



ELECTROMAGNETIC FLOWMETERS

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

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1.0 INTRODUCTION

1.1 Description

Ultra Mag meters are available with integral or remote mount converters. Standard display features include forward, reverse and net flow totalizers, flow rate, alarm monitoring, and automatic self diagnostics to ensure integrity. All data and values are in selectable units of measurement. System compatibility is assured with a choice of current, pulse and serial data. Please refer to the converter manual provided with your meter.

Ultra Mag operating parameters are set via the electronics keypad. The software features multilevel password protection capability to prevent inadvertent program or setting changes. Data is stored in nonvolatile memory.

The flanged end tube design permits use in a wide range of applications. The fabricated tube is stainless steel with steel or stainless steel flanges and incorporates the UltraLiner, an NSF approved fusion-bonded epoxy liner.

1.2 Uncrating

The shipping crate contains the following items:

- Electromagnetic Meter Assembly with grounding wire attached
- Converter Cable (attached to meter)
- Signal Converter
- Grounding Rings
- Ground Wires (2)
- Installation, Operation and Maintenance Manuals for both the sensor and converter

When uncrating the Ultra Mag, any damage due to rough or improper handling should be reported to the transportation firm and McCrometer. If for any reason it is determined that the unit or parts of the unit should be returned to the factory, please contact McCrometer for clearance prior to shipment. Each unit must be properly crated to prevent any further damage. The factory assumes no responsibility for equipment damaged in return shipment due to improper packaging.



Warning:

- **Installation and maintenance must only be carried out by suitably trained personnel.**
- **HAZARDOUS AREA DESIGNATION ON THE EQUIPMENT LABEL MUST BE SUITABLE FOR THE INTENDED DUTY AND LOCATION.**
- **All relevant sections in this O & M Manual must be read before selecting a location.**
- **Safety requirements of this equipment, any associated equipment and the local environment must be taken into consideration.**
- **The installation and use of this equipment must be in accordance with relevant national and local standards.**

