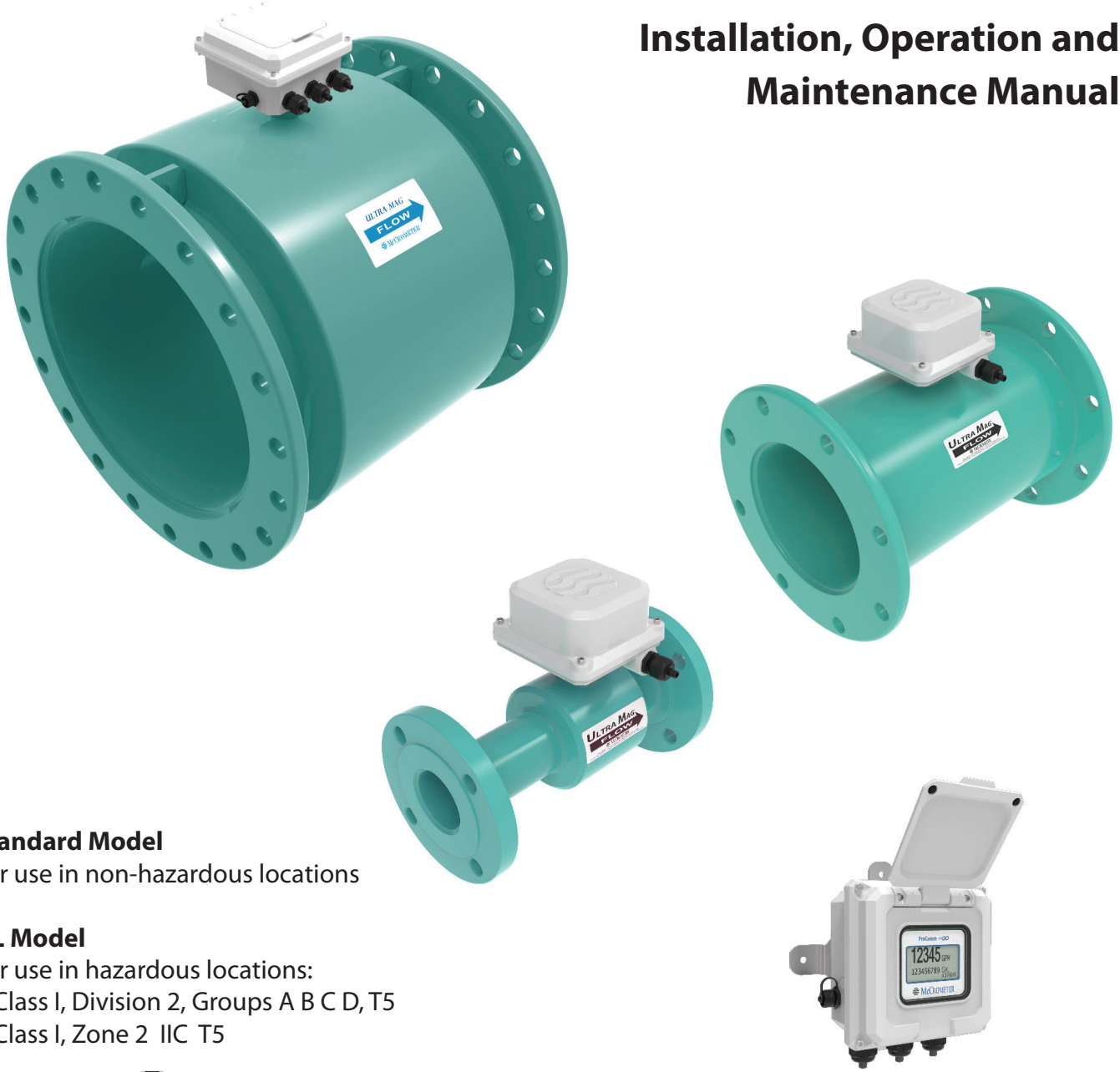
HACH® ULTRA MAG

Ultra Mag 3000 Electromagnetic Flow Meter

Installation, Operation and Maintenance Manual



Standard Model
For use in non-hazardous locations

HL Model
For use in hazardous locations:
- Class I, Division 2, Groups A B C D, T5
- Class I, Zone 2 IIC T5

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Hach's Flow Solutions by McCROMETER

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SAFETY

Safety Symbols And Warnings

Throughout this manual are safety warning and caution information boxes. Each warning and caution box will be identified by a large symbol indicating the type of information contained in the box. The symbols are explained below:



This symbol indicates important safety information. Failure to follow the instructions can result in serious injury or death.



This symbol indicates important information. Failure to follow the instructions can result in permanent damage to the meter or installation site.

Safety Warnings

When installing, operating, and maintaining McCrometer equipment where hazards may be present, you must protect yourself by wearing Personal Protective Equipment (PPE) and be trained to enter confined spaces. Examples of confined spaces are manholes, pumping stations, pipelines, pits, septic tanks, sewage digesters, vaults, degreasers, storage tanks, boilers, and furnaces.

You must follow all state and local laws, as well as Occupational Safety and Health Administration (OSHA) regulations concerning Personal Protective Equipment and confined-space entry. Specific requirements can be found in the OSHA section of the Code of Federal Regulations: *29 CFR, 1910.132 - 1910.140, Personal Protective Equipment; and CFR Title 29, Part 1910.146, Permit-Required Confined-Spaces.*



WARNING!
Incorrect installation or removal of meters can result in serious injury or death. Read the instructions in this manual on the proper procedures carefully.



WARNING!
Never enter a confined space without testing the air at the top, middle, and bottom of the space. The air may be toxic, oxygen deficient, or explosive. Do not trust your senses to determine if the air is safe. You cannot see or smell many toxic gases.



WARNING!
Never enter a confined space without the proper safety equipment. You may need a respirator, gas detector, tripod, lifeline, and other safety equipment.



WARNING!
Never enter a confined space without standby/rescue personnel within earshot. Standby/rescue personnel must know what action to take in case of an emergency.

1.0 DESCRIPTION OF THE FLOW METER

Ultra Mag meters are available with integral or remote mount transmitters. 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 transmitter 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.

2.0 UNPACKING THE CRATE AND VERIFYING SERIAL NUMBERS

2.1 Uncrating

The shipping crate contains the following items:

- Electromagnetic meter assembly with grounding wire attached
- Transmitter cable (attached to meter)
- Signal transmitter
- Grounding rings
- Ground wires (2)
- User manuals for both the sensor and transmitter
- Installation hardware (2" & 3" only)
- Gaskets (4) (2" & 3" only)

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.

2.2 Verifying the Serial Numbers

The transmitter and sensor are supplied as a custom calibrated matched system. Verify the system serial numbers on both the transmitter and sensor match. This will ensure a properly calibrated system.

The meter serial number is located on the side of the sensor body on a silver label. An example is shown below (Figure 1).

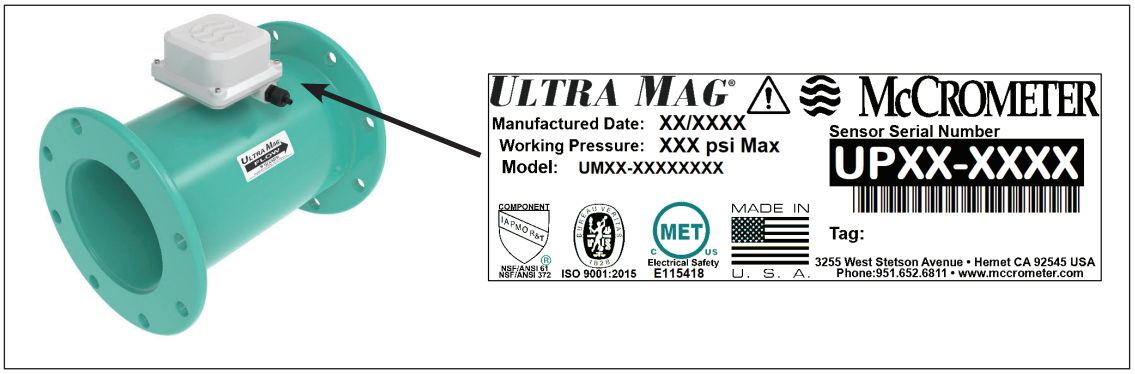


Figure 1. Flow meter serial number tag

IMPORTANT: Verify the meter serial numbers on both the transmitter and sensor match. If the meter serial numbers do not match, contact the factory before continuing with the installation.

