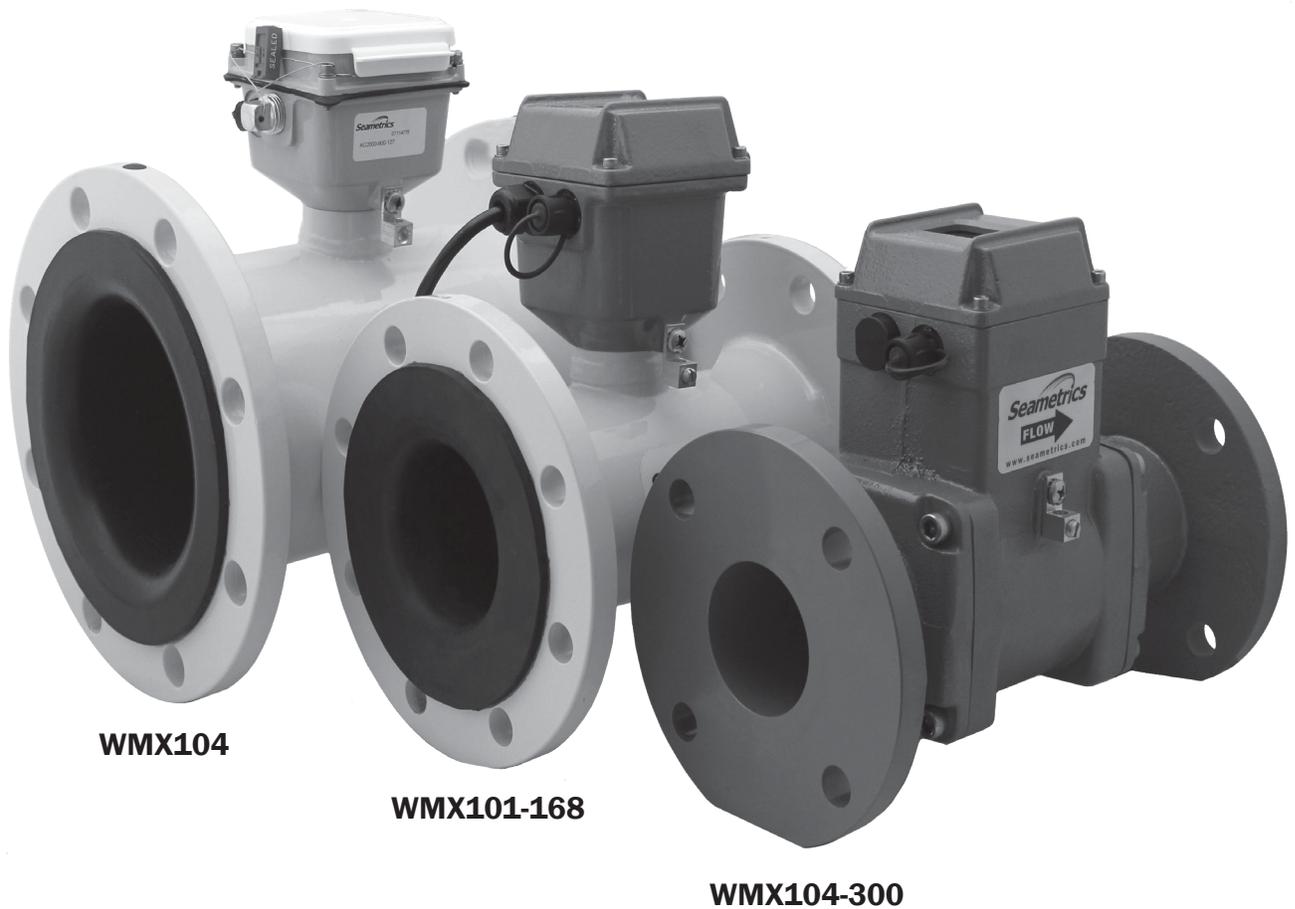


WMX-SERIES



MUNICIPAL/INDUSTRIAL MAGMETER INSTRUCTIONS



WMX104

WMX101-168

WMX104-300

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GENERAL INFORMATION

The **WMX-Series** are flanged electromagnetic flowmeters for use in 3" to 12" pipe in municipal or industrial water and wastewater applications where propeller meters have typically been used in the past. Because the WMX 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 would impede propeller meters. There is no rotor to stop turning or bearings to wear out. Minimal straight pipe requirements allow WMX-Series meters to be used in piping configurations where there is little space between the meter and an elbow.

In chemical injection applications, 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.

The submersible units, -168 option, are rated IP68 (NEMA 6P) for applications where the meter may be under water up to a depth of 3 meters for prolonged periods of time.

