

User's Guide



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FMG-800 SERIES **Plastic Bodied Magmeter**



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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.

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GENERAL INFORMATION and FEATURES

GENERAL INFORMATION

The FMG800 Series is a full-bore, plastic-bodied electromagnetic flow meter designed for flow and usage monitoring applications in 1, 2 and 3 inch pipe. The polypropylene flow tube offers corrosion resistance to a wide range of chemicals. Its light weight and easy to install or remove from the pipe for inspection.

With no moving parts, the magmeter permits unobstructed flow, minimizing flow disturbances and hence, straight pipe requirements. The FMG800 Series can be used in piping configurations where there is little space between the meter and an elbow or valve. The FMG800 Series, like other magmeters, are resistant to wear from sand and debris found in ground or surface water. Since there are no bearings or propeller to wear out, downtime and maintenance and repair costs are kept to a minimum. Because there are no mechanical parts in the flow stream, the meter tolerates high flows without damage.

The hinged, opaque polyethylene cover protects from dust and UV rays, while permitting easy access to the LCD flow rate and total display. The electronics housing is made of rugged powder-coated die-cast aluminum. It can be fitted with cross-drilled screws and seal wire for tamper-evidence. Flow rate and total can be displayed in a variety of units, customer-selected and factory-set.

The FMG800 Series is used for tracking flow rate and total flow in usage monitoring applications, for instance, in compliance with regulatory requirements. These would include wells, industrial wastewater, gray water, irrigation metering, turf and landscape applications, and other water reclamation operations.

In the event of DC power loss, or when changing the battery, the FMG800 is designed to retain the internal settings and flow total.

The **FMG81x** is externally powered via a 5-pin connector and the power cable also provides pulse output for use with a variety of displays and controls for remote reading, data logging, pulse-to-analog conversion, and telemetry applications.

The **FMG80x** is a battery-operated unit for use when pulse output is not required. The standard batteries are user replaceable with an approximate 1 year life depending on usage.

Model	Description
FMG801	1" Battery Powered Magmeter
FMG802	2" Battery Powered Magmeter
FMG803	3" Battery Powered Magmeter
FMG811	1" DC Powered Magmeter 1 Pulse/Gal Output
FMG812	2" DC Powered Magmeter 1 Pulse/Gal Output
FMG813	3" DC Powered Magmeter 1 Pulse/Gal Output
FMG811-HF	1" DC Powered Magmeter High Frequency Output
FMG812-HF	2" DC Powered Magmeter High Frequency Output
FMG813-HF	3" DC Powered Magmeter High Frequency Output

FEATURES

Polyethylene protective cover

LCD rate and total indicator

Powder-coated die cast-aluminum electronics housing

Cross-drilled screws (2) for tamper-evidence

316SS electrodes

Corrosion-resistant glass-filled polypropylene body
Lightweight for easy handling