The serial number tag is located on the side or top of the transmitter (Figure 2). The tag has the transmitter model number, the transmitter serial number, the meter model number and the meter serial number. Examples are shown below (Figure 3 and Figure 4).

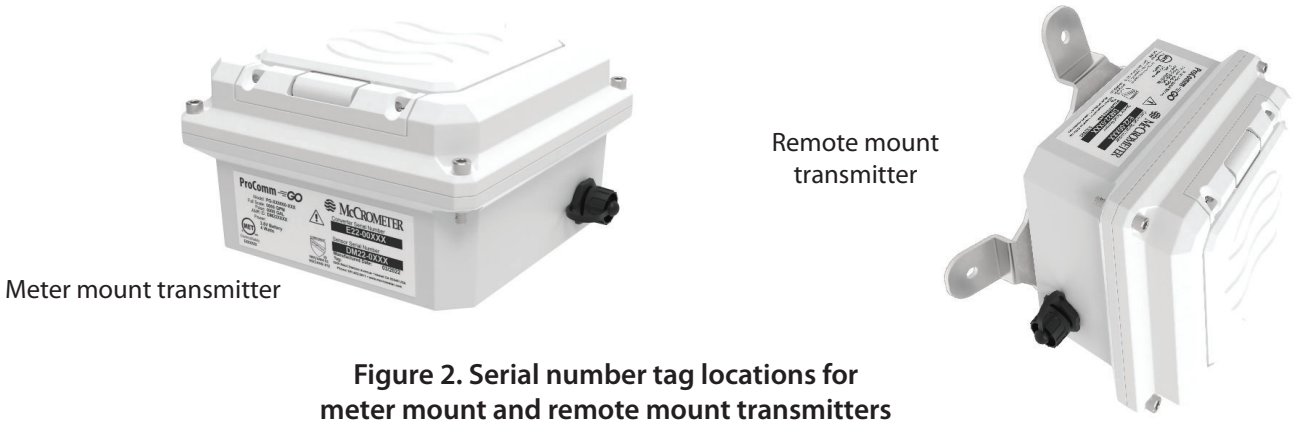


Figure 2. Serial number tag locations for meter mount and remote mount transmitters



Figure 3. Serial number tag for standard model



Figure 4. Serial number tag for hazardous location model

3.0 PREPARING FOR A NEW INSTALLATION

3.1 Sensor Location

Adjoining pipe must be adequately supported, and the area around the sensor should provide sufficient drainage to prevent flooding the transmitter 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 transmitter should not be subjected to intense, prolonged sunlight and/or vibrations. Unit should also be protected from heat.

3.2 Remote Mount Transmitter Location

The signal transmitter 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 transmitter is 25 feet. For applications with extended lengths, consult factory.

3.3 Pipe Run Requirements

The meter needs to be located a minimum distance before and after flow disturbances, such as elbows, pumps, partially opened valves, and changes in pipe diameter. The uneven flow created by these obstructions can vary with each system.

The minimum distance is measured in pipe diameters (D). To ensure accuracy locate the sensor upstream and downstream of flow disturbances as shown at right.

Meter size	Upstream/ Downstream
Flanged 1½" to 3"	0 / 0
Wafer 2" & 3"	3 / 1
Flanged 4" to 48"	1 / 0

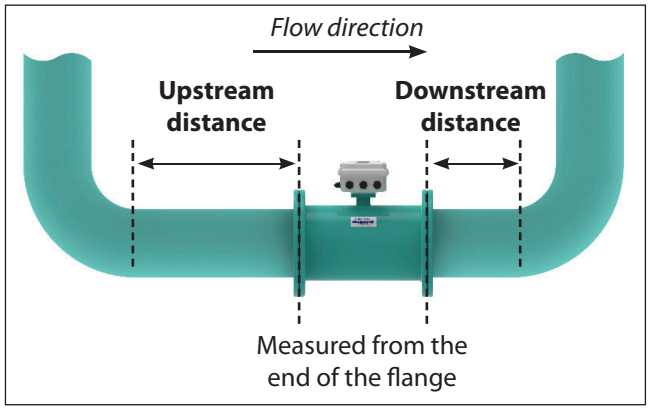


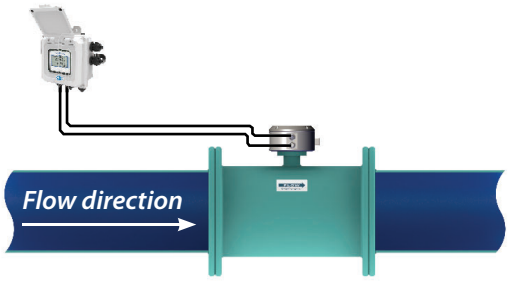
Figure 5. Upstream and downstream requirements

3.4 Positioning and Orienting the Sensor

The following installation recommendations should be followed (see Figure 2 for installation diagrams):

Horizontal installation

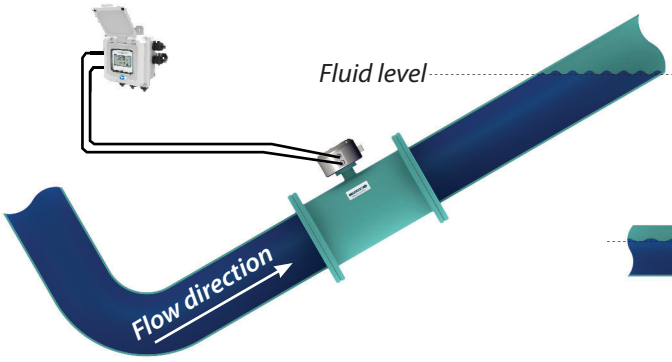
In horizontal pipe runs, the meter should be installed so that the junction box is vertical insuring the electrodes are positioned to prevent coating by sediments or loss of electrode contact due to air bubbles.





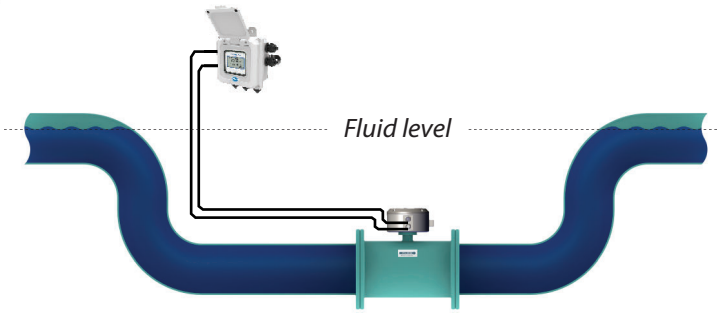
Vertical installation

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



Less than full pipes

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.



4.0 FLOW METER INSTALLATION

NOTE Nothing in this manual supersedes local codes.