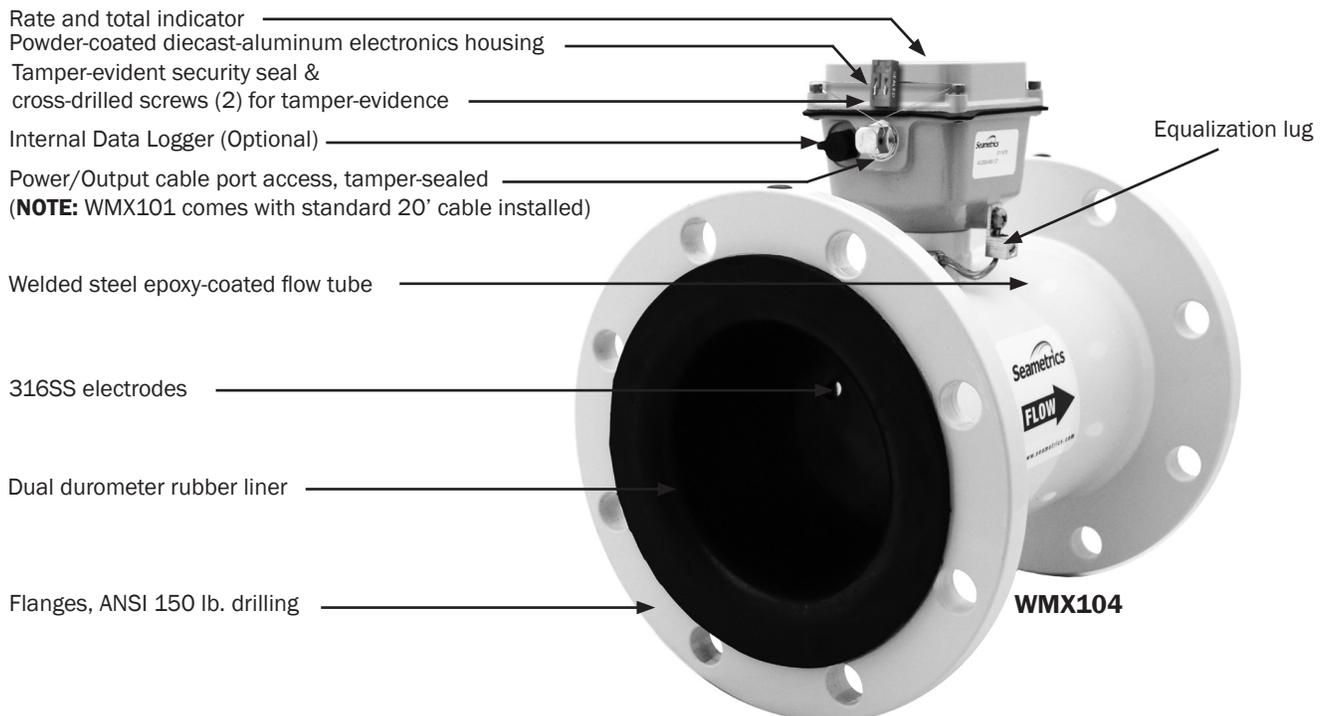
Rate and total indication are standard on both models. Units are customer-selected and factory-set. No set-up is required. The **WMX101** is externally powered with 8-32 Vdc at 30 mA max (see **NOTE** in Specifications). Two Lithium 3.6V "AA" batteries provide auxiliary power during power failures, allowing the meter to continue recording flow rate and total without interruption for the duration of the outage. Where external power loss is infrequent, battery life exceeds 10 years.

The 20-foot power cable also provides pulse output for use with a variety of Seametrics and other displays and controls for remote reading, data logging, pulse-to-analog conversion, and telemetry applications. High frequency pulse rate (required for use with 4-20 mA converters) is standard; additional pulse rates are optional.

The **WMX104** is a battery-operated unit for use when pulse output is not required. Two Lithium 3.6V "D" batteries provide power and are replaceable with an approximate 1-year life under continuous use. An optional input/output cable can be installed post-factory if needed for changing applications.

***Extended battery life is standard on all IP68 meters.**

FEATURES



GENERAL INFORMATION

FEATURES Continued

Rate and total indicator

Tamper-evident security seal & cross-drilled screws (2) for tamper-evidence

Internal Data Logger (Optional)

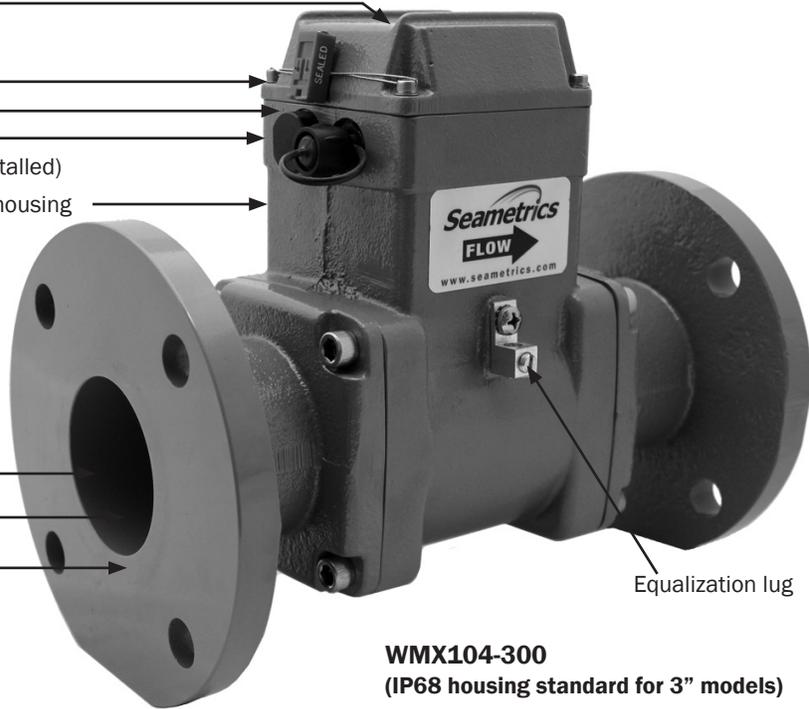
Power/Output cable port access, tamper-sealed
(NOTE: WMX101 comes with standard 20' cable installed)

