

### MODEL Mx UltraMag

### ELECTROMAGNETIC FLOWMETER

#### Remote Mounted

#### DESCRIPTION

The Mx UltraMag model is manufactured to the highest standard available for magmeters. They incorporate microprocessor technology to offer a broad rangeability from very low flows to high pressure flows. The flanged end tube design permits use in a wide range of applications. They are equipped with a remote mounted signal converter that indicates both rate of flow and total flow as well as providing analog and pulse outputs. It has been designed to meet the needs of the municipal and agricultural water markets. The meter body is completely submersible. The meter can be installed vertically, horizontally or inclined on suction or discharge lines.

The Mx UltraMag electromagnetic flowmeter is an obstructionless, volumetric flow measuring device that is capable of measuring the flowrate of almost all conducting liquids and slurries with a high degree of accuracy. Compact, high-density field coils generate a magnetic field across the flowtube. The moving flow generates a voltage which is then amplified and converted to give a direct flowrate reading with 4 to 20 mA and frequency outputs. Proper operation can only be achieved with a full pipe of liquid and blending or chemical injection should be done early enough so that the flow media is thoroughly mixed prior to entering the measurement area.

The signal converter is remotely mounted up to 300 feet from the meter and is factory programmed for every meter at desired requirements. The parameters are 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. Also available, as an option, is HART™ protocol compatibility. The converter is encased in a NEMA 4x case. The display is backlit with three lines and is located behind a polycarbonate window.



### MODEL Mx UltraMag SPECIFICATIONS

### ELECTROMAGNETIC FLOWMETER

**CONFIGURATION:**

Signal Converter is mounted remotely from sensor on all sizes.

**Separation (remote signal converter)**

The maximum cable length is the lower of 300 feet or 15 x the conductivity ( $\mu\text{S}/\text{cm}$ ).

**ACCURACY (UNDER REFERENCE CONDITIONS):****Display, Serial Comms, Frequency Output:**

$\pm 0.2\%$  of reading or  $\pm 0.003$  ft/sec ( $0.001$  m/s), whichever is greater, up to a maximum velocity of  $>49$  ft/sec ( $15$  m/s).

**Analog Output:**

As frequency output plus  $\pm 0.008$  mA.

**Pressure Effects:**

Less than  $0.15\%$  over the operating range of the instrument.

**Temperature Effects:**

Transmitter: Display, frequency output, Serial comms  $< \pm 0.08\%$  of reading per  $10^\circ\text{C}$ . Analog output – as frequency plus  $< \pm 0.08\%$  of reading per  $10^\circ\text{C}$ .

**Repeatability & Reproducibility:**

$\pm 0.05\%$  or  $\pm 0.0008$  ft/s ( $\pm 0.25$  mm/s), whichever is greater.

**Power Supply Variation:**

Negligible effect – within published specification.

**Conductivity:**

Liquids and slurries having a conductivity of not less than  $5\mu\text{S}/\text{cm}$  ( $5\mu\text{mho}/\text{cm}$ ).

**Mounting:**

Directly into pipeline at any attitude.

**Electrodes should not be on a vertical plane.**

**Recommended Mating Pipe Conditions:**

**Upstream:** 5 diameters of straight pipe from the center of the meter to any normal obstruction is sufficient to obtain specified accuracy. Partially opened valves, 90 or 45 degree elbows, and pump discharges located upstream of the installation require 10 diameters. All blending and chemical injection should be done early enough so the flow media is thoroughly mixed prior to entering the measurement area.

**Downstream:** 2 diameters of straight pipe from the center of the meter.

**Power Consumption:**

Less than 20VA

**Warm-up Time:**

1-minute

**Calibration:**

3 point, 8 point or witnessed

**Sensor Cable Connection:**

0.5 inch NPT-single opening. A single cable is provided that provides for the coil drive and electrode signals.

**Sizes (Nominal Bore):**

2-48 inch (50 mm-1200 mm). Consult factory for other sizes.

**METERING TUBE:** Lined stainless steel (304 SST)

**Liner:** UltraLiner™ NSF approved, fusion bonded epoxy

**Electrodes:** Non-removable (316 SST)

**Grounding Ring:** Recommended (316 SST)

**Flanged Meters:**

Sizes 2-inch to 48-inch (50 mm to 1200 mm) with maximum working pressure 150 or 300 psi. (300 psi not available larger than 20-inch).

