

# User's Guide



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## **FMG-1000-MAW Blind Analog Transmitter**



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The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

**WARNING:** These products are not designed for use in, and should not be used for, human applications.

## GENERAL INFORMATION, SPECIFICATIONS and INSTALLATION

### GENERAL INFORMATION

The Omega FMG-1000-MAW is a blind (non-indicating) 4-20 mA transmitter, designed for use with almost all Omega flow sensors. It accepts a pulse frequency input from the flow sensor, and converts this input into a continuous analog output signal. Power for the transmitter is taken from the current loop itself, so only two wires are required. The digital design makes it possible to span the unit in the field without tools. The frequency at which 20 mA is desired is entered on a set of rotary switches, and an internal microcontroller automatically scales all other values accordingly. An additional benefit of the microcontroller is its ability to average inputs, for smoothing of the output signal. The degree of averaging can be selected in the field, from 2 to 16 seconds.

For maximum environmental protection, the electronic components are encased in a special semi-flexible urethane potting material. The housing is cast from aluminum and fuse-coated. The clamshell housing is provided with mounting feet for remote mounting.

The FMG-1000-MAW will operate on a relatively wide range of current loop voltages, 24 to 36 Vdc. Lower voltages limit the load that can be applied to the loop without distortion of the signal. (See Load/Supply chart if there is a question regarding voltage vs. load.) A built-in power regulator supplies the appropriate power to the flow sensor.

Typical applications for this transmitter are telemetry (or SCADA), distributed control systems, programmable controllers, data logging, and chart recording.

### INSTALLATION

**Mounting.** The FMG-1000-MAW comes with mounting feet and requires four screws to attach it to any stable surface.

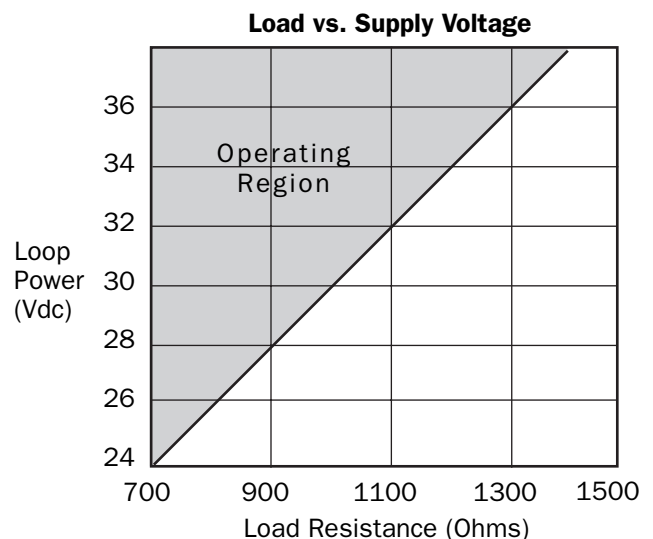
**Connection.** The upper portion must be removed to make connections. Use a standard hex wrench (5/32" or 4 mm) to loosen the screws, then remove the upper half. The connections are made to terminal blocks in the upper half, which contains the potted electronics.

Consult the Connections diagram before connecting to the current loop. On an FMG-1000-MAW, the sensor must be connected, since it is remote from the transmitter. Be careful to follow the color coding of the flow sensor wires in order to establish the correct polarity. Incorrect polarity can damage the sensor.

### SPECIFICATIONS\*

<b>Power</b>	24 - 36 Vdc	
<b>Temperature</b>	32° - 130° F (0° - 55° C)	
<b>Input</b>	Open-collector solid state sensor	
<b>Input Averaging</b>	2 - 16 seconds (switch selectable)	
<b>Response Time</b>	2-60 seconds; 90% of full scale (dependent on input averaging)	
<b>Frequency</b>	<b>Minimum</b>	10 Hz (@20 mA)
	<b>Maximum</b>	999.9 Hz
	<b>Setting</b>	4 Rotary DIP switches
<b>Output</b>	Proportional 4-20 mA	

\*Specifications subject to change



**SETTINGS, CALIBRATION and FREQUENCY**

**SETTINGS**

**Setting Frequency.** The FMG-1000-MAW converts a train of off/on pulses from the flow sensor into a continuous milliAmp signal that ranges from 4 mA at zero flow to 20 mA at the desired maximum flow. The desired maximum is determined by the user and entered as a frequency as follows:

- 1) Decide what flow rate should represent the top of the scale. This is ordinarily the maximum expected flow, or a value just above it, in gallons per minute.
- 2) Locate the K-factor of the flow sensor (found on the meter or fitting, or in the instruction manual, depending on meter model). The K-factor is the number of pulses the flow sensor produces per gallon of flow.