Fitting Kit for 2" and 3" models

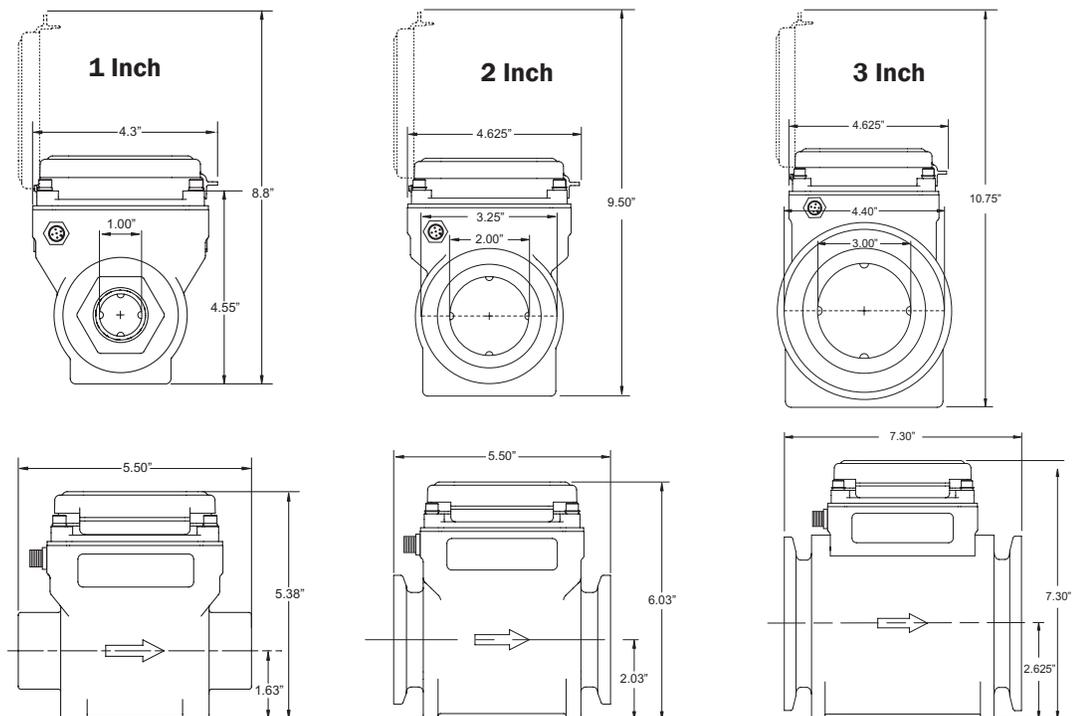
SPECIFICATIONS*

Pipe Size	1, 2 or 3 inch full port			
Fittings	1 inch NPTF, 2 or 3 inch flange clamps with 2 or 3 inch NPTF fitting kit			
Pressure	150 psi or 10.3 bar working pressure @ 70° F			
Operating Temperature Range	10° to 130° F (-12° to 54° C) operating, -40° to 176° F (-40° to 80° C) non-operating			
Accuracy	+/- 1% of reading (between 10% and 100% of max flow) +/- 3% of reading (between cutoff and 10% of max flow)			
Flow Range	Minimum	1 inch: 2.3 GPM (.145 LPS) 2 inch: 6 GPM (.38 LPS) 3 inch: 14 GPM (.88 LPS)		
	Maximum	1 inch: 110 GPM (6.94 LPS) 2 inch: 300 GPM (18.9 LPS) 3 inch: 670 GPM (42.3 LPS)		
Materials	Body	Glass-filled polypropylene		
	Electrodes	316 stainless steel		
	Electronics Housing	Diecast aluminum, powder-coated		
	Display Cover	Polyethylene		
Display	Rate		Total	
	Digits	6	8	
	Units	Gallons/Minute, Cubic Feet/Second, Cubic Feet/Minute, Liters/Second, Liters/Minute, Cubic Meters/Minute	Acre-Feet, Acre-Inch, Gallons, Gallons x 1000, Cubic Feet, Liters, Megaliters, Cubic Meters	
Security	Cross-drilled screws and tamper-evident seal (optional)			
Power	FMG81x	10-30 Vdc @ 60 mA max (15 mA average) NOTE: Using an unregulated power supply >18 Vdc may damage the meter due to AC line input voltage fluctuation		
	FMG80x	6 each AA alkaline cells, replaceable. Estimated life is 1 year depending on usage		
Pulse Output Signal (FMG81x Only)	Current sinking pulse, opto isolated, 32 Vdc max at 10 mA max			
Pulse Rate (FMG81x Only)	Low Frequency	1 unit/pulse out, pulse width of 10ms depending on unit selection		
	High Frequency	1"	2"	3"
		Pulse/Unit	80	30
Empty Pipe Detection	Hardware/software, conductivity-based			
Conductivity	>20 microSiemens/cm			
Environmental	NEMA 4X standard			
Electrical Connection (FMG81x Only)	5 pin male circular connector, mates to industry standard cable			

