

SECTION 23 00 00

MODEL 735

Tee Mounted, Insert-Style, Impeller Flow Sensor

PART 1 - GENERAL

1.1 SCOPE

- A. This section describes the requirements for a flow sensor.
- 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. Customer connection and power wiring diagrams
 - 2. Data sheets and catalog literature for flow sensor
 - 3. Installation and operations manual
 - 4. List of spare parts
 - 5. Complete technical product description including a complete list of options provided
 - 6. Any portions of this specification not met must be clearly indicated or the supplier and contractor shall be liable to provide all additional components required to meet this specification

1.3 SYSTEM DESCRIPTION

- A. Impeller flow sensor shall work in conjunction with impeller flow monitor or transmitter to calculate and/or collect readings of the rate of liquid flow and total accumulated flow. Nonmagnetic, spinning impeller is swept forward by as liquid passes through the conduit; a low impedance square wave signal is transmitted with a

frequency proportional to the flow rate. Internal preamplifier allows the pulse signal to travel up to 2,000' [610 m] without further amplification. Power is provided on an analog current loop by receiving device. Impeller assembly is field-replaceable and sensors of similar type are interchangeable. Recalibration after servicing or replacement is not required. All sensor electrical components are self-contained. Irrigation versions are suitable for below grade installation (irrigation, groundwater, municipal).

1.4 DEFINITIONS

- A. Analog Current Loop – An electrical signaling scheme using in systems in which a device must be monitored or controlled remotely over a pair of conductors. Only one current level can be present at any time.
- B. AWG – (American Wire Gauge) Standardized wire gauge system used since 1857 predominantly in the United States and Canada for the diameters of round, solid or stranded, nonferrous, electrically conducting wire. The cross-sectional area of each gauge is an important factor for determining its current-carrying capacity.
- C. Flow monitor – Peripheral device which remotely displays various flow conditions (e.g. total volume, flow rate) using a potential variety of inputs.
- D. Impeller – The rotating element exposed to the moving fluid in the conduit. The rotations of the impeller are detected by a sensing mechanism and correlated to flow rate.
- E. NEMA – (National Electrical Manufacturers Association) Association of companies which provides a forum for the development of technical standards that are in the best interests of the industry and users, advocacy of industry policies on legislative and regulatory matters, and collection, analysis, and dissemination of industry data.
- F. Transmitter - A set of electronic equipment used to transmit messages or signals.

PART 2 – PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with specifications, provide flow measurement technology by one of the following:
 - 1. Data Industrial by Badger Meter

2.2 OPERATING CONDITIONS

A. Operational Requirements

1. Impeller Flow Meter

a. Flow Sensor

- 1) Primary Sensor: Four-bladed, stainless steel impeller design with a proprietary non-magnetic sensing mechanism.
 - i. Sensor will operate with which pipe sizes ½", ¾" and 1" [20, 25, and 32mm]. Threaded BSP adapters are available.
 - ii. Housing shall be constructed from Polyphenylene sulfide (PPS).

b. Transducer Excitation

- 1) Quiescent current 600uA @8VDC to 35VDC max.
- 2) Quiescent voltage (V_{high})
- 3) Supply Voltage-(600uA*Supply impedance)
- 4) ON State (V_{low}) Max. 1.2VDC@40mA current limit (15W+0.7VDC)

c. Internal Electronics

- 1) Enclosure shall be NEMA-6P [IP 68]
- 2) Sensor electronics shall be 18 AWG Irrigation Wire (solid copper)
- 3) Sensor electronics rated to temperature of 105°F [°C]
- 4) Frequency output range shall be from 3.2 to 200 Hz and has a width of 5msec ±25%, maximum transmission distance is 2000' (610m).

5) Outputs

i. Native

a) Frequency Output

6) Connectivity

- i. Point-to-Point Wireless: For simple wireless connections to bridge the distance between flow sensors and networks or local displays. Reaches distances up to 25' [7.6 m] indoors and 500' or more [152+ m] line of sight. Provides periodic measurements every 15 minutes or 1 hour.

d. System Performance

- 1) Measuring range 2 to 20 FPS [0.6 to 6.1 MPS]
- 2) Accuracy shall be $\pm 3\%$ of full scale
- 3) Repeatability: 1.5% of reading
- 4) Linearity: 1.5% of reading
- 5) Pressure/Temperature: 150 PSIG @ 73° F, 75 PSIG @ 110° F

B. Integrations

1. 300 Series Programmable Output Transmitters
2. Network Transmitter with Built-In Hydronic Energy Calculator
3. Temperature Sensors
4. Models 3000, 3050, or 3100 Remote Display

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Follow manufacturer's recommendation for installation and conform to the guidelines provided by the Installation & Operation Manual.
- B. Straight pipe requirement for mounting shall be 10 diameters up stream and 5 downstream.

- C. Tee sensor shall be vertically upright as installation location allows; any circumferential orientation in vertical pipes is acceptable.
- D. Sensor orientation shall be such that flow arrow on sensor is aligned with flow direction.

3.2 MANUFACTURER'S WARRANTY

A. Terms

- 1. The manufacturer of the above specified equipment shall guarantee for twelve (12) months from date of installation; or one (1) year and six (6) months after the date of shipment that the equipment shall be free from defects in design, workmanship or materials.

END OF SECTION