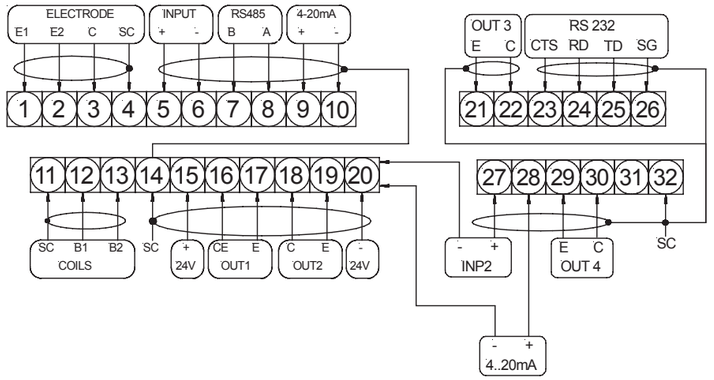
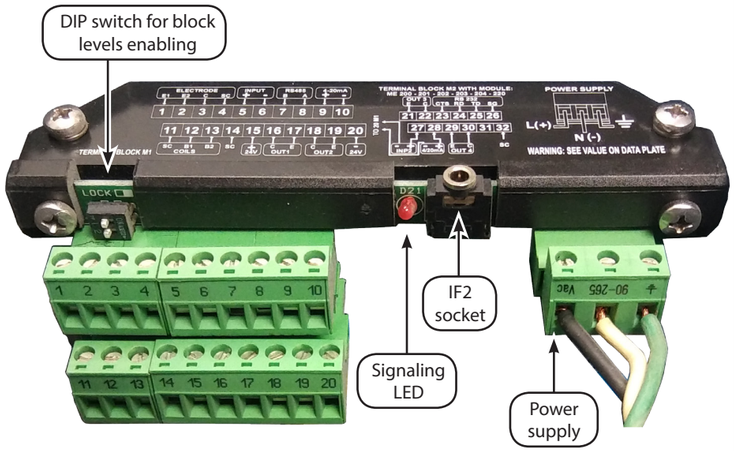
14 TERMINAL BOARD (M-SERIES CONVERTER)

All electrical cables enter the converter through compression fittings located on the side of the converter. Ensure that all compression glands are properly tightened and all unused fittings are plugged so the case remains sealed.

All connections are made on the terminal board. To access the terminal board, loosen the four screws on the back of the converter to remove the rear cover.

CAUTION! Always disconnect the power cord before attempting any electrical connections.

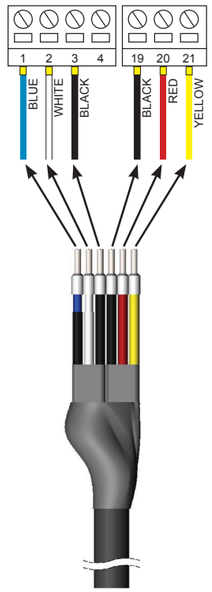




15 282L WIRING DIAGRAM

Terminal Block Assignments

Terminal	Wire Color	Connected To
#1	Blue	Sensing electrode
#2	White	Sensing electrode
#3	Black	Reference ground
#11	Black	Magnet shield / overall cable shield
#12	Red	Coil
#13	Yellow	Coil



Cable Diameter:
Single Cable (36002): 0.250"

Note: M-Series wiring diagram is used in this example. Additional wiring diagrams can be found in the converter IOM or inside the converter cover.

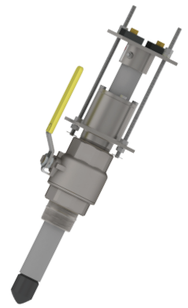
16 CONTACT INFORMATION

McCROMETER
www.mccrometer.com

3255 WEST STETSON AVENUE • HEMET, CALIFORNIA 92545 USA
TEL: 951-652-6811 • 800-220-2279 • FAX: 951-652-3078 Printed In The U.S.A. Lit. 30120-66, Rev. 1.2 / 8-18-17

McCROMETER

SPI Mag™



Model 282L

Single Profile Insertion

Electromagnetic Flow Meter

Quick Start Guide

30120-66 Rev. 1.2
August 18, 2017

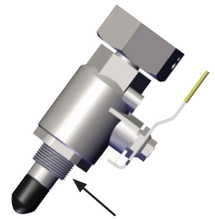
1 CONTENTS

1 - SPI Mag Sensor
2 - Long threaded retaining rods
1 - Converter (M Series, L Series or ABB)
1 - Calibration Certificate
1 - SPI Mag Installation, Operation and Maintenance Manual
1 - Converter Installation, Operation and Maintenance Manual
2 - 3/4" reversible ratchet wrenches
1 - Pipe thread sealant
1 - Compression Seal Assembly
4 - Hex nuts (3/8")
2 - Locking cotter pins
1 - Power cord (8', 115 VAC)

2 SERIAL NUMBERS

Verify the system serial numbers on both the sensor and converter match to ensure a properly calibrated system.

