ULTRA MAG 5000 ELECTROMAGNETIC FLOW METER WITH PROCOMM ELECTRONIC TRANSMITTER

PART 1 - GENERAL

1.1 SCOPE

This section describes the requirements for an electromagnetic flow meter and microprocessor-based signal transmitter. Under this item, the contractor shall furnish and install the mag meter equipment and accessories as indicated on the plans and as herein specified.

1.1 SUBMITTALS

The following information shall be included in the submittal for this section:

1. Data sheets and catalog literature for the magmeter and the microprocessor-based signal transmitter.
2. Connection diagrams for equipment wiring.
3. List of spare parts and optional equipment.

PART 2 - PRODUCTS

2.1 ELECTROMAGNETIC FLOWMETER (MAG METER)

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

A. Sensor:

1. Operating principle: Utilizing Faraday's Law of Electromagnetic Induction, the flow of liquid through the sensor induces an electrical voltage that is proportional to the velocity of the flow.
2. Construction:
   a. The sensor flow tube shall be NEMA 6P or IP68 rated.
   b. Flow tube shall be constructed of 304 Stainless Steel.
   c. The liner material shall be Ultra Liner NSF approved fusion bonded epoxy. The liner shall carry a lifetime guarantee.
   d. Measurement and grounding electrodes shall be 316 Stainless Steel.
      1) Optional: Hastelloy C276 Electrodes shall be available for when corrosive fluids are present.
   e. Connecting flanges shall be AWWA 150# Or ANSI 150# (Optional 300# service shall be available) Flat Face Carbon Steel.
3. ANSI Flanges shall be available when required.
4. Two Stainless Steel grounding rings shall be supplied with each flow meter.
5. Installation:
   a. A minimum of 0 pipe diameters up stream and 0 pipe diameter downstream are recommended for sizes 1.5" – 3"
   b. A minimum of 1 pipe diameters up stream and 0 pipe diameters downstream are recommended for sizes 4" – 48"
6. Flow tube Operating Temp: +14 to +140° F.
7. Size: 1.5 " to 48" diameter (see instrument schedule)
8. Submergence: The sensor shall be capable of continual submergence at up to 6 ft. with standard strain relief cable or up to 30 ft. with optional quick connect cabling system.

B. Transmitter:

1. Electronic Enclosure: Shall be a NEMA 4X, IP67 rated enclosure.
2. Transmitter/display: Background illumination with alphanumeric 8-line graphical backlit LCD display with 6-key touch programming to indicate flow rate, totalized values, settings, and faults.
3. Power Supply: Power supplies must be modular and able to be changed in the field.
   a. 90-265 VAC
   b. 10-35 VDC
4. Operating temperature: -4 to +140 degrees F.
5. Outputs:
   a. Single, 4-20mA (active or passive)
   b. Two separate digital programmable outputs:
      1) Open collector transistor usable for pulse
      2) Frequency and alarm settings
6. Communications - Optional: Communications Protocols must be modular and able to be changed in the field.
   a. HART or secondary 4-20mA (active or passive)
   b. Modbus
   c. Ethernet IP
   d. AMI Smart Output (Sensus, Itron 6, Itron 9)
7. Transmitter Self Diagnostics – Data logger and Alarm information
8. Sensor and signal transmitter performance:
   a. Flow Range: .2 FPS to 32 FPS for accuracies stated below.
   b. Accuracy:
      1) AC or DC Power: Plus, or minus 0.2% or Plus, or minus 0.5% of actual flow.
   c. Cable Length: Remote Mount
      1) AC or DC Power: Up to 500'/152.4m
   d. Manufacturer shall offer optional Quick Connect cabling for remote mounted installations.
   e. Repeatability: ±0.05% or ±.0008ft/s (±0.25mm/s), whichever is greater
   f. Conductivity: Minimum 5 µs/cm
   g. Optional meter mounted transmitter.
   h. Bi-directional flow capabilities shall be standard.
   i. Power & Signal Cabling: The power and signal between the transmitter and sensor are isolated within single cable.
   j. Flow Direction Measurement: Forward and reverse flow indication and forward, reverse, net totalization is standard on all meters.
9. The electromagnetic flow meter shall be a Hach's Ultra Mag 5000 or approved equal.

2.2 SPARE PARTS

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

1. Extra operation manuals as required.

2.3 OPERATOR FUNCTIONS

A. Calibration

1. Each flow sensor shall have a 3 or 5- point wet flow calibration of the complete meter flow tube and its signal transmitter. The calibration facilities must be traceable to the National Institute of Standards and Technology (N.I.S.T). All the calibration information and factory settings matching the sensor shall be stored in an integrally mounted memory unit. The memory unit shall store sensor calibration data and signal transmitter settings for the lifetime of the product. At initial commissioning, the flow meter commences measurement without any initial programming. Any customer specified settings are downloaded to the memory unit. Should the signal transmitter need to be replaced, the new signal transmitter will upload all previous settings and resume measurement without any need for reprogramming or rewiring.
2. Manufacturer shall provide a calibrated meter set which includes the sensor tube, the cabling and the transmitter.
3. An N.I.S.T. 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 transmitters 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 provide a two-year warranty that the equipment shall be free from defects in design, workmanship, or materials. Extended warranties up to five years shall be available for additional cost.
2. The manufacturer of the electromagnetic flow meter shall provide a Lifetime Guarantee on the flow tubes Ultra Liner fusion bonded epoxy liner.
3. 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.

