



SERIES FLMG

MUNICIPAL/INDUSTRIAL MAGMETER INSTRUCTIONS

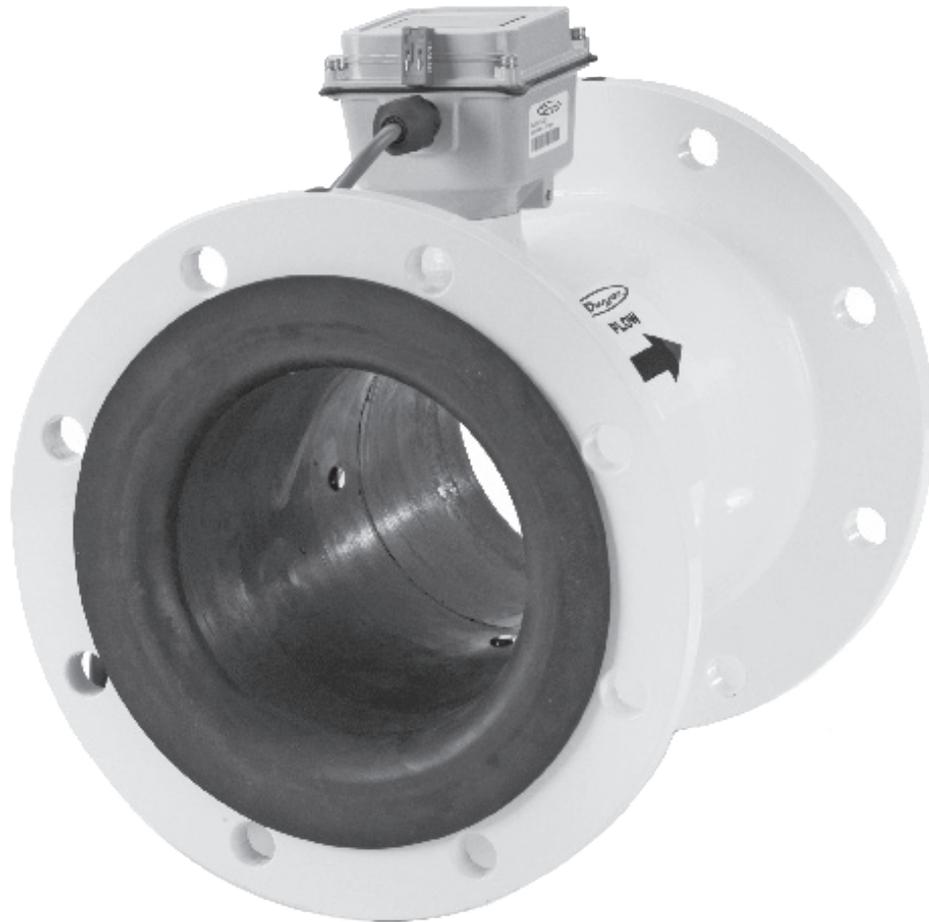


TABLE OF CONTENTS

General Information	
General Information, Features	Page 1
Specifications	
Specifications, Flow Range	Page 2
Installation and Grounding	
Positioning the Meter, Straight Pipe Recommendations, Full Pipe Recommendations, Fittings, Calibration, Chemical Injection, Metal Pipe Installations, Plastic Pipe Installations.....	Page 3
Straight Pipe Recommendations	Page 4
Full Pipe Recommendations	Page 5
Inputs/Outputs and Operation	
Power, Pulse Output, High Frequency Output/K-Factor, Display Reading	Page 6
Connections Diagrams	
BAT/FLMG, RTI/FLMG	Page 7
Troubleshooting	
Problem, Probable Cause, To Try	Page 8

TABLES, DIAGRAMS & CHARTS

Features	Page 1
Specifications	Page 2
Flow Range	Page 2
Metal Pipe Installation, Plastic Pipe Installation	Page 3
Straight Pipe Recommendations	Page 4
Full Pipe Recommendations	Page 5
High Frequency Output/K-Factor	Page 6
Display Readings	Page 6
Connections Diagrams	Page 7
Troubleshooting	Page 8

