

# User's Guide



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## **FMG980 SERIES**

### **Electromagnetic Flow Sensor**



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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.

# TABLE OF CONTENTS

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## SECTION I FLOW METER INSTRUCTIONS

### General Information

Features, Specifications .....Page 1

### Installation

Distorted Flows, Fitting Installation, Chemical Injection or Fertigation, Meter Installation,  
Positioning the Meter.....Page 2  
Straight Pipe Recommendations .....Page 3  
Full Pipe Recommendations.....Page 4

### Electrical Connections

General Electrical Guidelines, Power, Forward Flow Output, Reverse Flow Output,  
Grounding Guidelines, Grounding Diagram.....Page 5

### Operation & Maintenance

Zero Adjustment, Minimum Flow, Flow Rate Table, Presence of Flow Indication,  
Filtering, Electrode Coating, Calibration (“K-Factor”), K-Factor Chart .....Page 6

### Caution & Troubleshooting

Problems, Probable Causes .....Page 7

## SECTION II FLOW COMPUTER INSTRUCTIONS

### General Information

Features, Specifications .....Page 8

### FMG980 Installation and Settings

Wall Mounting, K-Factor, Reading in Other Units, Changing Volume Units, Changing Time Units,  
Settings, Set K, Set P/Flow Alarm, Set 20 mA, Set Decimal Point, Set Time Unit.....Page 9

### FMG980 Connections and Operation

Counter or PLC, FMG980 Display and Proportional Feed .....Page 10  
FMG980 & 4-20 mA Output, Dual FMG980 Displays (Example of Bidirectional Connection) .....Page 11  
FMG980 Connection Diagram, FMG980-M and FMG980-W Operation .....Page 12

### Quick Settings

Quick Settings Overview .....Page 13

### FMG980 Troubleshooting

Problems, Probable Causes .....Page 14

# SECTION I: FMG980 SERIES FLOW METER INSTRUCTIONS

## GENERAL INFORMATION

FMG980 series insertion electromagnetic flowmeters are designed for use with conductive liquids in 1" to 12" pipe. A choice of materials (stainless steel, brass, and PVC) allows the meter to adapt to a range of temperature, pressure, and corrosive environments.

The FMG980 series are highly suitable for difficult applications with changing viscosities and pulsating flows, such as air-driven diaphragm pumps. With no moving parts, these meters can be used in "dirty" applications where debris would foul a mechanical meter. Like all magmeters, when used in chemical injection applications, these meters should be installed upstream of the chemical line (or far enough downstream to allow complete mixing of fluids before the meter).

Designed for modularity and versatility, the FMG980 series

has a current-sinking pulse output that can be combined with the appropriate transmitter or indicator for the application. For analog output and display of rate and total, an FMG980 can be used. Modules can be wall- or meter- mounted. If the FMG980 series meter is used with a programmable controller, the output signal can be fed direct, with no other conditioning required.

FMG980 series fixed depth insertion meters require special fittings. Factory installation in the fitting ensures correct depth placement in the pipe. An FMG980 series meter can be ordered in a full power model when a source of electricity is available, or in a low power model that can run on an external battery with solar panel.

Reverse flow output and immersibility are optional.

## FEATURES

Cover, or transmitter or indicator module

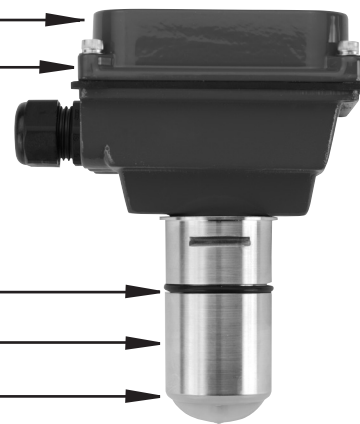
Powder coated aluminum housing

Cable strain relief

O-ring, EPDM (FKM optional)

Sensor body (Stainless, Brass, PVC)

PVDF electrode cap



Hastelloy electrodes

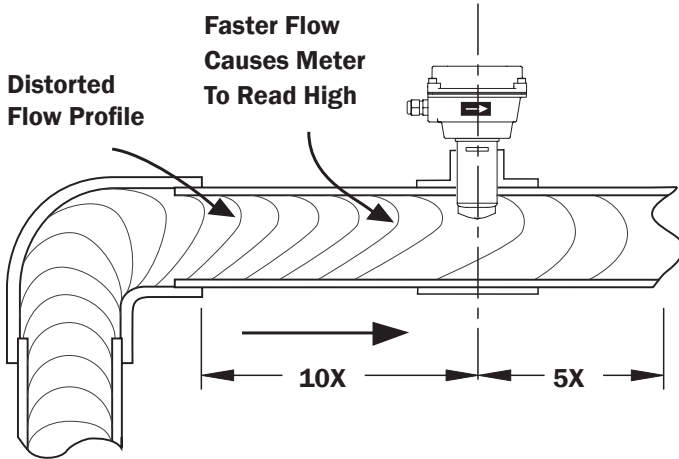
## SPECIFICATIONS\*

<b>Pipe Size</b>		1" to 12"
<b>Materials</b>	<b>Mechanical</b>	316 SS/Brass/PVC
	<b>Electrodes</b>	Hastelloy
	<b>Housing</b>	Cast powder-coated aluminum
	<b>Electrode Cap</b>	PVDF
	<b>O-Ring</b>	EPDM standard (FKM optional)
<b>Power</b>	<b>Full Power</b>	12 - 25 Vdc, 250 mA
	<b>Low Power</b>	12 - 25 Vdc, 40 mA average with 250 mA peaks
<b>Flow Rate</b>		0.28 - 20 ft/sec (0.08 - 6.09 m/sec)
<b>Temperature</b>	<b>Ambient Temp</b>	0° to 160° F (-17° to 72° C)
	<b>Fluid Temp : Brass/SS</b>	32° to 200° F (0° to 93° C)
	<b>Fluid Temp: PVC</b>	32° to 130° F (0° to 55° C) @ 0 psi
<b>Pressure</b>	<b>Brass/SS</b>	200 psi (13.8 bar)
	<b>PVC</b>	150 psi (10 bar) @ 75° F
<b>Minimum Conductivity</b>		20 microSiemens/cm
<b>Calibration Accuracy</b>		+/- 1% of full scale
<b>Output</b>		Square wave pulse, opto isolated, 550 Hz @ 20 ft/sec
<b>Empty Pipe Detection</b>		Software, defaults to zero flow
<b>Regulatory</b>		CE Mark (Stainless Steel, Brass and Standard Power Only)

\*Specifications subject to change

# INSTALLATION

## DISTORTED FLOWS



**Fitting Installation.** FMG980 series meters require special fittings that ensure that the flow sensor is installed to the correct depth. The fitting must be installed in the pipeline before the meter can be installed. For best results, install with at least ten diameters of straight pipe upstream of the meter and five diameters downstream (or more under specific adverse circumstances). See diagrams, next page.