1.3 Parts List With Remote Mount Converter

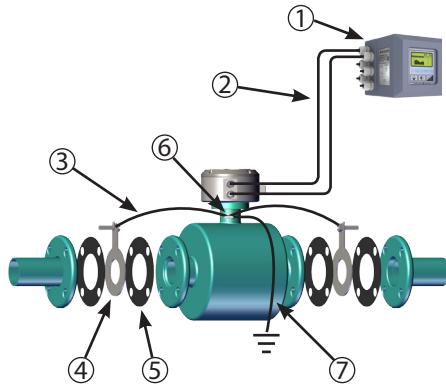


Figure 1. 2" - 3" Model

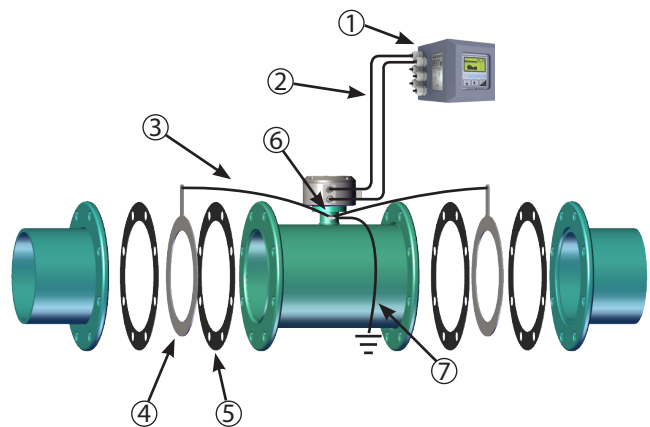


Figure 2. 4" - 12" Model

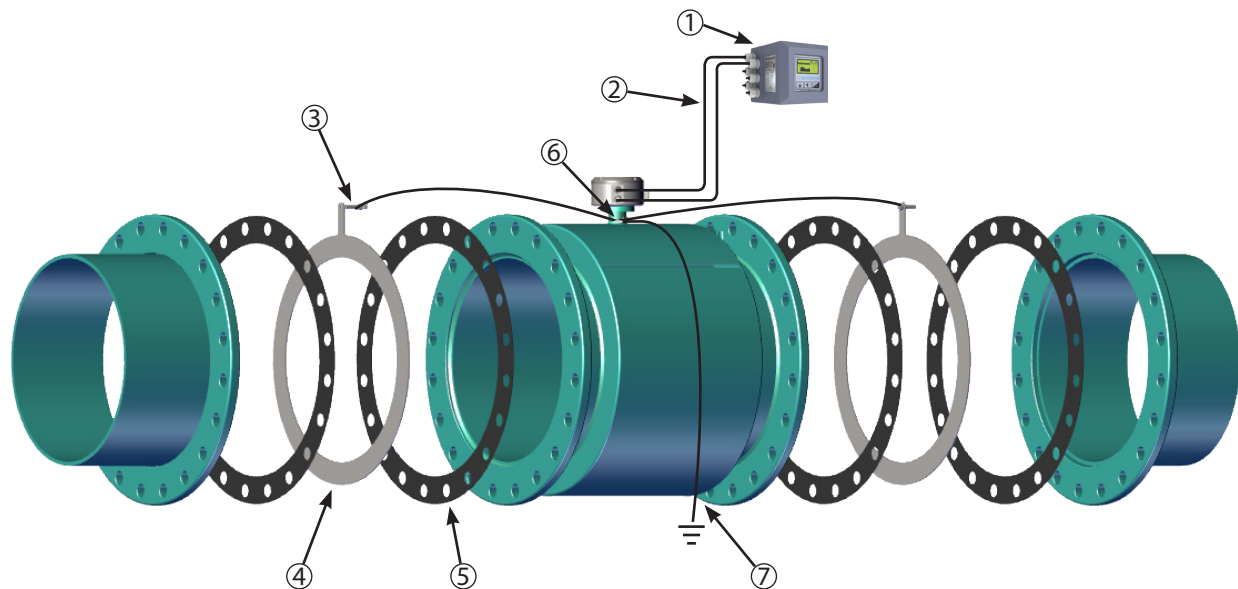


Figure 3. 14" And Larger Model

NO.	PART NUMBER	DESCRIPTION
1	880003051	AC Converter (Dual 4-20mA Output)
1	880003052	DC Converter (Dual 4-20mA Output)
1	880003054	AC Converter w/ Modbus RS485 Communications Protocol
1	880003055	DC Converter w/ Modbus RS485 Communications Protocol
2	15035 / 15036	Dual Cables - Submersible
3	3-2757-##	Grounding Wire Assembly
4	3-2781-*	Grounding Rings, Stainless Steel (Optional on 4"-12")
5	1-1557-*	Gaskets (Optional)
6	1-1201-10	Nut, Hex, Brass
7	15029	Earth Ground Wire
* INSERT METER SIZE TO COMPLETE PART NUMBER - INSERT -02 FOR 2", -04 FOR 4", -06 FOR 6", ETC. ## -W = 2" - 16" -14 = 14" - 20" -24 = 24" - 30" -36 = 36" - 48"		
When ordering replacement parts, please specify: Meter Size • Meter Model • Meter Serial Number		

1.4 Serial Numbers

The converter and sensor are supplied as a matched system. Verify the meter serial numbers on both the converter and sensor match. This will insure a properly calibrated system.

The tag on the side of the converter has the Converter Model Number, the Converter Serial Number and the Meter Serial number, which is calibrated to the converter. An example is shown below.

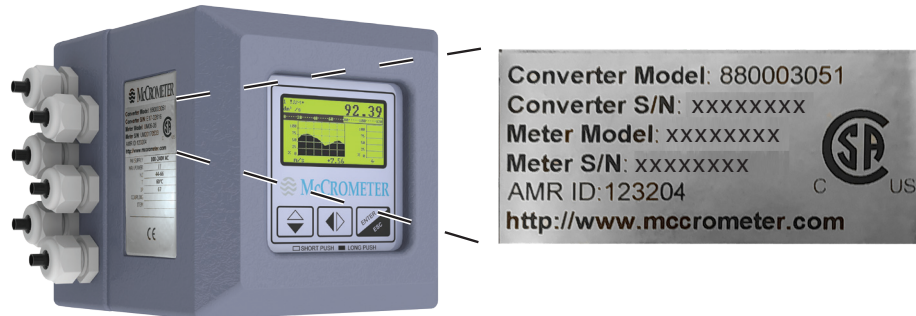




Figure 4. Converter Serial Number Tag



IMPORTANT: Verify the Meter Serial Numbers on both the converter and sensor match. This will insure a properly calibrated system. The Meter Serial Number is located on a plate on the body of the sensor, and the Converter Serial Number and the Meter Serial Number are located on a label on the side of the converter. Insure the Meter Serial Number on the sensor and the converter tags match.

