

1 YEAR
WARRANTY

Ω OMEGA™

User's Guide



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FMG480 SERIES
Municipal/Industrial Magmeter



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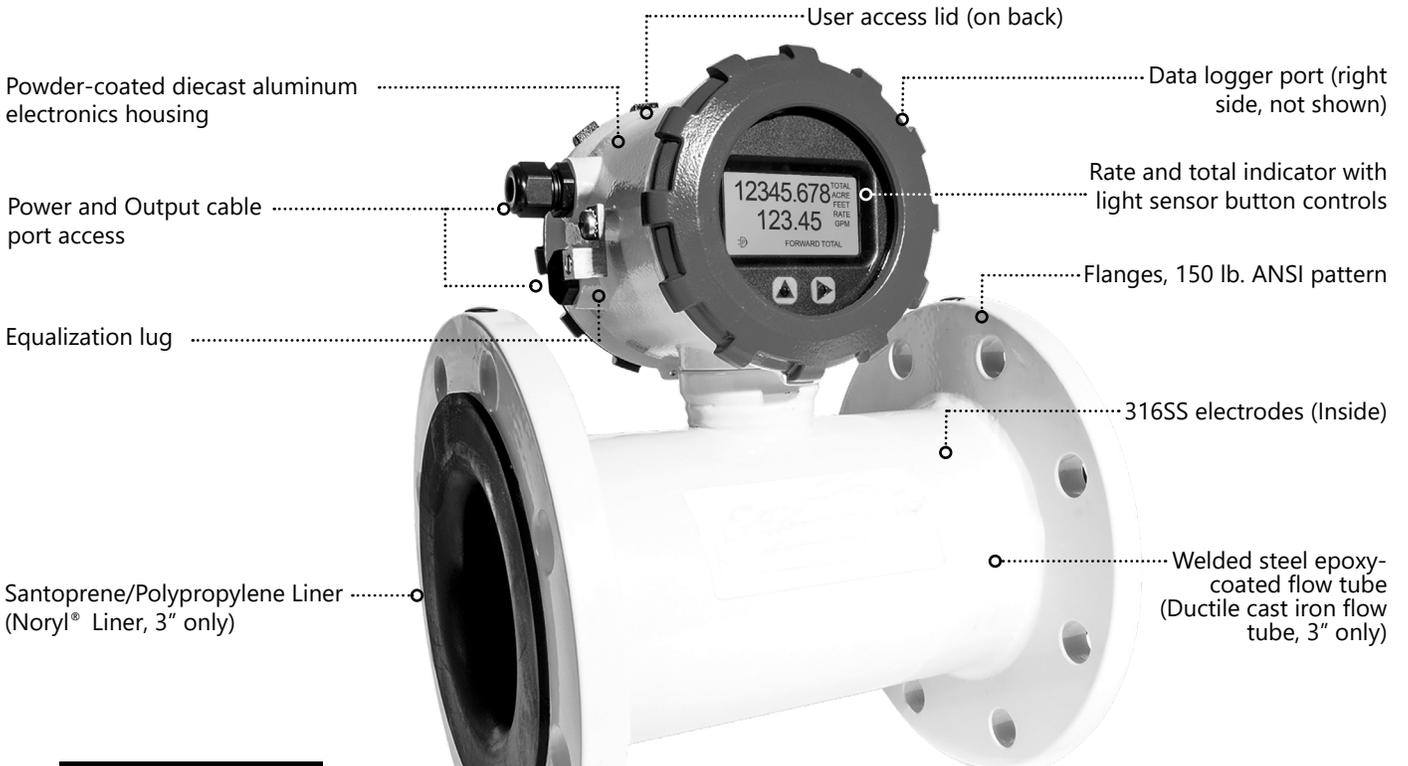
The **FMG480 Series** is a spool-type electromagnetic flowmeter for use in irrigation applications in 3" to 12" pipe. With no moving parts, these meters provide unobstructed flow and are resistant to wear from debris found in ground or surface water. Little maintenance is required because there are no bearings to wear out or propellers to stop turning. Minimal straight pipe requirements allow FMG480 meters to be used in piping configurations where there is little space between the meter and an elbow.

The FMG480 is available as either AC or DC powered, with battery backup. Both rate and total indication show on the meter mounted display. Bidirectional flow reading is standard with totals available in forward, reverse, net flow,

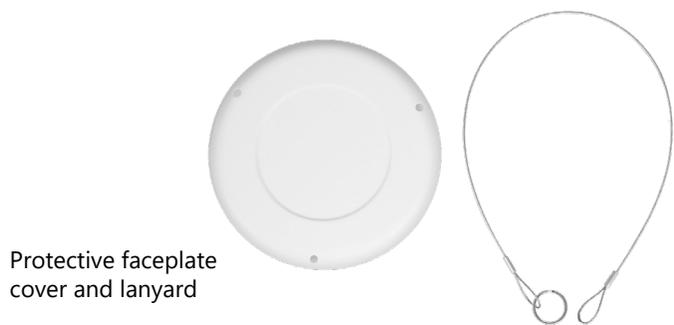
batch forward flow, and batch reverse flow. Batch totals can be reset. Built-in data logging is available as an option for secure flow logging.

Scaled pulse and 4-20mA outputs are standard. The FMG480 Series is CE certified and IP68 for burial, or applications where the meter may be under water for prolonged periods of time. All meters are provided with a security seal to protect against unauthorized access. The seal can be broken by an authorized agent, to change units of measure, pulse rate, replace the battery pack, or field install a power/output cable. The cable(s) are field installed.

