User’s Guide

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It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

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.
The FMG200 is a small electromagnetic low-flow flowmeter with chemically-resistant plastic wetted parts and platinum electrodes suitable for use with a variety of chemicals. Capable of measuring pulsating flows from diaphragm-type metering pumps, it is designed primarily for electrically-conductive chemical injection applications. The 1/4” and 3/8” sizes monitor maximum flows of 1 and 3 gallons per minute (or 4 and 11 L/min), respectively. Barb or NPT fittings are available, and must be designated at time of order.

The FMG200 is 115 Vac, 60 Hz powered and includes a rate and total display as well as a variety of outputs. For continuous transmission of a flow signal, there is a 4-20 mA output, a 0-5 volt signal, and a frequency signal proportional to flow. In addition, there are relay alarm outputs for user-set low and high flow levels.

### FEATURES
- Captive plastic cover screw (4) (mounting screws inside)
- Backlit LCD display (16 characters x 2 lines)
- Keypad switches, tactile
- Polycarbonate housing
- Power cord
- Connector (2) for optional output cables
- Connector (2) for sensor cables
- 6 ft. control cables (2) out to display
- Fusion coated aluminum housing
- PVDF plastic fittings (2) Male NPT or barb (must be designated at time of order)
- 10-24 grounding screws (on bottom of meter)
- Removable bracket for mounting

### GENERAL INFORMATION

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Materials</th>
<th>Meter Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrodes</td>
<td>Platinum</td>
</tr>
<tr>
<td>O-Ring</td>
<td>FKM (EPDM optional)</td>
</tr>
<tr>
<td>Display Housing</td>
<td>Polycarbonate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rate Display Units</th>
<th>Total Display Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gal/Minute, Liters/Second, Gal/Hour</td>
<td>Gallons, Liters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power</th>
<th>115 Vac, 60 Hz</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Accuracy</th>
<th>+/-1% of reading, plus .005 gpm (0.02 lpm)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Max Fluid Temperature</th>
<th>185˚ F (85˚ C)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Maximum Pressure</th>
<th>150 psi (@ 75˚ F)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Minimum Conductivity</th>
<th>&gt;20 microSiemens/cm</th>
</tr>
</thead>
</table>

| Outputs | • 4-20 mA, 0-5 Volts, both isolated  
|         | • Frequency to 9999 pulses per gallon, isolated (10 mA, 30 Vdc)  
|         | • High alarm, low alarm relay, isolated (100 mA, 110 Vac/Vdc) |

*Specifications subject to change*

### FLOW RANGE

<table>
<thead>
<tr>
<th>SIZE</th>
<th>LOW FLOW CUTOFF</th>
<th>MINIMUM FLOW for spec accuracy</th>
<th>MAXIMUM FLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L/Min</td>
<td>Gal/Min</td>
<td>Gal/Hr</td>
</tr>
<tr>
<td>-025</td>
<td>.04</td>
<td>.01</td>
<td>.60</td>
</tr>
<tr>
<td>-038</td>
<td>.11</td>
<td>.03</td>
<td>1.80</td>
</tr>
</tbody>
</table>
**INSTALLATION and OPERATION**

**INSTALLATION**

**Mounting.** Mount the display housing to a secure surface with screws or bolts. Remove the front cover to gain access to the mounting holes, directly under the front cover screws. Attach the flow meter to a secure surface using the foot bracket. Alternatively, the unit can be supported by the piping and the foot bracket removed. See mounting diagrams below.

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**CONNECTIONS**

The meter ships with the coil activation and signal leads already connected to the display housing. To connect optional output signal or alarm relay leads, remove the front cover. See the Connections diagram, page 3. Power connection uses a standard power cord. If conduit connection is required, remove the cord and strain relief and use the strain relief hole for a conduit connector.

**Grounding.** For proper operation, one or both of the ground lugs must be well connected to a good quality earth ground. (The ground lugs also retain the foot bracket). See the Grounding diagrams, page 3. The meter comes with a 12 foot ground wire attached.

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**OPERATION**

**Display.** The flow rate is displayed in the time and volume units that have been selected in Set-Up (page 5) (liters/min, for example). The cumulative total flow is displayed in the chosen units, up to eight digits. When the total reaches its maximum, the display resets to zero and begins again.

**Outputs.** The analog output varies continuously with the flow. If the output is too “jumpy” (changes too frequently), it can be damped in one of two ways: 1) increase the averaging time (under the Fast Analog Output setting); or 2) select “Disabled” (the default condition) under Fast Analog Output and increase the amount of damping using the Low Pass Filter setting.

The pulse output will produce a 50% duty cycle pulse at the volume intervals for which it is set - one pulse per liter, for example. Note: Since each pulse consists of equal times on and off, if the interval between pulses is large, the pulse may remain in the “on” condition for several seconds.