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

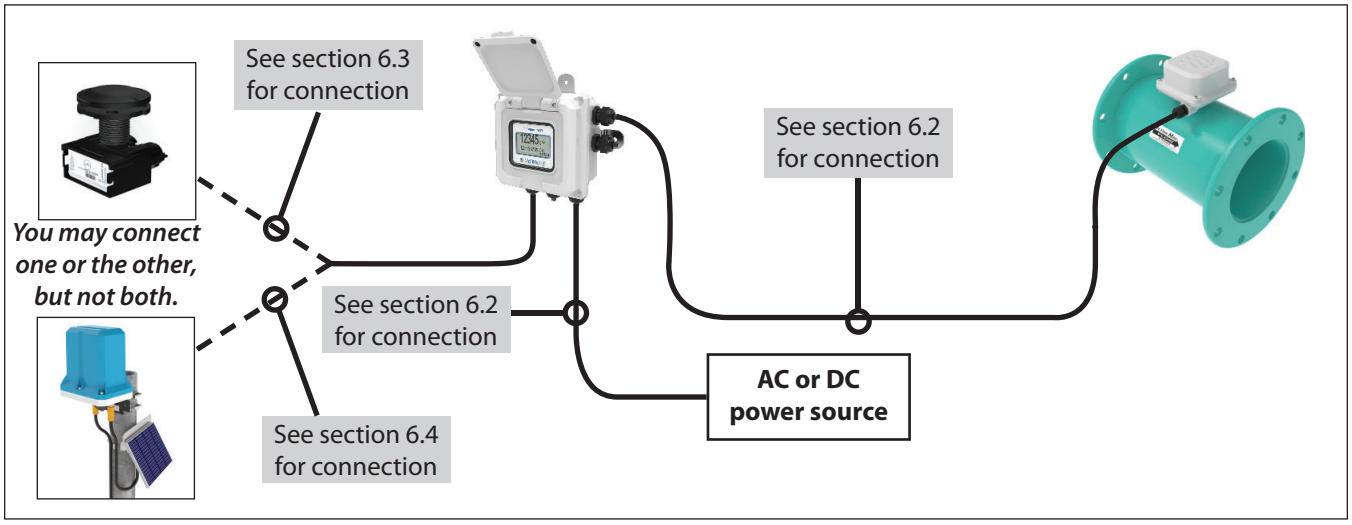
4.1 Meter Installation

Install the Ultra Mag flow meter inline between two flanged end pipes. The flow meter may require grounding, depending on the environment they are being installed in. Refer to section 8.0 for a full description of grounding methods that are available.

4.2 Remote Mount Transmitter Installation

You will need to prepare the location where you will install the remote transmitter. The location cannot be further from the flow meter than the length of the 25' cable. This must be planned in advance because ***the cable cannot be lengthened.*** Doing so will alter the calibration accuracy between the meter and the transmitter and void the warranty.

Install the flow meter as described in section 4.1. Mount the transmitter and connect the cable to the meter's junction box and the transmitter's external connection. Figure 6 below shows an example of a remote mount installation with an optional Smart Output connection.



IMPORTANT: The example shown above does not include grounding installation. Depending on your requirements, the meter will need to be grounded according to the methods shown in section 8.0.

Figure 6. Example remote mount configuration

5.0 REMOTE MOUNT TRANSMITTER INSTALLATION

5.1 Mounting the ProComm GO Transmitter

Note: This applies to the remote mount transmitter only.

If possible, mount the transmitter in an electronics shed or environmental enclosure. The sun shield should be oriented in a direction to reduce sun damage and ensure readability. This electronic unit is rated IP67 for temporary flooding.

There is a stainless steel mounting plate attached to the back of the ProComm GO transmitter, which is used to mount the transmitter to a solid, flat surface using four bolts (Figure 7). Mounting plate feet are located at the top, bottom, left, and right sides.

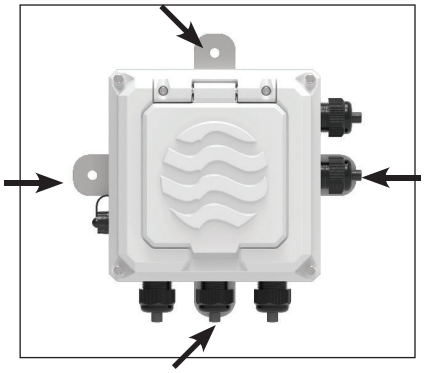


Figure 7. Mounting transmitter to solid surface

5.2 Installing Cables through Cable Glands and Conduit

All electrical cables enter the transmitter through compression fittings or optional customer-supplied conduit located on the side or bottom of the transmitter (Figure 8 and Figure 9). Ensure that all compression glands are properly tightened and all unused fittings are plugged so the case remains sealed.

The power cable and wiring harnesses are each assigned specific cable glands where they will pass through into the transmitter. See section 5.4 for cable gland assignment for wiring harnesses and section 6.2 for wiring diagrams.

All cable compression glands must be properly tightened to prevent moisture intrusion and maintain the IP67 rating. To insure IP67 rating, use only round cable 0.24" to 0.47" in diameter.

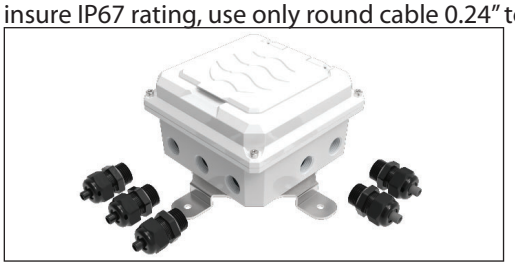


Figure 8. Compression fittings

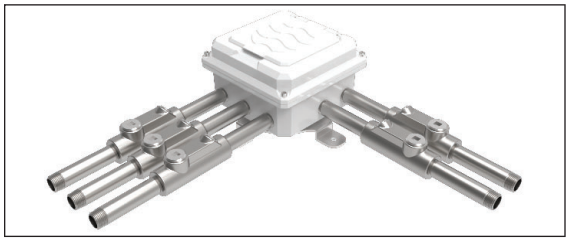


Figure 9. Remote mount transmitter with conduit pass-throughs

WARNING
Attaching conduit directly to the enclosure may introduce dangerous gasses and moisture into the enclosure creating a dangerous condition, and will remove the enclosure's IP67 rating. **Damage caused by attaching conduit to the enclosure or altering the enclosure in any way is not covered by the warranty.**

WARNING
EXPLOSION HAZARD. DO NOT REMOVE OR REPLACE LAMPS, FUSES OR PLUG-IN MODULES (AS APPLICABLE) UNLESS POWER HAS BEEN DISCONNECTED OR THE AREA IS FREE OF IGNITABLE CONCENTRATIONS.

WARNING
EXPLOSION HAZARD. DO NOT DISCONNECT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS FREE OF IGNITABLE CONCENTRATIONS.

IMPORTANT: Do not cut or alter the cable length on power or signal cables!
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 transmitter must be replaced. (Consult factory for replacement cable.)

5.3 Pulling Sensor Cable Through Electrical Conduit

It is very important to protect the end of the sensor cable when pulling it through a conduit. Water can accumulate in low portions of conduit. Always use a cable cover, or similar method, to seal the end of the cable against water when pulling the cable through conduit (see Figure 10). This will ensure proper operation of the meter.

NOTE Cable cover is not provided.

1. Tie a rope or cable-snake securely around the middle of the cable cover.
2. Carefully pull the rope or snake until the sensor cable end clears the conduit.
3. Bring the cable end to the transmitter location. If necessary, secure the cable so that it does not fall back through the conduit.
4. Remove the cable cover by pulling the rip wire. The cable cover will tear off (discard the cover).

CAUTION: Do not cut the cable cover off. Doing so may damage the sensor cable and adversely effect the calibration of the meter.

