. The warranty for the **FPI-Mag** extends for a period of twenty-four (24) months after date of shipment, unless altered by mutual agreement between the purchaser and manufacturer prior to the shipment of the product. If this product is believed to be defective and is within its warranty period, purchaser shall notify the manufacturer, and will return the product to the manufacturer, postage paid, within twenty-four (24) months after date of shipment by the manufacturer. If the purchaser believes the return of the product to be impractical, manufacturer shall have the option, but will not be required, to inspect the product wherever located. In any event, if the purchaser requests the manufacturer visit their location, the purchaser agrees to pay the non-warranty expenses of travel, lodging and subsistence for the field service response. If the product is found by the manufacturer's inspection to be defective in workmanship or material, the defective part or parts will either be repaired or replaced, at manufacturer's election, free of charge, and if necessary the product will be returned to purchaser, transportation prepaid to any point in the United States. If inspection by the manufacturer of such product does not disclose any defect of workmanship or material, manufacturer's regular service repair charges will apply. Computing devices sold but not manufactured by McCrometer, Inc. are covered only by the original manufacturer's written warranty. Hence, this warranty statement does not apply.

**THE FOREGOING WARRANTY IS MANUFACTURER'S SOLE WARRANTY, AND ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE NEGATED AND EXCLUDED. THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, GUARANTEES, REPRESENTATIONS, OBLIGATIONS OR LIABILITIES ON THE PART OF THE MANUFACTURER.**

Purchaser's sole remedy and manufacturer's sole obligation for alleged product failure, whether under warranty claim or otherwise, shall be the aforesated obligation of manufacturer to repair or replace products returned within twenty-four months after date of original shipment. The manufacturer shall not be liable for, and the purchaser assumes and agrees to indemnify and save harmless the manufacturer in respect to, any loss or damage that may arise through the use by the purchaser of any of the manufacturer's products.



## OTHER McCROMETER PRODUCTS INCLUDE:



Magnetic Flowmeters



Magnetic Flowmeters



Magnetic Flowmeters



Propeller Flowmeters



Wireless Telemetry Systems



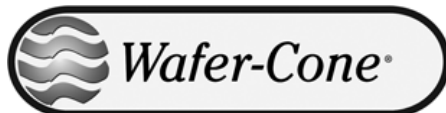
Propeller Flowmeters



Differential Pressure Flowmeters



Differential Pressure Flowmeters



Differential Pressure Flowmeters

Represented By: