

# EMCO DemiMag DM Series Electromagnetic Flow Meter With 4411e Flow Transmitter

Engineering Specifications

January, 2005 / RO

## 1.0 INSTRUMENT

- A. There shall be furnished an electromagnetic flow meter suitable for fixed-site monitoring. The flow meter shall consist of a flow tube and a flow transmitter, which shall transmit flow. The flow meter shall use a flow tube with integral electrodes and grounding to accurately measure low flow rates, including pulsatile flows from chemical feed pumps and similar.

## 2.0 SPOOL PIECE FLOW TUBE AND SENSORS

- A. The nominal diameter of the flow tube shall be \_\_\_\_\_<sup>1</sup>.
- B. The flow tube shall be made of [Kynar (polyvinylidene fluoride (PVDF, PVF2)) with conductive Kynar electrodes, approved for sanitary applications by the US Food and Drug Administration (FDA)] [aluminum trioxide ceramic with fused platinum electrodes]<sup>2</sup>. O ring seals between the flow tube and process connections shall be made of [Viton] [Kalrez]<sup>3</sup>.
1. The flow tube shall not require a separate electrical insulating liner.
  2. The flow tube shall be supplied with process connections and grounding with [AISI 316 stainless steel wetted parts and grounding, having Tri-Clamp sanitary or screwed ends, or rotary flanges] [PVDF wetted parts with conductive PVDF grounding, having screwed ends or PVC non-wetted, rotary flanges] 4. The connection types shall be [ ½" ANSI 150rf] [ ½" ANSI 300rf] [DIN/BS4504 ND 15 PN10-40] [15mm JIS 10k rf] [BS/AS2129 ½" Table D] [BS/AS2129 ½" Table E] [G ½" threaded BSP parallel male ends to ISO 228 ] [threaded ½" NPT male ends] [1/2"Tri-Clamp sanitary ends] [15mm DIN 11851 sanitary ends] [1/2" outside diameter plain ends]<sup>5</sup>.
- C. The flow tube shall contain a coil, a pair of sensing electrodes, and integral grounding. External grounding rings and straps shall not be necessary.

All flow tube components shall be encapsulated in a removable gel. The flow tube housing shall be [Nylon] [Type 316 stainless steel]<sup>6</sup>.

1. The flow tube shall use unipolar pulsed electromagnetic excitation, with typical magnetizing current of not less than 1 A base to peak, and frequency of not less than 2/3 of power supply frequency (40 Hz for a 60 Hz power supply frequency), to ensure a high signal-to-media noise ratio.
- D. The minimum media conductivity shall be 1 microS/cm. For conductivity < 5 microS/cm or cable lengths > 15 feet a booster pre-amp shall be embodied.
- D. The maximum media temperature and pressure shall be {[250 degrees F (120 degrees C) @ 40 psig, or 150 psig @ 70 degrees F for Kynar wetted parts] [285 degrees F (140 degrees C) @ 150 psig for aluminum trioxide wetted parts]}<sup>2</sup>.
- F. The mean velocity measurement range shall be from 0 to 0.6 feet per second (0 to 0.2 meters per second) to 0 to 30 feet per second (0 to 10 meters per second)\*.
- G. The minimum detectable mean velocity shall be 0.02 feet per second (0.006 meters per second).
- H. The accuracy shall be :  
 $\pm 0.5\%$  of rate for flows > 1.5 fps (0.45 m/s)  
 $\pm 0.0075$  fps (0.0025 m/s) for < 1.5 fps (0.45 m/s)  
 This accuracy shall be traceable to the US National Institute of Standards and Technology (NIST). A NIST traceable calibration certificate shall be provided with each flow meter.
- I. The temperature coefficient shall be less than 0.05% per 10 degrees F (0.09% per 10 degrees C).
- I. The wiring from the converter to the flow tube shall be 3 separate 2-conductor cables, 18 gauge (0.75 mm<sup>2</sup>), twisted and shielded. [The wiring from the converter to the flow tube shall be 15 feet (5 m) long.] [The wiring from the converter to the flow tube shall be \_\_\_\_\_ long.]<sup>7</sup>
- K. The flow tube and sensors shall meet the NEMA 6P (IP68) standard, and shall be indefinitely submersible to 10 feet (3 m) water column.
- L. The flow tube assembly shall be certified to conform to [UL and CSA standards for use in ordinary locations] [NEC and CSA Class 1, Division 2 explosive areas, with the transmitter to be located in the safe area].<sup>8</sup>

### 3.0 FLOW TRANSMITTER

A) The flow transmitter shall be a remote, microprocessor based Pulsed AC technology with an auto zero feature to allow exciter frequencies of  $2/3 \times$  power frequency for all size flowtubes, without zero offset.

B) The flow transmitter shall have an input impedance of  $10^{12}$  ohms.

C) The flow transmitter shall include bi-directional isolated, internally powered 4 – 20mA outputs from separate terminals into a maximum load of 800 Ohms. A scaleable pulse frequency output shall be available, with a frequency mode 0 – 1000Hz to 0 – 10000Hz, 30Vdc, 250mA or externally powered relay 125Vac, 1A, 30VA.

D) The flow transmitter shall be [Entela approved to UL and CSA standards for use in ordinary locations][Entela approved to NEC and CSA standards for Class 1, Division 2 explosive atmospheres, with the transmitter located in the safe area]<sup>9</sup>.

E) The flow transmitter shall operate on [120Vac, 60Hz][230Vac, 50Hz][120Vac, 50Hz]<sup>10</sup> line power. Typical power consumption shall be 15W.

F) The flow transmitter shall be housed in a wall mounting, UV ray resistant fiber glass enclosure. It shall be watertight, dust-tight and corrosion resistant to NEMA 4X and IP65. The enclosure shall embody lockable stainless steel latches, as well as a screwed down lid. Electrical connections shall be suitable for conduit connections.

G) The transmitter shall have a waterproof and backlit LCD display, 4 lines with 20 characters.

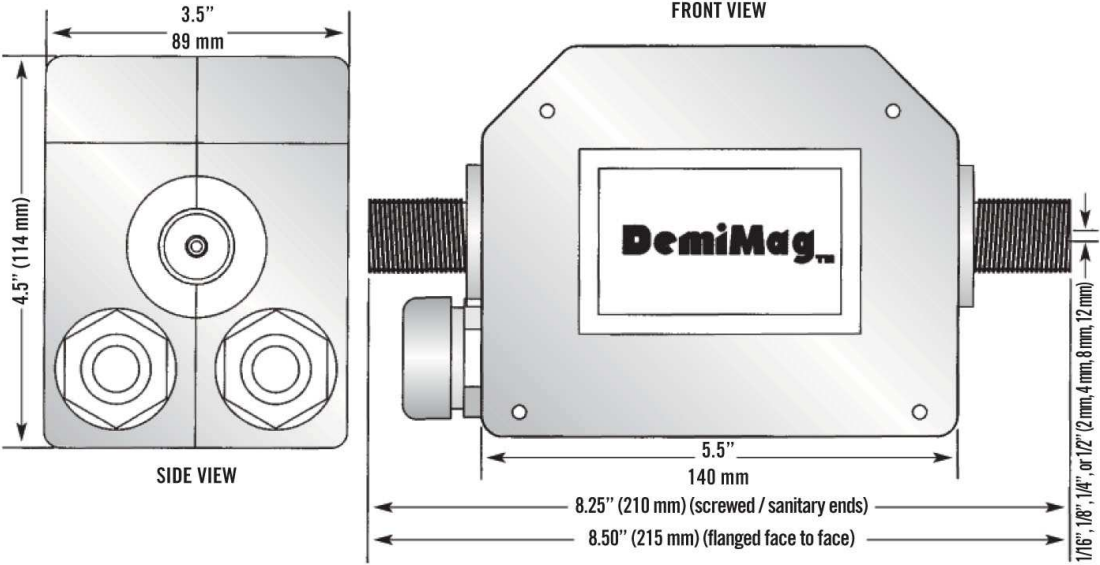
H) The transmitter shall be programmable using a tactile feedback, waterproof and sealed keypad. All necessary diagnostics, user security password readings and system status shall be available using the keypad. A separate calibration box shall be unnecessary.