GENERAL INFORMATION

The Series FLMG is a flanged electromagnetic flowmeter for use in 4" to 10" pipe in municipal or industrial water and wastewater applications where propeller meters have typically been used in the past. Because the FLMG has no moving parts and has electrodes designed to discourage fouling, this magmeter performs well and requires much less frequent maintenance in applications where debris or sand would impede propeller meters. There is no rotor to stop turning or bearings to wear out. Minimal straight pipe requirements allow FLMG Series meters to be used in piping configurations where there is little space between the meter and an elbow.

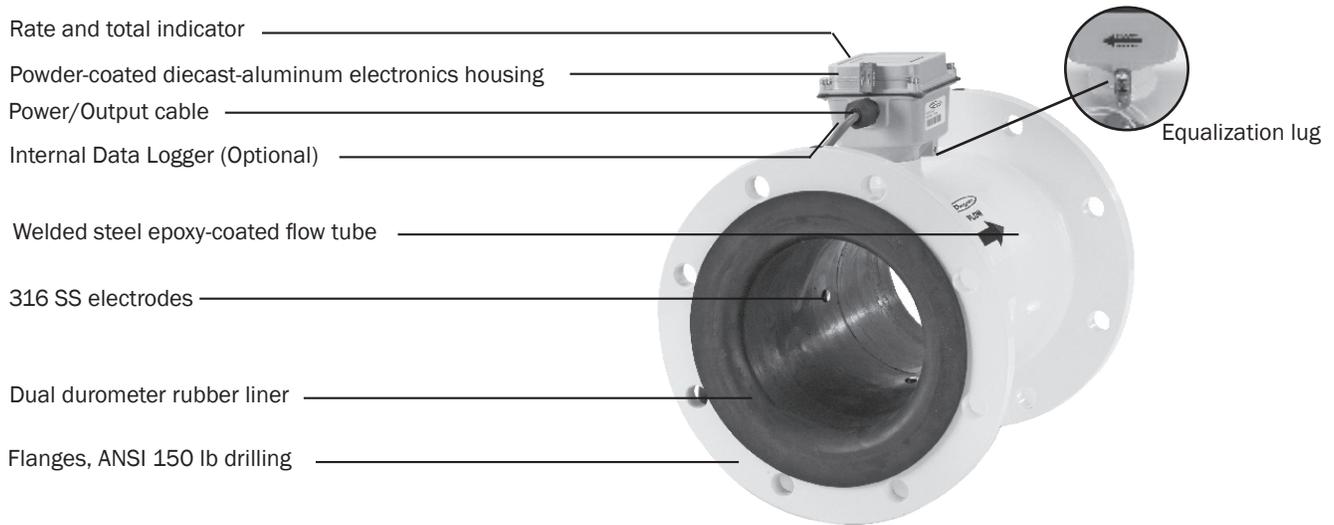
In chemical injection applications, the meter should be placed upstream of the injection line or far enough downstream for thorough mixing to occur before the meter.

Rate and total indication are standard on both models. Flow measurement units are customer-selected and factory-set and can only be changed in the field by an authorized agent.

The Series FLMG is externally powered with 7-26 VDC at 30 mA max (see WARNING on Wiring Diagrams). Two Lithium 3.6V "AA" batteries provide backup during power failures, allowing the meter to seamlessly continue recording flow rate and total for the duration of the outage. Under intermittent use, the battery life is approximately 10 years.

The 20-foot power cable also provides pulse output for use with a variety of Dwyer Instruments Inc. and other displays and controls for remote reading, data logging, pulse-to-analog conversion, and telemetry applications. An internal data logger is also available for secure flow logging. Pulse rate is customer-selected and factory-set and can only be changed in the field by an authorized agent. Default is high frequency for use with 4 to 20 mA signal conversion devices.