If there is not enough straight run to smooth out the turbulence caused by valves, fittings, and changes in direction, some decrease in accuracy may result. This does not mean that the flow meter's reading is meaningless, however. In some applications (control systems, valve operation, chemical addition), a repeatable reading may be more important than a highly accurate one.

Although FMG980 series PVC meter tees are supplied with some straight pipe, additional straight pipe should be added to meet straight pipe recommendations. It is not advisable to connect a flow-disturbing device (e.g. valve or elbow) directly to the end of these fittings.

A PVC fitting is usually installed by solvent welding. The stainless steel and brass meter fittings have female pipe threads, requiring the appropriate male threaded fittings. Saddle or weld fittings (3" and above) require a hole to be cut in the pipe. Recommended hole size is 1-3/4".

**Chemical Injection or Fertigation.** When any magmeter, by any manufacturer, is used in a chemical injection application (including fertigation), the chemical injection point must be placed downstream of the magmeter OR far enough upstream for complete mixing to occur before the fluid reaches the meter. When unmixed chemical or fertilizer alternates with water passing through the meter, the rapid changes in conductivity may cause sudden spikes and drops in the meter's reading, resulting in inaccurate measurement. The magmeter will restabilize, however, with a steady flow of fluid of uniform conductivity.



**Caution:** In chemical injection or fertigation applications, install chemical injection point downstream of magmeter, or far enough upstream to allow complete mixing of fluids before the meter.

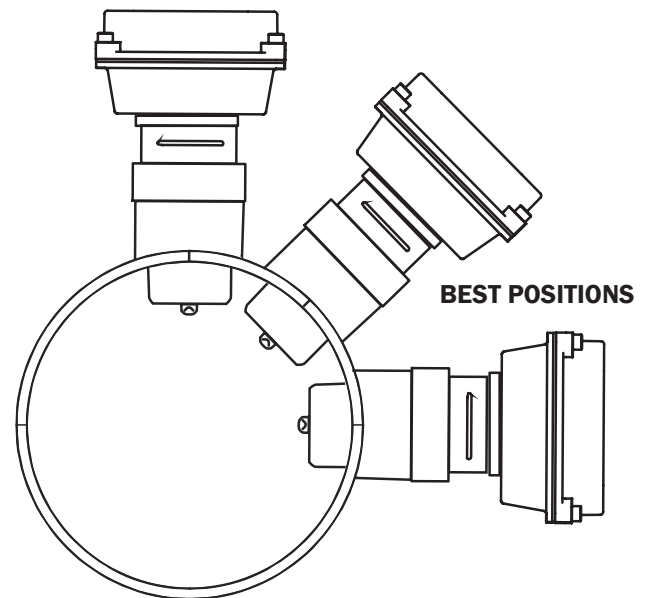
**Meter Installation.** After the meter fitting is installed in the pipeline, the meter can be installed in the fitting. After noting the direction of the flow arrow, press the meter into the fitting as far as it will go. Retain the meter in place by inserting the U-clip. The pin can be installed from either side. It may be necessary to rotate the probe back and forth slightly to start the pin into the slots on the probe. Slide the pin in as far as it will go.



**Caution:** These flow sensors are not recommended for installation downstream of a boiler feedwater pump where installation fault may expose the flow sensor to boiler pressure and temperature. Maximum recommended temperature is 130 °F (Plastic), 200 °F (Metal).

## POSITIONING THE METER

Okay position if there is no air in the pipe



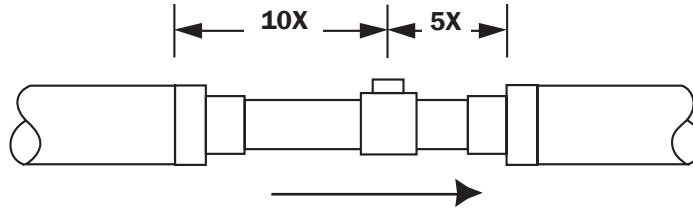
**Caution:** Never remove the U-clip retainer when the pipe is under pressure. Always remove pressure from the pipe before you attempt to remove the meter. Removal under pressure may result in damage or serious injury.

# INSTALLATION

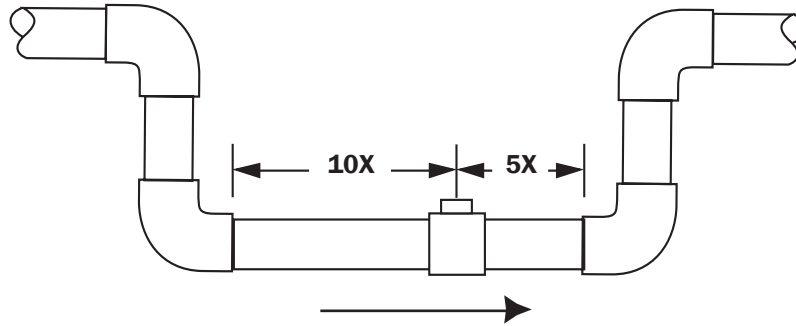
## STRAIGHT PIPE RECOMMENDATIONS

(X = pipe diameter)