2.0 SENSOR INSTALLATION



IMPORTANT: Nothing in this manual subsidizes local building codes.

2.1 Installation Considerations

2.1.1 Grounding And Electrical Interference

The sensor body must have electrical contact with the media. This is achieved via grounding rings. For best performance, McCrometer provides grounding rings for all sizes, and they should be installed.

Always ensure that the converter and the sensor are grounded (earthed) correctly. The grounding of the sensor and converter ensures that the equipment and liquid have an equal potential. For most installations the quality of grounding by the provided cabling assures the sensor is properly grounded and additional grounding of the sensor is not required. However, in instances where this is not the case, i.e. the equipment and fluid do not have an equal potential, such as where the installation location and/or media is subjected to electrical interference, additional grounding steps may be required. Consult an electrician experienced with instrumentation installations to determine if electrical interference is present. For further information on installation environments and sensor grounding, please contact McCrometer Technical Support.

2.1.2 Lines With Cathodic Protection

On meters installed on a line with cathodic protection it may be necessary to insulate the meter from the line. Consult your cathodic protection vendor for instructions.

2.1.3 Fluid Conductivity

The fluid to be measured must have a minimum conductivity of $5\mu\text{S}/\text{cm}$ for an electromagnetic flow meter to operate. Systems with such low conductivity require that the system is well grounded with no electrical interference. Also, in low conductivity fluids (less than $50\mu\text{S}/\text{cm}$) long cable lengths may affect flow meter's ability to read the flow signal.

To eliminate rapid changes in fluid conductivity, it is recommended that all blending and chemical injecting be done downstream of the meter to avoid possible measurement error and/or issues. If blending or chemical injecting is performed upstream of the meter, it should be done upstream of the meter early enough so the flow media is thoroughly mixed prior to entering the measurement area.

2.1.4 Meter Mounted Converter Location

Adjoining pipe must be adequately supported, and the area around the sensor should provide sufficient drainage to prevent flooding the converter or conduits.

The location chosen should provide room to read the display and be free from harsh electrical noise from adjacent equipment, cables, R.F.I., or E.M.I. The signal converter should not be subjected to intense, prolonged sunlight and/or vibrations. Unit should also be protected from heat.

2.1.5 Remote Mount

The signal converter may be installed in a desired location provided that free access is available to allow the display to be viewed as required. The unit can be either wall mounted or panel mounted with masonry fixings or nuts and bolts respectively via the fixing holes provided. The maximum distance between the meter and the converter is 200 feet. For applications with extended lengths, consult factory.

2.1.6 Grounding Ring And Gaskets

The grounding rings and gaskets must be used to ensure a positive seal at the flanges, and to ensure fluid is properly grounded to sensor. For best performance, McCrometer provides grounding rings, which should be installed for all sizes.

When installing into a PVC or plastic pipe system, grounding rings are required for all sizes.



Information For All Installations

1. Gaskets must be used on either side of the grounding ring to provide a proper seal on the flanges. One gasket is used on flanges without a grounding ring.
2. Rings & gaskets must align concentrically with the pipe so they do not obstruct or affect flow through the tube.

2.1.7 Converter/transmitter Connections

Connections to the sensor must be made with cable supplied by McCrometer specifically for that purpose. Do not substitute the supplied cable with other types of cable, even for short runs. For repairs or added lengths of cable, the entire cable between the sensor and the converter must be replaced. (Consult factory for replacement cable.)



IMPORTANT: Do not cut or alter the cable length on power or signal cables!

2.2 Positioning The Sensor

2.2.1 Pipe Diameters

For proper accuracies any 90 or 45 degree elbows, valves, partially opened valves etc. should be placed not closer than one pipe diameter upstream and zero pipe diameters downstream.

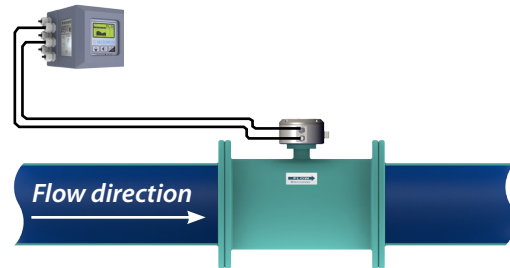
2.2.2 Flow Direction

The flow of the medium should correspond to the direction shown by the arrow on the sensor.