FEATURES



SPECIFICATIONS

SPECIFICATIONS*

Pipe Sizes	4", 6", 8", 10"				
Flanges	ANSI 150 lb drilling				
Pressure	150 psi (10.3 bar) working pressure				
Temperature	Operating	10° to 130° F (-12° to 54° C)			
	Non-Operating	-40° to 158° F (-40° to 70° C)			
Accuracy	+/- 1% of reading for flow between 10% to 100% of max flow				
	+/- 2% of reading for flow from cutoff to 10% of max flow				
Materials	Body	Welded steel, epoxy-coated			
	Liner	Dual durometer rubber			
	Electronics Housing	Diecast aluminum, powder-coated			
	Electrodes	316 SS			
Display	Rate	Rate		Total	
	Digits	5		8	
	Units	Gallon/Minute, Liter/Minute, Liter/Second, Cubic Feet/Minute, Cubic Meter/Hour, Million Gallon/Day, Mega Liter/Day		Gallon, Gallon x 1000, Liter, Liter x 1000, Mega Liter, Cubic Meter, Cubic Meter x 1000, Cubic Feet, Cubic Feet x 1000	
Power	7-32 Vdc at 30 mA max, with auxiliary battery for continuous operation during power failures NOTE: Using an unregulated power supply >18 Vdc may damage the meter due to AC line input voltage fluctuation				
Pulse Output	Signal	Current sinking pulse, opto-isolated, 30 Vdc at 10 mA max			
	Pulse Rates	High Frequency (default); 10 units/pulse; 100 units/pulse; 1000 units/pulse			
	High Frequency (pulse/gal)	4"	6"	8"	10"
		16.362	6.307	3.344	2.150
Conductivity	>20 microSiemens/cm				
Empty Pipe Detection	Hardware/software, conductivity-based				
Environmental	NEMA 4X (IP66)				

*Specifications subject to change.

FLOW RANGE

	4"		6"		8"		10"	
	Gal/Min	Liter/Sec	Gal/Min	Liter/Sec	Gal/Min	Liter/Sec	Gal/Min	Liter/Sec
Minimum	12	.75	32	2	60	3.8	95	6
Maximum	500	31.5	1,200	75.7	2,200	138.8	3,500	220.8

INSTALLATION and GROUNDING

INSTALLATION



Caution: These flow sensors are not recommended where installation fault may expose the flow sensor to boiler pressure and temperature. Maximum recommended temperature is 130° F.

Positioning the Meter. These meters can be installed horizontally, vertically, and in any radial position.

Straight Pipe Recommendations. As with most flow meters, the FLMG requires some straight pipe before and after the meter for best accuracy. However, the ability of electromagnetic meters to average the flow across the entire pipe allows for shorter straight pipe recommendations than most mechanical meters (see page 4).

Full Pipe Recommendations. All magmeters require a method for determining that the pipe is empty, to prevent false reading. This meter is designed to go to zero reading if one or more electrodes is exposed. For highest accuracy, install the meter so that the pipe will be full when there is flow. If air bubbles may be present in the pipe or sludge accumulation is an issue, rotate the meter by one flange hole to position the control housing at a 45° angle (see diagrams on page 4).

Fittings. The FLMG flanges have standard ANSI 150 lb drilling and mate with any other ANSI 150 lb flange.

Calibration. The FLMG is factory-calibrated and will not require any form of field calibration.

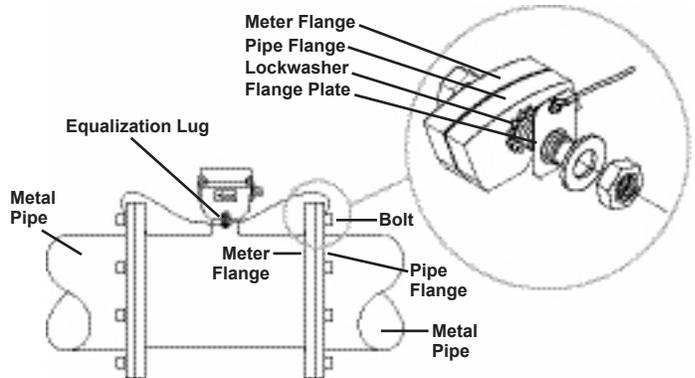
Chemical Injection. When any magmeter, by any manufacturer, is used in a chemical injection application, the chemical injection point must be placed downstream of the magmeter OR far enough upstream for complete mixing to occur before the fluid reaches the meter. When unmixed chemical alternates with 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 applications, install chemical injection point downstream of magmeter, or far enough upstream to allow complete mixing of fluids before the meter.

