MCMAG2000 ELECTROMAGNETIC FLOW METER WITH INTEGRATED ELECTRONIC CONVERTER SIZES 4" TO 16"

PART 1 - GENERAL

1.1 SCOPE

This section describes the requirements for a saddle-mounted electromagnetic flow meter and microprocessor-based signal converter. Under this item, the contractor shall furnish and install the mag meter equipment and accessories as indicated on the plans and as herein specified. The electromagnetic saddle mounted flow meter shall be McMag2000.

1.2 SUBMITTALS

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

1. Data sheets and catalog literature for the McMag2000 electromagnetic flow 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 ELECTROMAGNETIC FLOWMETER

A. Description

1. Operating principle: Utilizing Faraday's Law of Electromagnetic Induction, the flow of a conductive liquid around the sensor induces an electrical voltage that is proportional to the velocity of the flow.
2. The electromagnetic flow meter shall consist of a flow sensor and a microprocessor-based signal converter. Measurement method is volumetric flow in filled flow conduits 4" to 16" utilizing saddle installed sensor. Flow indication is in English standard or metric units.

B. Description of Installation:

a. Bolt-on saddle attaches to pipe with two U-bolts.
b. Sensor is inserted into 3" diameter hole.
c. Saddle mount flow meter can replace any existing 4" - 16" Mc Propeller flow meter.
d. Pipe run requirements for this flow meter are:

1) With or without straightening vanes: 5D upstream / 2D downstream
2) With flow straightener: 1.5D upstream / 1D downstream

C. Physical Specifications

1. Size: 4" to 16" diameter
2. Construction:

a. Saddle Mount:
1) Saddle: Stainless steel (304)
2) U-Bolt/Hardware: Zinc coated steel
3) Saddle Gasket: Neoprene

b. Sensor:
1) Sensor body: HDPE plastic
2) Electrodes: Stainless steel (316)

3. Converter Display:
    a. Large LCD display (no backlight)
    b. Non-volatile memory
    c. Anti-reverse totalizer (standard)
    d. Total (to 9 digits of precision)
    e. Flow Rate and Velocity (to 5 digits of precision)
    f. Two alarms: low battery and empty pipe (optional)
    g. Opening lid activates display
4. Power supply: Battery or DC power:
    a. Battery: Standard -- two 3.6V lithium-thionyl chloride (Li-SOCI2) D size batteries. Batteries are field replaceable. Unit will contain a backup battery. Battery life expectancy will be five years.
    b. DC power: Linear power supply 10-35VDC, 2W
5. Outputs:
    a. Pulse Output: One digital pulse (open collector) output for volumetric, with the following pulses:
        1) With battery power: 1 pulse per second (1 Hz) maximum allowable
        2) With DC power: 5 pulses per second (5 Hz) maximum allowable

D. Performance Specifications

1. Operating temp: -4° to 140°F (-20° to 60°C)
2. Storage temp: -40° to 149°F (-40° to 65°C)
3. Submergence (IP rating):
    a. Sensor: IP68 (submersible sensor)
    b. Converter enclosure: IP67
4. Operating pressure: 150 PSI
5. Accuracy:
    a. ±2%
    b. ±0.25% with standard full scale flow
6. Velocity range: 0.5 ft/s to 15 ft/s

2.2 SPARE PARTS

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

1. One set of manufacturer's recommended spare parts.
2. Extra operation manuals as required.

2.3 OPERATOR FUNCTIONS

1. 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 manufacturer's recommendations.

3.2 MANUFACTURER'S ASSISTANCE

A. Warranty

1. The manufacturer of the electromagnetic flow meter shall guarantee for five 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, repairs shall be warranted for 12 months or, if the repair is performed under this warranty, for the remainder of the original warranty period, whichever is less.