4.0 The flowmeter shall be a DemiMag DM Series electromagnetic flowmeter with a 4411e transmitter, or equal.

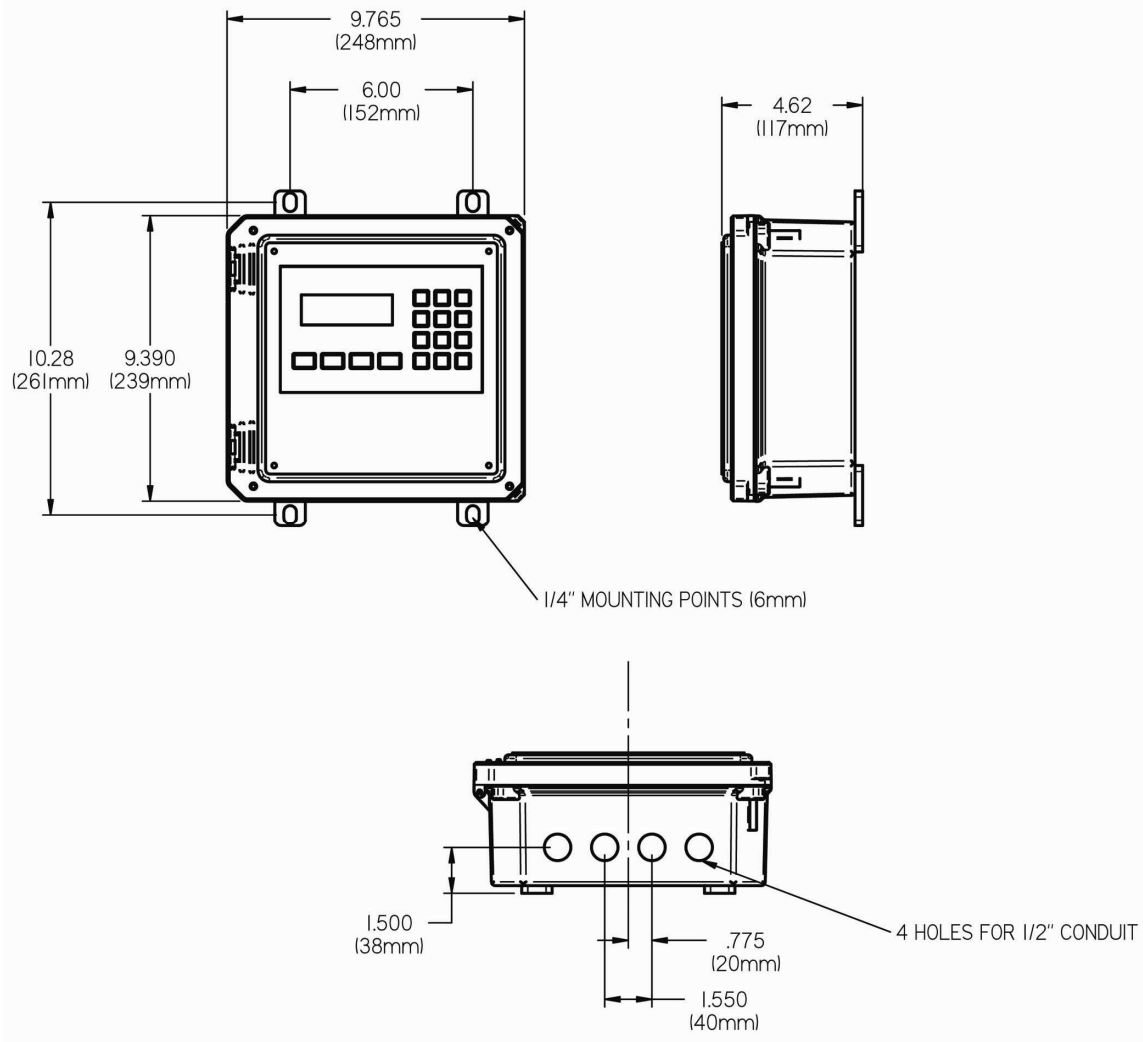
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- <sup>1</sup> Specify nominal diameter from 1/16 to 1/2 inch (2 to 12 mm). All flow tubes have 1/2 inch (15 mm Metric System) process connections.
  - <sup>2</sup> Specify flow tube and electrode material. See product literature for options available in specified flow tube diameter.
  - <sup>3</sup> Specify O ring seal material.
  - <sup>4</sup> Specify process connection and grounding material.
  - <sup>5</sup> Specify process connections.
  - <sup>6</sup> Specify housing material.
  - <sup>7</sup> Specify optional special cable length.
  - <sup>8/9</sup> Specify remote flow transmitter installation.
  - <sup>10</sup> Specify power supply.

\* Minimum mean velocity measurement range for 1/16 inch (2 mm) flow tube shall be 0 to 1 foot per second (0 to 0.3 meters per second).

# EMCO DemiMag DM



### 4411e Flow Transmitter



Weight: 7 lb (3.2 kg)