The relay alarm output will only energize if the flow goes above (high) or below (low) the flow alarm setting. The alarm relay will remain energized until the flow exceeds the setpoint by .25% (hysteresis).
CONNECTIONS and GROUNDING

FLOW METER

DISPLAY BOARD

IDEAL GROUNDING WITH METALLIC PIPING

STANDARD GROUNDING

To Sensor

4-20mA Output
(Consult Factory for Other Ranges)

Bare End Under Clamp

Mounting Bracket Removed

To Earth Ground

Mounting Bracket

Connect Ground to Either Screw

To Earth Ground

Fuse, .25 AMP, 5 X 20mm

110 Vac

110 Vac

120 Vac

120 Vac

240 Vac

240 Vac

Power Supply

Display Cable

Analog Device

Display

BoarD

WHITE

GREEN

BLACK

RED

To Sensor

Strain Reliefs and Housing Front are Not Shown

To Sensor

123

[UNUSED]

Page 3
**SET-UP.** Use the instructions below to set up your control. Use the SET key to move from one operation to the next, and use the ▲ and ▼ keys as described to change settings within operations.

### DISPLAY

**Rate**

This is the power-up display. Rate/total display (shows two seconds after power-up), Press SET to begin programming.

**Tot**

Use the ▲ key to choose the volume units: milliliters (mL) liters (L) or gallons (G)

**Volume Units G**

Use the ▲ key to choose the time base for rate: per second (S), per minute (M), per hour (H), per day (D).

**Time Units M**

Use the ▲ key to choose number of decimal places: 0, 0.0, 0.00.

**Tot Dec Point Format 0.0**

Leave “Analog Output Type” unchanged unless you intend to use the 0-5 V output. Standard setting is for 4-20 mA. Consult factory for 0-5 V output.

**An. output Type**

Leave default (“Fast Analog Output”) unchanged unless you have a demanding closed-loop application. Standard setting is “disabled”. If you enable this output, use the ▲ key to select a response time, 50 to 1000 milliseconds. This will control how rapidly the analog output tracks flow.

**Fast An. Output**

Use the ▲ and ▼ key to set the percentage of full scale at which peak analog output (20 mA or 5 V) occurs. On a max 10 gpm meter, 60% would be 6 gpm, for instance.

**Rate For Analog Output:**

Use the ▲ and ▼ key to set the percent of full scale at which the high flow alarm will energize. On a 10 gpm meter, 90% would equal 9 gpm, for instance.

**Rate For High Alarm:**

Use the ▲ and ▼ key to set the percent of full scale at which the low flow alarm will energize. On a 10 gpm meter, 10% would equal 1 gpm, for instance.

**Rate For Low Alarm:**

Use the ▲ and ▼ key to set the number of pulses (0000 to 9999) per unit. If you have selected liters, it will be pulses per liter, etc.

**Pulse Output**

This setting controls the smooth/responsive trade off of the display. Increasing the time makes the display smoother, but slower to respond to change. Use the ▲ to set 1, 2, 5, 10, or 20 seconds. If using the meter with pulsing flows, it may be necessary to increase the time.

**Low Pass Digital Filter:**

Use the ▲ key to switch between totalizer reset “Enabled” and “Disabled”. If the reset is enabled, every time the ▲ key is pressed during normal operation, the totalizer will reset to zero. Settings finished.

**Totalizer Reset**
<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable Causes</th>
<th>Try...</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Display</td>
<td>No power</td>
<td>Check for 110 Vac</td>
</tr>
<tr>
<td></td>
<td>Blown fuse</td>
<td>Test fuse, replace if bad</td>
</tr>
<tr>
<td></td>
<td>Loose ribbon cable</td>
<td>Check ribbon cable connections</td>
</tr>
<tr>
<td>Flow rate always reads “0”</td>
<td>Reversed flow direction</td>
<td>Reverse flow connections</td>
</tr>
<tr>
<td></td>
<td>Missing ground wire</td>
<td>Install ground wire</td>
</tr>
<tr>
<td></td>
<td>Empty pipe</td>
<td>Install meter in vertical position</td>
</tr>
<tr>
<td></td>
<td>Flow rate below minimum</td>
<td>Use next smaller flow meter</td>
</tr>
<tr>
<td></td>
<td>Loose wiring or incorrect wiring</td>
<td>Check connections on display board</td>
</tr>
<tr>
<td></td>
<td>Fluid conductivity &lt;20 microSiemens/cm</td>
<td>Select another flow meter</td>
</tr>
<tr>
<td>Flow rate incorrect</td>
<td>Missing or incorrect ground wire</td>
<td>Check for proper grounding</td>
</tr>
<tr>
<td></td>
<td>Fluid conductivity &lt;20 microSiemens/cm</td>
<td>Select another flow meter</td>
</tr>
<tr>
<td></td>
<td>Empty pipe</td>
<td>Install meter in vertical position</td>
</tr>
</tbody>
</table>
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.

**OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the customer will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.**

**CONDITIONS:** Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a “Basic Component” under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

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

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

**FOR NON-WARRANTY REPAIRS**, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA’s policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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- Pumps & Tubing
- Air, Soil & Water Monitors
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