**Process Connections:**

Flanged meter-carbon steel flanges to mate with ANSI flanges

**Temperature:**

Sensors, with integral transmitters,  
Ambient:  $-10$  to  $+76^\circ\text{C}$  ( $14$  to  $170^\circ\text{F}$ )

**Environmental Protection:**

Flanged sensors, with remote converter  
NEMA 6P/IP68 with potted terminal box and cable

**Configuration Methods:**

All configurations are user defined and password protected. The configuration is stored in non-volatile memory with a 10-year retention. The converter is fully programmed before shipping. Reprogramming can be easily done on site using the following methods:

**Keypad** – can be used to access and change all menu parameters using four membrane keys and 3-line display.

**RS232** – standard 9-pin data connection for local handheld terminal or computer (null modem/Lap Link cable required). Software such as ProComm Plus, Windows, PC Tools, or our communications option is required.

**RS423/RS422** – option for remote serial communication.

**HART™ Communications.**

**Displays:**

Keypad: 3-line, 16 character, backlit display with large  $1/2$ " numerals for flowrate and two lines for engineering units, totalizers, alarm status, velocity and percent of range.

**Internal Totalizer:**

Resettable 9-digit for forward, reverse and net totals. Can be programmed to reset via external input.

**Time Constant:**

Fully programmable from 2 to 120 seconds.

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#### SPECIFICATIONS (Continued)

##### Test Mode and Output Circuit Loop Verification:

After converter has been programmed, operation of the test mode will drive all outputs to programmed value to provide total system test.

##### Power Supply:

Universal switch mode.

AC: 85 to 265V 45 to 400 Hz at 20VA maximum **OR**

DC: 11 to 40V at 20VA maximum

##### High Input Impedance:

10<sup>15</sup> OHM performance allows non-conductive coatings on the electrodes to be ignored. Eliminates the need for removable electrodes or electrode cleaners.

##### OUTPUTS:

###### Standard

###### 1. Analog:

Fully programmable for zero, full scale, up to 21mA and flow direction.

Fully isolated. Output capability  $\leq 16$ .  
(800 ohm, 4-20mA)

Secondary range enabled by external input or programmed alarm condition as a percent of full scale.

###### 2. Pulse/Frequency

One frequency/pulse output for forward and one for reverse flow.

Forward and reverse flows 0 to 800 Hz squarewave or fixed pulse width up to 2.5 sec. Fully programmable for pulse rate, pulse factor, low flow cutoff, pulse width, etc. Minimum frequency/resolution <0.1 pulse/day.

Frequency limit settable 1Hz-800Hz in 1Hz steps.

Isolated protected transistor switch capable of sinking <250mA. Voltage <35V.

3. **Dual Alarms** (2 separate outputs): Isolated protected transistor switch capable of sinking <250mA. Voltage <35V. NOTE: Not isolated from frequency output. Fully programmable for high/low rates, percentage of range, empty-pipe zero, fault conditions, forward/reverse polarity (Normally open/close), analog over-range, pulse over-range, pulse cutoff, etc.

4. **RS232C**: 9-pin data connector for local handheld configurator or any computer with serial communications.

###### Optional

###### 1. Dual Analog:

Additional analog outputs for re-ranging (provides two separate inputs to a recorder/controller). Only one output is active at a time. Nonactive output is 4mA.

2. **Serial Communication RS423/RS422**: Compatible data link (via terminal block).

3. **HART™ Communications**.

##### INPUT:

An external input such as contact closure, open collector voltage or logic signal can be used to:

1. reset totalizer
2. change range (span)
3. hold the output constant
4. drive the output to zero (i.e., empty pipe or partial filled pipe conditions)

NOTE: Not isolated from pulse and alarm outputs.

##### Isolation:

Galvanic separation to 50V dc between analog, pulse/ alarm, and earth/ground.

##### Temperature:

Operating: -10 to +60°C (14 to 140°F)

Storage: -15 to +75°C (5 to 167°F)

##### Enclosure:

Case is NEMA 4X/IP65 rated with separate termination and electronic compartments. It is constructed of glass filled polypropylene, and has a polycarbonate window.

##### Electrical Connections:

0.5 inch NPT with gasket seal.

##### Approvals:

CSA, General Purpose.