Powder-coated ductile cast iron body & electronics housing

Glass filled molded plastic liner

316SS electrodes

Flanges, ANSI 150 lb. drilling



WMX104-300
(IP68 housing standard for 3" models)

Rate and total indicator

Tamper-evident security seal & cross-drilled screws (2) for tamper-evidence

Power/Output cable port access, tamper-sealed
(NOTE: WMX101 comes with standard 20' cable installed)

Internal Data Logger (Optional)

Powder-coated ductile cast iron electronics housing



IP68 Housing Option
(For 4"-10" meter;
standard for 3" models)

SPECIFICATIONS

SPECIFICATIONS*

Pipe Sizes	3", 4", 6", 8", 10", 12"												
Fittings	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 (3" Only)	Ductile cast iron, powder coated											
	Body (4"-12")	Welded steel, epoxy-coated											
	Liner (3" Only)	Noryl®											
	Liner (4"-12")	Santoprene/Polypropylene											
	Electronics Housing	Diecast aluminum, powder-coated (non-IP68)						Ductile Cast Iron (IP68)					
	Electrodes	316 stainless steel											
	O-ring (3" Only)	EPDM											
Display	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 Meters, Cubic Meter x 1000, Cubic Feet, Cubic Feet x 1000					
Power	WMX101: 8-32 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												
	WMX104: 2 Lithium 3.6V "D" batteries, replaceable, 1 year life under continuous use.												
Pulse Output	Signal	WMX101: Current sinking pulse, opto-isolated, 30 Vdc at 10 mA max											
		WMX104: Pulse output available only with addition of post-factory output cable											
	Pulse Rates	High Frequency; 10 units/pulse; 100 units/pulse; 1000 units/pulse											
	High Frequency (pulse/gal)	3"	4"	6"	8"	10"	12"						
	25.228	16.362	6.307	3.344	2.150	1.530							
Conductivity	>20 microSiemens/cm												
Empty Pipe Detection	Hardware/software, conductivity-based												
Environmental	NEMA 4X Standard (IP68 Option)												
Regulatory	Certified to NSF/ANSI standard 61												

*Specifications subject to change. Please consult our website for the most current data (www.seametrics.com).

FLOW RANGE (3" - 12")

Meter Size	3"		4"		6"		8"		10"		12"	
	Gal/Min	Liter/Sec										
Minimum	7.5	.47	12	.75	32	2	60	3.8	95	6	130	8.2
Maximum	700	44.2	1,000	63	2,400	151.4	4,400	277.6	7,000	441.6	10,000	630.9

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. **Using a check valve on the upstream side of the meter, and/or an air vent (vacuum relief valve) in the same, unobstructed run of pipe as the meter, is required in any installation where the meter may be exposed to suction when the system is not in normal operation. Suction can cause damage to the liner. Liner damage caused by suction, without the use of a check valve and/or air vent, may void the warranty.**

Straight Pipe Recommendations. As with most flow meters, the WMX 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 5).

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

Calibration. The WMX 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.

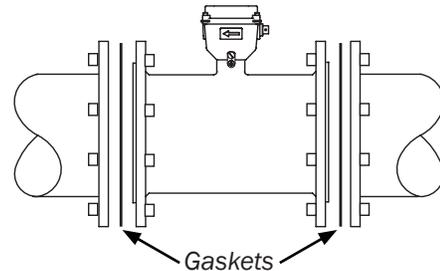
Installing Gaskets



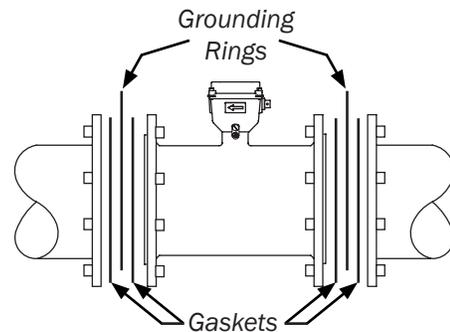
GASKETS

Gaskets are required at all junctions.
(Not applicable to 3" model.)

1. Select a suitable full-face gasket.
 - Only use flat compressible gaskets (either pliable or hard fiber will work).
 - Use a material compatible with the fluid you will be using.
 - Thickness should be 1/8" - 1/4" (3 - 6 mm), depending on the flatness of the pipe flange surface.
 - Inner diameter must be larger than opening in flow meter.
2. Be sure all mating surfaces are smooth and free of debris.
3. Install gaskets on each end of meter as shown in diagrams below. If using grounding rings, install one gasket on each side of the grounding ring.



