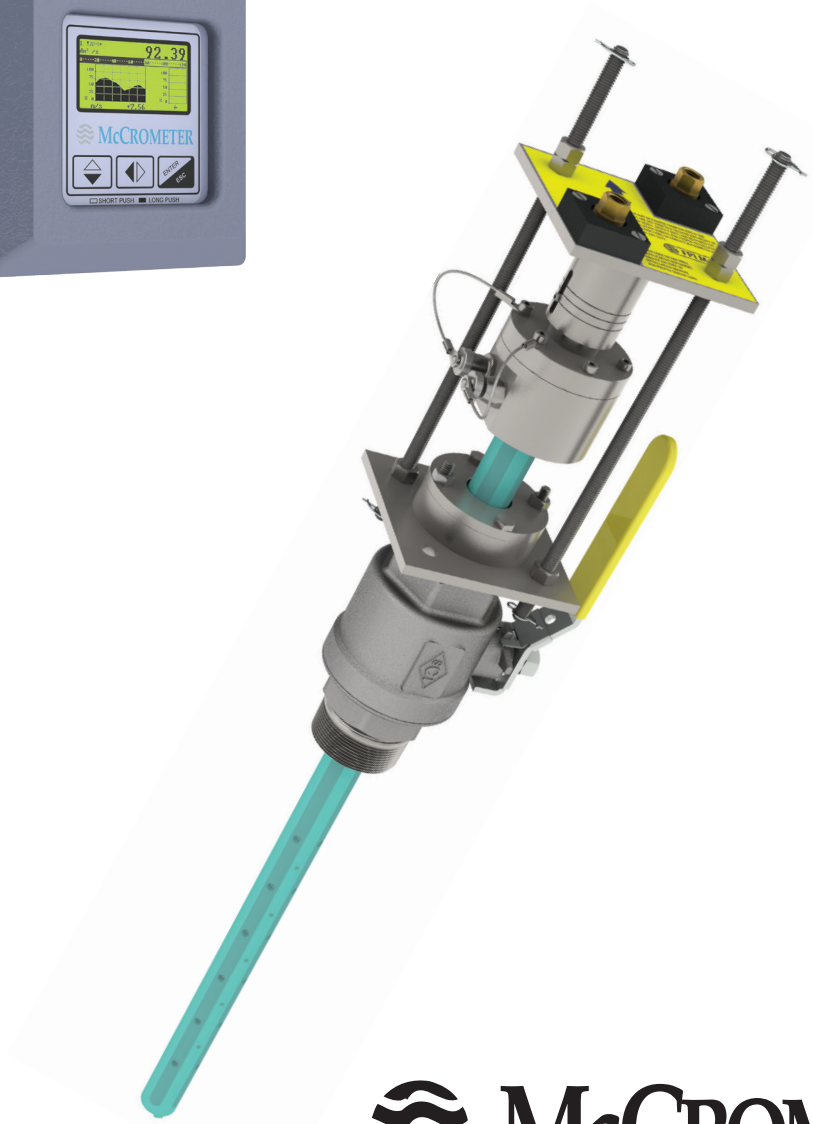
FPI Mag®

Models 394L and 395L Full Profile Insertion Electromagnetic Flow Meter

with Converter

Suggested Specifications

30120-53, Rev. 1.9
April 2, 2018



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FPI Mag® FPI Mag Models 394L and 395L Suggested Specifications

PART 1 - GENERAL

1.1 SCOPE

A. This section describes the requirements for a Full Profile Insertion electromagnetic flow meter and microprocessor-based signal converter. Under this item, the contractor shall furnish and install the magmeter equipment and accessories as indicated on the plans and as herein specified.

1.1 SUBMITTALS

A. The following information shall be included in the submittal for this section:
   1. Data sheets and catalog literature for the 395L or 394L Insertion Mag meter and the microprocessor-based signal converter
   2. Connection diagrams for equipment wiring
   3. List of spare parts and optional equipment

PART 2 - PRODUCTS

2.1 ELECTROMAGNETIC FLOWMETER (FULL PROFILE INSERTION MAGMETER)

A. The electromagnetic flow meter shall consist of a flow sensor based on Faraday's Law of Electromagnetic Induction and microprocessor-based signal converter.