##### Meets:

Electrical safety: BS4743 Class 1. (IEC 348).

Vibration specification: BS2011: Part 2.1Fc: 1983.

##### EMC Specification:

1. Conforms to BS6667 Part 3 "Radiated susceptibility to 10V/m."
2. Conforms to BS6527 "Terminal voltage and radiated emissions."
3. Conforms to BS800 "Interference Power."

##### HART™ Communications:

The Mx UltraMag converter HART™ option allows communications via the HART™ field communications protocol using a communications device connected to points located anywhere in the 4-20mA current output circuit wiring. Mx UltraMag also supports a multi-drop system and permits up to 15 Mx UltraMag converters on a single pair of wires without losing the 4-20mA signals on the individual meter. The unit can be configured with universal HART™ Communications such as the Rosemount 275 or 268 (version 6 or higher). HART™ burst mode is also supported, enabling regular transmission of selected data.

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#### SPECIFICATIONS (Continued)

##### Self-Diagnostic:

Signal converter confirms correct operation of hardware with fault diagnosis, e.g. coil drive problems.

##### Empty Pipe Detection:

Programmable for conductivity trip point. Liquid level sensing results in drive to zero (i.e., empty pipe zero when electrodes are uncovered), for Process Mode only. Also can drive output to zero via external input in process or slurry mode.

##### Interchangeability:

Signal converters are fully interchangeable with all sizes of Mx UltraMag sensors and can be configured on site. System specification not affected by converter change.

##### Test Equipment:

Flow signal simulators for testing and checking the electronic calibration of the Mx UltraMag converter are available.

#### MODEL NUMBER CONFIGURATION - MX

MX {size} - {W or Z} {optional A modifier} {cable length}

W - 150 PSI, AWWA Class D, Flat Face Flange standard\*

Z - 300 PSI AWWA Class F, Raised Face Flange standard\*

(limited to sizes 2-20")

A - specifies ANSI Raised Face Flanges

\* Unless otherwise specified.

Standard Cable lengths are 10, 50, 100 and 250 feet with other options available.

Examples:

MX02-W100 MX UltraMag 2", 150 psi, 100' cable

MX08-ZA50 MX UltraMag 8", 300 psi, ANSI flange, 50' cable

#### DIMENSIONS

Nominal Size	Dimensions (inches)			Shipping Weight Approx. w/150 LB Flanges
	A	B	C	
2"	11.0	11.3	7.9	55 pounds
3"	13.4	12.8	9.4	70 pounds
4"	13.4	13.8	10.4	80 pounds
6"	14.6	15.9	12.5	150 pounds
8"	16.1	19.2	15.7	230 pounds
10"	18.5	21.3	17.8	264 pounds
12"	19.7	22.8	19.4	328 pounds
14"	21.7	24.1	20.3	442 pounds
16"	23.6	26.1	21.1	458 pounds
18"	23.6	27.9	21.1	550 pounds
20"	25.6	30.1	24.8	661 pounds
24"	30.7	34.3	29.6	815 pounds
30"	35.8	40.8	35.9	1,330 pounds
36"	46.1	48.0	42.7	1,450 pounds
42"	46.1	54.0	47.3	1,600 pounds
48"	47.2	61.2	55.6	2,240 pounds

#### FLOWRATE CAPACITIES

Nominal Size	Gallons per Minute		Cubic Feet per Second	
	.2 ft/sec. Minimum	49 ft/sec. Maximum	.2 ft/sec. Minimum	49 ft/sec. Maximum
2"	2	479	0.004	1.13
3"	5	1079	0.011	2.67
4"	8	1,919	0.018	4.63
6"	19	4,318	0.042	10.46
8"	33	7,676	0.074	18.10
10"	52	11,995	0.116	28.46
12"	74	17,273	0.165	40.37
14"	90	23,510	0.201	48.88
16"	118	30,707	0.263	64.40
18"	150	38,864	0.334	86.39
20"	185	47,980	0.412	101.25
24"	268	69,092	0.597	146.33
30"	420	107,956	0.936	229.06
36"	609	155,457	1.357	332.57
42"	834	211,594	1.858	455.32
48"	1,094	276,368	2.437	597.31

ANSI: American National Standards Institute

AWWA: American Water Works Association

NEMA: National Electronic Manufacturers Association