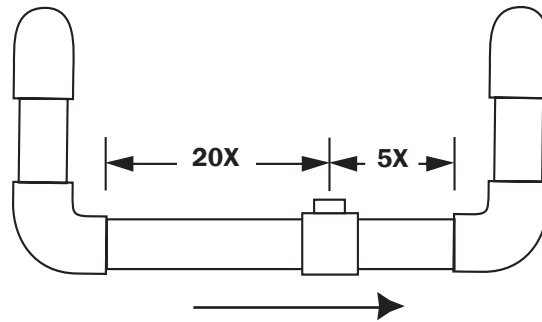
Reduced Pipe



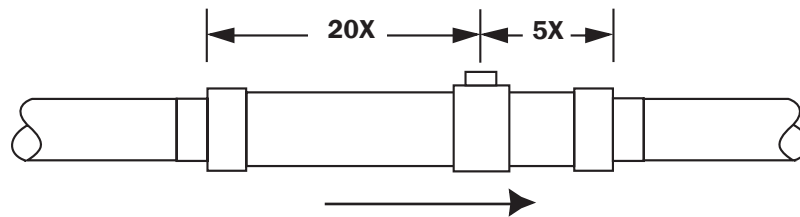
Two Elbows In Plane



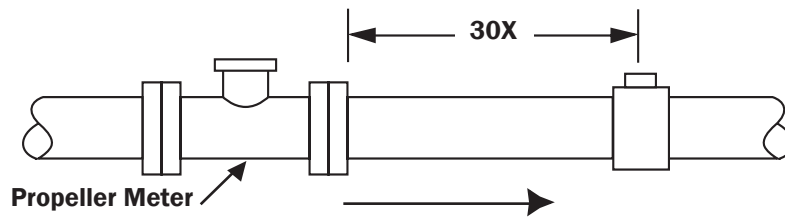
Two Elbows, Out Of Plane



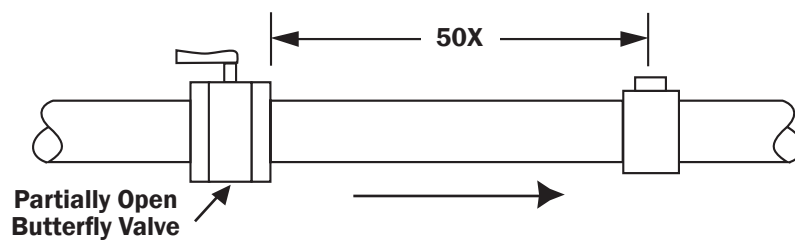
Expanded Pipe



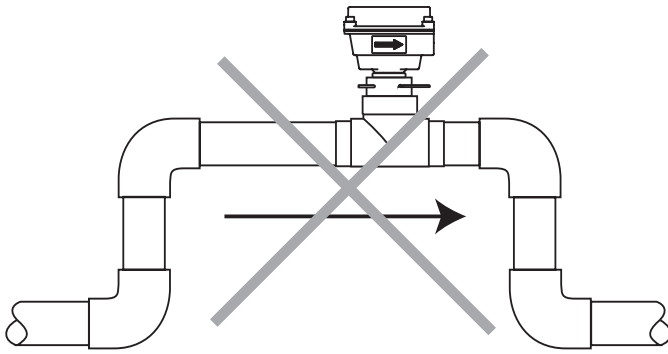
Spiral Flow



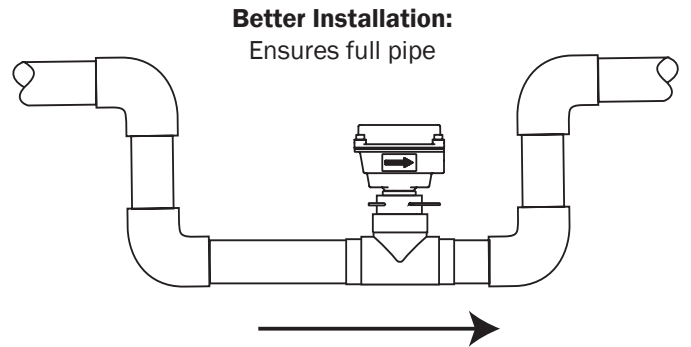
Swirling Flow



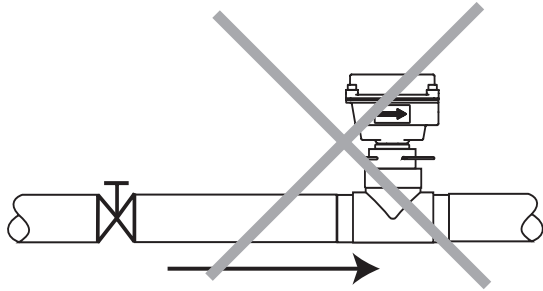
FULL PIPE RECOMMENDATIONS



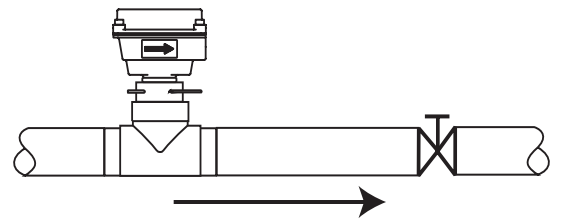
**Possible Problem:**  
Allows air pockets to form at sensor



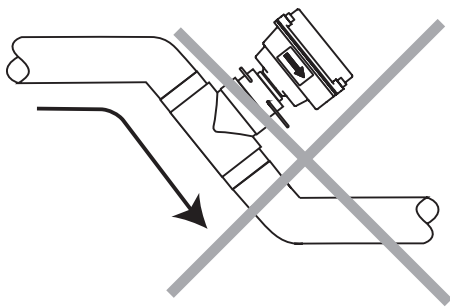
**Better Installation:**  
Ensures full pipe



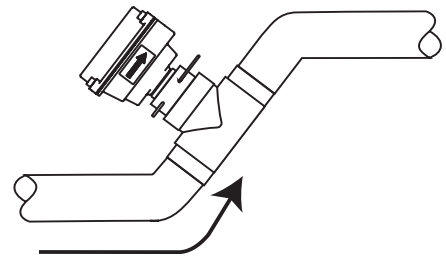
**Possible Problem:**  
Post-valve cavitation can create air pocket



**Better Installation:**  
Keeps pipe full at sensor



**Possible Problem:**  
Air can be trapped



**Better Installation:**  
Allows air to bleed off

## General Electrical Guidelines:

- Whenever possible avoid running control cables in the same conduit with or bundled with AC power.
- Using shielded cable, be sure to connect shield to ground at power supply end of the cable.
- Avoid routing flow sensor cables in close proximity to a variable frequency drive.
- Recommended power and output wiring is shielded twisted pair 18-22 AWG control cable.
- Recommended voltage is 12-24 Vdc. Note that unregulated power supplies can vary from nameplate voltage by a considerable amount, especially with AC line voltage fluctuation. Therefore 24V power supplies must be regulated.

See the Connections diagrams on the following pages for the appropriate terminals.

**Power:** A 12 - 24 Vdc power supply capable of at least 250 mA current output is needed.

**Forward Flow Output:** This open-collector isolated output does not supply power. This pulse is generated in the forward flow direction on the standard unit. (Reverse flow output is available as an option).

**Note:** This output is limited to 6 mA at 30 Vdc maximum.

**Reverse Flow Output:** Reverse flow output is available as an option. This open-collector isolated output does not supply power. It functions like a polarity-sensitive switch closure.  
**Note:** This output is limited to 6 mA at 30 Vdc maximum.

## Grounding Guidelines:

For best results, use a good quality earth ground, such as metallic water piping or a driven ground, to ensure a good connection to earth ground and good noise suppression.

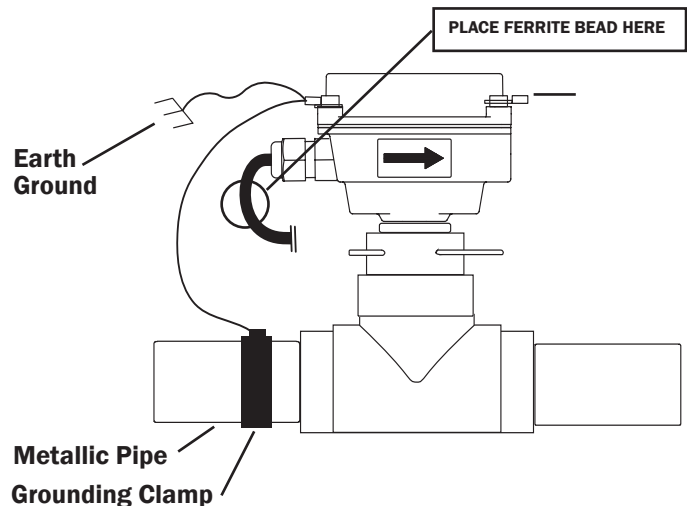
If the flow sensor is installed in metallic piping, for optimum connection clamp wire to the piping a short distance to one side of the flow sensor using an electrical grounding clamp. Connect the wire to the earth ground and to one of the housing screws.