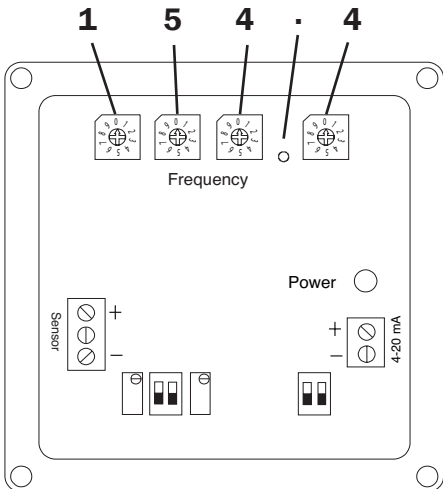
Calculate frequency, using this formula:

$$3) \quad \frac{\text{K-Factor} \times \text{Top Flow (GPM)}}{60} = \text{Frequency}$$

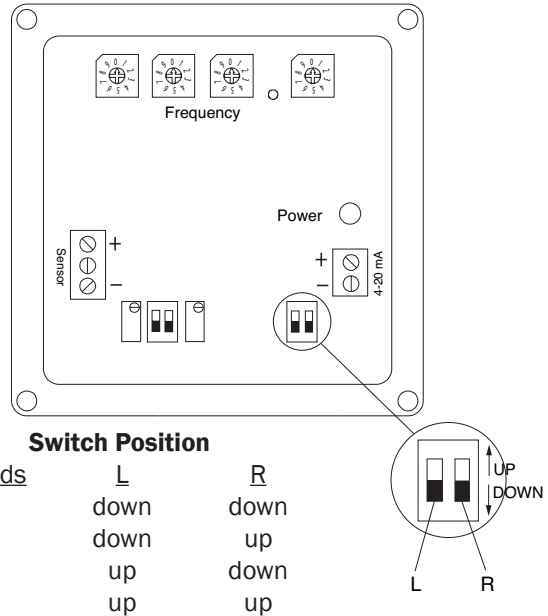
Enter the frequency using the four rotary Frequency switches. Note the decimal point between the third and fourth switches.

**SETTING FREQUENCY EXAMPLE**

- 1) In an installation with an estimated maximum flow rate of about 150 GPM, a flow rate of 170 GPM is selected as the full-scale maximum, the flow at which the current loop will register 20 mA.
- 2) In this example, the K-factor (found on the meter or fitting, or in the manual) is "K = 54.50".
- 3) Calculate the frequency as  $\frac{54.50 \times 170}{60} = 154.42$
- 4) Rounding to one decimal point, enter 154.4 on the rotary switches by turning the rotary switch pointer to the desired digit.

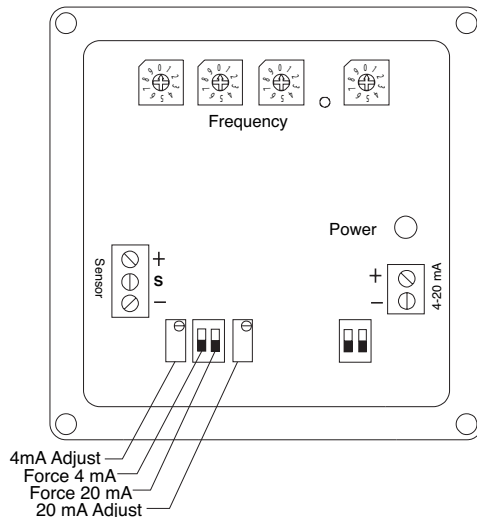


**Setting Averaging Time.** For most applications, this step can be ignored, as the standard setting will work fine. However, when a particularly steady output signal is desired, or in large pipe, a larger averaging period may be desirable. Note however that the averaging period requires a tradeoff, since a longer averaging period implies a slower response time. If steady signal is more important than fast response, increase the averaging time as desired. See the diagram below for the switch positions and their corresponding times.