Installation without gaskets



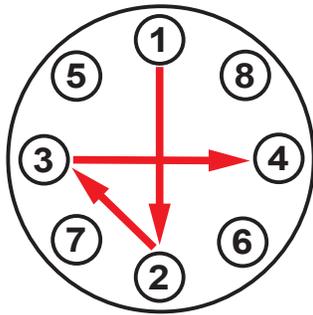
Installation with gaskets

INSTALLATION and GROUNDING

Tightening Flange Bolts

NOTE: Mating pipe flanges must be ANSI 150# full face (FF) and/or raised face (RF).

1. Tighten flange bolts in an alternating pattern.
 - Tighten left flange bolt-1 to 20% recommended torque.
 - Tighten right flange bolt-1 to 20% of recommended torque.
 - Repeat steps a and b for each bolt in an alternating order, such as shown at right, tightening to 40%, then 60%, then 80%, and then 100%.
2. Test for leaks.
3. If needed, tighten further in 10% increments until leaking stops. **DO NOT over-tighten. Over-tightening can cause serious damage to the flow meter.**
4. Recheck after 24 hours, adjusting if needed.



Suggested Tightening Sequence



Caution: Improper tightening sequence can cause serious damage to the flow meter.

- Do not tighten one side at a time.
- Do not tighten each bolt completely at one time.

SUGGESTED FLANGE BOLT TORQUE

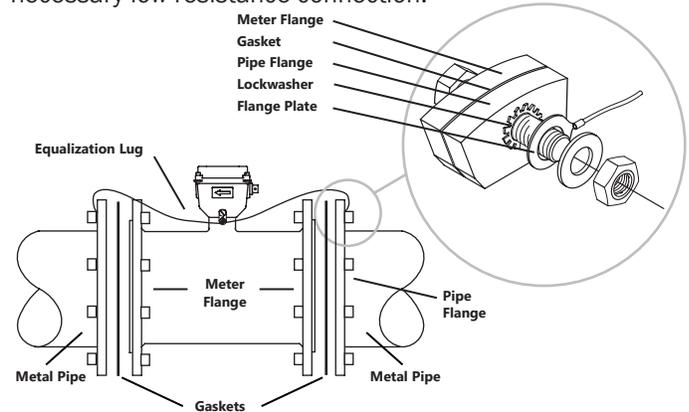
Pipe Size	Santoprene Liner	
	ft-lb	Nm
3"	25	34
4"	20	27
6"	42	57
8"	65	88
10"	73	99
12"	97	132

Equalization and Grounding



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

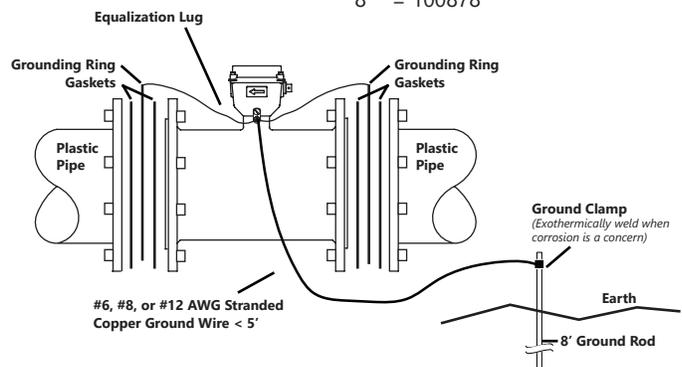
Metal Pipe Installations. To equalize the electrical potential of the fluid, the meter, and the surrounding pipe, secure the flange plates (factory-installed on the equalization wire) to both pipe flanges at one of the bolt holes, as shown below. Be sure the lock washer fits between the pipe flange and the flange plate. For the best electrical bonding, remove rust and paint to expose clean, bare metal where the equalization flange plate lock washer contacts the pipe flange. Connection must be inspected periodically for corrosion to maintain the necessary low resistance connection.



Plastic Pipe Installations. When the meter is installed in a plastic piping system, grounding rings are recommended (except 3" pipe size), especially in the presence of electrical interference sources such as VFD pump drives. As shown in the diagram below, the equalization wires should then be connected to the grounding ring tabs instead of the flange bolts as in metal piping installations. Where lightning is a threat, or in severe electrical environments, an optional connection to a nearby equipment ground or ground rod may be advisable.