**For Non-Metallic Pipe:** Connect one to the housing screws by wire to a good earth ground, such as metallic water piping or a rod driven into the ground.

EX meters are usually unaffected by moderate levels of electrical noise. In some applications performance may be improved by taking the following steps:

- Use shielded twisted pair cable (Belden 8723 or equivalent above ground or Alpha 35482 or equivalent burial).
- Clamp a ferrite bead (Steward 28A2029-OAO or equivalent) on meter signal/power wire within 3/4" of the meter strain relief (tape or tie wrap in place if necessary). See diagram below.
- IMPORTANT - Connect the cable shield ground wire to ground, ONLY at power supply end of cable.

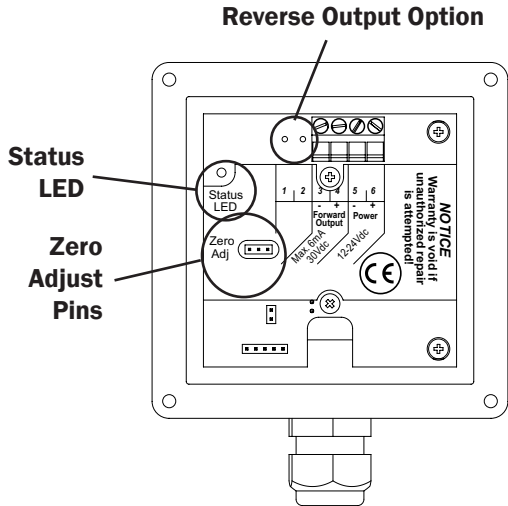
## GROUNDING DIAGRAM





# OPERATION & MAINTENANCE

**Zero Adjustment.** When the FMG980 series is powered up and there is no flow, there should be no output pulses (or, if connected to the FMG980, flow rate should read “0”). If there are pulses it may be necessary to adjust the flow meter under no-flow conditions after it has been installed. This should only be done if the indicated flow is low, near the lower cutoff.



To perform the adjustment, after determining that there is a **full pipe with no flow**, short between the two pins marked “Zero Adjust”. A red LED light will come on for approximately 50 seconds and then go out. The zero adjustment is completed.

**Minimum Flow.** As with any other flow sensor, there is a rate below which the FMG980 series sensor cannot read. Check the flow rate table below for the minimum flow rate detectable by the sensor for a given pipe size.

### FLOW RATE (GPM)

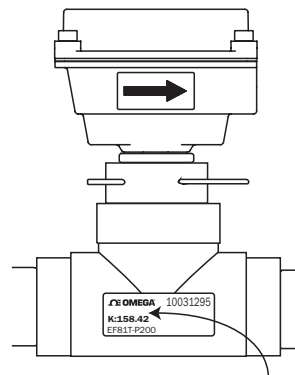
Nominal Pipe Size	1"	1-1/2"	2"	3"	4"	6"	8"	10"	12"
• Min @ 0.28 ft/sec	.7	1.5	2.7	6	11	25	44	69	99
• Max @ 20 ft/sec	49	110	196	440	783	1760	3130	4900	7050

**Presence of Flow Indication.** To assist in troubleshooting, the “Status LED” has two blinking modes in normal operation. When there is no flow detectable by the meter (below minimum threshold) the LED blinks every 8.0 seconds. When there is detectable flow, the same indicator blinks every 3.0 seconds.

**Filtering.** The software of the FMG980 series sensor filters out electrical noise and averages sudden variations in the flow to smooth the output. It takes a matter of seconds for the flow sensor to get up to full output when it is powered up or when flow begins.

**Electrode Coating.** Grease or other adhering, non-conductive materials can stop flow detection if the electrodes become heavily coated. To clean the electrodes, remove the sensor from the pipe and gently scrub the electrodes (three silver bumps) on the reading face of the flow sensor. A mild soap (dishwashing liquid for example) can be used to aid the cleaning process.

**Calibration (“K-factor”).** The K-factor represents the actual number of pulses per gallon the meter produces during a flow test. This number can be entered into your electronic control to make it read properly. The FMG980 series meter is ordered with a tee fitting. The fittings have been factory tested and the K-factor is indicated on the side of the fitting (see diagram).



**Find Your K-Factor Here**

If the FMG980 series meter is ordered with a **saddle or weldolet fitting**, find your K-factor in the chart below.

K-FACTORS SADDLES & WELDOLETS						
	3"	4"	6"	8"	10"	12"
<b>PVC/Steel Sch. 40</b>	70.397	40.985	18.130	10.497	6.674	4.709
<b>PVC/Steel Sch. 80</b>	78.748	45.360	20.084	11.495	7.322	5.184
<b>Stainless Steel (10S)</b>	62.385	36.626	16.510	9.642	6.173	4.373
<b>Stainless Steel (40S)</b>	70.397	40.985	18.130	10.497	6.674	4.661
<b>Copper Tubing (Type L)</b>	76.371	43.552	19.513	11.201	7.230	5.016
<b>Copper Tubing (Type K)</b>	78.371	44.638	20.223	11.622	7.500	5.239
<b>Brass Pipe</b>	70.672	41.517	17.778	10.445	6.674	4.661
<b>Duct. Iron (Class 52)</b>	57.376	37.320	16.915	9.503	6.197	4.325

**NOTE:** K-factors are in Pulses/gallon. For Pulses/Liter, divide by 3.785.

## CAUTION & TROUBLESHOOTING



**Caution:** The electronics of the FMG980 series meters are not field-repairable. Warranty is void if unauthorized repair is attempted

### TROUBLESHOOTING

Problem	Probable Cause	Try...
No pulse output	Pipe not full	Check plumbing
	Below minimum flow cutoff	Check the presence of Flow LED (see pg. 9)
	Unit not grounded	Connect to earth ground
	Excessive electrical noise	Check for proper electrical wiring
	No power	Check for power across power input terminals
	Flow reversed	Note flow direction arrow, reverse direction of meter
	Power reversed	Reverse connections
	Output connections reversed	Change output connections
Output pulses incorrect	Fluid conductivity <20 microSiemens/cm	Select another flow meter
	Missing or incorrect ground wire	Check for proper ground
	Excessive electrical noise	Check for proper electrical wiring
	Empty pipe	Check for full pipe or install meter in the vertical position
	Not enough straight pipe	Check for ten diameters upstream AND five diameters downstream
Jumpy reading	Rapidly changing conductivity (in chemical injection or fertigation applications)	Install chemical injection line downstream of magmeter (or far enough upstream to allow complete mixing of fluids before meter)

