

GENERAL

The innovative design of the Badger® M-Series® mag meter model M-2000 amplifier represents the next generation of electromagnetic (mag) flow meter signal processing. Incorporating the latest developments in microprocessor signal conditioning, the advanced design of the M-2000 meter allows for an accuracy of ± 0.25 percent with a flow range of 300:1. The M-2000 amplifier can be integrally mounted to the detector or can be mounted remotely, if necessary. Housed in a NEMA 4X (IP66) enclosure, the amplifier targets a variety of applications and is well suited for the diverse water and wastewater treatment industry.

OPERATION

The M-2000 amplifier receives the detector's analog signal, amplifies that signal and converts it into digital information. At the processor level, the signal is analyzed through a series of sophisticated software algorithms. After separating the signal from electrical noise, it is converted into both analog and digital signals that are used to display rate of flow and totalization. In addition, the processor controls zero-flow stability, analog and frequency outputs, serial communications and a variety of other parameters. The large four-line, 20-character LCD display indicates rate of flow, forward and reverse totalizers and diagnostic messages. The display also serves to guide the user in simple terms through the user-friendly programmable routines.

Programmable parameters of the amplifier include, but are not limited to: calibration factors, totalizer resets, unit of measure, analog and pulse output scaling, flow-alarm functions, language selection, low-flow cutoff, noise dampening factor and excitation frequency selection.

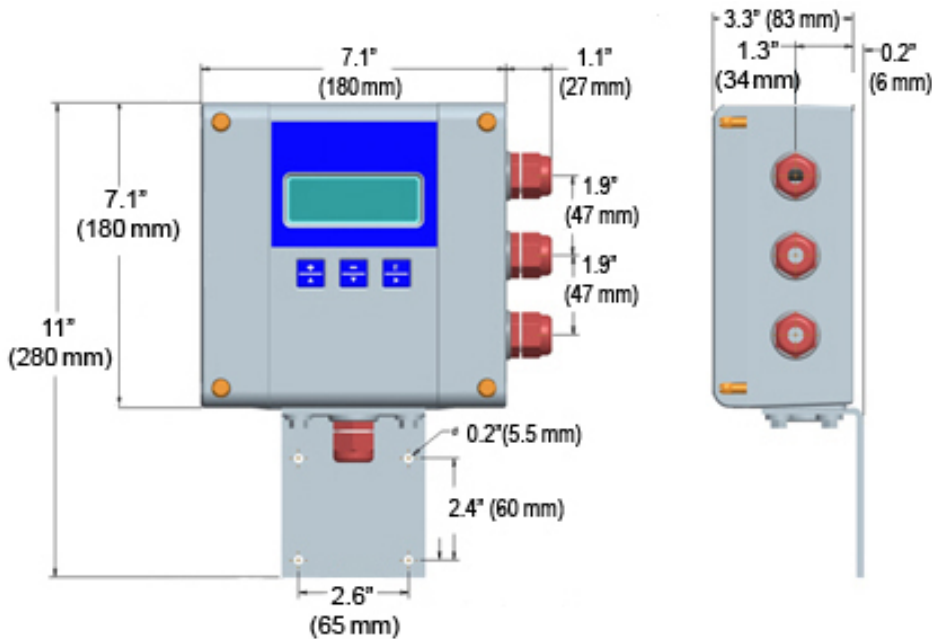
APPLICATION

The M-2000 amplifier's main function is to detect and condition flow information from the electromagnetic detector. The unit is ideally suited for measuring dynamic, non-continuous flow. In applications where a minimum and/or maximum flow rate must be tracked and monitored, the unit provides pulse signals that can be fed to dedicated batch controllers, PLCs and other more specialized instrumentation.

**M-2000 Amplifier****FEATURES**

- Digital signal processor (32 bit)
- Large, four-line by 20 character LCD display with backlight
- User-friendly programming procedure
- Digital and analog outputs
- NEMA 4X (IP66) enclosure
- Meter mount or remote wall mount
- Bidirectional flow sensing/totalization
- Better than $\pm 0.1\%$ repeatability
- Measures fluids with as low as 5.0 micromhos/cm conductivity
- Empty pipe detection
- Power loss totalization
- Modbus RTU via RS232
- Non-volatile programming memory
- Exterior buttons for easy menu navigation
- Rotating cover
- Enhanced security options





SPECIFICATIONS

Power Supply: AC, 85-265 VAC (45-65 Hz)

Power Consumption: 15 Watts

Accuracy: ± 0.25 percent of rate for velocities greater than 1.64 ft/s (0.50 m/s)
± 0.004 ft/s (± 0.001 m/s) for velocities less than 1.64 ft/s (0.50 m/s)

Repeatability: ± 0.1 percent

Flow Range: 0.10 to 39.4 ft/s (0.03 to 12 m/s)

Fluid Conductivity: Minimum 5.0 micromhos/cm

Flow Direction: Unidirectional or bidirectional two separate totalizers (programmable)

Totalization: Programmable/resettable
Unidirectional: T1, T2

Bidirectional: T+ (Fwd), T- (Rev), Tn (Net)

Minimum Fluid Conductivity: 5.0 micromhos/cm

Processing: 32-bit DSP

Analog Output: 4-20 mA, 0-20 mA, 0-10 mA, 2-10 mA (programmable and scalable)
Voltage sourced 24 VDC – isolated
Maximum loop resistance < 800 ohms

Digital Outputs: Four total, configurable
24VDC sourcing active output (up to two), 100 mA total, 50 mA each; sinking open collector output (up to four), 30 VDC Max, 100 mA each; AC solid-state relay (up to two), 48 VAC, 500 mA max.

Pulse Outputs: Scalable up to 10 kHz, passive open collector up to 10 kHz, active switched 24 VDC. Up to two outputs (forward and reverse). Pulse width programmable from 1-1,000 ms or 50 percent duty cycle.

Frequency Output: Scalable up to 10 kHz, open collector. up to 1 kHz, solid-state relay.

Misc Outputs: High/low flow alarm (0-100 percent of flow), error alarm, empty pipe alarm, flow direction, preset batch alarm, 24 VDC supply.

Noise Dampening: Programmable 0-30 seconds

Empty Pipe Detection: Field tunable for optimum performance based on specific application

Excitation Frequency: 1 Hz, 3.75 Hz, 7.5 Hz or 15 Hz (factory optimized to pipe diameter).

Digital Input: Max. 30 VDC (programmable – positive zero return, external totalizer reset or preset batch start)

Units of Measure: Ounces, pounds, liters, US gallon, imperial gallon, barrel, hectoliter, megagallon, cubic meters, cubic feet, acre feet

Galvanic Separation: 250 volts

Low-flow-cutoff: Programmable 0-10 percent of max. flow

LCD Display: 4 x 20 character display with backlight

Programming: Three-button, external manual or remotely

Housing: Cast aluminum, powder-coated paint

Housing Rating: NEMA 4X (IP66)

Mounting: Meter mount or remote wall mount (bracket supplied)

Cable Connection: 1/2-inch NPT Cord Grip (three)

Ambient Temperature: -4 to 140° F (-20 to 60° C)

Serial Communication: RS232 – Modbus RTU or remote display

Logging: Power loss totalization

Relative Humidity: Up to 90 percent non-condensing

Locations: Indoor and outdoor

Altitude: Maximum 6,500 feet (2000 m)

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