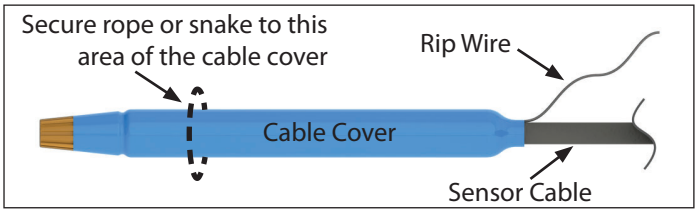


Figure 10. Cable cover

5.4 Cable Gland Assignment for Wiring Harnesses

Port assignment

1 - Outputs

2 - Outputs

3 - Power

4 - Coils

5 - Electrodes

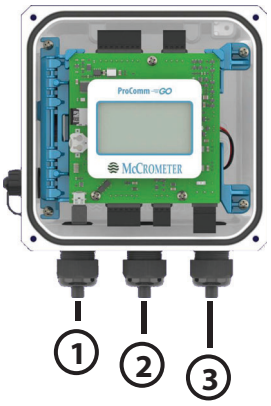


Figure 11. Meter mount view

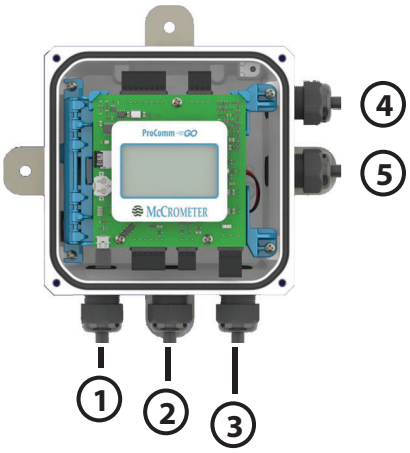


Figure 12. Remote mount view

6.0 INTERNAL WIRE CONNECTION

This section describes cable and wire harness connection inside the transmitter. Section 7.0 describes wire connection for all peripherals outside of the transmitter, including pulse output and external power options.

6.1 Terminal Block Diagram and Grounding Lug

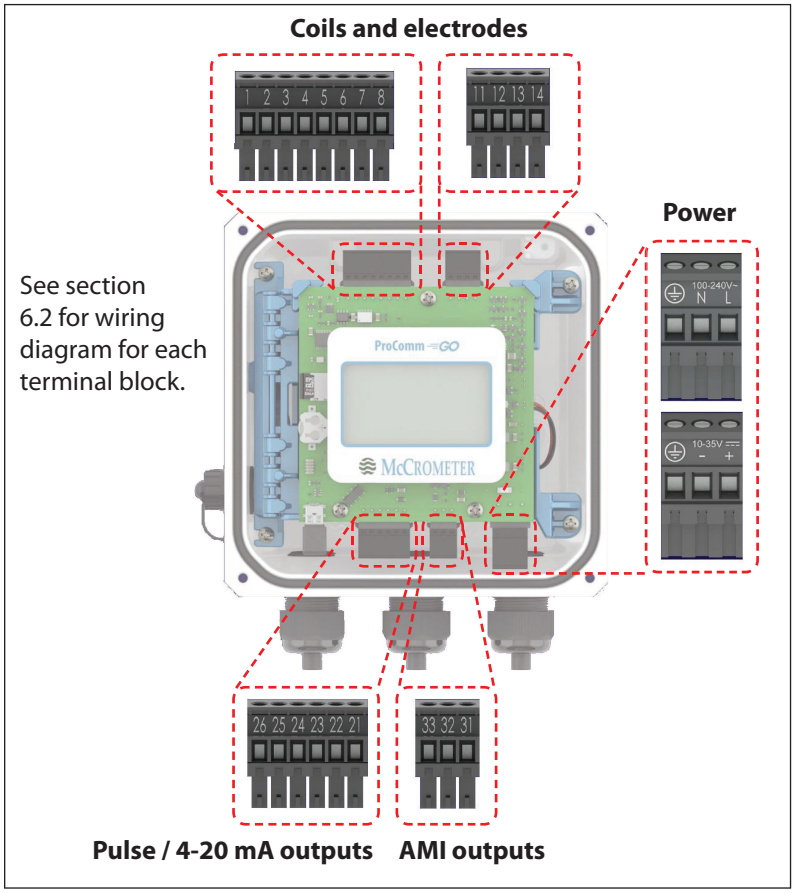


Figure 13. Terminal blocks

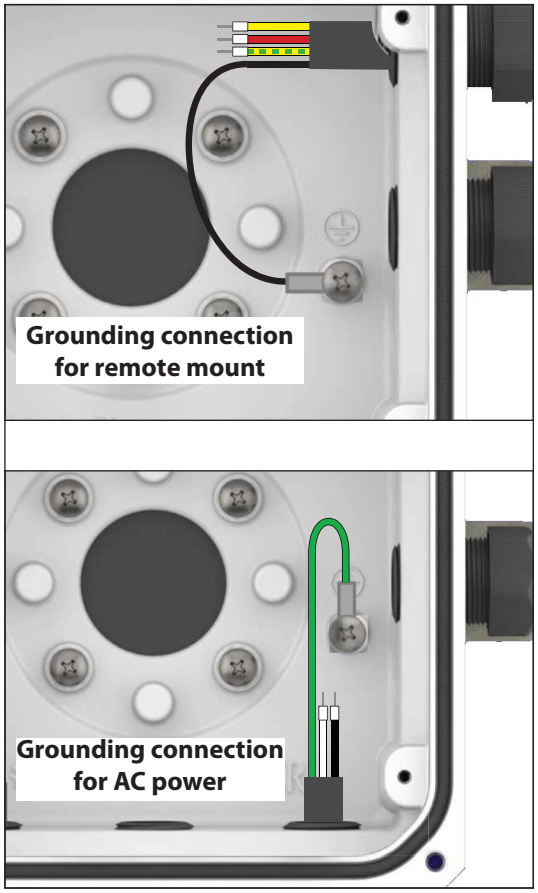
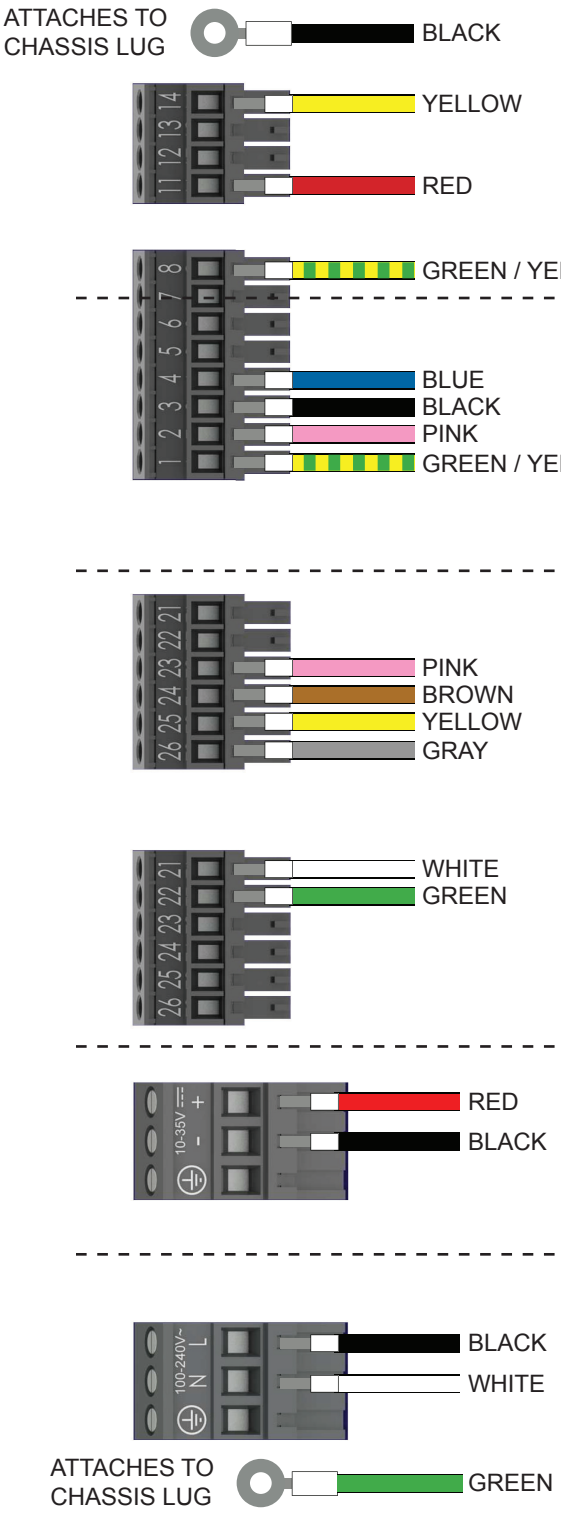