# SECTION II: FMG980-M AND FMG980-W FLOW COMPUTER INSTRUCTIONS

## GENERAL INFORMATION

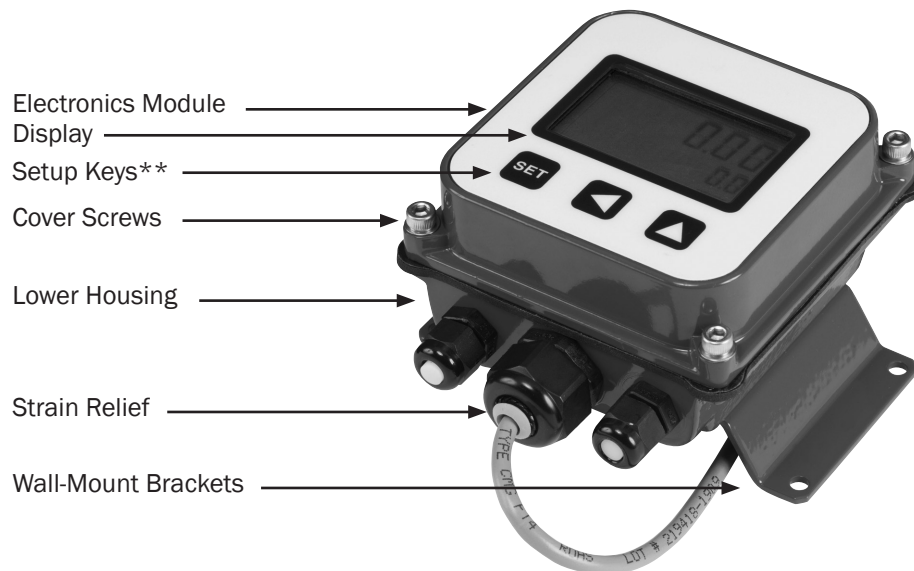
These flow computers are microcontroller-based indicator/transmitters that display flow rate and total and provide output signals. The FMG980 is powered by external DC voltage and has both pulse and 4-20 mA analog outputs. When the FMG980 is being used in the 4-20 mA mode, it is a “two-wire” or “loop-powered” device, meaning that the 4-20 mA output signal doubles as its power supply.

The addition of a dual-relay output board (-R2) allows for certain applications requiring contact output isolation (e.g., certain metering pumps and water treatment controls). Dual solid state relays provide exactly the same pulse output as the standard unit, and each can signal one external device. A non-resettable total is also available.

The FMG980 Flow Computer can be ordered with a built-in 115 Vac/12-24 Vdc dual power supply for magmeters (-DPW).

Housings are rugged cast aluminum, potted and gasketed for maximum environmental protection. A membrane keypad allows settings to be changed without removing the cover. (Password protection, a standard feature, can be used to prevent settings from being changed.)

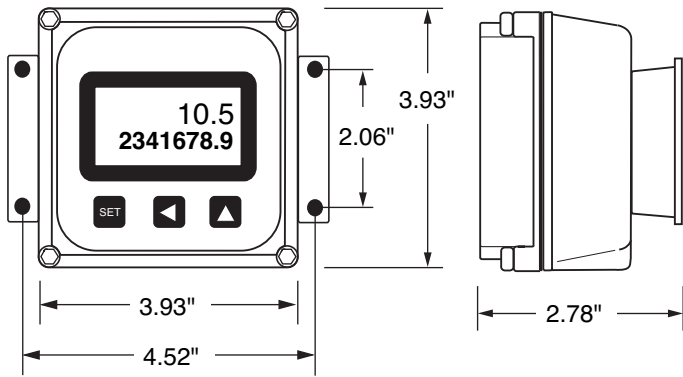
## FEATURES



## SPECIFICATIONS\*

<b>Power</b>		12-32 Vdc (for 4 mA DC min) 24-32 Vdc (for accuracy of 4-20 mA loop)
<b>Display</b>	<b>Rate</b>	6-digit autorange, 1/2" character height
	<b>Total</b>	8-digit, 5/16" character height
<b>Output</b>	<b>Pulse</b>	0.1 second open collector pulse (scaled); 0-75 pulse/sec passthrough (unscaled); High alarm or low alarm
	<b>Analog</b>	4-20 mA loop (requires 24-32 Vdc)
<b>Pulse Output Range</b>		0.1 - 9999999.9 units/pulse
<b>Input</b>		Open collector/switch @ 5 Vdc
<b>Input Range</b>		1.0 - 1,500 pulses/second
<b>K-Factor Range</b>		.001 - 99999.999
<b>Flow Alarm Output Range</b>		.01 - 999999.99
<b>Temperature</b>		0° C - 70° C (32° - 158° F)
<b>Environmental</b>		NEMA 4X

**Wall Mounting.** To mount the FMG980-W on a wall, hold the unit in the desired position, mark the holes in the mounting feet, drill, and mount with screws.



**CONNECTIONS**

See Connections Diagram for FMG980-W, next page.



**CAUTION!** If output is being used to control an external device, such as a metering pump, do not connect the device until programming is completed. If malfunction or incorrect programming of the output could cause personal injury or property damage, separate safeguards must be installed to prevent such injury or damage.

**K-FACTOR**

At a minimum, every FMG980 flow computer must be programmed with the “K-factor” (This is the number of pulses that the meter produces per gallon of flow.) If you wish to read in units other than gallons, see below.

The K-factor can be found on the model-serial label. The line reading K = xxxx gives the desired number.

**READING IN OTHER UNITS**

**Changing Volume Units.** The default K-factor units are pulses per gallon. To read your total in metric or other units instead, the standard K-factor must be converted to the desired volume units. For example, to read in pulses per liter, the K-factor must be multiplied by the applicable number shown below.

**NOTE:** Both rate & total will read in whatever units you choose.

To Convert K to:	Multiply by:
Liters	.26418
Cubic Meters	264.18
Fluid Ounces	.0078
Cubic Feet	7.48

**Changing Time Units:** To read your rate in liters per second (for example), convert the K-factor volume units as shown above and change the time units to Seconds, using the Set Time Unit instructions at right.

**SETTINGS**

**Set K.** Begin by pressing the SET key once. The prompt SET K should appear on the display. The digit to the far right will be blinking. Use the up arrow key to reach your desired value. Then press the left arrow key to move to the next digit. Repeat the process until the entire number is entered. (Note that the decimal is fixed at three places. If you only have two decimal places for your K-factor, enter a zero for the third digit.) Press SET to advance.

**Set P/Flow Alarm.** At this screen you may select between pulse output (P) or flow alarm (A) functions. If the pulse output and flow alarm features are not being used, this step can be skipped. The P (pulse output) setting does not affect anything if it is not being used.