*Specifications subject to change

DIMENSIONS

Power/Output Cable
- FMG81x Only



FLOW RANGE, INSTALLATION

FLOW RANGE

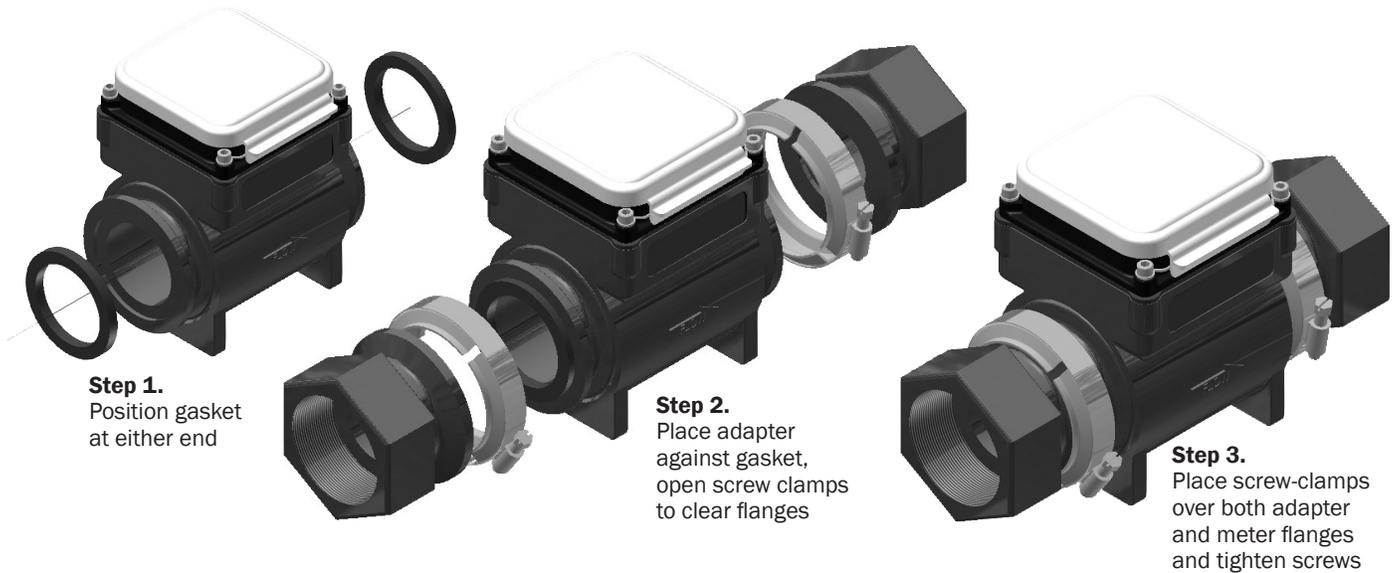
	1"		2"		3"	
	Gal/Min	Liter/Sec	Gal/Min	Liter/Sec	Gal/Min	Liter/Sec
Minimum	2.3	.145	6	.38	14	.88
Maximum	110	6.94	300	18.9	670	42.3

INSTALLATION

Piping Conditions. Installing the meter with a length of straight pipe at least two times the diameter upstream and one diameters downstream is highly recommended. Some piping conditions require more than this. See chart for recommendations.

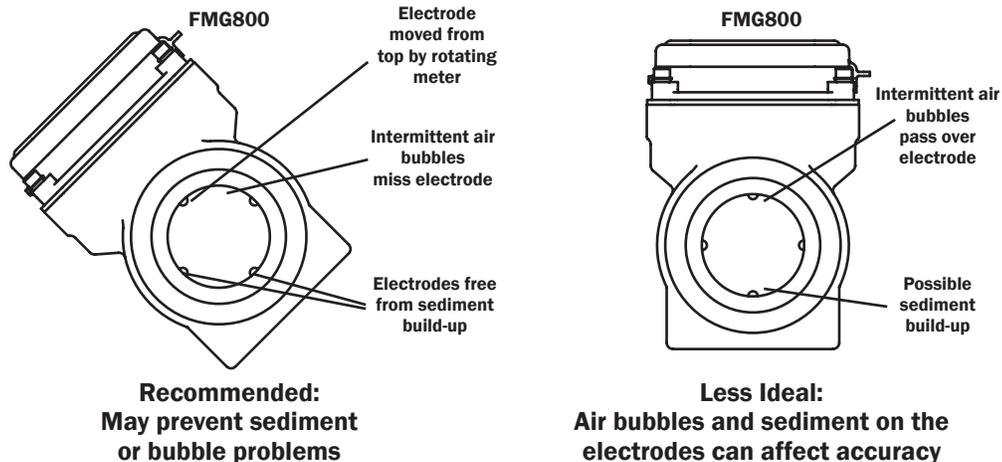
End Connections. The meter comes with union-type flange connections for ease in servicing the meter. To connect these to piping ends, a variety of kits are available.

Follow the diagram below to make the connections.



NOTE: Above installation instructions are for FMG802/812 (2") and FMG803/813 (3") only. The FMG801/811 (1") is provided with intergrated NPT female threaded ends.