Features



No moving parts



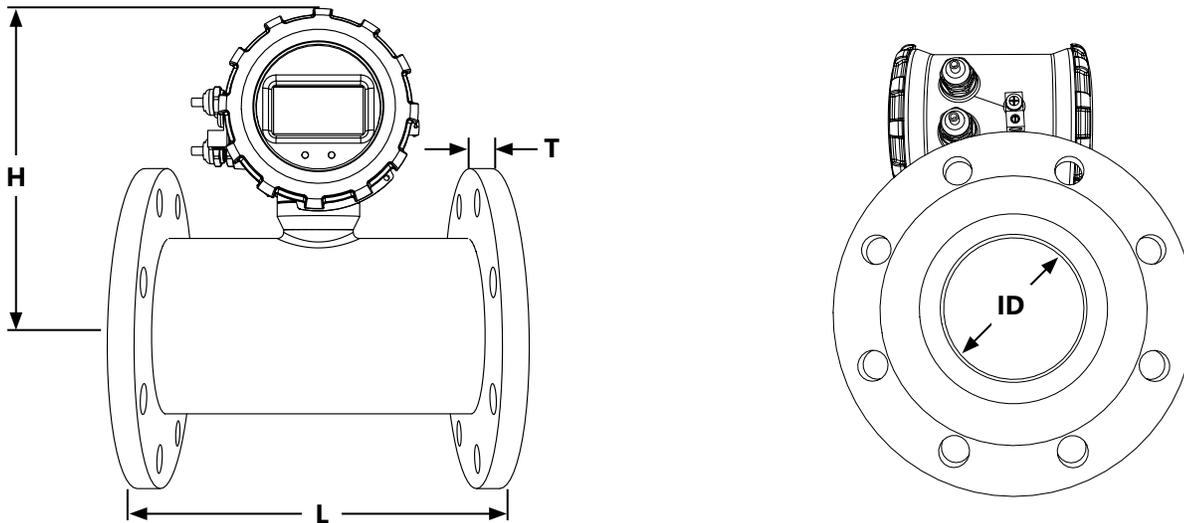
Specifications*

Pipe Sizes	3", 4", 6", 8", 10", 12"			
Flanges	150 lb. ANSI Pattern			
Pressure	150 psi (10.3 bar) line pressure			
Temperature Operating	10° to 140° F (-12° to 60° C)			
Storage	-40° to 158° F (-40° to 70° C)			
Accuracy	±0.75% of reading on FMG480 and FMG490 (±1.0% FMG470), ±0.025% of full-scale flow from low flow cutoff to maximum flow rate of 10 m/sec			
Low Flow Cutoff	0.5% of maximum flow rate			
Material	Body (3" only)	Ductile cast iron, powder coated		
	Body (4"-12")	Welded steel, epoxy-coated		
	Liner (3" only)	Noryl®		
	Liner (4"-12")	Santoprene flange/Polypropylene liner body		
	Electronics Housing	Powder-coated diecast aluminum		
	Electrodes	316 stainless steel		
	O-ring (3" only)	EPDM		
Display	Type	128x64 dot-matrix LCD		
	Digits	5 Digit Rate		8 Digit Total
	Units	Rate Volume Units		Rate Time Units
	<i>Please Note: All FMG470 meters are factory set for gallons per minute (GPM) rate and acre feet total. If other units are required, they can be set in the field.</i>	Gallons Liters Barrels(42 gal) Cubic Feet Cubic Meters	Million Gallons ² Mega Liters ² Imperial Gallons Million Imperial Gallons ²	Second Minute Hour Day
				Barrels (42 gal) Cubic Meters Cubic Meters x 1000 Cubic Feet Cubic Feet x 1000 Second Foot Day Million Cubic Feet
				Acre Feet Acre Inches Imperial Gallons x 1000 Million Imperial Gallons Fluid Ounces
Bidirectional	Forward Total, Reverse Total, Net Total, Batch Forward Total, Batch Reverse Total (Batch totals can be reset)			
Power	DC Power	9-36 Vdc @ 250 mA max, 30 mA average		
	Battery Backup <i>(Not for use as primary power)</i>	DC powered units: Two lithium 3.6V 'D' batteries, replaceable. AC powered units: One 9V alkaline battery, replaceable.		
	AC Power <i>(FMG490 and FMG480 only)</i>	85-264Vac, 50/60Hz, 0.12A		
	Battery <i>(FMG470 only)</i>	One lithium 7.2V 'D' size battery pack, replaceable.		
Scaled Pulse Output	Signal	Current sinking pulse, isolated, 36 Vdc at 10 mA max		
	Pulse Rates	User-scalable from 0.1 to 99,999.9 volume units/pulse. Pulse width is one-half of pulse period with minimum pulse width of 2.5 ms, 200 pulses/sec max. For battery option meters, pulse width varies with frequency, 150 pulses/sec max.		
Options	4-20mA Current Loop	Isolated, passive, 24Vdc, 650 Ω maximum current loop		
Cable	Power/Output Cable	20ft (6m) standard length polyurethane jacketed cable—for power and outputs (lengths up to 200' available).		
	Remote Display Cable <i>(FMG490)</i>	20ft (6m) standard length polyurethane jacketed cable—for connection between meter and remote display (lengths up to 200' available).		
Conductivity	> 20 microSiemens/cm			
Empty Pipe Detection	Hardware/software, conductivity-based			
Regulatory	CE (EN 61326)			
Environmental	NEMA 6P, IP68 (10ft (3m) depth, continuously)			

* Specifications subject to change.

² Rate Time Unit is available in Day only.

Dimensions



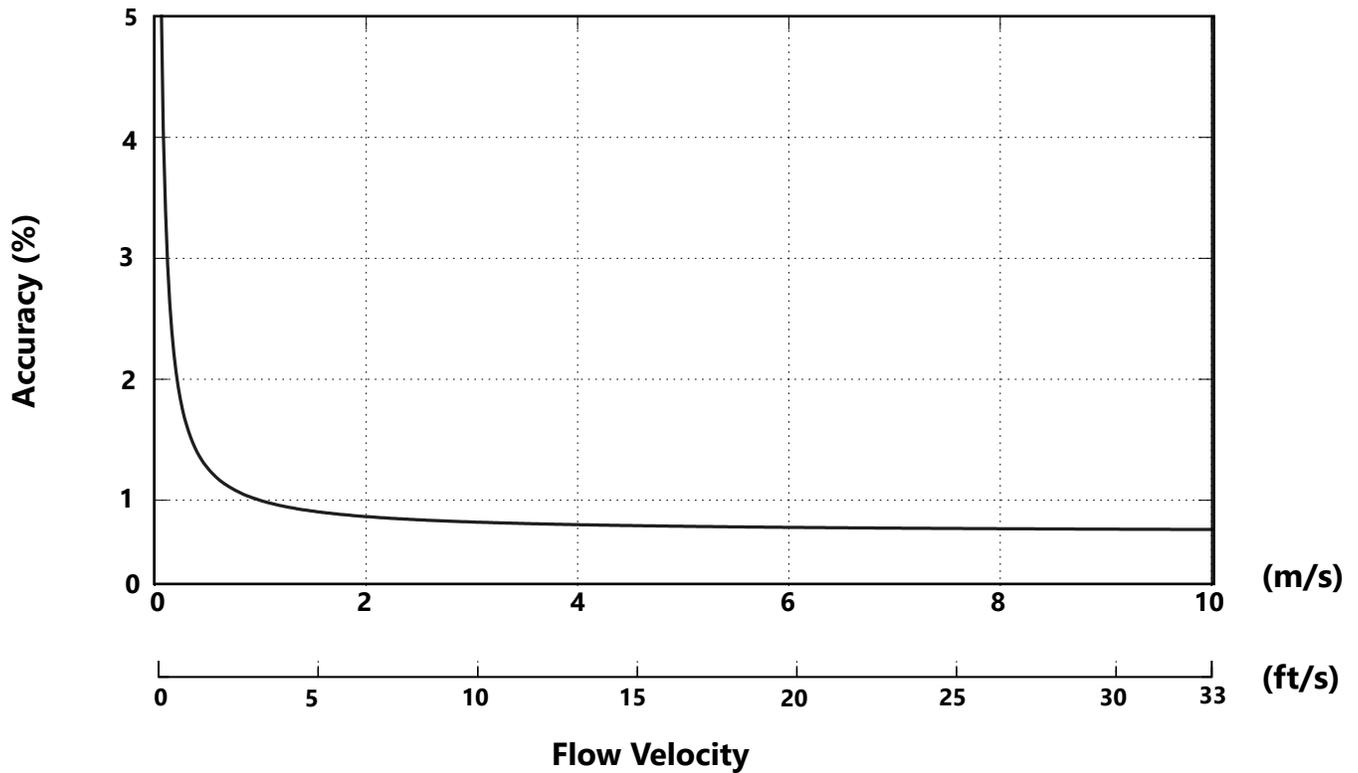
FMG480 Meter Size	L		H		T		ID		Shipping Weight	
	inch	mm	inch	mm	inch	mm	inch	mm	lbs	Kg
3"	12.25	311	7.08	179.8	.68	17.25	2.6	66.04	39	17.5
4"	10.12	257	8.3	211	.62	15.7	3.12	79	34	15.5
6"	12.09	307	9.1	231	.69	17.5	5.05	128	50	22.5
8"	14.14	359	10.1	257	.69	17.5	6.44	164	71	32
10"	18.08	459	11.2	284	.69	17.5	8.61	219	130	59
12"	19.68	500	12.2	310	.81	20.6	10.55	268	170	77
Flanges	Standard ANSI 150 lb. drilling								Cable 1 lb.	

Note: 'L' dimension is total from liner face to liner face

Install security seals during installation if regulations require.



FMG480 Accuracy

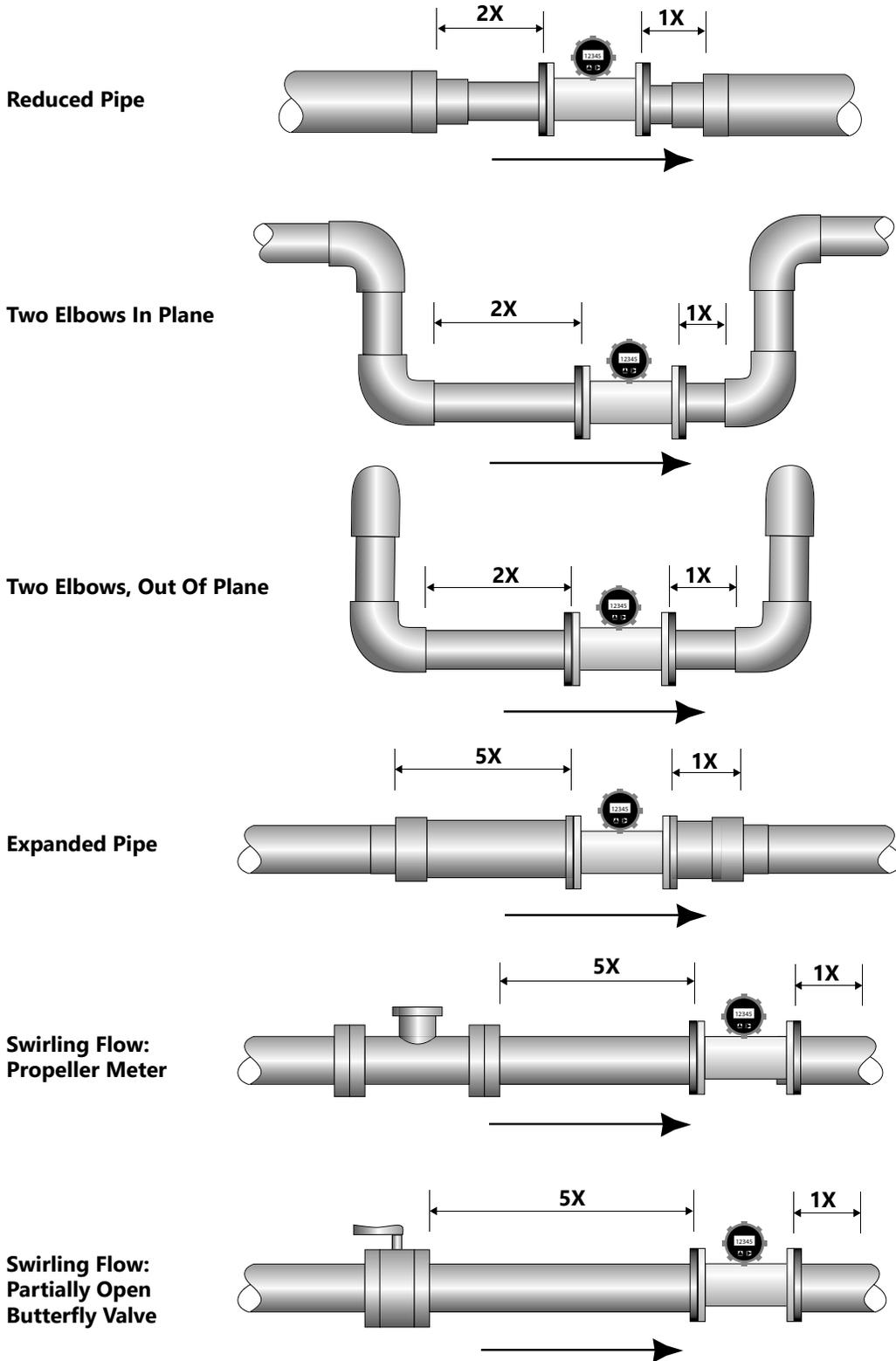


Flow Rate (3" - 12")

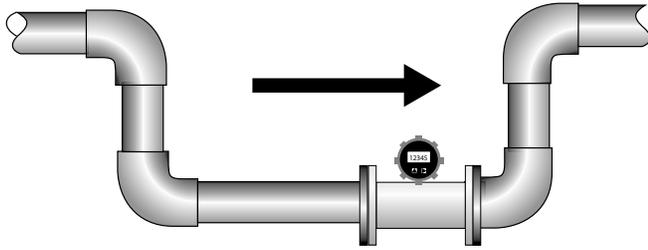
Pipe Size <i>(Inches in diameter)</i>	3"	4"	6"	8"	10"	12"
Max Flow Rate <i>(Gallons/Minute)</i>	723	1285	2891	5140	8031	11565
Cut-off (min) Flow Rate <i>(Gallons/Minute)</i>	3.62	6.43	14.46	25.70	40.15	57.82
Max Flow Rate <i>(Liters/Second)</i>	46	81	182	324	507	730
Cut-off (min) Flow Rate <i>(Liters/Second)</i>	0.23	0.41	0.91	1.62	2.54	3.65
Max Flow Velocity <i>(Meters/Second)</i>	10	10	10	10	10	10

Straight Pipe Recommendations (*X = diameter*)

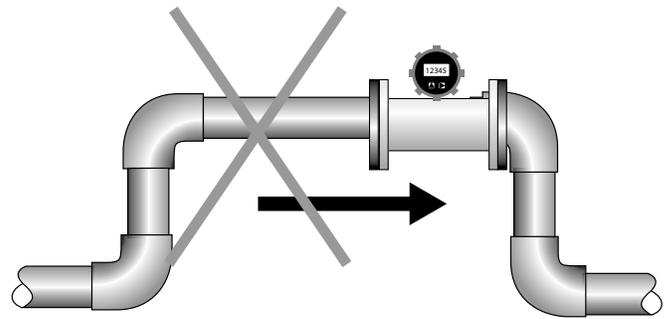
NOTE: These configurations are to be used as general guidelines and do not cover every possible installation. A combination of two or more obstructions will require additional straight pipe. If there is any concern about the length of pipe required for a specific application, please contact your local dealer.