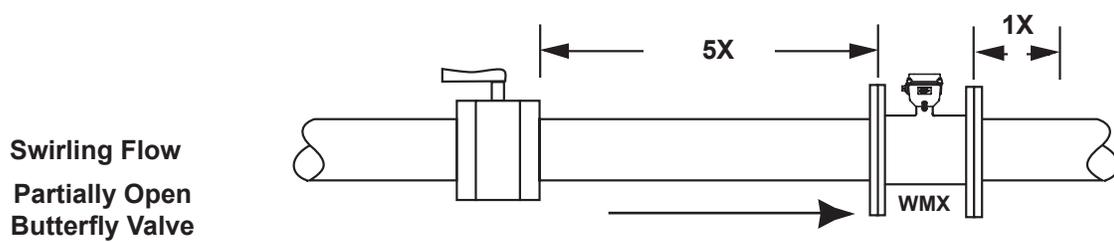
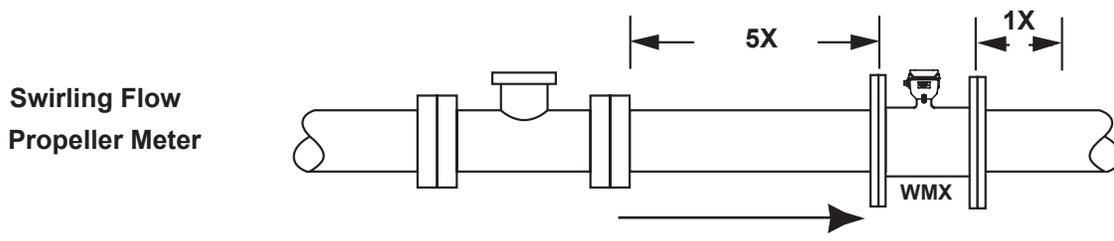
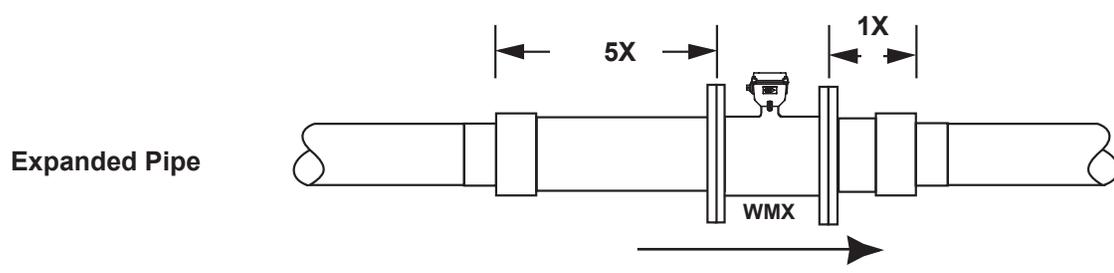
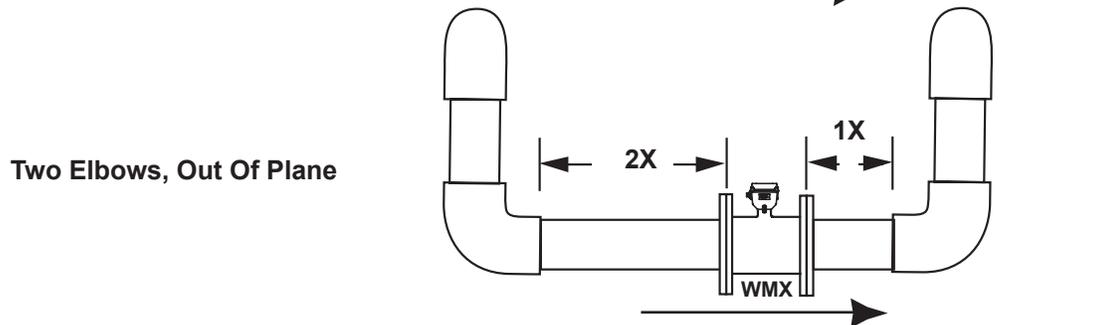
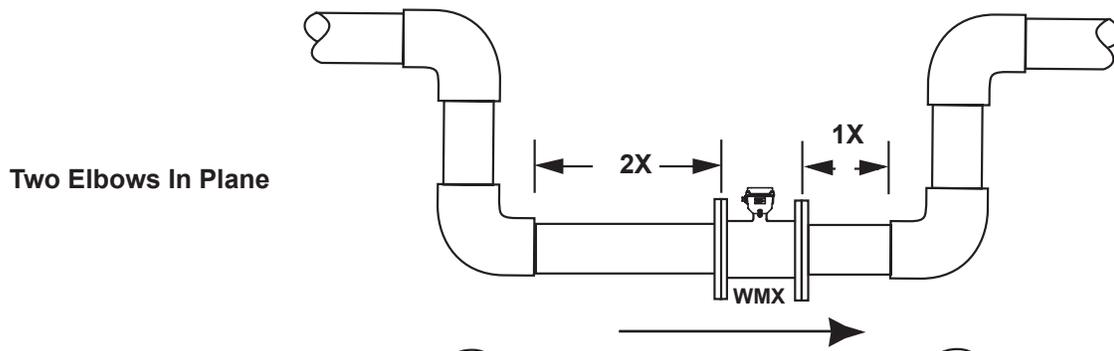
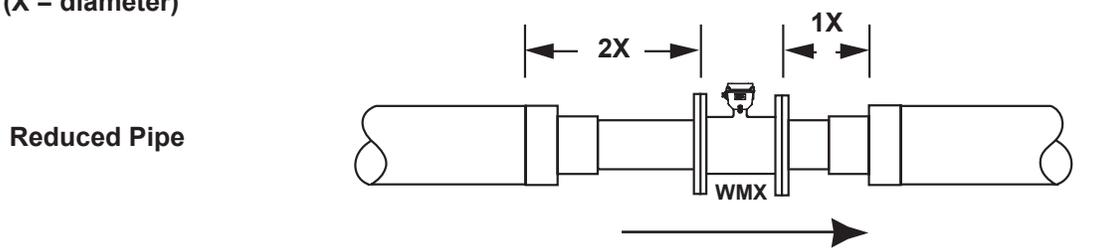
Grounding Ring Part Numbers:

- 4" = 100876 10" = 100879
- 6" = 100877 12" = 103288
- 8" = 100878



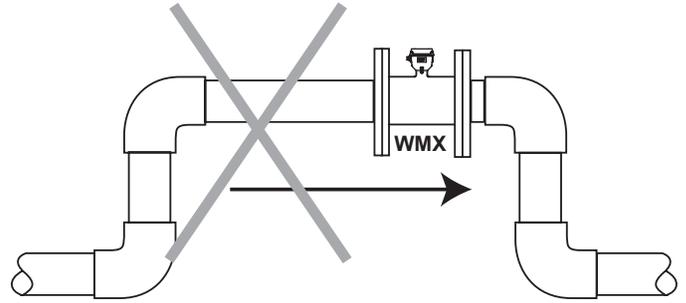
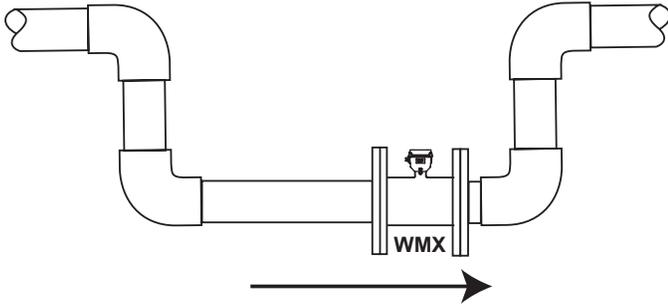
STRAIGHT PIPE RECOMMENDATIONS

(X = diameter)

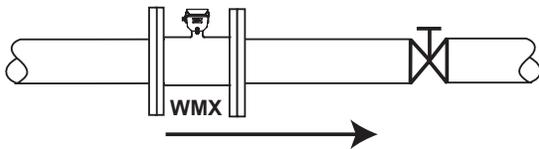


FULL PIPE RECOMMENDATIONS

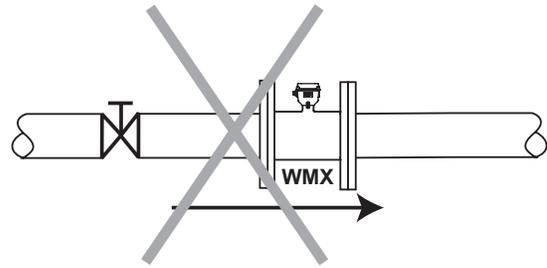
Recommended:
Keep pipe full at meter for accuracy



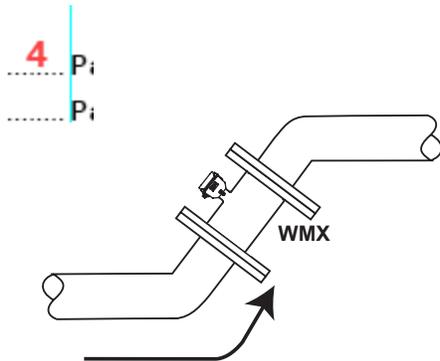
Not Ideal:
Allows air pockets to form at meter



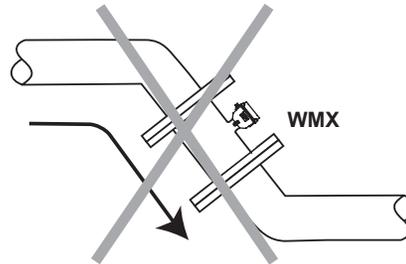
Recommended:
Keeps pipe full at meter for accuracy



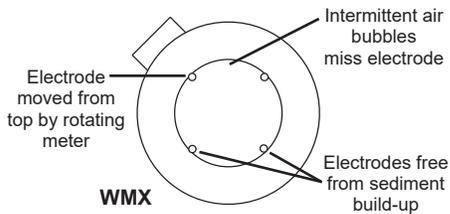
Not Ideal:
Post-valve cavitation can create air pocket



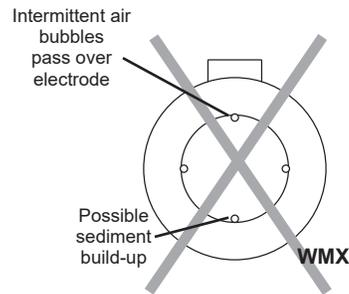
Recommended:
Allows air to bleed off



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

WMX101

External Power (WMX101). The WMX101 operates on 8 to 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 WMX101 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 WMX101 display continues to read out the rate and total, but the “P” indicating external power is extinguished. When power resumes, the WMX101 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 (WMX101). The WMX101 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 Seametrics 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, and can only be changed in the field by an authorized Seametrics dealer. 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 4-20 mA converters; see below):

High Frequency Output/K-Factor		
Meter Size	Pulses per Gallon	Pulses per Liter
3"	25.228	6.665
4"	16.362	4.323
6"	6.307	1.666
8"	3.344	0.883
10"	2.150	0.568
12"	1.530	0.405

WMX104

Battery Power (WMX104)*. The WMX104 is powered by a non-rechargeable battery pack with an approximate 1-year life under continuous use. Actual lifespan will vary from application to application, depending on the duty cycle.