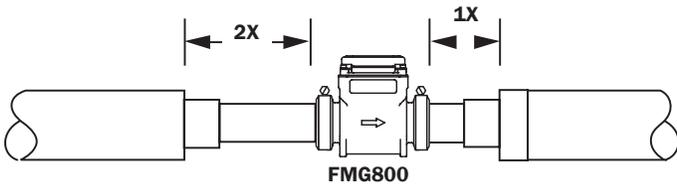
Position. This is an all position meter which can be installed either vertically or horizontally, register up, down or angled. However, entrained air or solids may make some positions preferable to others. See the position diagram for guidance.



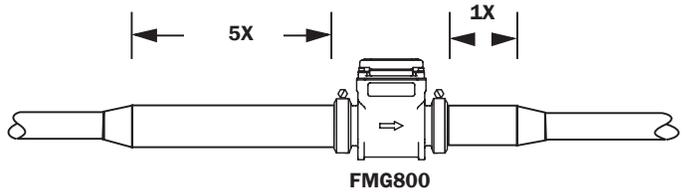
STRAIGHT and FULL PIPE RECOMMENDATIONS

(X = diameter)

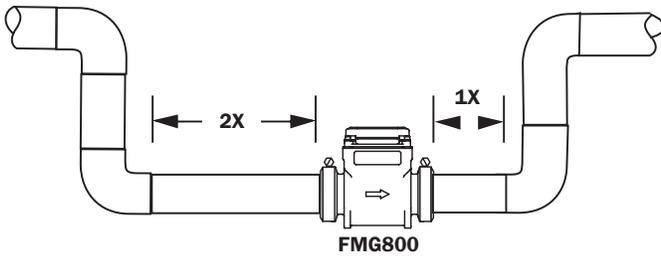
Reduced Pipe



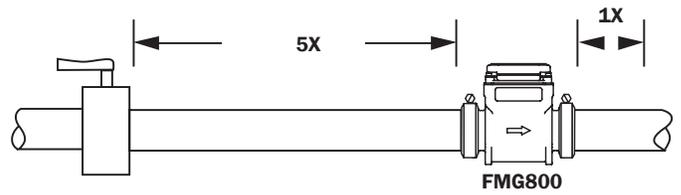
Expanded Pipe



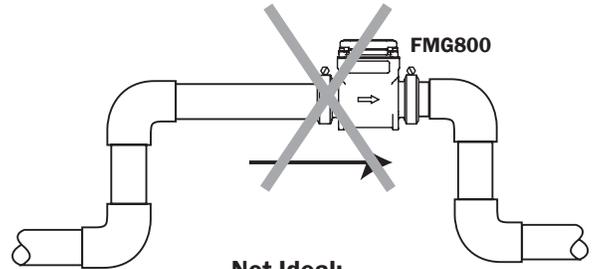
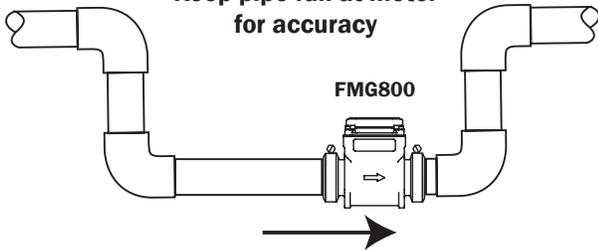
Elbows