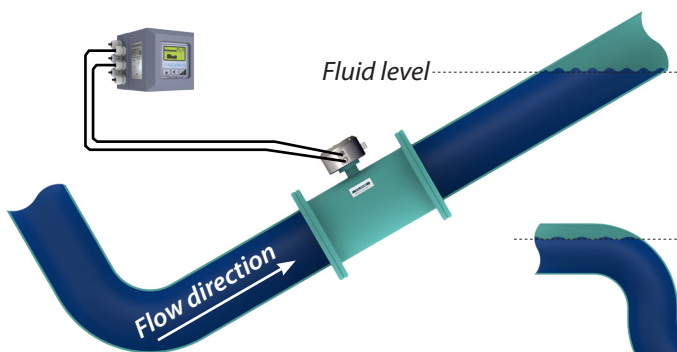
2.2.3 Sensor Orientation

The following installation recommendations should be followed (see Figure 5 for installation diagrams):

- A. In horizontal pipe runs, the meter should be installed so that the junction box is vertical insuring the electrodes are positioned to prevent coating by sediments or loss of electrode contact due to air bubbles.



- B. In vertical pipe runs, the flow should be upward. In slurry application, a vertical position ensures optimal distribution of solids under all flow conditions.



- C. In pipes which may encounter less than a full pipe of fluid, the meter must be positioned in a trap to ensure that the sensor is always completely filled with liquid.

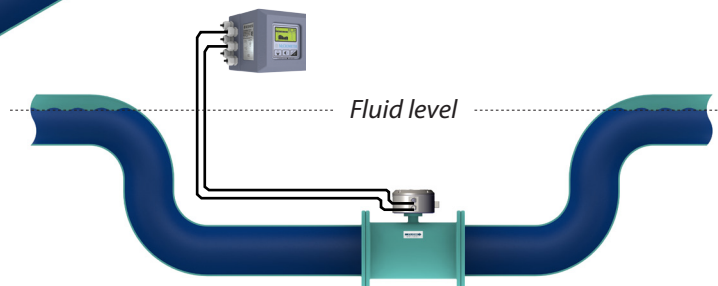


Figure 5. Sensor Orientation Options

3.0 QUICK CONNECT CABLE ENDS (OPTIONAL)

Quick Connect cable end fittings are optional. If selected at the time of order, follow the instructions below:

1. Remove the protective caps from both the receiving ports and the cable ends.
2. Insert the cable end into the port until fully seated, then turn the knurled collar on the cable to the right until the cable is tight.
3. With both cables properly attached to the meter, connect the meter-end protective cap to the cable-end protective cap. This insures that the protective caps remain free from dirt.



IMPORTANT NOTE: When the cables are not attached to the meter insure that the protective caps are properly secured to cable ends and the receiving ports to insure all connections remain free from dirt.