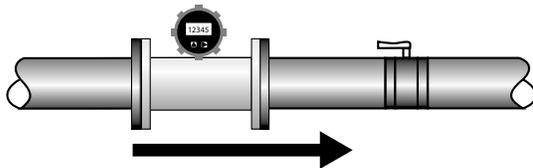
Full Pipe Recommendations



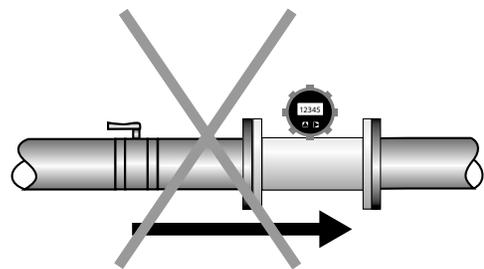
Recommended:
Keep pipe full at meter for accuracy



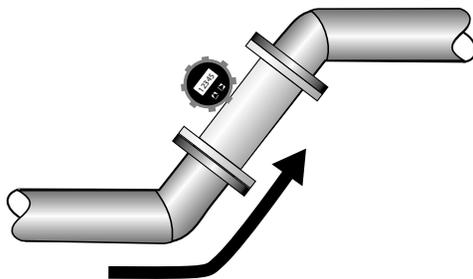
Not Ideal:
Allows air pockets to form at meter



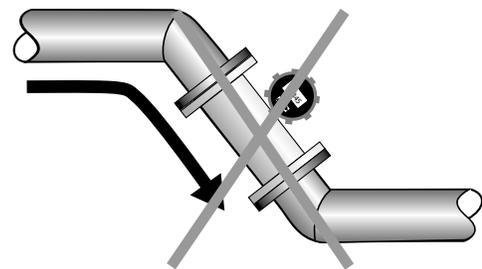
Recommended:
Keeps pipe full at meter for accuracy



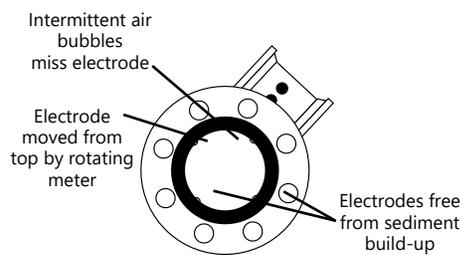
Not Ideal:
Post-valve cavitation can create air pocket



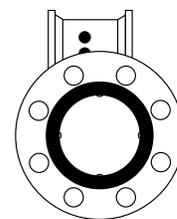
Recommended:
Allows air to bleed off



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

Positioning the Meter



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

These meters can be installed horizontally, vertically (with upward flow), 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. The FMG480 requires 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 8).

Full Pipe Recommendations. To prevent false readings, this meter is designed to indicate 'EMPTY PIPE' 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 9).

Fittings. The meters have ANSI 150 lb. drilled flanges and will mate with any other ANSI 150 lb. flanges. See table on page 11 for flange bolt tightening torque specifications.

Calibration. The FMG480 meters are factory-calibrated and will not require any form of field calibration.

Chemical Injection. When an FMG480 meter 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.



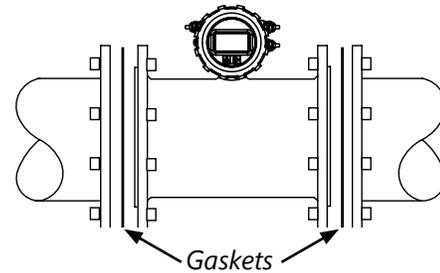
CAUTION: In chemical injection applications, install chemical injection point downstream of magmeter, or far enough upstream to allow complete mixing of fluids.

Installing Gaskets

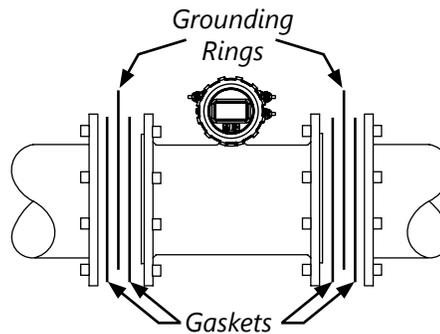


GASKETS
Gaskets are required at all junctions.

1. Be sure all mating surfaces are smooth and free of debris.
2. Install provided gaskets, or equivalent, on each end of meter as shown in diagrams below. If using grounding rings, install one gasket on each side of the grounding ring.
3. **Failure to install gaskets will void warranty.**



Installation without grounding rings

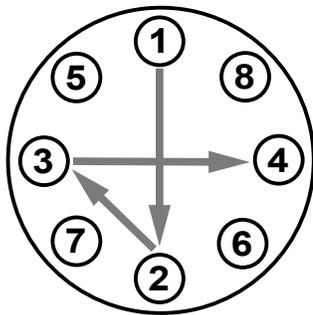


Installation with grounding rings

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

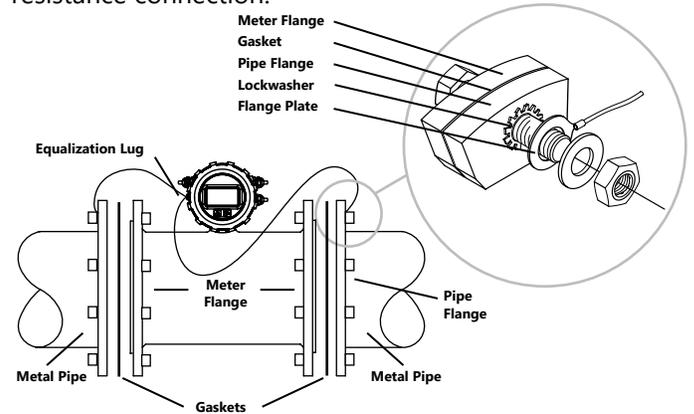
Equalization and Grounding



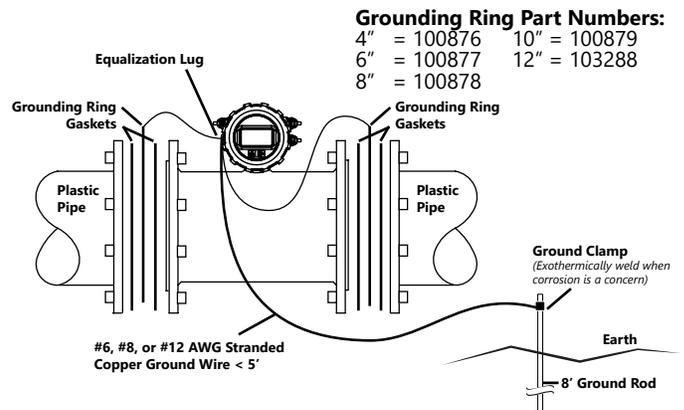
WARNING: ELECTRICAL SHOCK HAZARD

When the FMG480 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 FMG480 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.



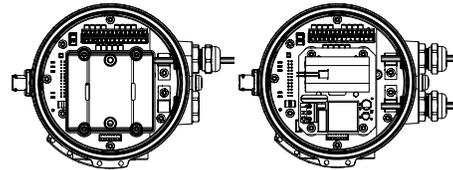
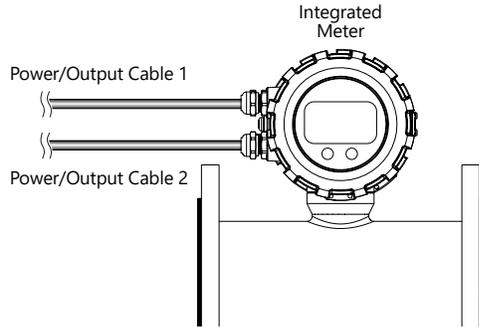
Plastic Pipe and Electronically Noisy Installations. When the FMG480 is installed in plastic pipe or in an electrically noisy system (near a VFD etc.), grounding rings are recommended. As shown in the diagram below, the equalization wires should be solidly connected to the grounding ring tabs instead 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.



General Cable Information

In the FMG480 meter, there are a maximum of two Power/Output cables that can be installed. These cables contain the wires for any available options (scaled pulse, 4-20mA, Modbus®, HART, and Digital) as well as power (DC or AC). (See Cable Wiring Diagrams and Cable Wiring Table.) It is up to the user to decide how to best organize the wiring for the application.

The FMG480 is available in either DC or AC versions.