B. Sensor:
   1. Operating principle: Utilizing Faraday's Law of Electromagnetic Induction, the flow of a conductive liquid around the sensor induces an electrical voltage that is proportional to the velocity of the flow.
   2. Construction: The sensor material shall be constructed of 316 Stainless Steel and coated with NSF 61 certified approved epoxy coating.
   3. Hastelloy Electrodes (Optional) shall be used when corrosive fluid is present.
   4. Sensor operating Temp: +14° to +170° F @ 250 PSI
   5. Electronics operating temperature (Converter): -4° to +140° F
   6. Size: 4" to 138" diameter (see instrument schedule)
   7. Installation hardware shall include a Stainless Steel 2" full ported valve with a stainless steel nipple.
   8. Submergence:
      a. The sensor shall be NEMA 6P or IP68 rated to be permanently submerged up to 6 feet.
      b. The sensor shall be NEMA 6P or IP68 rated to be permanently submerged up to 30 feet (option with IP68 rated strain relief connection only).
   9. Converter enclosure: NEMA 4X or IP67 enclosure
   10. Display: Background illumination with a three button menu driven alphanumeric 5-line, 40-character display to indicate flow rate, totalized values, settings, and faults
   11. Power supply: 90/265 VAC or 11-35VDC
   12. Outputs: 4-20mA (0–21mA) into 1000 ohms max
   13. Standard Outputs:
      a. Four separate digital programmable outputs: open collector transistor useable for pulse, frequency, or alarm settings, for standard converters and Modbus configuration.
      b. Two separate digital programmable outputs: open collector transistor usable for pulse, frequency, or alarm settings, for Profibus and HART configurations.
   14. Communications: Option: RS-485 Modbus, Profibus Protocols and HART
   (Must specifiy at the time of order.)

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15. Sensor and signal converter performance:
    a. Flow Range: 0.3 fps to 32* fps for accuracies stated below. *Maximum velocities may be restricted to less than 32 fps in larger diameter applications.
    b. Accuracy: +/- 0.5% of actual flow for flow range of 1 f/s to 32 f/s, and +/-1% from .3 f/s to 1 f/s
    c. Separation: Maximum distance of 500 feet between signal converter and sensor without the use of any additional equipment. Longer cable lengths shall be available upon request. Please contact the factory.
    d. Bi-directional flow capabilities (Optional)
16. Totalizer: Three eight-digit counters for forward flow, reverse flow and net
17. The electromagnetic insertion flow meter shall be McCrometer 395L for forward flow, or 394L Bi-directional Full Profile Insertion Mag Meter or equal.

2.1 SPARE PARTS

A. Spare parts for the equipment shall include the following, unless otherwise noted.

B. One set of manufacturers recommended spare parts.

C. Extra operation manuals as required.

2.1 OPERATOR FUNCTIONS

A. Calibration
1. Each flow sensor shall be N.I.S.T. wet calibrated and all of the calibration information and factory settings matching the sensor shall be stored integrally within the converter's non – volatile memory. At initial commissioning, the flow meter commences measurement without any initial programming. Should the signal converter need to be replaced, the new signal converter will upload all previous settings and resume measurement without any need for reprogramming or rewiring.
2. An N.I.S.T traceable certificate of calibration shall accompany each flow sensor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Follow manufacturer's recommendation for the minimum upstream and downstream installation requirements for the flow sensor.

B. Wiring between flow sensors and remote mounted signal converters shall use cable type and procedures as per the manufacturer's recommendations.

3.1 MANUFACTURER'S ASSISTANCE

A. Warranty
1. The manufacturer of the electromagnetic flow meter shall guarantee for two years of operation that the equipment shall be free from defects in design, workmanship, or materials.
2. In the event a component fails to perform as specified, or is proven defective in service during the guarantee period, the manufacturer shall promptly repair or replace the defective part at no cost to the owner.

FPI Mag® Models 394L and 395L Suggested Specifications

DESCRIPTION
The full pipe averaging flow meter comes complete with Mounting Hardware, AC Converter with Single or Dual 4-20mA output, 25 Feet of Dual Submersible Cables with quick connects at sensor, Stainless Steel Body, 316 Stainless Steel Electrodes, NSF Approved Fusion Bonded Epoxy Coating, 2" Stainless Steel Ball Valve (minimum of 1-7/8" port I.D.), 2" x Close Stainless Steel Nipple, 2-Year Warranty.

MEASUREMENT
Volumetric flow in filled flow conduits 4" (100 mm) to 138" (3,500 mm) utilizing insertable electromagnetic averaging sensor. Flow indication in English Standard or Metric units.