Set P is the default that appears on a new display. On a unit that has been previously set up with flow alarm function, an A will appear on this screen. To move between P and A screens, firmly press all three keys for 5-10 seconds, then use the up arrow to scroll through the three options: P, AL HI (high flow alarm) and AL LO (low flow alarm).

**Set P.** From this screen, follow the same process as for Set K to enter the desired pulse rate. This is the number of gallons (or whatever units are programmed) between pulses. (**Note:** Using the pulse output function disables the high and low flow alarm functions.)

**Set Flow Alarm.** From the A screen, use the up arrow key to choose either AL HI or AL LO and then press the SET key to set the alarm rate. Use the up arrow and left arrow as above to reach the desired digits. (**Note:** Using the flow alarm function disables the pulse output function.)

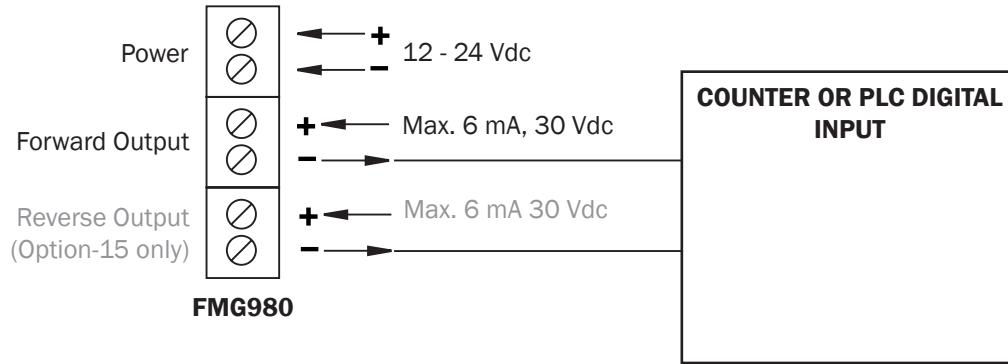
**Set 20 mA.** Press the SET key to advance to SET 20, to set the flow rate, in volume units per time unit, at which 20 mA is desired. Use the up arrow key to reach your desired value. Then press the left arrow key to move to the next digit. Repeat the process until the entire number is entered. The processor will automatically scale the 4-20 mA loop accordingly, with 4 mA at zero flow.

**Set Decimal Point.** Press the SET key again for the D prompt. Pressing the up arrow key switches among no decimal place, one decimal place and two decimal places.

**Set Time Unit.** When the SET key is pressed again, a blinking time unit appears. Press the up arrow key to select SEC (seconds), MIN (minutes), HR (hours) or DAY (days) (for example, gal/min, or gal/hr).

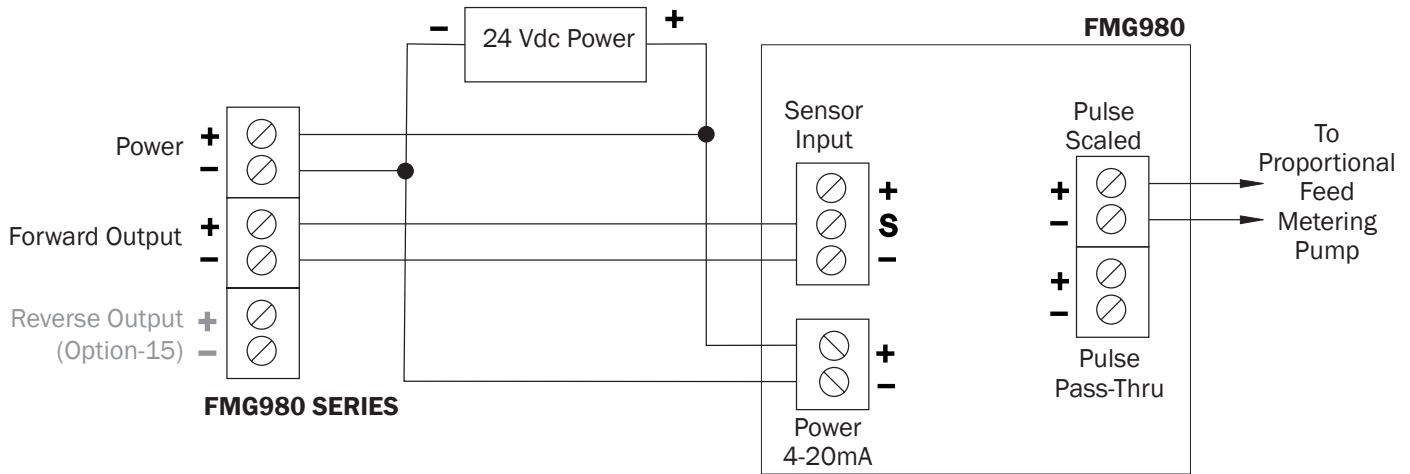
To return to normal operation after entering settings, press SET again. When the unit is connected to an operating flow sensor, the rate (larger digits) and total (smaller digits) indicator numbers should appear in the display.

**COUNTER OR PLC**



\*See Dual FMG980 Diagram for an example of bidirectional connections.

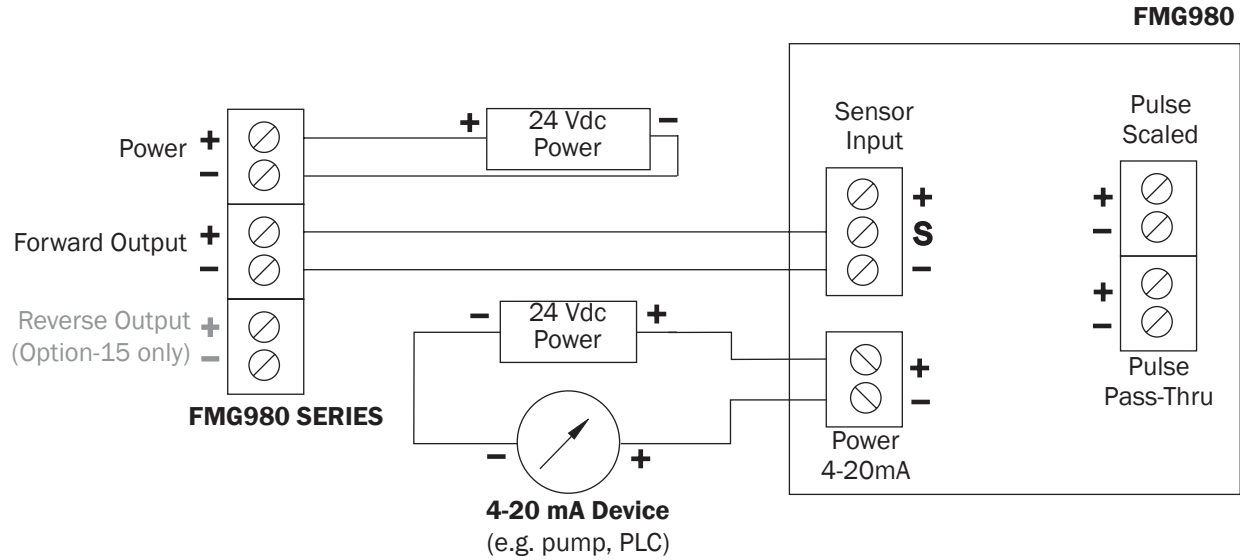
**FMG980 DISPLAY AND PROPORTIONAL FEED**



\*See Dual FMG980 Diagram for an example of bidirectional connections.