EQUALIZATION AND GROUNDING

Metal Pipe Installations. To equalize the electrical potential of the fluid, the FLMG meter, and the surrounding pipe, secure the flange plates (factory-installed on the equalization lug) to both pipe flanges at one of the bolt holes, as shown below. Be sure the lockwasher fits between the pipe flange and the flange plate.



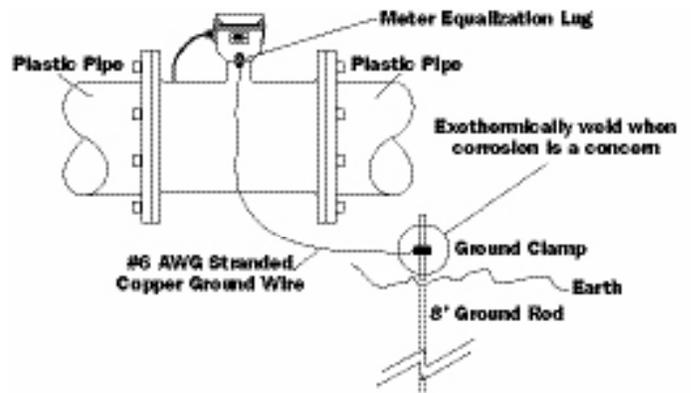
Equalization Diagram

Run wire from equalization lug to both pipe flanges; secure flange plates under bolt heads as shown.



