FPI-X™ Dual Sensor
Electromagnetic Flow Meter

Suggested Specifications

30121-55 Rev. 1.2
May, 2015
DUAL SENSOR ELECTROMAGNETIC FLOWMETER

PART 1 - GENERAL

1.1 SCOPE

A. This section describes the requirements for a Dual Sensor 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.

1.2 SUBMITTALS

A. The following information shall be included in the submittal for this section:
   1. Data sheets and catalog literature for the 395X 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 DUAL SENSOR ELECTROMAGNETIC FLOWMETER (FULL PROFILE INSERTION MAGMETER)

A. The electromagnetic flow meter shall consist of two flow sensors 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 sensors 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 degrees F.
   6. Size: 12” 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 sensors shall be NEMA 6P or IP68 rated to be permanently submerged up to 6 feet.
      b. The sensors 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: 4-20 mA (0 – 21mA) into 1000 ohms max.
   13. Two separate digital programmable outputs: open collector transistor usable for pulse, frequency, or alarm settings.
15. Sensors 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 fps to 32 fps, and +/-1% from .3 fps to 1 fps.
   c. Separation: Maximum distance of 200 feet between signal converter and sensor

16. Totalizer: Three eight-digit counters for forward flow, reverse flow and net.

17. The electromagnetic insertion flow meter shall be McCrometer 395X Full Profile Insertion Mag Meter or equal.

2.2 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.

2.3 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 manufacturers’ recommendations.

3.2 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-X™ Dual Sensor Electromagnetic Flow Meter
Suggested Specifications

The FPI-X flow meter comes complete with an AC Converter with a 4-20mA output, 20 Feet of Submersible Cable with quick connect at sensors. Each of the two sensors comes with: Mounting Hardware, 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.), and a 2” x Close Stainless Steel Nipple. The FPI-X has a 2-Year Warranty.

MEASUREMENT
Volumetric flow in filled flow conduits 12” (300 mm) to 138” (3,500 mm) utilizing two insertable electromagnetic averaging sensors. Flow indication in English Standard or Metric units.

FLOW MEASUREMENT
Method: Electromagnetic
Accuracy for Forward and Bidirectional Sensors:
± 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 Range
395L sensor: forward flow measurement and reverse flow indication.

POWER REQUIREMENTS
AC: 90-265 VAC / 44-66 Hz (20 W/25 VA) or DC: 10-35 VDC (20 W)
AC or DC must be specified at time of ordering.

MATERIALS
Fusion bonded epoxy (NSF 61 approved) coated 316 SS
Stainless steel isolation valve (included)
Insertion Hardware: 316 Stainless Steel
Compression Seal: Silicone Rubber
Sensor Electrodes: 316 Stainless Steel

OUTPUTS
Single 4-20mA Output: Galvanically isolated and fully programmable for zero and full scale (0-21mA)
Two separate digital programmable outputs: open collector transistor usable for pulse, frequency, or alarm settings.
- Volumetric Pulse
- Empty Pipe
- Flow Rate (Frequency)
- Hardware Alarm
- High/Low Flow Alarms
Maximum switching voltage: 40 VDC
Maximum switching current: 100mA
Maximum switching frequency: 1250 Hz
Insulation from other secondary circuits: 500V

ENGINEERING UNITS
Cubic Meter; Kilo Cubic Foot; Cubic Centimeter; Milliliter; Liter; Cubic Decimeter; Decaliter; Hectaliter; Cubic Inches; American Gallons; Imperial Gallons; Cubic Feet; Standard Barrel; Oil Barrel; Cubic Yard; American Kilogallon; Imperial Kilogallon; Acre Feet; Megagallon; Imperial Megagallon

COMMUNICATIONS PROTOCOL OPTIONS
- Profibus Protocol
- Modbus
- HART

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

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 Sensors
IP67 Die Cast Aluminum 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 9001:2008 certified quality management system
CE: Certified (Converter Only)

ENVIRONMENTAL
Pressure / Temperature Limits:
Sensor: Flow temperate range 14° to 170° F (-10° to 77° C) @ 250 PSI
Sensor is submersible (IP68)
Electronics: Operating and storage temperature: -4˚ to 140˚ F (-20˚ to 60˚ C)

SYSTEM OPTIONS FORWARD AND BIDIRECTIONAL
- Hastelloy® Electrodes
- DC Power
- Sun Shield
- Extended Warranties
- Additional sensor cable up to 180° (Max 200°)
- 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.
## L-Series Converter

<table>
<thead>
<tr>
<th>Pipe Size (Nominal)</th>
<th>Pipe ID Range</th>
<th>Flow Ranges (GPM Standard)</th>
<th>Standard Program Defaults</th>
<th>Hardware Clearance*</th>
<th>Required Installation Clearance*</th>
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<td>Min Pipe ID</td>
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### FPI-X™ Dual Sensor Electromagnetic Flow Meter

**Suggested Specifications**

![Converter Dimensions](image)

**At the time of ordering, please be prepared to provide the following information:**

1. Pipe ID and Pipe OD
2. Unit of Measure (US Gallons is Default)
3. Maximum pressure

Consult factory if any chemicals are in use.