Flow Meter Specifications

Description and Operating Specifications

	Volumetric flow in filled flow conduits 4" to 16" utilizing saddle installed sensor. Flow indication in English Standard or Metric units.
Method	Electromagnetic
Pipe Sizes and Flow Rates	4" 20 - 600 gpm 6" 45 - 1350 gpm 8" 75 - 2350 gpm 10" 125 - 3700 gpm 12" 175 - 5300 gpm 14" 225 - 6700 gpm 16" 300 - 8800 gpm
Body Style	Saddle mount
Pressure	150 psi (10.3 bar) working pressure
Accuracy	±2% accuracy, or ±0.25% of standard full scale flow
Velocity Range	0.5 ft/s to 15 ft/s
Empty Pipe Detection	Hardware/Software, conductivity-based
Electrical Connections	Optional shielded cable for 10-35VDC Optional shielded cable for pulse out
Pipe Run Requirements	With or without vanes: 5D upstream / 2D downstream With flow straightener: 1.5D upstream / 1 downstream
Retrofit	Available using McPropeller saddle

Display and Measurement

Display	• Large LCD display (no backlight) • Non-volatile memory • Anti-reverse totalizer (standard) • Total (to 9 digits of precision) • Flow Rate and Velocity (to 5 digits of precision) • Low battery and empty pipe indication • Opening lid activates display		
Digits	5 Rate, 9 Total		
Rate Units	Gallons per minute Million gallons per day Cubic feet per second Megaliters per day Liters per second Cubic meters per hour Liters per minute Gallons per hour	Imperial gallons per minute Miner's inch (9G) Miner's inch (11.22G) Acre-feet per day Kiloliters per hour Liters per hour Cubic meters per minute	Cubic feet per minute Barrels per minute (55G) Barrels per hour (55G) Barrels per day (55G) Barrels per minute (42G) Barrels per hour (42G) Barrels per day (42G)
Totalizer Units	Gallons Cubic Feet Acre Feet Cubic Meters Liters Megaliter Metric Ton (KL)	Barrel (31G) Barrel (42G) Barrel (46G) Barrel (55G) Imperial Gallon Acre Inch Ton (Short)	Miners Inch Minute (11.22G) Miners Inch Minute (9G) Miners Inch Hour (11.22G) Miners Inch Day (11.22G) Miners Inch Hour (9G) Miners Inch Day (9G)

Flow Meter Specifications (cont.)

Power

Battery	Standard: two 3.6V lithium-thionyl chloride (Li-$SOCl_2$) D size batteries. Batteries are field replaceable. Unit contains backup battery.
DC Power	Linear power supply 10-35VDC, 2W
Battery Life	Five-year expected battery life, five-year battery warranty. ***Note: Battery expectancy is with standard configuration***

Environmental

Operating Temperature	10° to 140°F (-12° to 60°C) sensor
Storage Temperature	-40° to 149°F (-40° to 65°C)
Operating Pressure	150 PSI
Water Impermeability	IP67

Outputs

Pulse Output	One digital pulse (open collector) output for volumetric	
	With battery power:	Maximum allowable is 1 pulse per second, 1 Hz Calculation: Max flow [gpm] / 60 = minimum gallons per pulse
	With DC power:	Maximum allowable is 5 pulses per second, 5 Hz Calculation: Max flow [gpm] / 300 = minimum gallons per pulse

Options and Accessories

- Epoxy coated carbon steel flanged spool piece
- DC power w/battery backup
- Annual verification / calibration
- Stainless Steel ID tag
- Boot cover

Materials

Sensor Body	HDPE plastic
Electrodes	Stainless steel (316)
Saddle Mount	Stainless steel (304)
U-Bolt/Hardware	Zinc coated steel
Electronic Housing	IP-67 Certified diecast aluminum, powder coated enclosure w/ tamper resistant seal, 6" x 6" x 5" tall
Saddle Gasket	Neoprene
Boot Cover	EPDM rubber optional

Warranty

Meter	5-year standard warranty
Battery	5-year warranty

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