SECTION 13422

magnetic flowmeters

# GENERAL

## DESCRIPTION

### This section describes requirements for magnetic flowmeters.

## RELATED WORK SPECIFIED ELSEWHERE

### Section 01000 – General Requirements

### Section 17200 – Field mounted instruments.

## SUBMITTALS

### Submit shop drawings in accordance with the General Conditions.

### Submit manufacturer’s catalog data and detail drawings showing dimensions, pressure rating, coatings, and meter parts and describe by material of construction specifications (such as AISI, ASTM, SAE, or CDA), and grade or type. [Identify each meter by tag number to which the catalog data and detail sheets pertain.]

### Show meter laying lengths.

## MEASUREMENT AND PAYMENT

### Payment for the work in this section shall be included as part of the lump-sum bid amount stated in the Proposal.

# MATERIALS

## MANUFACTURERS

### The meter flow tube and transmitter shall be by the same manufacturer.

### For water applications the magnetic flowmeter and transmitter shall be UltraMag Model UM-06-R using Procomm converter (or latest model) with HART signal and AMI/AMR Sensus wiring manufactured by McCrometer, Hemet, California: For wastewater applications where in-house flowmeter calibration is required, the magnetic flowmeter and transmitter shall be manufactured by Krohne with an IFC-100 HART signal converter.

### The manufacturer shall have a minimum of five years’ experience in the manufacture of bipolar d-c magnetic flowmeters.

### Supplier shall have test facilities located within 200 miles, and have spare parts, personnel to maintain, instruct, train or whatever is necessary to assure meters will be maintained throughout the guarantee period.

## METER DESIGN

### The magnetic flowmeter shall be an obstructionless pipeline-mounted instrument to magnetically measure the flow of the process media. The output signal shall not be affected by changes in fluid viscosity or density and shall have zero point stability and auto zeroing functions. Provide the magnetic flowmeter with the following features:

### Drip and splash proof, capable of withstanding temporary submersion of up to 30 feet of water for 48 hours.

### Integral terminal box with watertight cable seals.

### Stainless steel grounding rings and grounding straps.

### Interconnecting cables.

### Liner protectors.

### The manufacturer shall furnish application performance guarantee with submittals.

## MATERIALS OF CONSTRUCTION

### The flow tube shall be as indicated in the subsection on “Service Conditions” with carbon steel flanges.

### Liner and electrodes shall be as indicated in the section on “Service Conditions.”

## INDICATOR/TOTALIZER

### The indicator/totalizer shall accept the process flow signal from the magnetic flowmeter and convert its electrical output signals directly proportional to the instantaneous metered flow rate. The housing shall be suitable for field mounting.

## TRANSMITTER -- SIGNAL CONVERTER

### The transmitter shall be pulsed dc coil excitation type auto zeroing.

### The signal converter shall be remotely mounted away from the meter but not in a vault. Mount signal converter inside of building near the Telemetry Control Panel (TCP). If no building exists mount in area protected from sun and moisture near the Telemetry Control Panel (TCP). The converter shall indicate direction of flow and provide a flow rate indication and a totalization of flow volume for both forward and reverse directions. Both forward and reverse totalizers shall be electronically resettable. The converter shall have both forward and reverse totalizers with configurable engineering units, multipliers and pulse outputs. The pulse output widths shall also be configurable.

### The converter shall provide an isolated 4-20 mA output into 800-ohm load, and a frequency output of 0-800 HZ and a scaled pulse output.

### The microprocessor based signal converter shall have a self-diagnostic test mode and a backlit display that continuously displays "Rate of Flow" and "Total Volume."

### The signal converter configuration parameters shall be lockout protected, but can be changed via the front panel keypad or with the use of a personal computer or electronic organizer with a 9-pin RS232 serial interface port.

### The converter shall be compatible with Microsoft Windows and other software programs with built in terminal communication capabilities. The converter shall be remotely mounted up to 300 feet (depending on liquid conductivity) from sensor and shall be supplied in a sealed NEMA 4X case, with all calibration complete for desired requirements.

### Converter shall be supplied with a programmable low flow drop out and empty pipe zero return.

### Power Requirements: 117-volt a-c, ±10%, 60 Hz.

### Totalized flow and programmed configuration shall be maintained in memory for up to 10 years.

## INTERCONNECTING CABLE

### The interconnecting cable between the sensor and the transmitter shall be furnished by the magnetic flowmeter manufacturer. Length of cable with 4ft slack shall be field verified by the Contractor.

## PERFORMANCE

### The overall system’s performance shall be as follows:

#### Accuracy: 0.5% of flow rate with minimum fluid velocity of 1 fps.

#### Repeatability: ±0.1% of flow rate.

#### The accuracy of each meter shall be verified by calibration in a flow laboratory traceable to the U.S. National Institute of Standards and Technology.