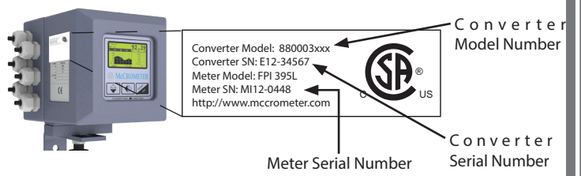
The Meter Serial Number is etched onto the sensor and can also be located on a tag near the end of the sensor cable



Meter Serial Number

Meter Serial Number

The tag on the side of the converter has the Converter Model Number, the Converter Serial Number and the Meter Serial Number.



3 SAFETY WARNINGS

WARNING! Incorrect installation or removal of SPI 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 emergency.

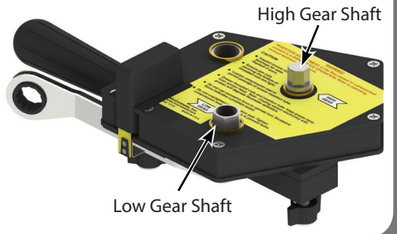
WARNING! Carefully read all safety warning tags attached to the meter.

4 SENSOR INSERTION TOOL

McCrometer recommends using a sensor insertion tool (P/N 75031) to help with inserting the sensor and to avoid any damage to the sensor.

Place the profiling insertion tool over the captive nuts and lock it into place with spring locks located on the bottom of the tool. Using the provided wrench rotate the high gear shaft clockwise until the bottom of the sensor reaches the far wall of the pipe.

3/8" Insertion Tool (Part Number 75031) for TSL < 72" and pressure < 200 psi



5 FLOW CALCULATION

To calculate the flow, two things are needed: The cross-sectional area of the pipe and the average velocity.

Cross-sectional area is found using the inside diameter of the pipe. **Average velocity** is found using the sensed velocity (measured by the sensor). A site calibration is performed to determine the velocity profile. This allows the flow meter to calculate the average velocity from the sensed velocity.

Flow is calculated by using the Continuity Equation: **Flow = Average Velocity x Area**

If the engineering design for this installation requires that flow in the line be profiled, please refer to the SPI Mag Profiling Guides.

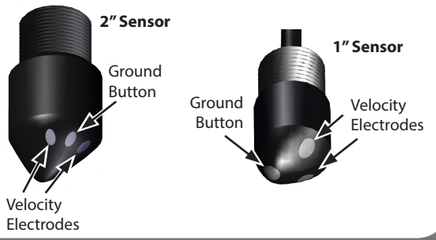
SPI Mag 1" Profiling Guide: Lit# 24510-58
SPI Mag 2" Profiling Guide: Lit# 24510-59

The Profiling Guides can be downloaded at:
www.mccrometer.com/Library

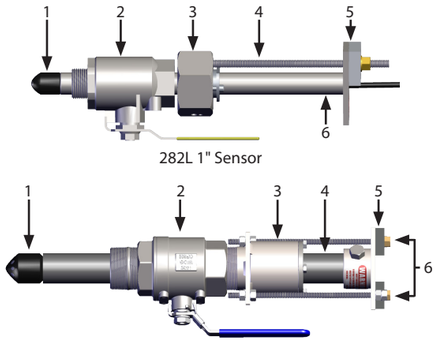
6 FULL PIPE SENSORS

The full pipe sensor makes use of *Faraday's Law of Electromagnetic Induction* to measure water velocity. Faraday's Law states: **A conductor, moving through a magnetic field, produces a voltage.**

Because water is a conductor, water moving through a magnetic field produces a voltage. The magnitude of the voltage is directly proportional to the velocity of the water. The sensor generates an electromagnetic field, creating a voltage in the water. The two velocity electrodes, along with the ground electrode measure this voltage. A faster water velocity produces a higher voltage. By accurately measuring this voltage, the velocity is determined.



7 PARTS DIAGRAM



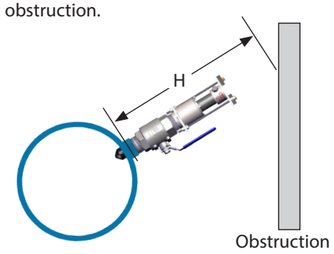
Item No. Part Name

1	Sensor Assembly
2	Bronze Ball Valve
3	Compression Seal Assembly
4	1" Insertion Tube with cap 2" Insertion Tube without cap
5	Insertion Tube Cap
6	3/8" SS Long Threaded Rod

NOTE: Valves are optional or supplied by user.

8 SENSOR CLEARANCE

The sensor will protrude from the pipe when installed requiring sufficient clearance from any obstruction.



Distance H is estimated by adding three measurements:

1. the height from the outer pipe wall to the top of the installation valve
2. the length of the meter (see table)
3. additional 9" of working space

1" 282L

Insertion Tube Length	Overall Sensor Length
12"	18.25"
24"	30.25"
36"	42.25"

2" 282L

Insertion Tube Length	Overall Sensor Length
18"	24.25"
24"	30.25"
30"	36.25"

9 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.