DC version

AC Version

If the meter is configured with AC power, one of the Power/Output cable ports must be reserved for AC power only. We do not recommend combining AC power signals with any of the meter outputs in a single cable. If the meter is configured for DC power, you may have one or two cables, depending on configuration. (See Cable Wiring Diagrams.)

Cable Gland Opening and Sealing



WARNING: Improper sealing of glands or cables will invalidate any warranty. If plugs or cable glands are removed, reinstall using Teflon pipe sealant, or tape, to ensure maximum moisture protection.



Remove plug & o-ring. Insert cable gland/strain relief. Feed cable through cable gland.



Clamp cable with strain relief clips. Attach drain wire lug to bracket post.



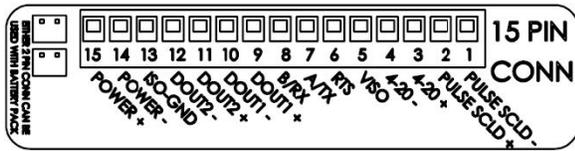
CRITICAL! Torque cable gland sealing nut to 22 in-lbs.

Cable Installation

1. On the back of the meter, unscrew the user access lid and remove it.

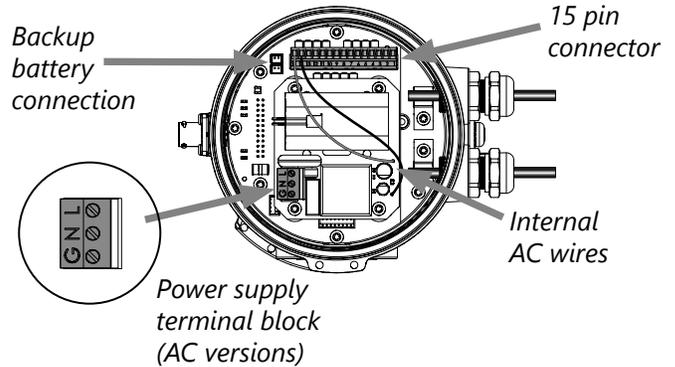


2. Remove the 15 pin screw connector from its bag.
3. Remove the plug and o-ring from the cable port(s) where you want to insert the cable(s).
4. Install cable gland(s) using Teflon pipe sealant, or tape, and insert cable end(s).
5. Strip cable jacket and conductors and install the wires into the 15 pin screw connector in their respective locations for your options (See Cable Wiring Table for details.)



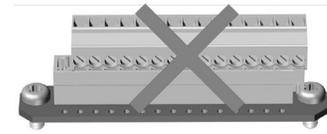
6. If using AC power version continue here. If not, then skip to step 11. If AC then take the red and black wires coming out of the AC supply board and install in POWER+ and POWER- (red wire to pin 15, black wire to pin 14).
7. When the AC power supply board is installed, 85-264 VAC power is supplied via a user-supplied 3 conductor power cord having local regulatory agency approval. If installed outdoors or less than 33ft. (10m) from a utility power service entrance, AC power should be supplied via a properly-grounded surge suppression device.
8. Remove the plug and o-ring from the AC cable port.

9. Install cable gland and insert cable end.
10. Strip cable jacket and conductors and install 3 conductor power cable and wire to Line (L), Neutral (N) and ground (G) positions on power supply terminal block.

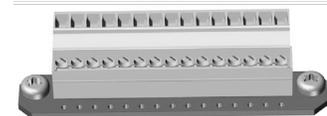


11. Plug the 15 pin screw connector into its socket. **Be sure all pins align properly and that the connector has not slipped to one side.**

Improper alignment



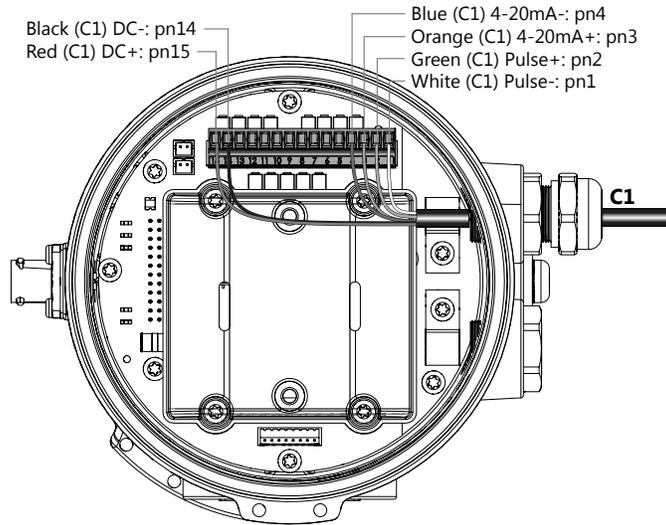
Proper alignment



12. **Plug the backup battery cable into either of the two connectors to the left of the 15 pin connector.** (Standard backup batteries are two 3.6V "D" lithium cells. For the AC option, the backup battery is one 9V alkaline cell.)
13. Secure the cables inside the internal strain relief clip and tighten the cable gland sealing nut securely (torque strain relief/sealing gland dome nut to 22 in-lbs). A loose nut could cause moisture ingress and compromise the meter head's IP68 rating, voiding the warranty.
14. Reinstall the user access lid. Be sure to avoid cross-threading the lid and to not pinch any wires with the lid.

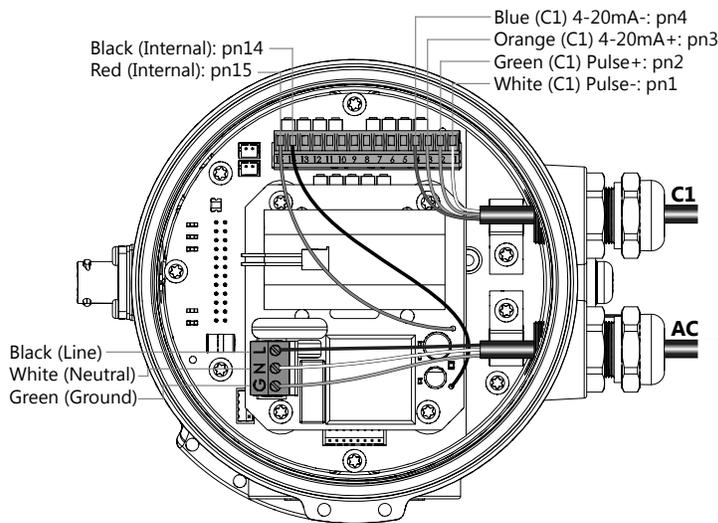
Wiring Diagrams

On the back of the meter, unscrew the black user access lid and remove it. Remove the 15 pin screw connector from its bag. Install the wires through the cable glands into the 15 pin screw connector in their respective locations. Plug the 15 pin screw connector into its socket. (C1 = power/output cable 1, C2 = power/output cable 2)

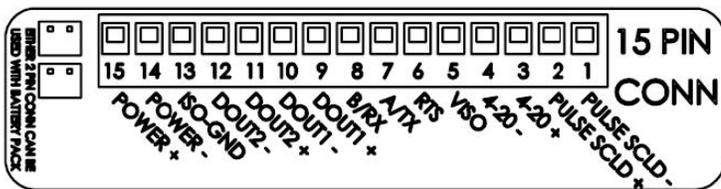


DC Power with Pulse and 4-20mA (D5/D6)

On the back of the meter, unscrew the black user access lid and remove it. Remove the 15 pin screw connector from its bag. Install the wires through the cable gland into the 15 pin screw connector in their respective locations. Connect internal black and red wires to pins 14 and 15, respectively. Plug the 15 pin screw connector into its socket. Install AC power cable through cable gland and connect to AC connector, as shown. (C1 = power/output cable, AC = AC power cable)

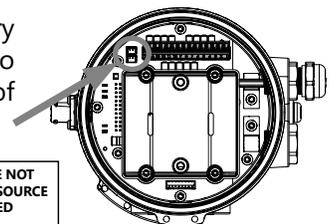


AC Power with Pulse and 4-20mA (A5/A6)



Plug the backup battery cable into either of the two connectors to the left of the 15 pin connector.