#### Adjustable full-scale range.

#### Outputs: Bidirectional, isolated 4- to 20-mA d-c and either 24-volt d-c scaled pulse, or 0- to 10-KHz frequency.

#### Minimum Conductivity: 5 micromho/centimeter.

#### Power Consumption: 20 watts maximum.

#### Temperature Limits, Ambient: -20°F to +140°F.

#### Temperature Limits, Process: Elastomers +160°F, Teflons +300°F, ceramic 350°F.

#### Field-Selectable Low Flow Cutoff: 0% to 10%.

#### The flowmeter shall have a positive zero return (PZR) input controlled by an external dry contact.

#### Environmental Rating: NEMA 4X, Class I, Division 1, Groups B, C, and D for both sensor and electronics whether remote or sensor mounted.

#### The meter shall have empty pipe detection.

#### A common alarm discrete output (a dry contact or a transistor switch) shall be provided for remote indication of fault conditions.

#### Volumetric testing of all meters must be performed and approved prior to shipment. The complete meter assembly and signal converter must be wet accuracy tested and calibrated as a unit at near minimum, intermediate, and maximum manufacturer's specified flow ranges of the meter. The amount of water used to conduct the test must be shown on a shipping tag attached to the meter. The test facility must be certified annually to an accuracy of ±0.2% and be traceable to the National Institute of Standards and Technology. The test shall be witnessed by the customer or their selected agent and a copy of the certified accuracy test record must be furnished at no charge to the customer, if requested.

## METER IDENTIFICATION

### Provide identification tag as shop drawing for District review.

# EXECUTION

## SERVICE CONDITIONS

| **MAGNETIC FLOWMETER AND INDICATOR/TOTALIZER** | | | | |
| --- | --- | --- | --- | --- |
| **GENERAL** | | | | |
|  | P&ID No. |  |  |  |
|  | Service |  |  |  |
| **MAGNETIC FLOWMETER** | | | | |
|  | Tag No. |  |  |  |
|  | Metering Tube |  |  |  |
|  | Size Flg. |  |  |  |
|  | Rating (psi) |  |  |  |
|  | Metering Tube Material | **[**Carbon**] [**Stainless**]** Steel | **[**Carbon**] [**Stainless**]** Steel | **[**Carbon**] [**Stainless**]** Steel |
|  | Liner Material | **[**Polyurethane**] [**Teflon**] [**Ceramics**]** | **[**Polyurethane**] [**Teflon**] [**Ceramics**]** | **[**Polyurethane**] [**Teflon**] [**Ceramics**]** |
|  | Electrode Material | 316 SST | 316 SST | 316 SST |
|  | Elec. Class. | NEMA [4]  [ 4X ] [ Zone 1] | NEMA [4]  [ 4X ] [ Zone 1] | NEMA [4]  [ 4X ] [ Zone 1] |
| **INDICATOR/TOTALIZER TRANSMITTER** | | | | |
|  | Tag No. |  |  |  |
|  | Flow Rate Ind. Scale |  |  |  |
|  | Flow Totalizer Multiplier | x10,000 gallons | x10,000 gallons | x10,000 gallons |
|  | Aux. Output Signal |  |  |  |
|  | Aux. Output Signal To |  |  |  |
|  | Elec. Area Class. |  |  |  |
|  | Mounting | **[**Wall Mount**] [**Pipe Mount**] [**On Flow Tube**]** | **[**Wall Mount**] [**Pipe Mount**] [**On Flow Tube**]** | **[**Wall Mount**] [**Pipe Mount**] [**On Flow Tube**]** |
| **SERVICE CONDITIONS** | | | | |
|  | Process Media |  |  |  |
|  | Spec. Gravity |  |  |  |
|  | Conductivity (Mhos) (min/max) |  |  |  |
|  | Percent Solids (min/max) |  |  |  |
|  | Flow (gpm) (min/max) |  |  |  |
|  | Velocity (fps) (min/max) |  |  |  |
|  | Press. (psig) (min/max) |  |  |  |
|  | Temp. (°F) (min/max) |  |  |  |

## REPLACEMENT SPOOL

### Delete paragraph 3.02 if not applicable to project. Furnish a flanged [Class 53 ductile iron] [or] [standard weight steel] spool with gaskets for each magnetic flowmeter. The spool shall be the same length as the meter.]

## PAINTING AND COATING

### Coat exposed carbon steel components of meter tube and sensor [the same as the adjacent piping. If the adjacent piping is not coated, then coat per Section 09800, Process Coating Systems: Exterior for Ferrous Metal Piping. The meter shall be coated per Section 09800, Process Coating Systems: Exterior for Valves and shall match the color of the adjacent piping.

## INSTALLATION

### Verify proper grounding of the flow sensor in accordance with requirements and recommendations from the manufacturer.

### Check power supply for proper connections.

### Install instrument tag to the sensor/transmitter.

END OF SECTION