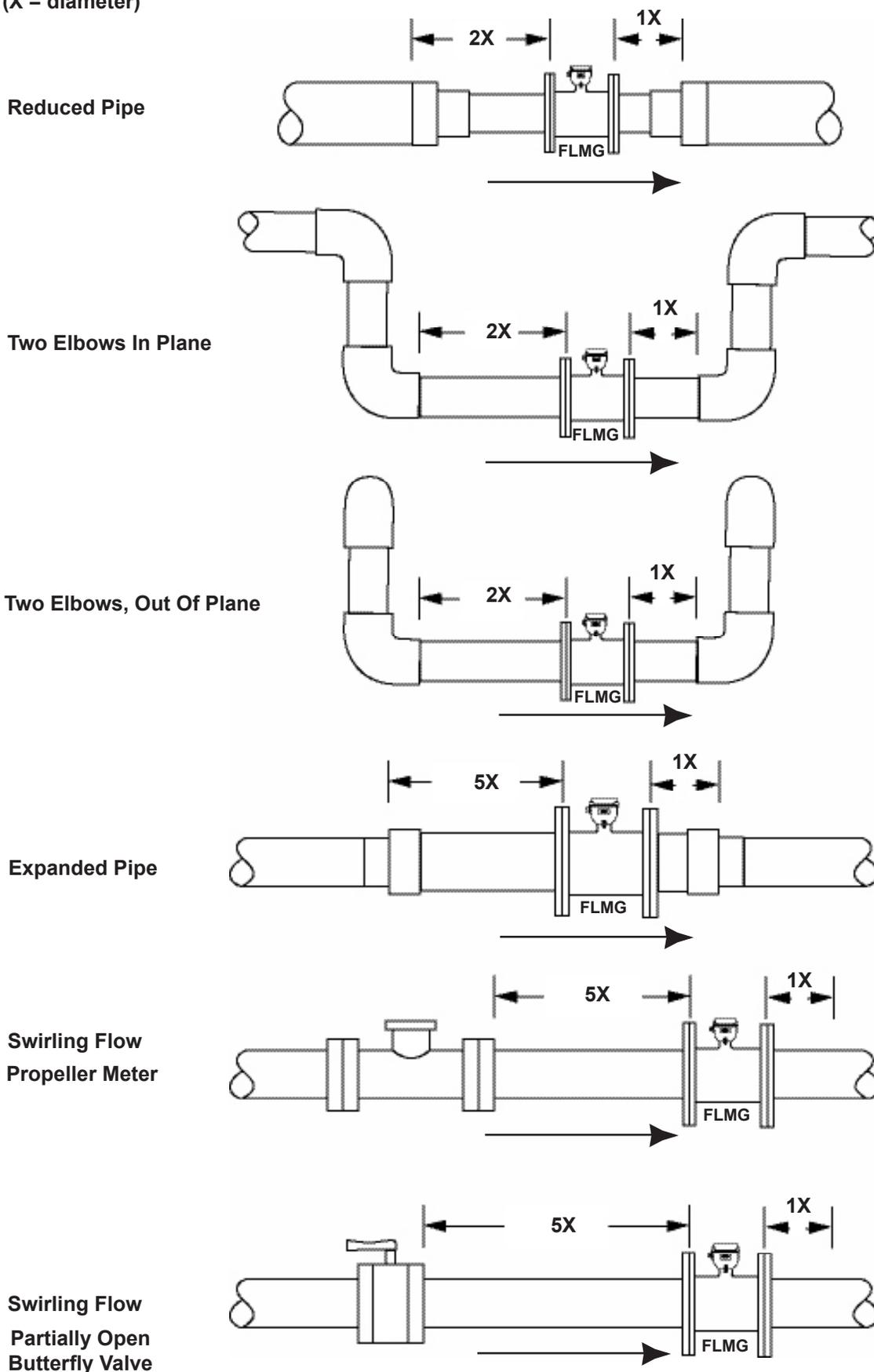
WARNING: ELECTRICAL SHOCK HAZARD When the meter is externally AC powered, the piping system must be grounded to meet national and local electrical safety codes. Failure to do so can result in electrocution.

Plastic Pipe Installations. When the FLMG is installed in a plastic piping system, it is not necessary to use the equalization straps, but very important to ground the meter to avoid electrical shock hazard and electrostatic interference with meter function.



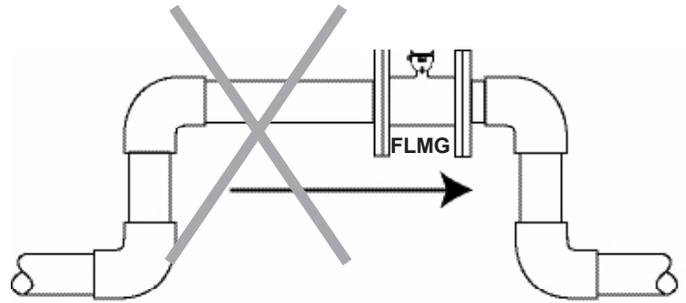
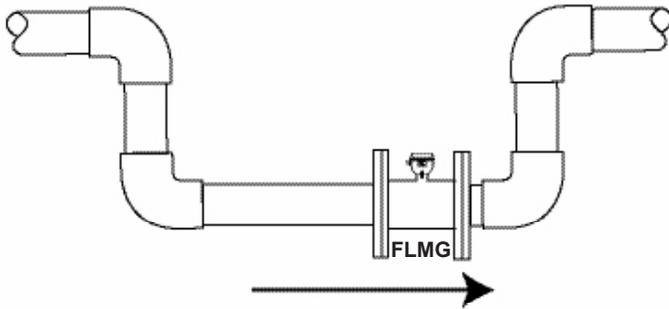
STRAIGHT PIPE RECOMMENDATIONS

(X = diameter)