Figure 14. Grounding lug

6.2 Wiring Diagrams

TERMINAL BLOCK ASSIGNMENTS



Coils Harness

Terminal	Port	Wire Color
8	4	Green/Yellow
11	4	Red
14	4	Yellow
Chassis Lug	4	Black

Electrodes Harness

Terminal	Port	Wire Color
1	5	Green/Yellow
2	5	Pink
3	5	Black
4	5	Blue

Pulse Output Harness

Terminal	Port	Wire Color
23	1	Pink
24	1	Brown
25	1	Yellow
26	1	Gray

4-20 mA Output Harness

Terminal	Port	Wire Color
21	1	White
22	1	Green

DC Power Harness

Terminal	Port	Wire Color
Negative	3	Black
Positive	3	Red

AC Power Harness

Terminal	Port	Wire Color
Ground	3	Green
Negative	3	White
Load	3	Black

To complete AC power connection, connect green grounding lug to chassis as shown on previous page.

6.3 Optional Smart Output Hook Up

The convertor comes pre-wired with an interconnection that should readily connect to most AMI transceivers. Where interconnective devices are not mechanically compatible or where non-standard wiring is encountered, the installer can opt to remove the connector from the end of the transmitter's interface cable and make direct connection via the wiring table shown at right. (Figure 15)

- Signals and associated wire colors in the McCrometer SmartOutput™ interface cable are identified together in the top row of the table at right.
- Corresponding wire colors for transceivers from each compatible AMI vendor are identified in the columns under the top row.

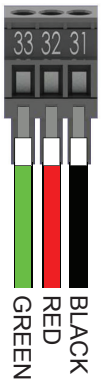
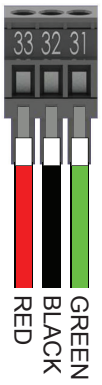
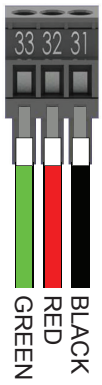
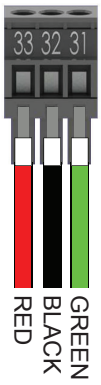
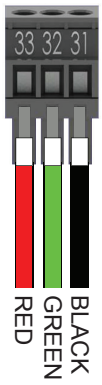
	Sensus	Itron	Badger	Neptune	Elster
31	Black	Green	Black	Green	Black
32	Red	Black	Red	Black	Green
33	Green	Red	Green	Red	Red
					

Figure 15. AMI Interface Pinout

6.4 Connecting the SmartTrax Remote Transmitting Unit

The SmartTrax remote transmitting unit will need to be installed remotely from the transmitter, regardless of whether the transmitter is mounted directly on the sensor or installed remotely from the sensor. Use the output transmitter port to run the cable through (section 5.2).

The example configuration in section 4.2 shows the SmartTrax with an optional solar panel. If you use a solar panel or an external AC or DC power source, you will need to use the female connection shown in Figure 18 and Figure 19.

For specific wiring diagrams to connect the transmitter to the transmitter, see section 6.5.

For more detail on the SmartTrax transmitter, including specifications, installation requirements, location, and remote data access, see the SmartTrax Installation, Operation, and Maintenance manual, 30125-82.

All Ultra Mag 3000 meters come software-preconfigured to accept SmartTrax in the future. When a SmartTrax unit is purchased, simply mount the unit as directed and wire the unit as indicated in the SmartTrax documentation. No specific options need to be selected at the time of order of the Ultra Mag 3000 meter.

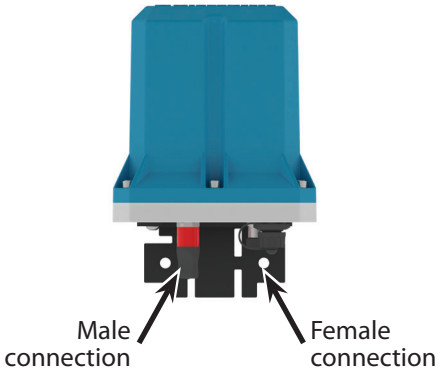


Figure 16. Connections, front view

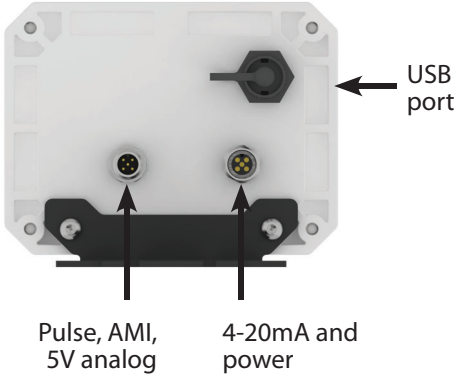


Figure 17. Connections, bottom view

6.5 Pin-out of SmartTrax Male and Female Connectors

FEMALE CABLE

Pulse / AMI / 5V Analog Connector



Figure 18. Pin-out of Female Connector

PULSE 1 & 2	
PULSE 1	BLUE
PULSE 2	WHITE
GROUND	BLACK

AMI	
DATA	BLUE
CLOCK	WHITE
GROUND	BLACK

5V ANALOG	
5V OUTPUT	BROWN
ANALOG IN	GRAY
GROUND	BLACK

MALE CABLE

4-20mA & Power Connector



Figure 19. Pin-out of Male Connector

4-20mA	
4-20mA -	WHITE
4-20mA +	BROWN

DC POWER / SOLAR	
9-30 VDC+	BLUE
GROUND / V-	BLACK

6.6 Installing the SmartTrax Optional Solar Panel

The optional solar panel can be installed as shown in Figure 20. The solar panel with nominal power is rated as 5.1W. Do not use the optional solar panel used to provide power to the ProComm GO transmitter.

Install the solar panel adjacent to the SmartTrax unit so that the two can be connected with the 6' cable. Connect the cable from the solar panel to the female connection (Figure 20).

If the cable is not connected to the solar panel, refer to the wiring diagram shown in Figure 18 and Figure 19.

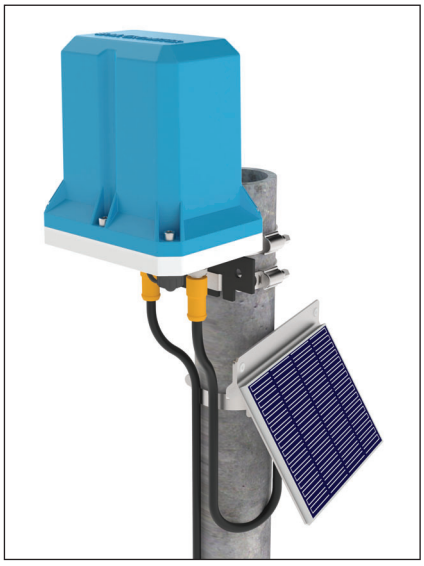


Figure 20. SmartTrax with attached solar panel

7.0 EXTERNAL WIRE CONNECTION

7.1 Cable Gland Connections

10-35VDC Power/4-20mA Output And Pulse Output

The flow meter has one dedicated port and two optional ports on the back side of the electronics enclosure. The dedicated port (center) is used to download data logger information or for meter service and troubleshooting. The two optional ports are for:

1. Optional 10-35 VDC power and 4-20mA output
2. Optional pulse outputs (flow volume and alarms)
3. AMI output
4. 100-240 VAC power

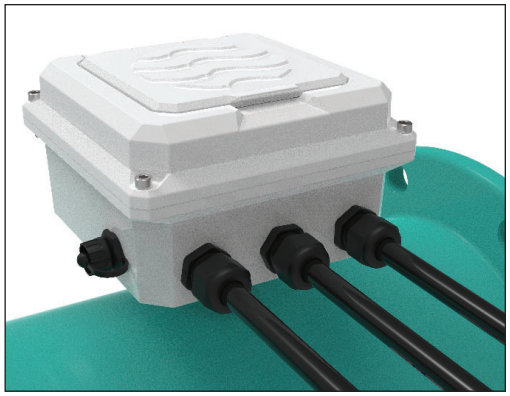


Figure 21. Standard cable gland

The flow meter is configured at the Factory for the optional outputs and requested by the customer at the time of order. The external cables attach through a permanent cable gland (standard, Figure 21) or through a screw locking-type waterproof connector (quick connect option, Figure 23).