WARNING: BACKUP BATTERIES ARE NOT INTENDED AS A PRIMARY POWER SOURCE OF A MAINS (DC or AC) CONFIGURED METER.



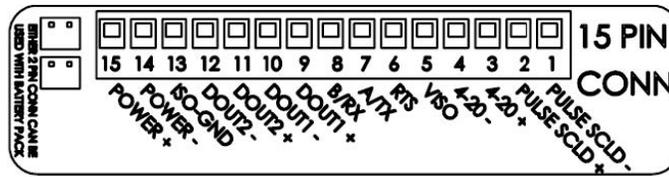
Cable Wiring Table

PIN	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
O ID	PWR+	PWR-	ISO-GND	DOUT 2 -	DOUT 2 +	DOUT 1 -	DOUT 1 +	B/RX	A/TX	RTS	VISO	4-20 -	4-20 +	PULSE SCLD+	PULSE SCLD-
D5/D6	RED C1	BLACK C1										BLUE C1	ORNG C1	GREEN C1	WHITE C1
A5/A6	RED INT	BLACK INT										BLUE C1	ORNG C1	GREEN C1	WHITE C1

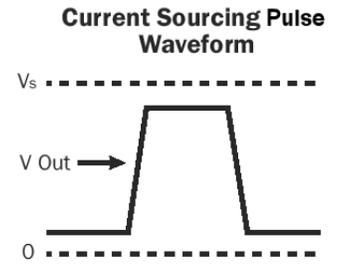
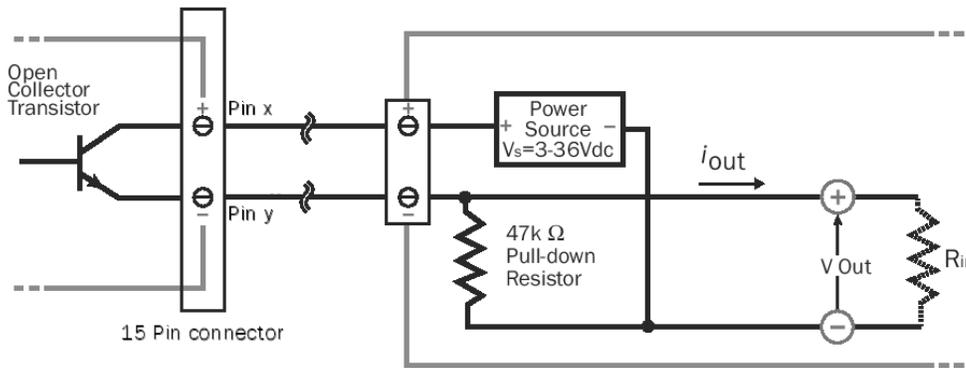
(C1 = power/output cable 1 C2 = power/output cable 2 INT = Internal AC power wires)

Option IDs

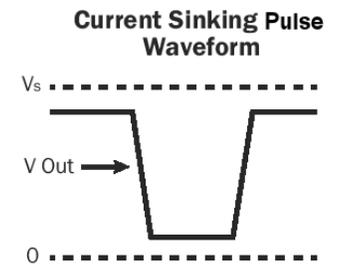
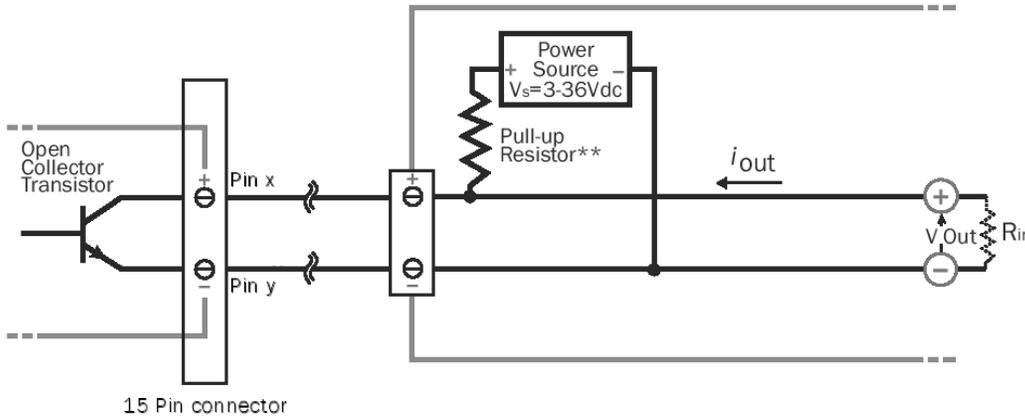
- O ID POWER SOURCE / OUTPUT(S)**
D5/D6 = DC POWER / PULSE SCALED AND 4-20mA
A5/A6 = AC POWER / PULSE SCALED AND 4-20mA



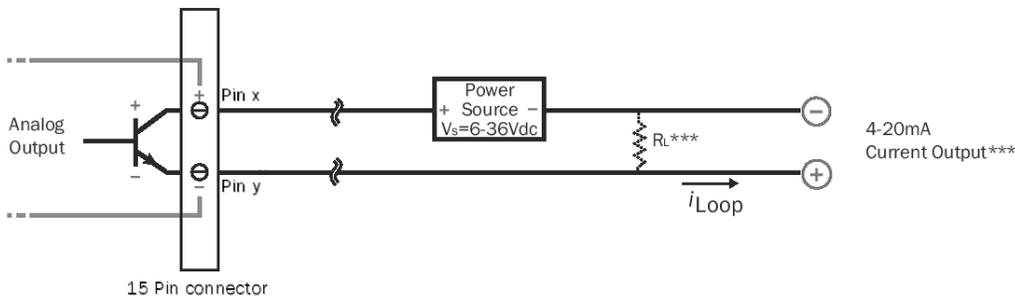
Pulse or Digital Output Application - Sourcing Mode (Recommended for $R_{in} < 30k\Omega$)



Pulse or Digital Output Application - Sinking Mode (Recommended for $R_{in} > 30k\Omega$)



Analog (4-20mA Current Loop) Output Application



** Minimum resistor value is $(100 \times V_s)$ ohms. Higher resistances maybe used depending on frequency and cable length. Longer cables and high frequencies require lower resistance.

*** Resistor R_L converts 4-20mA current to voltage for voltage input only devices.

Cable Shield. In general, the cable shield and its bare drain wire should be left unconnected at the user equipment end of the cable to minimize “ground loop” problems.

Pulse Output Configuration. A pulse output is standard on all models. Since this is an isolated output, the external equipment must include a DC power source to regenerate the pulse from the open-collector output (transistor equivalent of a contact closure). A pull-up or pull-down resistor may be needed if not included in the user equipment as shown in the diagrams. Both the power source and resistor may be supplied internally in some types of control and monitoring devices. If not, as for most PLC discrete input modules, they must be added externally at the module input terminals. The pulse output rate in volume units/pulse can be set by the user via the SETP tab on the meter’s setup menus.