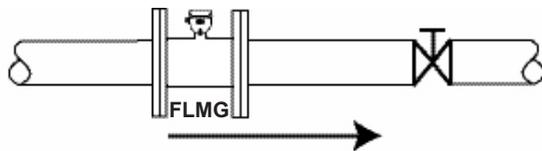


FULL PIPE RECOMMENDATIONS

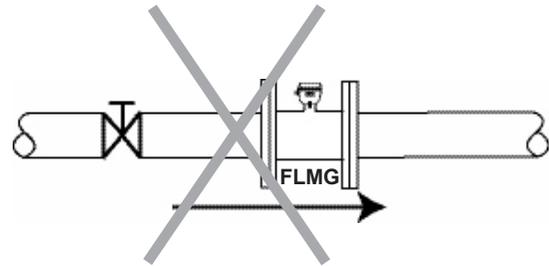
Recommended:
Keeps pipe full at meter for accuracy



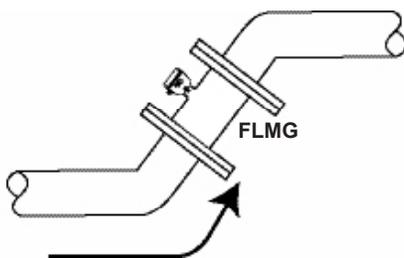
Not Ideal:
Allows air pockets to form at meter



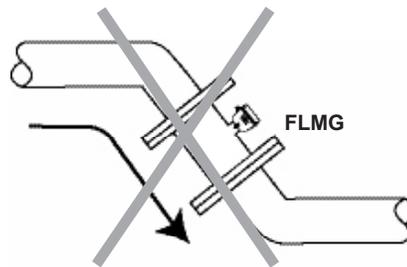
Recommended:
Keeps pipe full at meter for accuracy



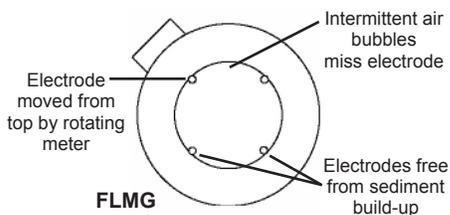
Not Ideal:
Post-valve cavitation can create air pocket



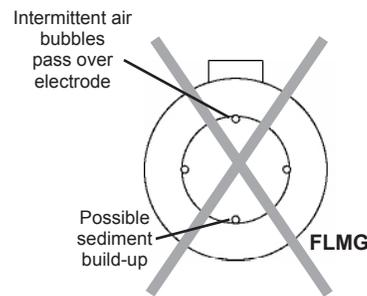
Recommended:
Allows air to bleed off



Not Ideal:
Air can be trapped



Recommended:
Improved accuracy results from unimpeded electrodes



Not Ideal:
Air bubbles and sediment on the electrodes can affect accuracy

INPUTS/OUTPUTS and OPERATION

Power.

The FLMG operates on 8-32 VDC at 30 mA max external power (see WARNING in wiring diagrams). The display reads “P” when external power is in use (see illustration below).

The Lithium battery pack installed in the FLMG serves as backup in the event of a power failure, when it will keep the meter operating without interruption for the duration of the outage. When battery power is in use, the FLMG display continues to read out the rate and total, but the “P” indicating external power is extinguished. When power resumes, the FLMG will seamlessly return to normal power mode, and the “P” will again display.

When used for occasional emergency backup, battery life is approximately ten years.

Pulse Output. The FLMG cable also provides pulse output that can be used for remote reading, 4-20 mA signal conversion, datalogging, and telemetry applications. See page 7 for connection diagrams to Dwyer Instruments Inc. controls and displays.

Note: For data logger setup and operation, refer to Flow Inspector Manual

Pulse rates are selected by the customer at time of order, factory-set. Three pulse rates are possible: One pulse per ten gallons (or liters), one pulse per thousand gallons (or liters), or High Frequency (required for use with 4 to 20 mA converters; see below):

High Frequency Output/K-Factor		
Meter Size	Pulses per Gallon	Pulses per Liter
4"	16.362	4.323
6"	6.307	1.666
8"	3.344	0.883
10"	2.150	0.568

OPERATION



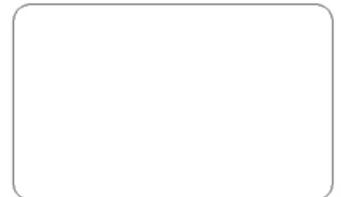
Caution: There are no user-adjustable connections or settings inside the display housing. Use caution when opening the housing for a battery change, to avoid damage to internal components.