7.2 Remote Mount Cable Connection to Sensor

The ProComm Go transmitter is designed to connect to a single-port transmitter box mounted on meter. Figure 22 shows the location of the connection port. This design converts flow data and sends it to the ProComm Go transmitter. The length of the cable between the transmitter and the transmitter is not important because the two devices do not need to be calibrated. This will allow users to swap transmitters in the field if needed, requiring only the SD card in the transmitter to be moved to the replacement unit.

The port on the transmitter is available as either a cable gland fitting or a quick connect fitting.



Figure 22. Transmitter box mounted on an Ultra Mag meter

7.3 Quick Connect Cabled Ends (Optional)

IMPORTANT
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.

Quick Connect cable end fittings are optional. If selected at the time of order, follow the instructions below. (Figure 24)

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.

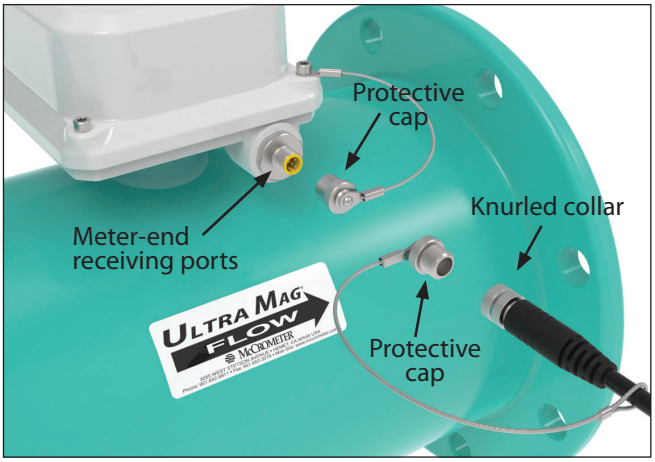


Figure 23. Optional quick connect cable ends

1. Remove protective cap.
2. Insert connector into the port.
3. Turn the knurled collar on the cable until tight.
4. When cable is connected, connect the meter-end protective cap to the cable-end protective cap (not shown).

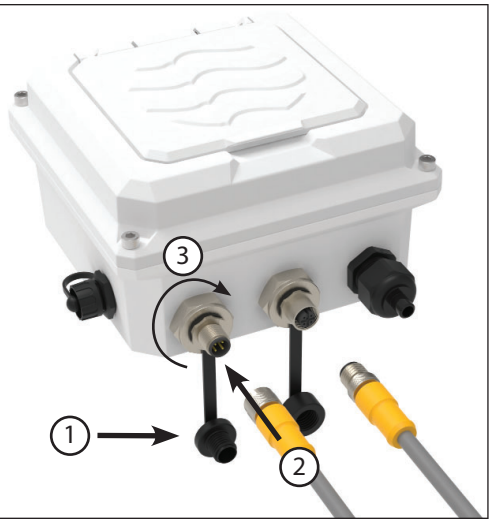


Figure 24. Transmitter optional quick connect cable ends

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.

WARNING
EXPLOSION HAZARD. DO NOT CONNECT/DISCONNECT CONNECTORS OR WIRING OR REMOVE ENCLOSURE LID WHILE WITHIN AN ELECTRICALLY CLASSIFIED HAZARDOUS AREA.

IMPORTANT
When not in use, always keep the attached cap firmly screwed into the connector to insure a water-tight seal. Also, keep the contacts in the cable connector clean and dry during assembly.

IMPORTANT
To connect sensor and transmitter via quick connect plugs and sockets, only use the supplied cable assemblies from McCrometer.

7.4 Power Options

Depending on output options and specific application position, you may choose to add additional power options to the battery powered transmitter. The 5W solar panel option (described in section 7.8) can extend battery life to 10-15 years. Additionally, you have the option of connecting external power of 10-32VDC or 100-240VAC.

7.5 DC Power Cable (Optional)

The cable contains wiring for both the optional 10-32VDC power to the meter, and the 4-20mA output from the meter. (Figure 25) Note: Input power is for the transmitter only if that option was selected at time of purchase. The 4-20mA loop requires its own power supplied to the loop, not be used with red/black wires.

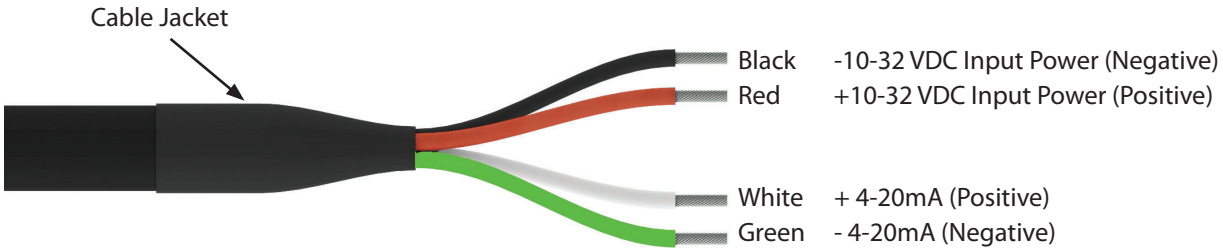


Figure 25. DC power cable wiring color scheme (optional)

7.6 4-20mA Current Loop

Output type: 4-20mA current loop

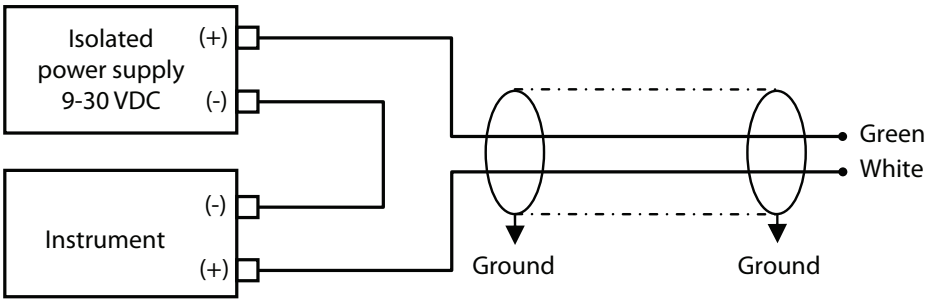


Figure 26. 4-20mA current loop

7.7 Pulse Output Cable (Optional)

The cable contains wiring for both pulse output 1 and pulse output 2. (Figure 27 and Figure 28)