Because the pulse output of an FMG480 meter is set by the user, care must be taken to assure the output pulses do not exceed the maximum frequency of the meter while also ensuring a reasonable resolution.

K-factor: Remember that SETP is expressed in units totaled per output pulse (G/P if using gallons) while K-factors are expressed in pulses per gallon (P/G.) To determine K-factor from SETP, divide 1 by SETP (if SETP is expressed in gallons.) Conversely, 1 divided by the K-factor equals SETP

FMG480 meters that were initially configured as battery powered units have a maximum output frequency of 150 Hz. Those that were initially configured as powered units have a maximum output frequency of 200 Hz.

Because all pulse outputs (SETP) are configured in (rate) units totaled per pulse, all sizes of meters can be configured with the same SETP values

For example, if your rate is chosen as gallons per minute (GPM) the table below applies. If your rate is different, simply use your rate label in place of (GPM.) The numerical values will remain the same.

Pulse Units. The units of measure of SETP are independently selectable and are not tied to rate or total. Upon change of the SETP unit, the pulse output may take up to 10 seconds, or the duration of one pulse (whichever is longer) to take effect.

If Pulse Output is Inconsistent. The PDAMP filter may need to be increased.

Pulse Width Timing. The unit and value of SETP must be chosen to keep the duration between meter pulse outputs to less than 500 seconds.

SETP	Flow Rate at 1 Hz (GPM)	Flow Rate at 200 Hz (GPM) <i>Powered Meters</i>	Flow Rate at 150 Hz (GPM) <i>Battery Powered Meters</i>
0.1	6	1200	900
0.2	12	2400	1800
0.3	18	3600	2700
0.4	24	4800	3600
0.5	30	6000	4500
0.6	36	7200	5400
0.7	42	8400	6300
0.8	48	9600	7200
0.9	54	10800	8100
1.0	60	12000	9000

Lower frequency output pulses (1 pulse for some particular number of gallons) can also be set.

Any output frequency can be determined by:

$$\text{Rate (units/minute)} \div \text{SETP (units/pulse)} = \text{pulse/minute}$$

$$\text{Hz} = \text{pulse/minute} \div 60 \text{ seconds / minutes}$$

Analog Output (4-20mA) Configuration. *(Not available on battery only units.)* Since the meter’s analog output is isolated and passive, loop power must be supplied externally as shown previously. (In addition, an external resistor R_L will be needed to convert the loop current to voltage for voltage-only input devices.) The meter’s loop transmitter minimum voltage drop is 6Vdc which, with wiring resistance and loop power supply voltage, will determine the maximum resistance for R_L. The flow rates corresponding to 4 and 20mA can be set by the user via the SET 4 and SET20 tabs on the meter’s setup menus.

Changing Flow Meter Settings

Home Screen and General Navigation

The HOME Screen displays flow volume, direction of the flow total and flow RATE along with status conditions such as Empty Pipe. Two buttons below the LCD display are used to access menu screens for viewing and changing meter setup parameters.



These two buttons are light sensors which can detect when a finger is covering them and activate upon release. Only three button touch actions are needed to control navigation through the menus, settings changes and back to the home screen.

HORIZONTAL SCROLLING:

Tap right button to scroll horizontally through menu tabs or move horizontally within a tab dialog when applicable.



SELECT:

Tap left button to change a highlighted item within a tab dialog.



ENTER/EXIT:

Hold left button while tapping right button once to enter or exit a tab dialog or to navigate between the HOME and other menu screens.



Changing Total Direction/Resetting Batch Totalizers

On the Main screen, hold right button and tap left button 5 times to scroll through the total direction options. Release right button to select a total direction.



Once BATCH FORWARD or BATCH REVERSE is selected, tap right button four times to reset batch totalizer.

Entering Menu System

To enter the Menu System perform the hold and tap sequence. The Passcode entry screen will display. The default passcode is 000000. If a different passcode has previously been set, use the left and right buttons to enter that passcode. In either case, hold and tap again to move into the menu system. (If you enter the wrong passcode, hold and tap again to return to the previous screen. See page 21 for information on how to change a passcode.)



Making Selections

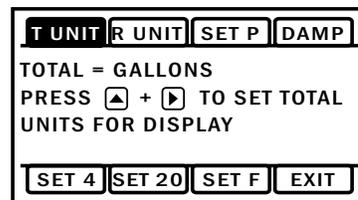
Once in the Menu System, move from tab to tab by tapping the right button. (See the next page for details on the various available tabs.)



Select the parameter. In the screen for the highlighted tab you will see the current parameter value for that tab. Tapping the right button, move to the tab for the parameter you want to change.



In this example, the first line indicates that the current unit for the TOTAL is GALLONS. The next two lines tell you what to do next.



If you would like to change the TOTAL units, just perform the hold and tap sequence to bring up a screen to change the setting.



Select a new setting. Select the new setting by scrolling through a list of selections as in the screen illustration below by tapping the left button to find a different TOTAL unit.



Accept changes. To accept any changes you have made, perform the hold and tap sequence.



When finished making changes. When you are finished making changes, move to the EXIT tab using the right button.



To return to the HOME screen, perform the hold and tap sequence.

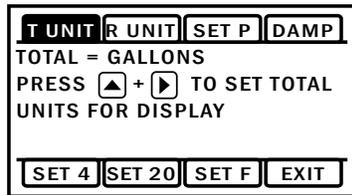


Standard Menu Options

Note: Available options will depend on specific meter configuration. Not all options are available on all meters.
Options not ordered with your meter will not appear on the meter menu.

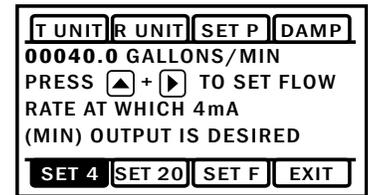
T UNIT

View or change TOTAL volume units



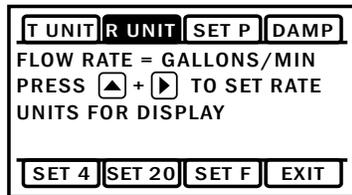
SET 4

View or change flow rate corresponding to 4mA.



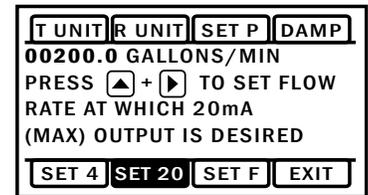
R UNIT

View or change flow RATE units



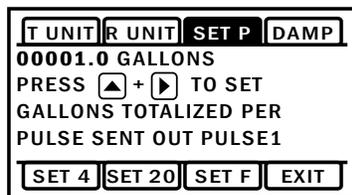
SET 20

View or change flow rate corresponding to 20mA.



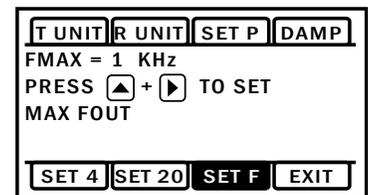
SET P

View or change pulse output scaling



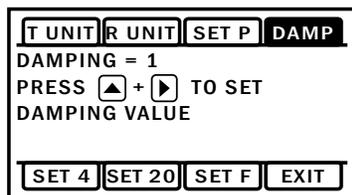
SET F

View or change high frequency output scaling



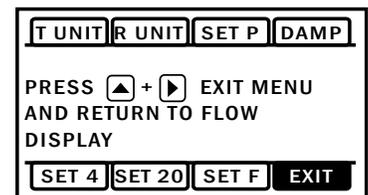
DAMP

View or change # of samples for rolling average.