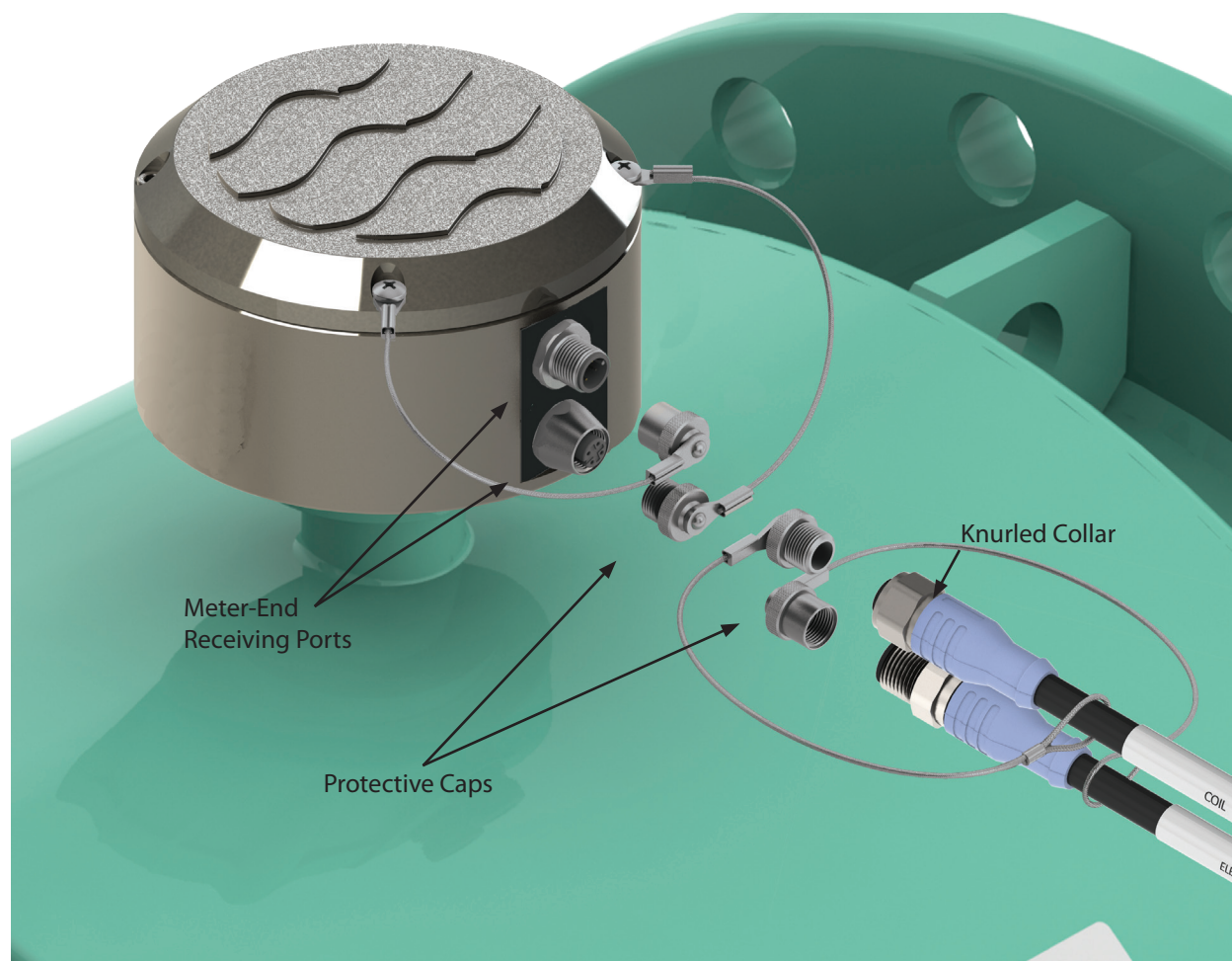


Figure 6. Optional Quick Connect Cable Ends

4.0 **DIMENSIONS**

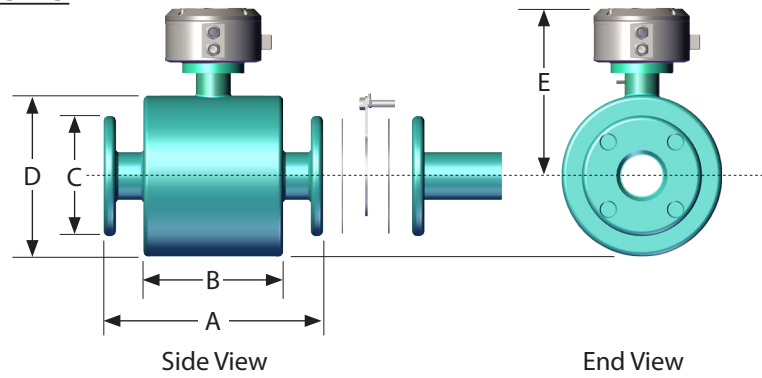


Figure 7. 2" and 3" Models Body Style

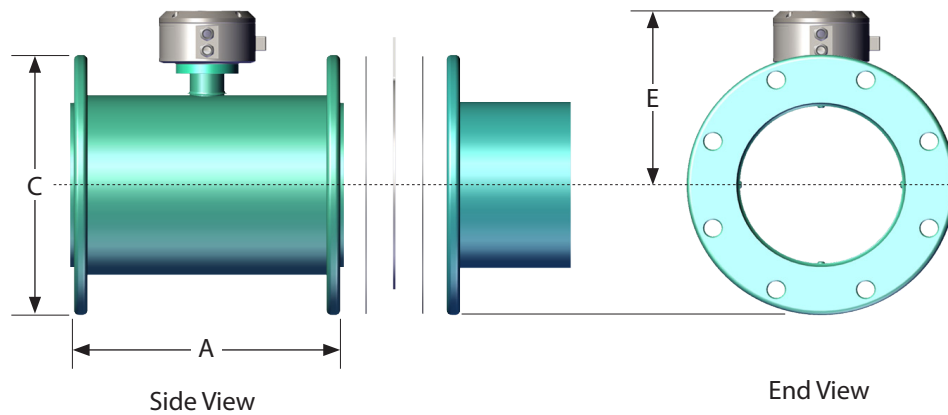


Figure 8. 4" to 12" Models Body Style

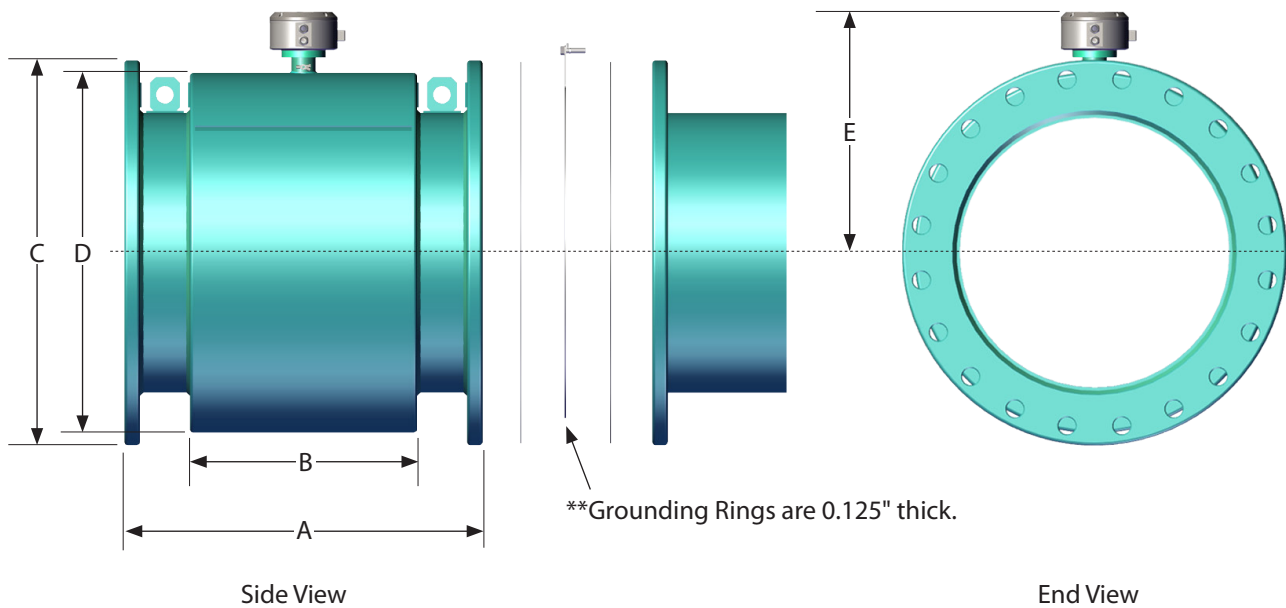


Figure 9. 14+\" Models Body Style

Meter Body Dimensions And Weights

Pipe Size (Nominal)	Meter Pipe ID	Flow Ranges GPM Standard .2 to 32 FPS Min - Max	DIMENSIONS (Lay Lengths)							†Estimated Shipping Weight (lbs.)	
			A*		B	C		D	E	UM06	UM08
			UM06	UM08		UM06	UM08				
2"	2.117	2 - 320	11.00	11.00	6.70	6.00	6.50	7.90	9.26	110	140
3"	3.220	5 - 730	13.40	13.40	6.70	7.50	8.25	9.40	10.01	115	150
4"	3.720	8 - 1,140	13.40	13.40	n/a	9.00	10.00	n/a	8.06	120	165
6"	5.692	19 - 2,660	14.60	14.60	n/a	11.00	12.50	n/a	9.06	125	170