Ultra Mag Flow Meter Specifications

All specifications apply to both Ultra Mag 3000 and Ultra Mag 5000 models except where noted.

Physical Specifications

Measurement Method	Electromagnetic flow based on Faraday's Law
Directionality	Forward and reverse flow indication and forward, reverse, net totalization are standard with all meters
Pipe Sizes	Ultra Mag 3000: 1½, 2", 2½, 3", 4", 6", 8", 10", 12", 14", 16", 18", 20", 24" Ultra Mag 5000: 1½, 2", 2½, 3", 4" 6", 8", 10", 12", 14", 16", 18", 20", 24", 30", 36", 42", 48"
Body Style	Flanged tube
Liner	206N
Electrodes	Type 316 stainless steel, Hastelloy optional
Electrode Shape	Standard shape
Electrical Connections	• Compression gland seals • Quick-Connect
Signal Transmitter	• Ultra Mag 3000: ProComm GO transmitter • Ultra Mag 5000: ProComm Max transmitter
Transmitter Mount	Either meter mount or remote mount
Sensor Cable Lengths	• **Standard**: 25'/7.6 m McCrometer supplied submersible cable with each remote mount unit. • **Optional:** Up to 500'/152.4 m, or 25'/7.6 m max for ProComm GO • **Custom Quick Connect:** Available in standard cable lengths: Feet: 25, 50, 75, 100, 125, 150, 175, 200, 500 Meters: 7.6, 15.25. 22.5, 30.5, 38.1, 45.75, 53.3, 61, 152.4 Custom quick connect cables at additional cost.

Performance and Operational Specifications

Operating Temperature	-10 to 60 °C (14 to 140 °F)
Storage Temperature	-15 to 60 °C (5 to 140 ° F)
IP Rating	• Quick Connect (NEMA 6P/IP68 with remote transmitter) • Compression gland seals (NEMA 6P/IP68 with remote transmitter)
Sensor Submersibility Depth	**With standard strain relief cable:** 1.8 m (6 ft.) **With optional quick connect cable:** 9 m (30 ft.)
Pressure Rating	• AWWA CL D, 150 PSI maximum working pressure • ANSI #150, 285 PSI maximum • ANSI #300, 500 PSI maximum
Velocity Range	0.2 to 32 FPS

Ultra Mag Flow Meter Specifications (cont.)

Performance and Operational Specifications (cont.)

Accuracy	• Ultra Mag 3000: Battery powered: 1% of measured value ±0.006 ft/s (±0.0018 m/s) • Ultra Mag 5000: Standard: +/- 0.5% of measured value ±0.006 ft/s (±0.0018 m/s) Optional: +/- 0.2% of measured value ±0.006 ft/s (±0.0018 m/s) **IMPORTANT NOTICE ON FLOW METER ACCURACY:** The Ultra Mag 3000 flow meter with remote display's cable and electronics are factory calibrated for accuracy as a single unit. Changing the cable length, even with the splice kit, changes the accuracy of the meter and invalidates the calibration certificate. The Ultra Mag 5000 flow meter does not have this restriction. Multiple point wet flow calibrations are conducted on every complete flow tube with its signal transmitter. If desired, the tests can be witnessed by the customer. The McCrometer test facilities are traceable to the National Institute of Standards & Technology. Uncertainty relative to flow is ±0.15%.
Repeatability	±0.05% or ±.0008ft/s (±0.25mm/s), whichever is greater
Head Loss	None. No obstruction in line and no moving parts
Conductivity	5 µs/cm
Pipe Run Requirements	**3000:** 1½" to 3" Flanged style meters — 0D upstream / 0D downstream 4" - 24" Steel flanged meters — 2D upstream / 1D downstream **5000:** 1½" to 3" Flanged style meters — 0D upstream / 0D downstream 4" - 48" Steel flanged meters — 1D upstream / 0D downstream

Other Specifications

Certifications and Approvals	**Ultra Mag 3000**
	Standard model:
	• ISO 9001:2015 certified quality management system
	• Certified by MET to UL 61010-1
	• Certified to NSF / ANSI Standards*
	HL Model:
	• ISO 9001:2015 certified quality management system
	• Certified by MET to UL 61010-1 and MET C22.2 No. 61010-1-04
	  • Class I, Division 2, Groups A B C D, T4
	  • Class I, Zone 2, IIC T4
	• Certified to NSF / ANSI Standards*
	Ultra Mag 5000
	• ISO 9001:2015 certified quality management system
	• Certified to NSF / ANSI Standards*

System Options	Stainless steel ID tag
Meter Options and Accessories	• Extended warranty • Hastelloy® electrodes • ANSI flanges • Special lay lengths, including ISO standard lay lengths • Additional sensor cable up to 475' • Quick connect cable fittings • Transmitter sun shield • Smart Output™ (Sensus or Itron compatible) • Battery or battery-solar powered transmitter (ProComm GO only)
Warranty	**Meter:** 2 year warranty **Liner:** Lifetime guarantee

* Certified by IAPMO R&T to NSF/ANSI 61 for material safety and NSF/ANSI 372 for low lead content.

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