EXIT

Return to HOME SCREEN or enter SUBMENU

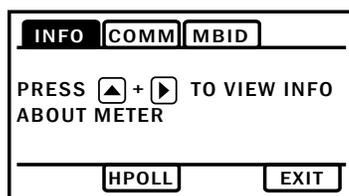


Special SUBMENU for Further Options

The EXIT tab in the MAIN MENU has a second function. If, instead of using the hold and tap sequence to return to the HOME screen, you tap [Up] five times, you will be redirected to a SUBMENU screen from which you can access several more options.

Navigation in this SUBMENU is the same as for the MAIN MENU. Whenever you wish, go to the EXIT tab in the SUBMENU and perform the hold and tap sequence to return to the MAIN MENU.

- INFO: Meter model number, serial number, and firmware version.
- COMM: Modbus® baud rate and parity. (Not available on battery only units.)
- MBID: Modbus® address (Not available on battery only units.)
- HPOLL: HART Address (Not available on battery only units.)
- EXIT: Return to MAIN MENU.



Sub-Menu

To Change a Passcode and Decimal Places

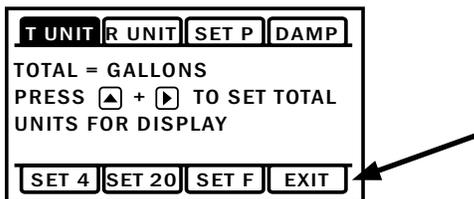
The FMG480 has a passcode system for restricting access to the menus. The FMG480 comes from the factory with the passcode set to 000000. When a user attempts to enter the menu system (see details on page 20), the passcode entry screen will be displayed.



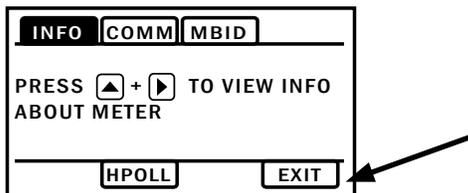
The default passcode is 000000. If a different passcode has previously been set, then the user must enter that passcode at this time. After entering the passcode, or leaving it at 000000 if using the default passcode, the user does the tap and hold sequence to move into the menu system.

To change the passcode, you must use the THIRD MENU screen. Access the THIRD MENU screen as follows:

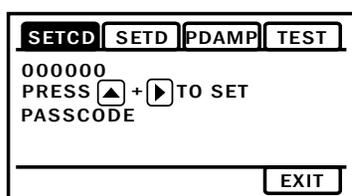
- Enter the main menu system, as described above.



- On the main menu, tab over to the EXIT tab and tap the up arrow five times. A SUBMENU screen will display.



- On the SUBMENU screen tab over to the EXIT tab and tap the up arrow five times. The THIRD MENU screen will display.



- To set the passcode, hold and tap and then use the [up arrow] and [right arrow] to enter the new code.
- Hold and tap again to return to the THIRD MENU screen.
- Tab to EXIT, and then hold and tap to return to the SUBMENU.

To change the number of decimal places in the total

- To set the decimal point, hold and tap on SETD and then use the [right arrow] to move the decimal point.
- Hold and tap again to return to the THIRD MENU screen.
- Tab to EXIT, and then hold and tap to return to the SUBMENU.

PDAMP

PDAMP is used to view or change the number of samples for rolling average of pulse output.

TEST

TEST allows the user to initiate a fully functional, artificial flow rate for the purpose of testing other connected equipment. When TEST is applied, all features of the meter will function at the stated flow rate (in gallons per second).

For TEST to function, the meter must be filled (not EMPTY PIPE).

To enter a value into the TEST feature, navigate to the TEST tab and enter a flow rate value in the VAL screen (in gallons per second only,) then [right arrow] to the VAL box and [up arrow] to the ON screen. This will initiate the TEST feature. The next [up arrow] would bring you to the OFF screen, but you can 'hold and tap' the arrows to return you to the sub menu while the feature operates.

After use, the TEST feature must be turned OFF. If the TEST feature is not turned OFF, the stated static flow rate (in gallons per second) will be shown any time the meter is full or in a flowing condition. Flow values recorded by the meter while the TEST feature is operating are permanently recorded in the displayed TOTAL. It may be useful to note that these values are only written to permanent memory every 15 minutes and cycling all power within this 15 minute time frame will return the meter to its previous total.

Power Indicators

A power indicator is displayed in the lower left of the main display window.

Any meter powered from an external power source will display a power plug icon when running on external power. If the connection to external power is lost, the meter will switch to the backup battery and the power icon will switch to a battery symbol.

OK on the battery indicator means battery voltage is above 6.4 volts.

LO on the battery indicator means the battery is low and should be replaced soon.



Being powered by external DC or AC



Being powered by battery - voltage is sufficient



Being powered by battery - voltage is low



If display reads, 'BATT END' replace battery immediately.

Problem	Probable Causes	Things to try...
Blank Display	Faulty wiring from power source to meter Battery has not been plugged in Dead battery	Check for incorrect wiring. Measure voltage with DMM where red and black wires connect to terminal block TB1 on back side of display. Verify correct polarity and confirm that voltage is steady and between 9Vdc and 32Vdc Plug in the battery Replace battery
Flow rate reading fluctuates excessively when flow is unchanging	Excessively turbulent or unsteady flow due to partially closed valves or other flow obstructions Pipe not full Pulsing flow due to combining multiple upstream flow sources Insufficient mixing of upstream chemicals Low fluid conductivity < 20 μ S/cm Noisy electrical environment Defective or noisy AC switching power supply	Eliminate or minimize causes of flow disturbances or increase meter damping Provide back pressure or other means to ensure pipe is filled Move connection point further upstream Move chemical injection downstream from meter Replace with different type of meter Improve grounding at meter and nearby potentially noisy electrical equipment. Increase distance between meter and electrical noise sources. Replace power supply
Flow Rate appears correct but pulse/ frequency output is low, erratic or absent	Wiring incorrect External device input impedance too low Cable too long	Compare wiring with appropriate wiring recommendations Use sourcing rather than sinking interface connection Reduce interface pull-up resistance
Flow Rate appears correct but pulse/frequency output is erratic and/or too high	Electrical noise sources interfering with pulse frequency signal Wrong type of cable Grounding problem	Isolate, remove or reduce noise sources. Move meter control cable away from noise sources. Increase pulse damp setting (PDAMP) Use only twisted pair cable and ensure both signal wires are on same twisted pair Improve or try different grounding method

Error Messages

Under certain conditions an error message may be displayed.

Message	Description	Notes
INIT	Initialization is occurring during power up.	
EMPTY PIPE	Fluid is not detected between the sensing electrodes.	Loop output = 22.8mA
LO in battery icon	Battery is getting low, replace soon. Meter still functions.	Above 6.4V, OK appears in icon
BATT END	Battery is very low (approx. 6.1V). Totalizer stops updating.	Loop output = 4mA
LOW VOLT	Incoming external power is very low and backup battery is dead or not connected	Loop output = 4mA
COIL FAIL	Coil current too high or too low (short or open).	Loop output = 22.8mA
COMM FAIL	Communication between transmitter and sensor board fails.	Loop output = 22.8mA
OVER RANGE	Rate exceeds number of digits that can be displayed. Adjust units.	Loop output = 4mA

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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