8"	7.692	33 - 4,870	16.10	17.25	n/a	13.50	15.00	n/a	10.06	130	195
10"	9.682	52 - 7,670	18.50	18.50	n/a	16.00	17.50	n/a	10.46	165	250
12"	11.682	74 - 11,180	19.70	19.70	n/a	19.00	20.50	n/a	12.31	230	345
14"	13.440	90 - 16,070	21.70	22.75	12.00	21.00	23.00	20.30	15.46	350	480
16"	15.440	118 - 20,900	23.60	25.25	14.20	23.50	25.50	21.10	16.21	410	645
18"	17.440	150 - 26,480	23.60	25.25	14.20	25.00	28.00	21.10	17.21	495	750
20"	19.440	185 - 32,720	25.60	28.25	16.20	27.50	30.50	24.80	18.26	570	880
24"	23.440	270 - 47,180	30.70	35.75	21.70	32.00	36.00	29.60	20.11	825	1600
30"	29.190	420 - 73,620	35.80	41.75	26.50	38.75	43.00	35.90	23.26	1200	2350
36"	35.190	610 - 105,930	46.10	46.10	28.20	46.00	50.00	42.70	26.66	1750	2950
42"	41.190	830 - 144,370	48.05	**	32.10	52.75	**	48.35	29.99	**	**
48"	47.190	1,080 - 188,430	50.00	**	36.00	59.50	**	54.00	33.31	**	**