Swirling Flow: Partially Open Butterfly Valve

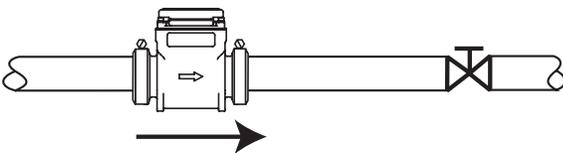


**Recommended:
Keep pipe full at meter
for accuracy**

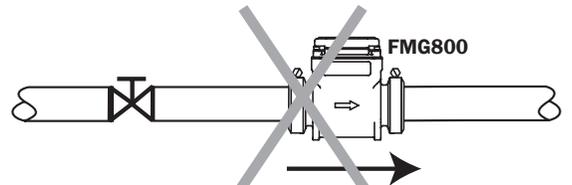


**Not Ideal:
Allows air pockets to form at meter**

FMG800

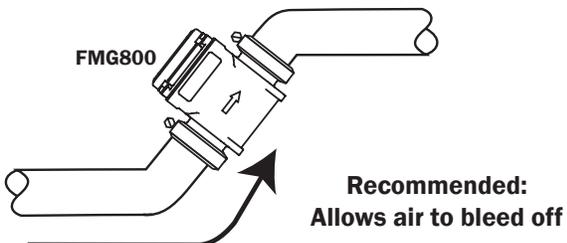


**Recommended:
Keeps pipe full at meter for accuracy**

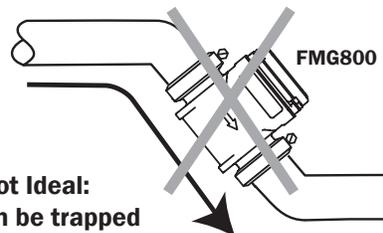


**Not Ideal:
Post-valve cavitation can create air pocket**

FMG800



**Recommended:
Allows air to bleed off**



**Not Ideal:
Air can be trapped**

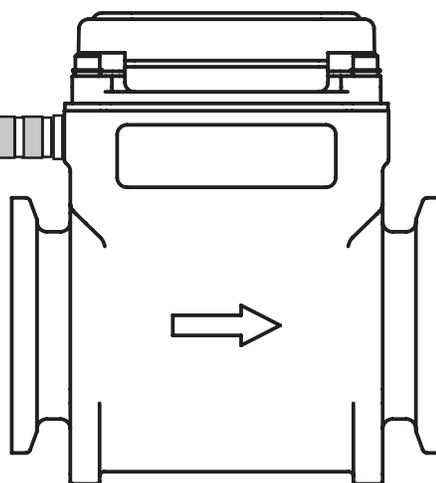
ELECTRICAL CONNECTIONS

FMG80x. The FMG80x is battery-powered totally self-contained and does not require any electrical connections (there is no output on the FMG80x model).

FMG81x. A connector is provided on the outside of the FMG81x. To connect to the meter, plug the cable in and hand tighten the retaining threads. Follow the diagram to make connections. If you are using the pulse output, connect power first and determine that the meter is working properly by observing the display. Then connect the pulse output.

CABLE CONNECTIONS

Gray: Pin 5 = Ground
White: Pin 4 = (-) Pulse
Blue: Pin 3 = (+) Pulse
Black: Pin 2 = (-) Power
Brown: Pin 1 = (+) Power
Shield Drain Wire



OPERATION

Grounding (FMG81x). For best performance, especially in chemically noisy environments, the gray ground wire and the bare drain wire should be connected together and to a good earth ground as close to the meter as possible. Metal pipe and fittings in contact with the fluid should also be bonded to the same earth ground with corrosion-resistant connections.

Display. The display reads flow rate and accumulated total, in the units for which it was ordered. The top line is total, the bottom line is rate, and indicators give the units (ac-ft, GPM for instance.) Empty or partially-full pipe is automatically detected and is indicated by a reading of “ - EP - “.

Battery. The AA Alkaline batteries are user replaceable with an approximate 1 year life depending on usage. On the battery-powered FMG80x there is a low-battery indicator (“low bat”) when the battery voltage drops below a certain point. Batteries should be changed within four weeks of the appearance of this indicator.

MAINTENANCE, REPAIR and TROUBLE SHOOTING

MAINTENANCE AND REPAIR

There are no user-serviceable parts in the FMG800 Series meters except the batteries in the FMG81x.

Battery Replacement. When the “low bat” indicator appears, the batteries should be changed. Six AA alkaline cells are required. To change the batteries, first remove the four screws which hold the top cover in place. Be careful not to lose the washers. Move the top cover to one side and remove the foam retainer which covers the battery tray or pack.

> Remove the old AA alkaline batteries from the battery tray, and replace them with fresh ones, taking care to follow the polarity indicators in the battery tray.

Replace the foam retainer, then put the top cover back in place. Warning! Use Extreme Caution not to pinch wiring or other assembly parts under the housing seal - this may cause an ingress of water, voiding the product warranty. Replace the four screws and washers, then tighten them securely using cross-pattern to evenly compress the gasket. Environmental and Safety note - take care to dispose of all batteries in accordance with Federal, State, and Local regulations.

TROUBLE SHOOTING

Problem	Probable Cause	Try...
Blank display: FMG81x	No power to unit	Check power supply Check wiring
Blank display: FMG80x	Batteries dead or misinstalled	Check polarity, replace batteries
Reading “-EP-”	Empty or partly filled pipe Excessive air pockets or foaming	Rearrange piping to ensure full pipe
Flow but no flow rate reading	Heavily coated electrodes	Remove meter and wipe electrodes



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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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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