Install a 2" (50mm) full port valve or corporation stop with a 2" (50mm) NPT female pipe thread output for the 2" sensor, or a 1" (25mm) full port valve or corporation stop with a 1" (25mm) NPT female pipe thread output for the 1" sensor.. Follow any and all installation instructions provided for the valve that you have chosen. The valve or corporation stop can be installed onto a welded coupling or pipe saddle

Pipe Saddle With Ball Valve | Welded Pipe Nipple With Ball Valve | Corporation Stop

10 SENSOR ASSEMBLY INSTALLATION

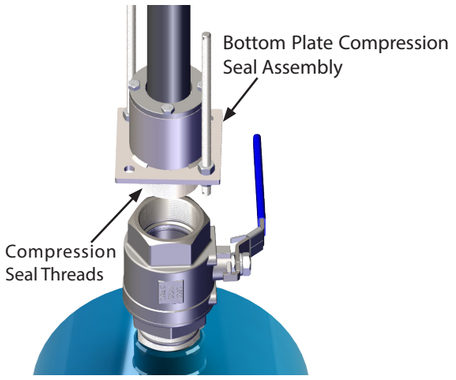
The sensor assembly uses a compression seal, which keeps the sensor watertight when the pipe is under pressure. Care must be taken when installing the sensor, to avoid leaks.

Visually inspect all elements of the installation to ensure they are structurally sound and of high quality materials, including all welds, couplings and nipples.

Put a generous amount of the supplied pipe sealant on the compression seal threads. Teflon tape may also be used. **NOTE: If pipe sealant gets on the sensor electrodes the velocity signal may be lost.**

Place the compression seal threads over the pipe valve. Turn the entire sensor assembly clockwise to secure the assembly to the valve.

The seal is secure when a large amount of force is required to turn the assembly. Line up the arrow (on the top plate) with the direction of the flow.



11 INSERTING THE SENSOR

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.

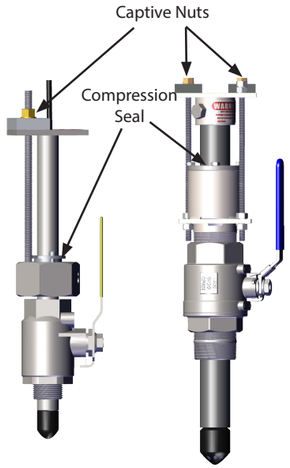
Ensure the compression seal is only hand tightened.

Barely crack open the valve and tighten the compression seal as required to minimize leaks. A towel draped around the compression seal can reduce spray if necessary.

Open the valve completely. Failure to open the valve completely will cause the valve to scrape the sensor during insertion and may result in permanent damage to the sensor.

Insert the sensor into the pipe by *simultaneously* rotating clockwise the two captive nuts on the top plate for the 2" sensor, and the single captive nut on the 1" sensor. For the two captive nuts on the 2" sensor use the two ratchet wrenches provided. It is recommended that the Sensor Insertion Tool be used to rotate the captive nuts on the 2" sensor to ensure the top plate compresses evenly.

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.

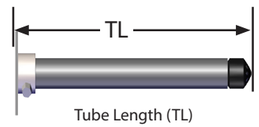


12 CLEAN WATER SENSOR POSITION

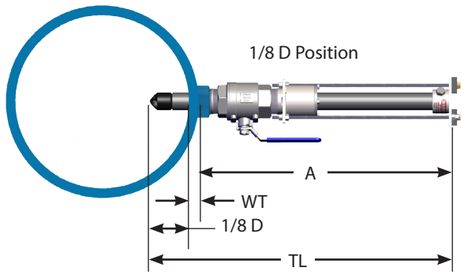
If the flow is clean water, the sensor can be placed at 1/8 of the inside diameter. To position the sensor at 1/8 of the ID, follow the instructions below:

- Measure the tube from the top of the cap to the end of the sensor to find tube length (TL).
- Calculate (1/8 D): 1/8 D = 0.125 x Pipe ID
- Add wall thickness(WT) to 1/8 D.
- Calculate distance A: A = TL - (1/8 D + WT)

Using the captive nuts, position the top edge of the tube cap so that its distance from the OD of the pipe is equal to "distance A" calculated above. See diagram.



If the flow is clean water, the sensor can be left at the 1/8D position. Do not leave the sensor in this position for raw waste water because debris could collect on the sensor and affect the velocity readings. In waste water applications, position the sensor at location 0.00.



13 RAW WATER SENSOR POSITION

The operation position for raw waste water and sludge is at sensor location 0.00 to prevent debris from collecting on the sensor and affecting velocity readings. To position the sensor at this location follow the instructions below:

Calculate distance A by subtracting the pipe wall thickness (WT) and ¾" from length C (Tube Length).

A = C - WT - ¾"

Using the captive nuts, position the top edge of the tube cap so that its distance from the OD of the pipe is equal to "distance A" calculated above. See diagram.