Display Reading. The FLMG display has two lines, the bottom line for flow rate and the top line for accumulated total. Measurement units are pre-ordered and factory-set and can be changed in the field only by an authorized individual.

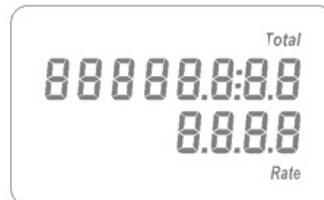
Refer to the diagrams below to read your display.



External Power Indicator



No Power



Backup Operation



Empty Pipe



Meter Installed Backwards

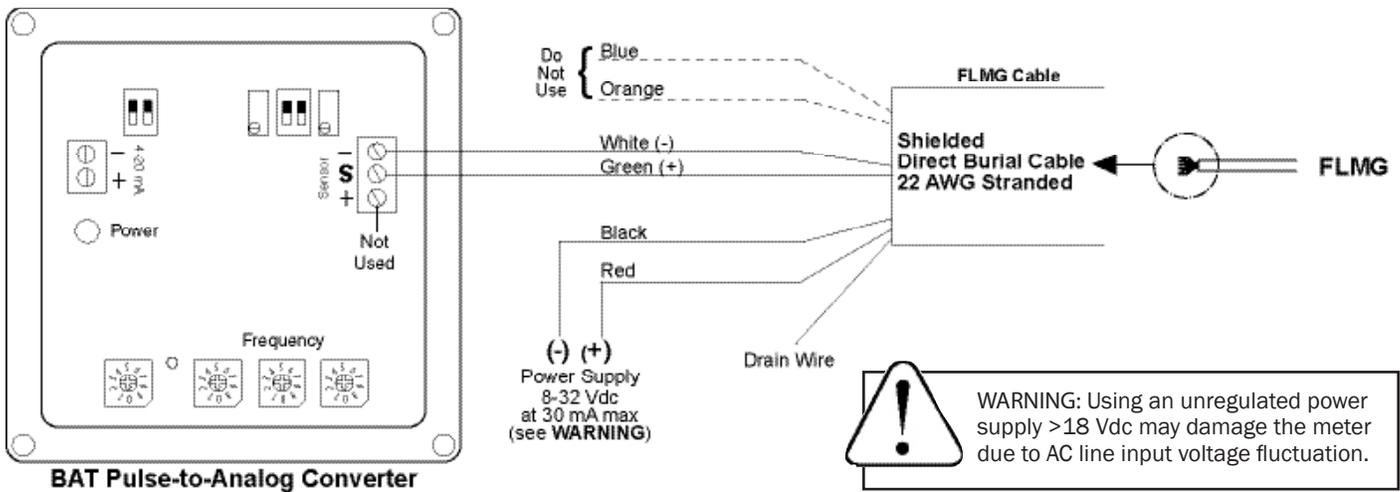
CONNECTIONS DIAGRAMS (WMX101)

The FLMG requires a power source of 8-32 VDC at 30 mA max (see WARNING). The power cable also serves as a pulse output if needed for remote reading, data logging, signal conversion, or telemetry.