† Shipping weights are estimated and may change due to specific order packaging.

* Laying lengths for meters with ANSI Class 150 Flanges are equal to UM08 laying lengths

** Consult factory

5.0 SPECIFICATIONS

ACCURACY

(under reference conditions): $\pm 0.5\%$ of actual flow from .2 to 32 FPS

ACCURACY TESTS

5-point wet flow calibration of every complete flow tube with its signal converter. If desired, the tests can be witnessed by the customer. The McCrometer test facilities are traceable to the National Institute of Standards & Technology. The test facility uncertainty relative to flow is $\pm 0.15\%$

IMPORTANT NOTICE ON FLOW METER ACCURACY:

The flow meter, the cable and the electronics are factory calibrated for accuracy as a single unit. Changing the cable length with the Splice Kit changes the accuracy of the meter and invalidates the calibration certificate.

REPEATABILITY

$\pm 0.05\%$ or $\pm 0.0008 \text{ ft/s}$ ($\pm 0.25 \text{ mm/s}$), whichever is greater

HEAD LOSS

None. No obstruction in line and no moving parts.

PRESSURE RANGE

- 150 PSI maximum working pressure (UM06)
- 300 PSI maximum working pressure (UM08)

TEMPERATURE RANGE:

- Sensor Operating: -10 to 60°C (14 to 140°F)
- Sensor Storage: -15 to 60°C (5 to 140°F)
- Electronics Operation and Storage: -20° to 60°C (-4° to 140°F)

VELOCITY RANGE

.2 to 32 FPS

BI-DIRECTIONAL FLOW

Forward and reverse flow indication and forward and reverse net totalization are standard with all meters

- Conductivity: Liquids and slurries having a conductivity of not less than $5 \mu\text{S/cm}$ ($5 \mu\text{mho/cm}$). For slurry applications please contact the factory for special converter programming.
- Liner: UltraLiner NSF approved, fusion bonded epoxy
- Electrodes: Stainless steel (Hastelloy® optional)

POWER SUPPLY

AC: 100-240VAC/45-66 Hz (20W/25VA), DC: 10-35VDC (21W), battery (four lithium D cell batteries), five-year estimated life, solar (5W panel). AC, DC, battery, or battery & solar must be specified at time of ordering.

OUTPUTS

Dual 4-20mA Outputs (Not available for Profibus, HART, or battery converters): Galvanically isolated and fully programmable for zero and full scale (0-22mA).

Four separate digital programmable outputs: open collector transistor usable for pulse, frequency, or alarm settings.

- Volumetric Pulse
- Flow Rate (Frequency)
- Directional Indication
- High/Low Flow Alarms
- Hardware Alarm
- Empty Pipe
- Range Indication

SENSOR CABLE LENGTHS:

- Standard: 25' McCrometer supplied submersible cable with each remote mount unit.
- Optional: Up to 500 feet.
- Quick connect: Available in standard cable lengths: 25', 50', 75', 100', 125', 150', 175', 200', and 500'. Custom cable lengths at additional cost.

CONVERTER/SENSOR SEPARATION

≤ 500 feet; for longer lengths consult factory

EMPTY PIPE SENSING

Zero return when electrodes are uncovered

ALARMS

Programmable alarm outputs

DIGITAL TOTALIZER

Cubic Meter; Cubic Centimeter; Milliliter; Liter; Cubic Decimeter; Decaliter; Hectoliter; Cubic Inches; US Gallons; Imperial Gallons; Cubic Feet; Kilo Cubic Feet; Standard Barrel; Oil Barrel; US Kilogallon; Ten Thousands of Gallons; Imperial Kilogallon; Acre Feet; Megagallon; Imperial Megagallon; Hundred Cubic Feet, Megaliters

IP RATINGS:

- NEMA 6P/IP68 Metering tube with remote converter
- IP67 Die cast aluminum converter
- IP65 Panel mount converter

SENSOR SUBMERSIBILITY DEPTH:

- With standard strain relief cable: 9 m (30 ft.)
- With optional quick connect: 1.8 m (6 ft.)