“Low Batt” will display when there are approximately three days of use left in the batteries (see illustration). Replacement instructions come with the custom battery pack available from your dealer or Seametrics.

Pulse Output (WMX104). Pulse output capabilities are built in to the WMX104, but cannot be utilized without the addition of an optional output cable. A WMX104 can be retrofitted with this cable in the field. **IMPORTANT:** *When field installing the input/output cable, be sure to snugly tighten the cable strain relief to prevent water ingress.*

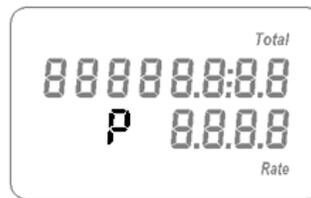
OPERATION



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 WMX 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.



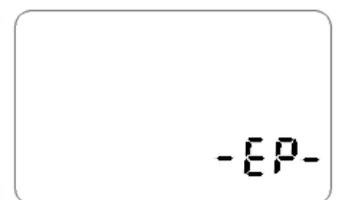
External Power Indicator
(WMX101 Only)



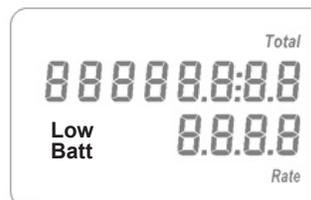
No Power



Battery Power
(WMX104 Standard Operation)
(WMX101 Backup Operation)



Empty Pipe



Low Battery Indicator
(3 days remaining)



Meter Installed Backwards

CONNECTIONS DIAGRAMS (WMX101)

The **WMX101** requires a power source of 8 to 32 Vdc at 30 mA max (see **WARNING**). The WMX101 power cable also serves as a pulse output if needed for remote reading, data logging, signal conversion, or telemetry.

WMX101 Cable Color Codes

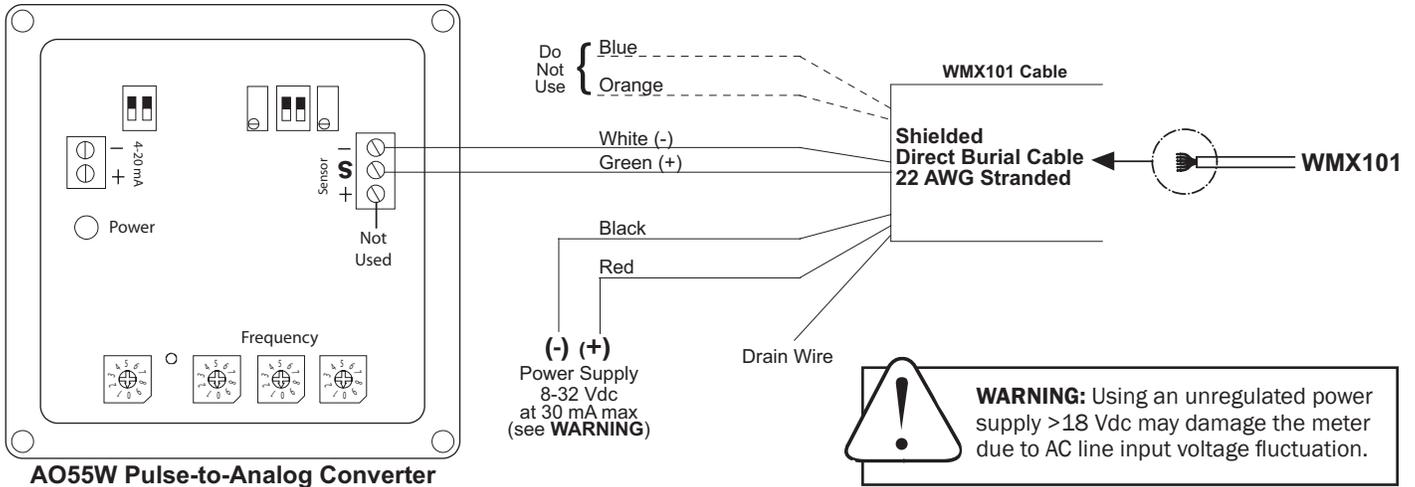
Orange and Blue: Serial Output (Do Not Use)