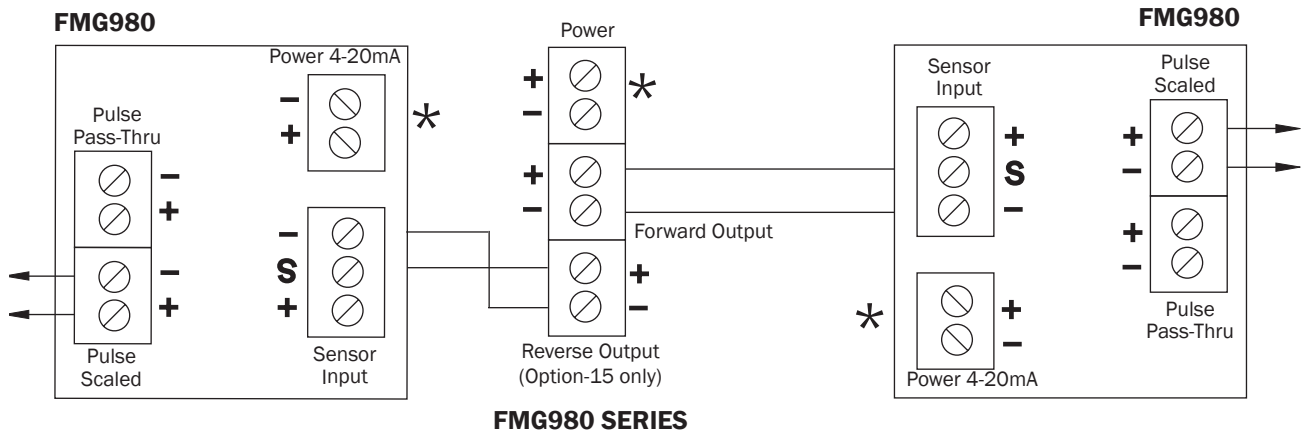
# FMG980 CONNECTIONS and OPERATION

## FMG980 DISPLAY AND 4-20 mA OUTPUT



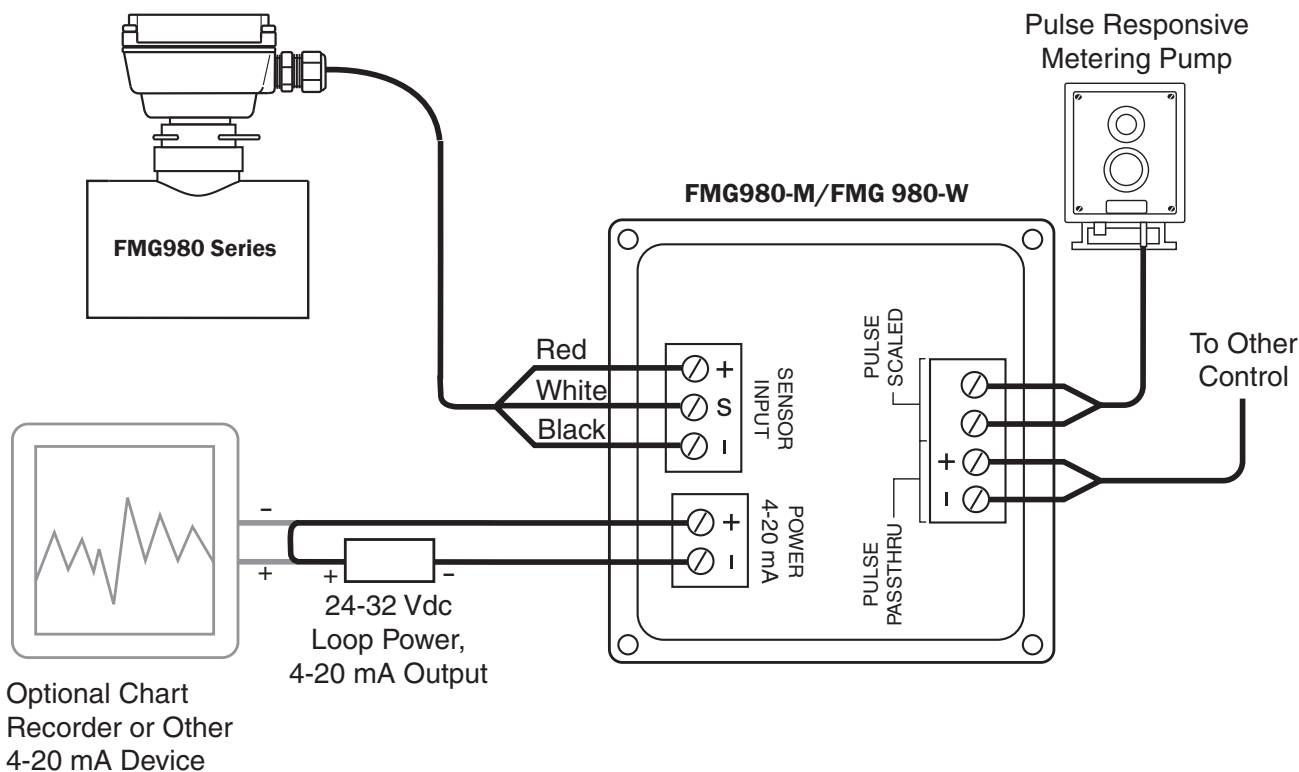
\*See Dual FMG980 Diagram for an example of bidirectional connections.

## DUAL FMG980 DISPLAYS (Example of Bidirectional Connection)



\*Requires 12-24 Vdc power source.

**FMG980 CONNECTION DIAGRAM**

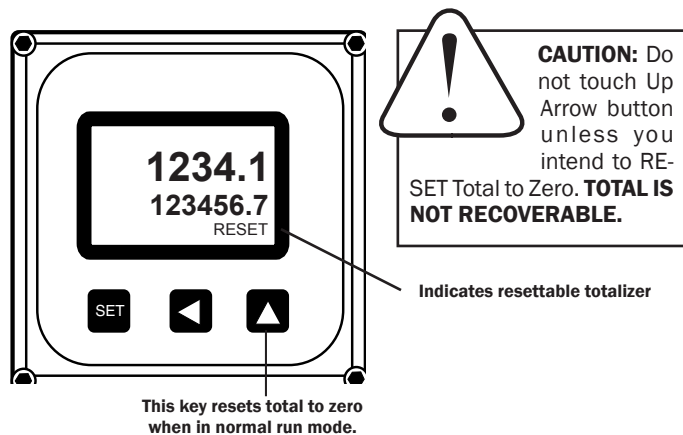


If the 4-20 mA current signal is not required, connect the power terminals to any 12-32 Vdc current source.