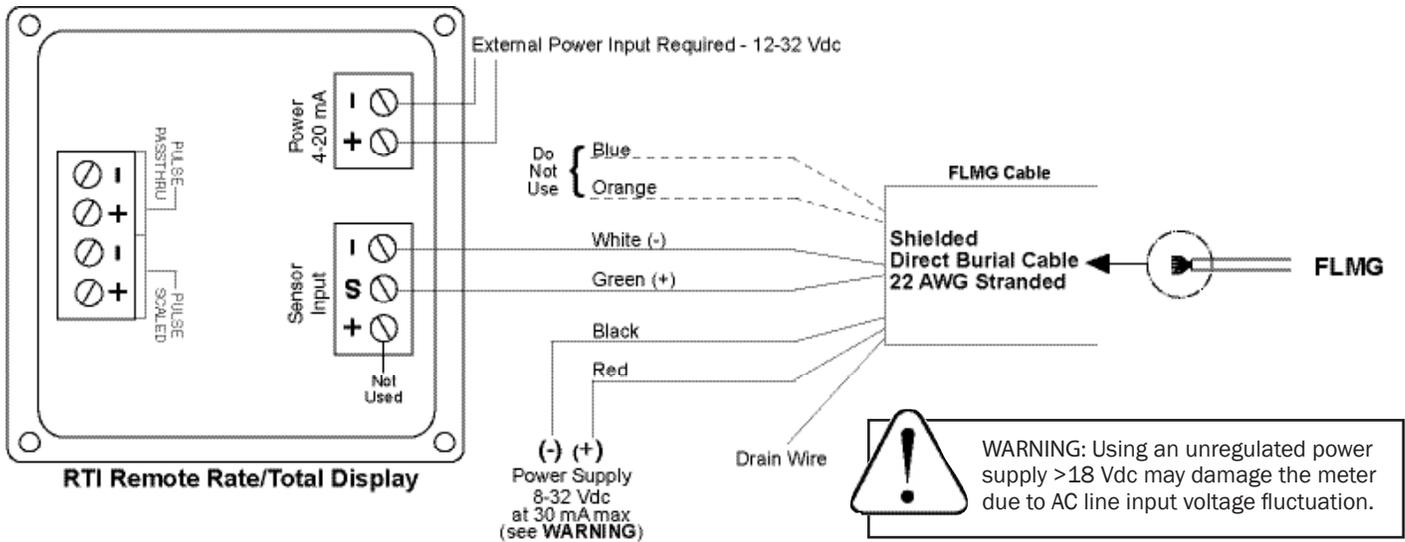
Cable Color Codes

Orange and Blue: Serial Output (Do Not Use)
 Green (+) and White (-): Pulse Output, 30 Vdc max, 10 mA max
 Red (+) and Black (-): External Power, 8-32 VDC at 30 mA max
 Drain: Connect to earth ground (see WARNING)

Series BAT/ Series FLMG



Series RTI/ Series FLMG



TROUBLESHOOTING

Problem	Probable Cause	Try...
Blank Display	No power plus dead backup battery	Replace battery pack, check power connections
Flow rate steadily reads zero when there is flow	Flow is below cutoff (very low) Pipe is not full Meter is installed backwards (display reads [-]) Power connections reversed Fluid conductivity <20microSiemens/cm	Reading will resume when flow increases Reposition meter for full pipe (see page 4) Note flow direction arrow, reverse meter Change power connections Select another flow meter
Flow rate intermittently drops when there is flow	Pipe is not full	Reposition meter for full pipe (see page 5)
Jumpy reading	Missing or incorrect ground wire Pulsing flow Rapidly changing conductivity (in chemical injection applications)	Check for proper ground Use external power source (allows more flow averaging) Install chemical injection line downstream of meter (or far enough upstream to allow complete mixing of fluids before meter)
Meter reads, but no pulse output	External device needs pull-up resistor Reversed leads (polarity sensitive)	Add pull-up resistor Change output connections
Output pulses missing	Meter not reading	Check display

WARRANTY/RETURN

Refer to "Terms and Conditions of Sale" in our catalog or on our website. Contact customer service to receive a Returns Goods Authorization number before shipping your product back for repair. Be sure to include a brief description of the problem plus any relevant application notes.



Dwyer Instruments, Inc. • 102 Indiana Highway 212 • Michigan City, IN 46360 • USA
(P) 219.879.8868 • (F) 219.872.9057 • 1.800.872.9141 • www.dwyer-inst.com