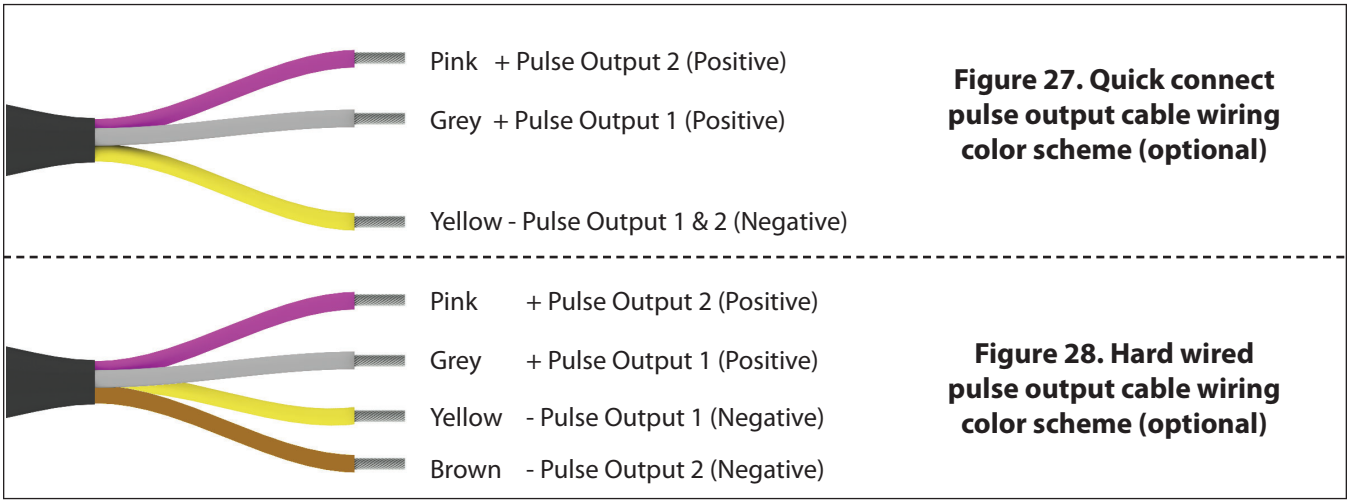


Figure 27. Quick connect pulse output cable wiring color scheme (optional)

Figure 28. Hard wired pulse output cable wiring color scheme (optional)

7.8 Transmitter Solar Panel Option (for use with standard model only)

The solar panel provides power to the transmitter by converting sunlight into electrical energy to recharge the solar panels' rechargeable battery. Its nominal power output is 5W.

When the solar panel is installed and the cable has been run to the transmitter, connection inside the transmitter is the same as installing batteries. See Figure 29 below.

The solar panel comes complete with all accessories, except for the fixing rod.

I These instructions apply only to McCrometer-supplied solar panels with a rechargeable battery. Connecting directly to a solar panel could damage the transmitter.

1. Remove lid from transmitter base.
2. Rotate battery tray open.
3. Route solar panel output cable through the bottom left strain relief.
4. Secure strain relief on the shrink wrap (Detail A) to avoid leaks.
5. Plug solar panel output cable into battery terminal 1 (BAT1).
6. Plug triple D battery pack into battery terminal 2 (BAT2).
7. Close battery tray.

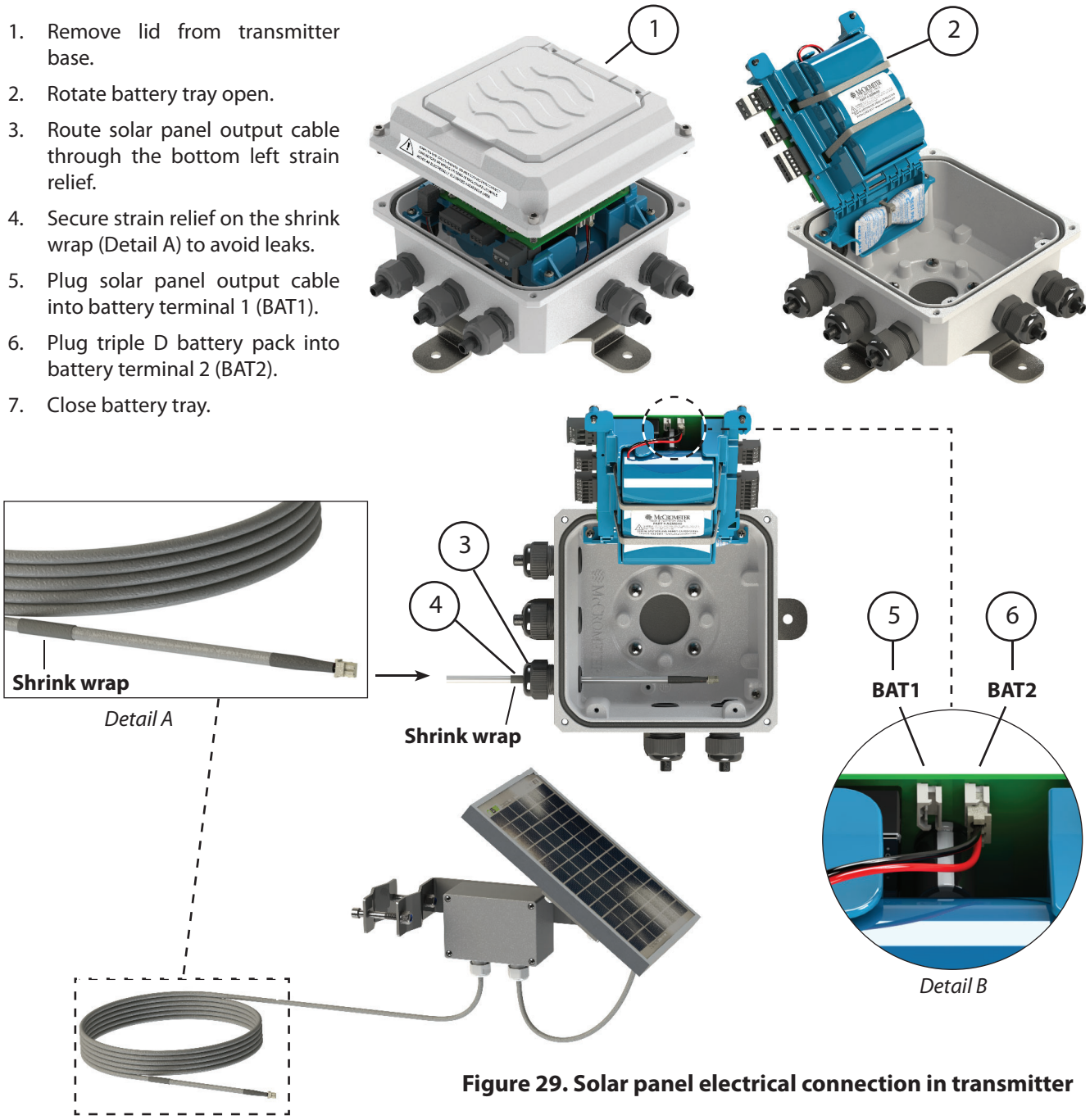
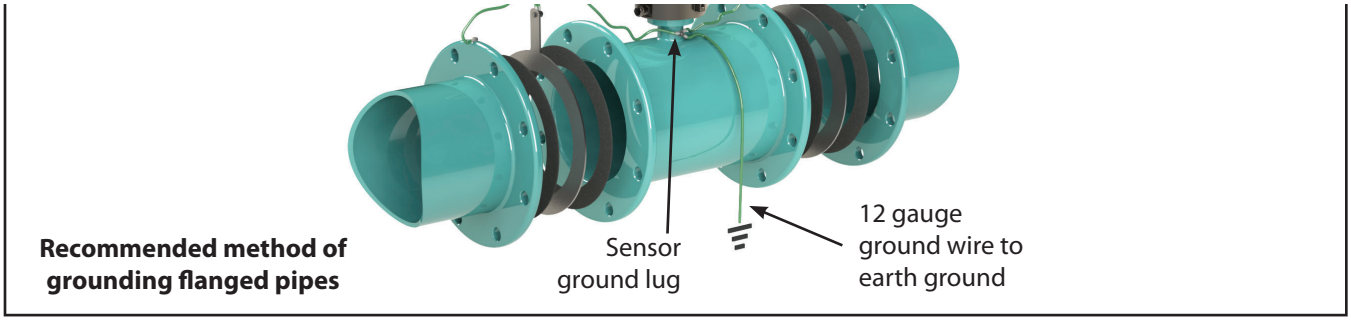


