

## Series MFX

### Magnetic Flow Meter, Insertion Probe

#### Part 1. General

##### 1.1 Scope

- A. This section describes the requirements for an ultrasonic flow measurement transmitter plus transducers.
- B. Under this item, the contractor shall furnish and install the flow measurement 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 microprocessor-based transmitter and insertion magnetic flow probe.
  - 2. Interconnection and dimensional drawings.
  - 3. List of spare parts

#### Part 2. Products

##### 2.1 Insertion Magnetic Flow Meter

- A. The insertion magnetic flow measurement system shall be a microprocessor-based measuring type providing an electronic output signal proportional to the flow of conductive liquid in closed piping systems as may be required. It shall consist of a transmitter and one probe connected by up to 990 feet [300 meters] of cable.
- B. **Insertion Probe:**
  - 1. Operating principle: Bipolar pulsed DC excitation of an iron-core electromagnet results in magnetic fields being imposed perpendicular to the liquid flow. If the liquid is conductive and moving, a voltage will be generated perpendicular to the

movement of the liquid and proportional to liquid velocity. Electrodes are in contact with the liquid and measure the voltage imposed.

2. Insertion Probe: The insertion magnetic probe shall contain an electromagnet, electrodes and preamplifier and transmitter circuit. Probes are available for both 1" and 1-1/2" NPT pipe connections.
  - a. 1" NPT Probes shall be available in nominal lengths of 24" and 48" [600 and 1200 mm].
  - b. 1-1/2" NPT Probes shall be available in nominal lengths of 8", 18", 28", 38" and 48" [200, 450, 700, 950 and 1200 mm].
  - c. Probes are designed to operate on pipe sizes ranging from 3" through 120" [75 through 3048 mm].
  - d. 1" NPT Probes shall have an operating pressure limit of 150 PSIG [6.8 Bar]; 1-1/2" NPT Probes shall have an operating pressure limit of 700 PSIG [48 Bar].
  - e. The probe housing shall be 316 SS, Viton® and PVDF.
  - f. Electrical connection shall be 1/2" NPT female
  - g. Standard operating temperature shall be -40° to 225° F [-40° to +107° C]

### **C. Transmitter**

1. Enclosure shall be NEMA 4X polycarbonate
2. Power supply shall be 115/230 VAC +/- 15% @ 50/60 Hz or 9-28 VDC
3. Power consumption shall be 7 VA
4. Operating temperature shall be -40° to 185° F [-40° to 85° C].

5. Input/output options: The transmitter shall accept up to one input/output option to be installed. Input/output options are field installable and replaceable.
  - a. 4-20ma into 800 ohms; jumper configurations for internal or external power
  - b. Two form C, SPDT multi-purpose relays rated 0.5 A /200 VAC non-inductive
  - c. Pulse rate output, 0-2,500 Hz, open-collector and turbine meter simulation
  - d. RS232C
  - e. RS485, 1/4-node, 126 drops max
  - f. Data Logger, 200,000-events, Windows® software utility
  - g. Dual-RTD input for liquid energy measurements
6. Control and Programming
  - a. A 4-key tactile keypad permits configuration of all flow measurement parameters.
  - b. All parameter, calibration and commands shall be entered via a personal computer, Windows® software utility and infrared communicator from outside the enclosure without opening the enclosure.
7. Measurements shall be made by measuring differential voltage imposed on a conductive liquid caused by the liquid moving through a magnetic field.

**D. Transmitter and Transducer Performance**

1. Measuring range -30 to +30 FPS [-9 to +9 MPS]
2. Accuracy shall be  $\pm 1\%$  of reading or  $\pm 0.01$  FPS [ $\pm 0.003$  MPS], whichever is greater.

3. Sensitivity is 0.001 FPS [0.001 MPS]
4. Maximum separation between transmitter and transducer shall be 990 feet

**E. Indication**

1. Display shall be two lines: 8-digit LCD with .7" high numerical values and 8-digit LCD with 0.35" high alpha numeric values. Display is backlighted with white LEDs.
2. Indicators for Run and Program modes and Relay 1 and Relay 2 status

**F. Equipment**

The insertion magnetic flow meter shall be a Dynasonics Series MFX transmitter and Dynasonics Series DMP MagProbe insertion probe sensor.

**Part 3. Operator Functions**

**3.1 Calibration**

- A. Flow meter calibration data shall be entered via a personal computer, Windows® software utility and infrared communicator. No additional equipment shall be required.
- B. Internal self-diagnostics shall be available to assist in installation and maintenance of the flow meter.

**3.2 Transmitter Function Details**

The following functions shall be provided:

- A. The flow meter shall output, via infrared communications, flow rate, positive, negative and net flow accumulations and diagnostic data.
- B. A local display shall display flow rate and total accumulated flows.

- C. The insertion probe shall be mounted at the measuring site and shall be installed in accordance with the manufacturers recommendations.
- D. The transducers shall generate magnetic fields and utilize electrodes to measure imposed voltages to accurately measure liquid flow.
- E. Operational range shall be adjustable be entering new data via infrared communicator or optional keypad.
- F. If equipped with an optional output module, the flow meter shall be capable of zero to full scale output simulation to assure proper operation with regards to flow charts or pump control parameters.
- H. There shall be no internal potentiometers or switches used in programming or adjusting the transmitter.
- I. The power to operate the insertion probe shall come solely from the transmitter over the signal interconnection cable.
- J. If the flow meter is equipped with dual alarm relays it shall be programmable for rate of flow, batch/total accumulation, loss of signal strength or system error.
- K. The flow meter shall have a FLASH memory and shall not require a battery to ensure protection of stored data.

**Part 4. Execution**

**4.1 Installation**

- A. Follow manufacturers recommendation upstream and downstream straight pipe diameters and insertion probe orientation.
- B. Enter pipe size information into the flow meter.
- C. Insert the probe, such that the tip of the probe is inserted to a depth of 12.5% of the pipe internal diameter.
- D. Additional cable for the probe shall be six-conductor shielded cable of at least 22 AWG size.

**Part 5. Warranty**

## **5.1 Terms**

- A.** The manufacturer of the above specified equipment shall guarantee for twelve (12) months from date of shipment that the equipment shall be free from defects in design, workmanship or materials.
- B.** In the event a component fails to perform as specified or is proven defective in service during the warranty period, the manufacturer shall promptly repair or replace the defective part at no cost to the owner.

## **Part 6. Options**

### **6.1 Related Equipment**

- A.** Infrared Communicator DB-9 connection
- B.** USB to DB-9 converter
- C.** 1" bronze isolation valve kit
- D.** 1" stainless isolation valve kit
- E.** 1-1/2" bronze isolation valve kit
- F.** 1-1/2" stainless isolation valve kit

## **Part 7. Spare Parts**

### **7.1 Recommended Spare Parts**

- A.** Replacement kit for seal fitting