**FMG980-M and FMG980-W OPERATION**

**Resettable/Non-Resettable Totalizer.** Unless the unit has been ordered with the non-reset option, a RESET prompt is visible in the lower right corner above the up arrow key, when the display is in use. Press the up arrow key at any time to reset the totalizer to zero.

**Operation of 4-20 mA Output.** If the 4-20 mA output is in use and is correctly connected, the signal should vary between 4 mA and 20 mA in proportion to the flow, with the top flow rate set by the user. At no time should the signal drop below 4 mA. A reading between 0 and 4 mA indicates a fault of some type, typically in the loop power supply or the connections (see Troubleshooting). In the rare instance that the 4-20 signal fluctuates excessively (“paints”) it may need to be damped by additional averaging. Contact Omega for information on how to increase filtering.

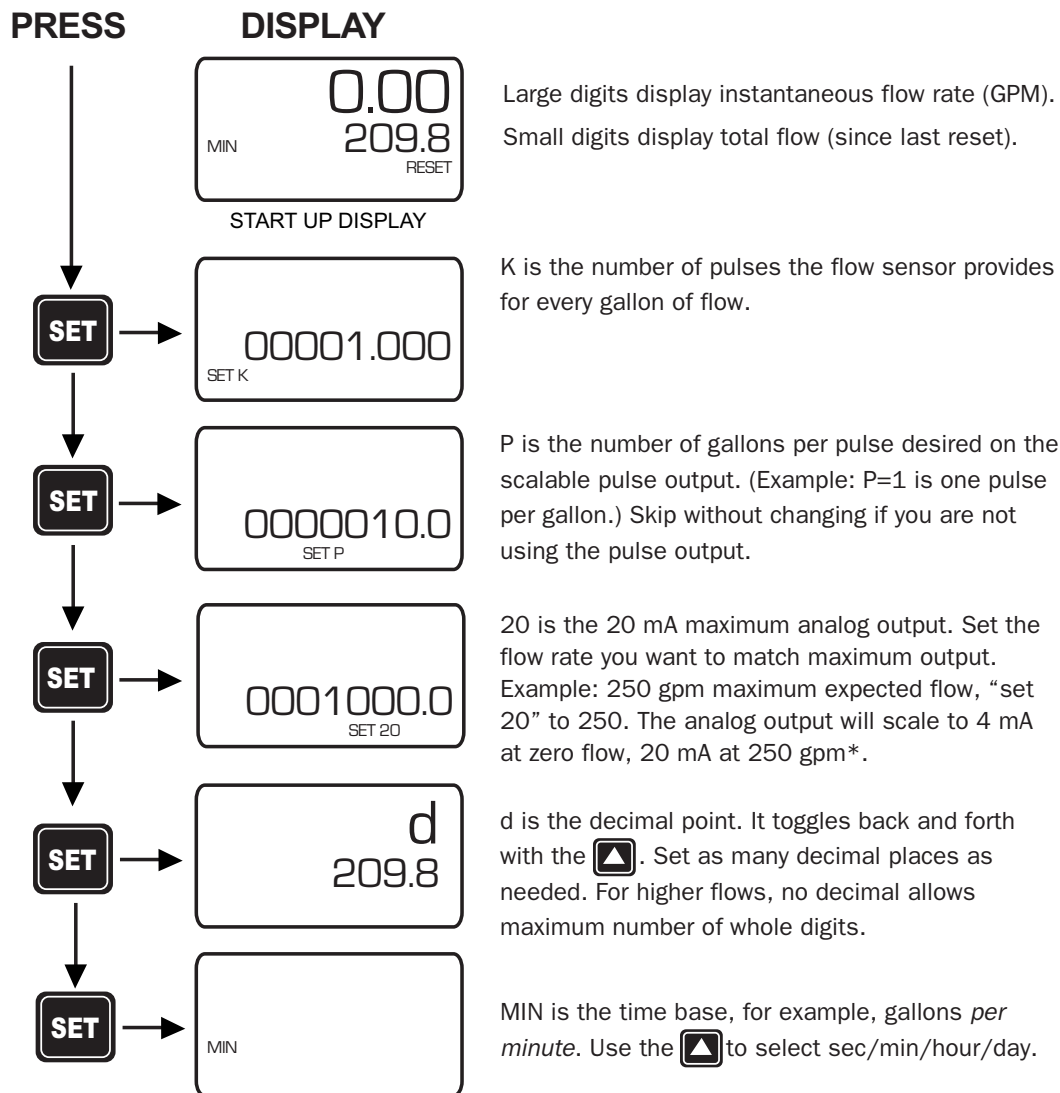


**Operation of the Pulse Output.** If the pulse output is being used, it should pulse for 0.1 second every time the set number of gallons has been totalized. If a pulse-responsive metering pump is properly connected to this output, it should stroke periodically. If this does not occur, see Troubleshooting.

## QUICK SETTINGS OVERVIEW

See following page for step-by-step instructions on changing these settings

Pass through all settings and return to original display to save settings.



**\*NOTE:** Use the up arrow key to reach your desired digit. Then press the left arrow key to move to the next digit. Repeat the process until the entire number is entered.



<b>Problem</b>	<b>Probable Cause</b>	<b>Try...</b>
Display blank	No power to the unit  Short in sensor circuit	Check for minimum 12 Vdc at power terminals  Disconnect sensor, see if display returns (zero flow rate)
Display missing segments	Damaged display module	Contact Omega for return/replacement
Display reading meaningless characters	Unit's microcontroller crashed	Disconnect and reconnect power. If problem repeats, contact Omega for return/replacement
Display reads normally,	Wrong K-factor or time base entered	Enter correct K-factor from meter
Display reads normally, incorrect pulse output	Wrong pulse output setting  Polarity reversed on pulse output terminals	Use "Set P" to correct pulse output setting  Reverse leads
Display reads normally, but no (or incorrect) 4-20 mA output	Wrong 20 mA setting  Inadequate loop power supply voltage  Polarity incorrect in 4-20 mA loop circuit	Use "Set 20" to correct target top flow rate  Check voltage (For 4-20 mA applications, 24-32 Vdc recommended)  Compare to Connections diagram
Display reads zero when there is flow	Flow sensor failed  Break in flow sensor circuit	Consult Omega  Check for continuity with multimeter
Display reads flow rate when there is none	Long flow sensor wire, running parallel to power wires  Flow sensor malfunction  Flow "jitter" (oscillating slosh) reads as flow	Reroute wire or change to shielded wire  Consult Omega  Consult Omega for "anti-jitter" setting





## 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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## 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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