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

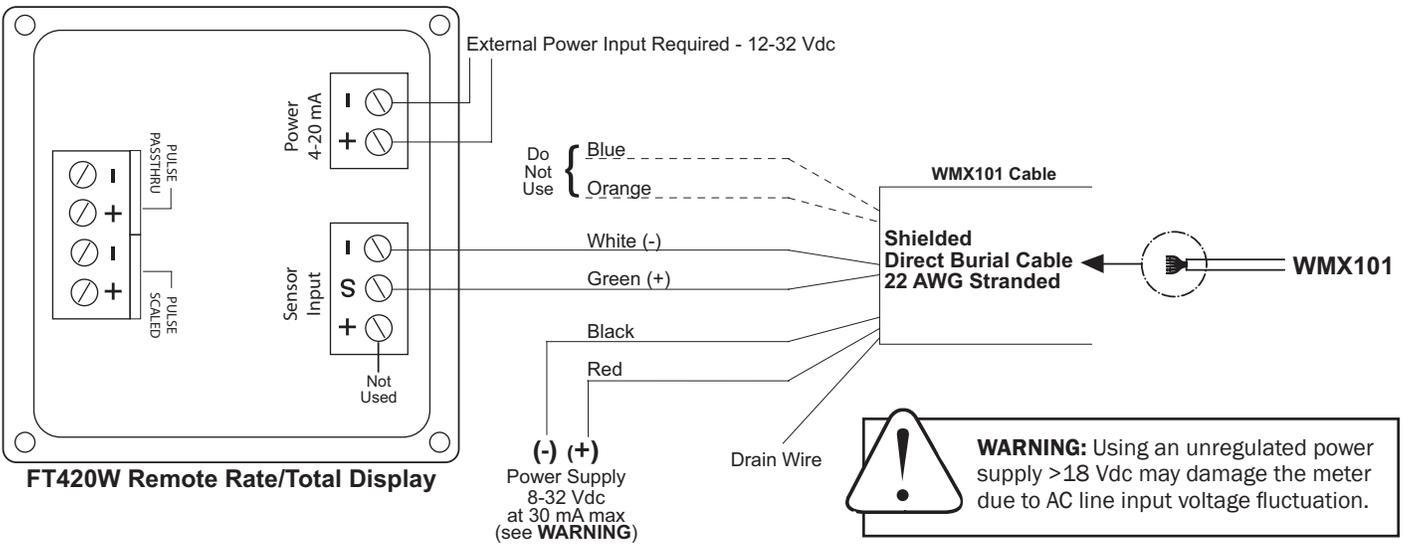
Red (+) and Black (-): External Power, 8-32 Vdc at 30 mA max

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

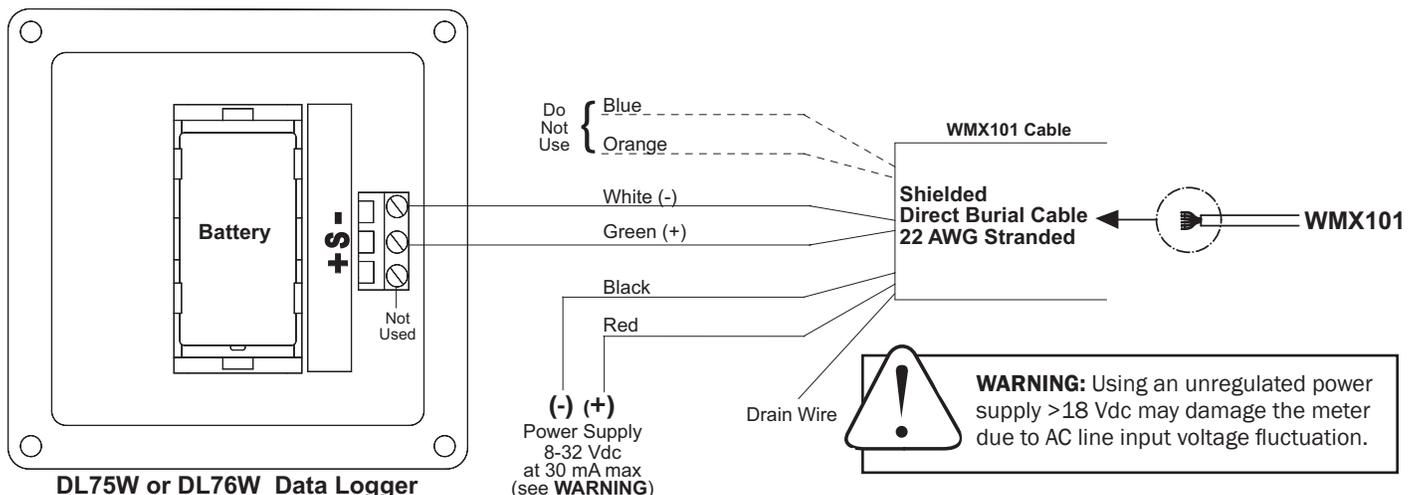
A055/WMX101



FT420/WMX101



DL75 or DL76/WMX101



TROUBLESHOOTING

Problem	Probable Cause	Try...
Blank Display	Dead battery (WMX104) No power plus dead battery (WMX101)	Replace battery pack 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 (WMX101) 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 4)
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 (WMX101)	External device needs pull-up resistor Reversed leads (polarity sensitive)	Add pull-up resistor (For details, refer to 'Connecting to PLCs' Technical Bulletin at www.seametrics.com) Change output connections
Output pulses missing	Meter not reading	Check display