CERTIFICATIONS

- CE Certified (Converter only)
- Listed by CSA to 61010-1: Certified by CSA to UL 61010-1 and CSA C22.2 No.61010-1-04
- ISO 9001:2015 certified quality management system

CALIBRATION

Wet flow calibrated in McCrometer flow lab traceable to the National Institute of Standards and Technology.

OPTIONS

- DC powered converter (10-35 VDC, 21 W)
- Meter mounted converter
- Extended warranty
- Hastelloy® electrodes
- ANSI or DIN flanges
- Quick Connect cable fittings
- Special lay lengths, including ISO standard lay lengths
- Converter sun shield
- Modbus Protocol RS485 converter
- HART® Converter
- Profibus Converter (No Dual 4-20mA on HART & Profibus)
- Smart Output™ (Sensus or Itron compatible)
- Panel mount converter (Not CSA approved)
- Battery or battery-solar powered converter (Not CSA approved, $\pm 1\%$ accuracy)

6.0 RETURNING A UNIT FOR REPAIR

If the unit needs to be returned to the factory for repair, please do the following:

- Prior to calling for a return authorization number, determine the model number, serial number, and reason for return.
- Call the McCrometer Customer Service Department and ask for a Return Authorization (RA) number.
- Ship the meter in the original packaging, if possible. Do not ship manuals, power cords, or other parts with your unit unless required for repair.
- Please make sure the meter is clean and free from foreign debris prior to shipping. McCrometer may charge a cleaning fee if the meter is sent without being cleaned.
- Write the RA number on the outside of the shipping box. All return shipments should be insured.
- Address all shipments to:

McCrometer, Inc.
RMA #
3255 W. Stetson Avenue
Hemet, CA 92545

WARRANTY

This Warranty shall apply to and be limited to the original purchaser consumer of any McCrometer product. Meters or instruments defective because of faulty material or workmanship will be repaired or replaced, at the option of McCrometer, free of charge, FOB the factory in Hemet, California, within a period of two (2) years from the date of delivery.

Repairs or modifications by others than McCrometer or their authorized representatives shall render this Warranty null and void in the event that factory examination reveals that such repair or modification was detrimental to the meter or instrument. Any deviations from the factory calibration require notification in writing to McCrometer of such recalibrations or this Warranty shall be voided.

In case of a claim under this Warranty, the claimant is instructed to contact McCrometer, 3255 W. Stetson Ave., Hemet, California 92545, and to provide an identification or description of the meter or instrument, the date of delivery, and the nature of the problem.

The Warranty provided above is the only Warranty made by McCrometer with respect to its products or any parts thereof and is made expressly in lieu of any other warranties, by course of dealing, usages of trade or otherwise, expressed or implied, including but not limited to any implied warranties of fitness for any particular purpose or of merchantability under the uniform commercial code. It is agreed this Warranty is in lieu of and buyer hereby waives all other warranties, guarantees or liabilities arising by law or otherwise. Seller shall not incur any other obligations or liabilities or be liable to buyer, or any customer of buyer for any anticipated or lost profits, incidental or consequential damages, or any other losses or expenses incurred by reason of the purchase, installation, repair, use or misuse by buyer or third parties of its products (including any parts repaired or replaced); and seller does not authorize any person to assume for seller any other liability in connection with the products or parts thereof. This Warranty cannot be extended, altered or varied except by a written instrument signed by seller and buyer.

This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

McCrometer reserves the right to make improvements and repairs on product components which are beyond the Warranty period at the manufacturer's option and expense, without obligation to renew the expired Warranty on the components or on the entire unit. Due to the rapid advancement of meter design technology, McCrometer reserves the right to make improvements in design and material without prior notice to the trade.

All sales and all agreements in relation to sales shall be deemed made at the manufacturer's place of business in Hemet, California and any dispute arising from any sale or agreement shall be interpreted under the laws of the State of California.

OTHER McCROMETER PRODUCTS INCLUDE:

Propeller Flowmeters



Differential Pressure Flowmeters



Magnetic Flowmeters



Wireless Monitoring System