FLOW MEASUREMENT
- Method: Electromagnetic
- Calibrated Accuracy for Forward and Bidirectional Sensors: ± 0.5% from 1 f/s to max velocity (on next page), up to ± 1% for 0.3 to 1 f/s; ± 1% for battery powered converter, ± 1% for reverse flow
- Linearity: 0.3% of Range
- Repeatability: 0.2% of Reading
- Direction Measurement: 395L sensor - Forward flow measurement and reverse flow indication; 394L sensor - bidirectional flow measurement

POWER SOURCE
- AC: 90-265 VAC / 45-66 Hz (20 W/25 VA)
- DC: 10-35 VDC (21 W)
- Battery: (for forward flow only) Estimated five year life span. (Battery life dependent on application. Estimated life based on factory standard settings)
- Solar panel option available.

AC, DC, or battery must be specified at time of ordering.

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

STANDARD OUTPUTS:
Single [1] or Dual [2] 4-20mA Outputs: Galvanically isolated and fully programmable for zero and full scale (0-21mA rangability)
Two [1] or Four [2] separate digital programmable outputs: open collector transistor usable for pulse, frequency, or alarm settings.

- Volumetric Pulse
- Flow Rate (Frequency)
- Hardware Alarm
- High/Low Flow Alarms
- Empty Pipe
- Directional Indication
- Range Indication

Maximum switching voltage: 40 VDC
Maximum switching current: 100mA
Maximum switching frequency: 1250 Hz
Insulation from other secondary circuits: 500V

OPTIONAL OUTPUTS:
- Profibus[1]
- HART[1]
- Modbus[2]
- Smart Output™ (Sensus or Itron)

[1] Available with *Single* 4-20mA only. Forward flow only.
[2] Available with *Single or Dual* 4-20mA.
Not available with battery powered

ISOLATION
All inputs / outputs are galvanically isolated from power supply up to 500 V

ENGINEERING UNITS
Cubic Meter; Cubic Centimeter; Milliliter; Liter; Cubic Decimeter; Decaliter; Hectoliter; Cubic Inches; US Gallons; Imperial Gallons; Cubic Feet; Kilo Cubic Feet; Standard Barrel; Oil Barrel; US Kilogallon; Ten Thousands of Gallons; Imperial Kilogallon; Acre Feet; Megagallon; Imperial Megagallon; Hundred Cubic Feet, Megaliters

CONDUCTIVITY
Minimum conductivity of 5µS/cm

CONVERTER ENCLOSURE
- IP67 Die Cast Aluminum
- 5.75" H x 5.75" W x 6.69" D (14.6 cm H x 14.6 cm W x 17 cm D)

ELECTRICAL CONNECTIONS
- Sensor: Quick-Connect (IP68)
- Converter: Compression gland seals for 0.125" to 0.375" diameter round cable.

RATINGS
- IP68 Submersible Sensor (details below)
- IP67 Die Cast Aluminum Converter
- IP65 Panel Mount Converter

CERTIFICATIONS AND APPROVALS
- *Safety: Listed by CSA to 61010-1: Certified by CSA to UL 61010-1 and CSA C22.2 No.61010-1-04*
- ISO 9001:2015 certified quality management system
- CE: compliant (converter only)

Note: Panel mount converter is not CSA approved.

NSF / ANSI 61 & NSF / ANSI 372

ENVIRONMENTAL
- Sensor: Flow temperate range 14° to 170° F (-10° to 77° C) up to 250 PSI
- Submersibility: Remote sensor is continuously submersible (IP68), with a standard quick-connect cable to 6 ft., and optional strain relief at 30 ft; die cast aluminum converter is rated IP67
- Electronics: Operating and storage temperature: -4° to 140° F (-20° to 60° C)
- Storage: During freezing conditions and when meter is not in use, sensor must be removed from pipe and stored in dry conditions. ***NOTE: Damage to the sensor caused by allowing the sensor freeze in the pipe is not covered by the warranty.***

SYSTEM OPTIONS FORWARD AND BIDIRECTIONAL
- Hastelloy® Electrodes
- DC Power
- Sun Shield
- Additional sensor cable up to 480' (Max 500')
- Extended Warranties
- Extension to hardware clearance
- Annual Verification / Calibration
- Sensor Insertion Tool
- Stainless Steel ID Tag

KEYPAD AND DISPLAY
Can be used to access and change set-up parameters using three membrane keys and an LCD display

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