**Checking Calibration**

Normally it should not be necessary to check calibration, since the digital design of this unit virtually eliminates drift. However, there are two types of calibration check that can be performed. Look at the diagram below to locate the 4 and 20 mA force switches. To force the 4 mA output, put its switch in the up position. Check the current output at the Power terminals, and if necessary trim to 4.00 mA using the appropriate trimpot. Return the switch to the down position, and repeat the process with the 20 mA switch.



## CONNECTIONS and TROUBLESHOOTING

The **FMG-1000** requires a power source of 7 to 26 Vdc at 30 mA max (see **WARNING**). The same cable that provides power also serves as a pulse output if needed for remote reading, data logging, signal conversion, or telemetry.

### FMG-1000 Cable Color Codes

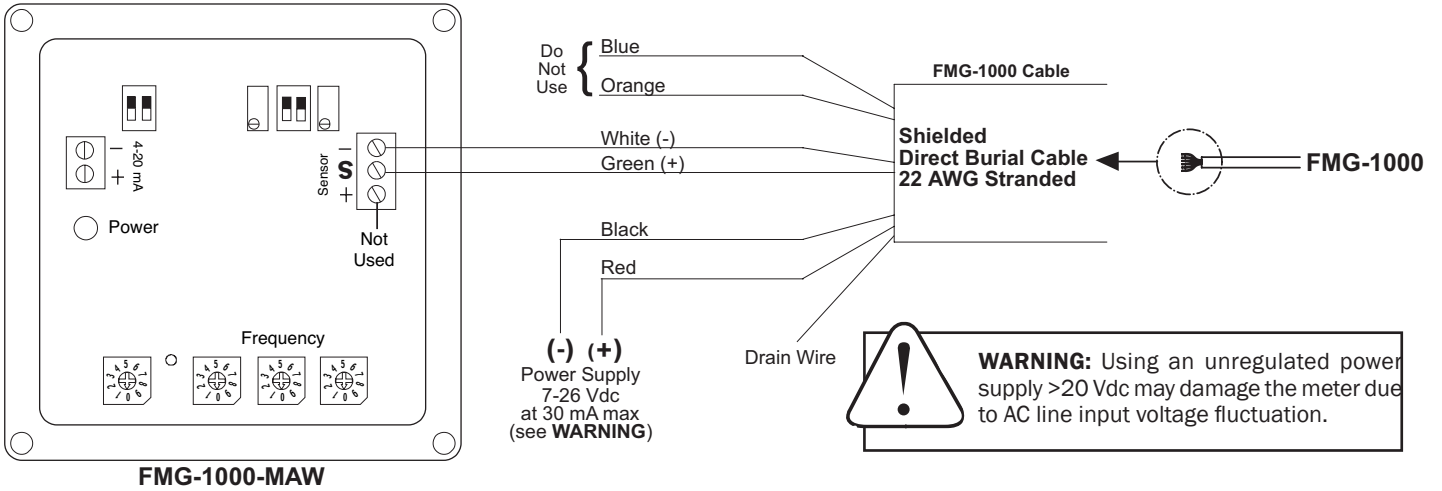
**Orange (+) and Blue (-):** Serial Output (Do Not Use)

**Green (+) and White (-):** Pulse Output, 30 Vdc max, 10 mA max

**Red (+) and Black (-):** External Power, 7-26 Vdc at 30 mA max

**Drain:** Connect to earth ground (see **WARNING**)

### Pulse-to-Analog Converter



## TROUBLESHOOTING

Problem	Probable Cause	Try...
No analog signal at reading device	Break in current loop Dead power supply Reversed polarity	Check if loop indicator light is on Check multimeter voltage on power supply Check polarity
Output stuck at 4 mA	No frequency input from flow sensor	Check flow sensor connections Check flow sensor polarity Be sure terminal blocks are firmly plugged in With flow sensor disconnected, use short wire to repeatedly short between sensor "S" and "-" terminals. Output should rise.
mA signal does not match flow rate	Inadequate voltage Wrong frequency setting	Check Load vs. Supply chart Review setting procedure Check multimeter voltage on power supply

## NOTES

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## WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

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2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

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