Figure 29. Solar panel electrical connection in transmitter

8.0 GROUNDING AND ELECTRICAL INTERFERENCE



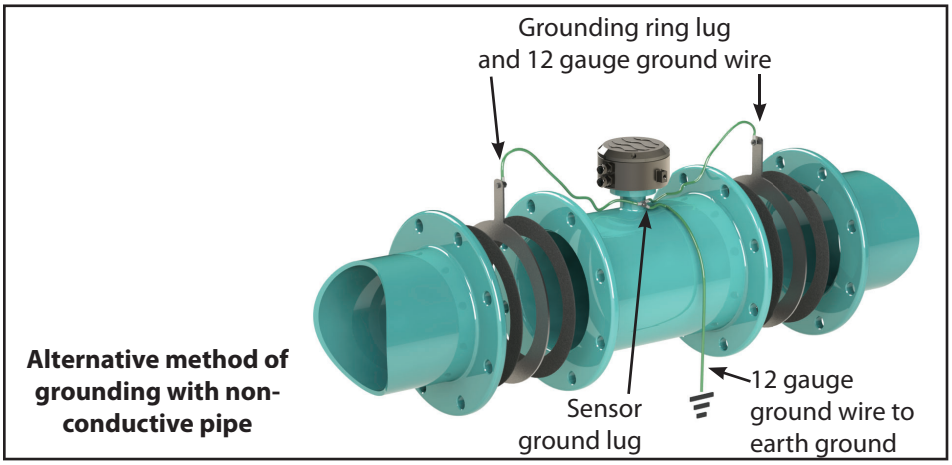


Figure 30. Sensor grounding

9.0 BATTERY REMOVAL AND REPLACEMENT

This procedure applies to all flow meters with the ProComm GO converter. It describes how to install batteries in a new meter and how to replace batteries using the replacement battery kit PGK01.

WARNING
EXPLOSION HAZARD. DO NOT DISCONNECT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS FREE OF IGNITABLE CONCENTRATIONS.

Before you begin:

Check materials and tools to ensure you have everything you need.

Materials Provided (shown in order of use)

One triple D battery pack



One double A battery pack



Replacement cover gasket



Molykote lubricant



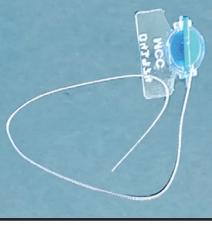
Zip ties:
- 2 large
- 1 small



Dry pack



Tamper proof wire seal



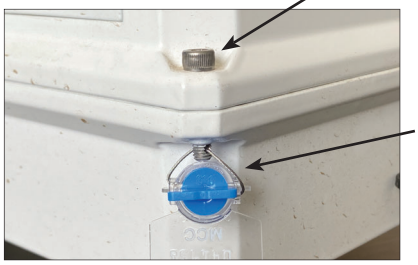
Tool Required

Wire cutters
Phillips screwdriver
5/32" Allen driver



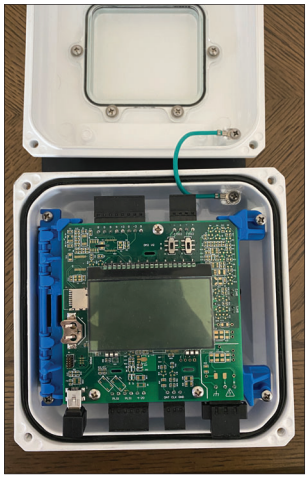
I. Removing the cover

1. Cut off the tamper-proof seal and remove the wire from the security screw.
   NOTE: This step is not required for battery installation in new meters.



2. Remove screws holding the lid to the housing using a 5/32" Allen driver. Lift the lid up and place the lid upside hanging by the green ground wire.



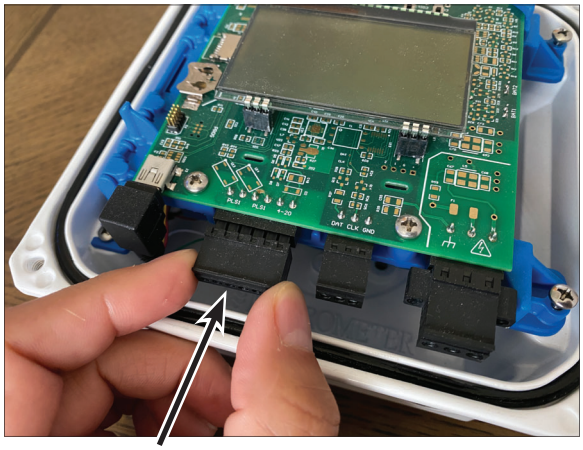


*If you are <u>replacing batteries</u> with fresh batteries, continue to step **3**.*

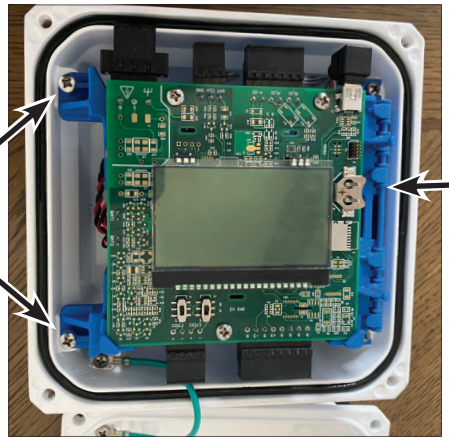
*If you are <u>installing batteries in a new meter</u> that does not have batteries already installed, go to step **9**.*

II. Removing the batteries

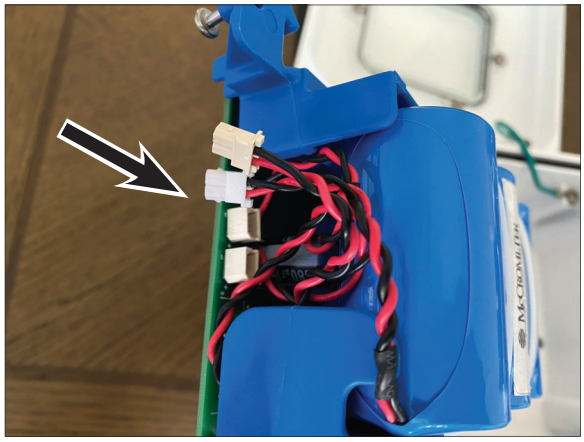
3. Unplug tall connectors to sensor, outputs, and power.



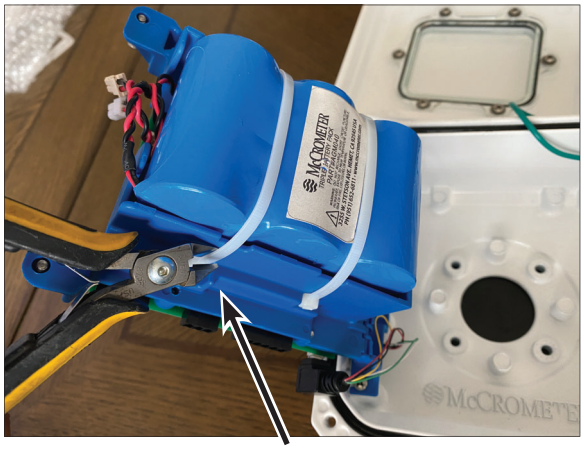
4. Loosen the captive screws opposite of the hinge and lift the battery cover.



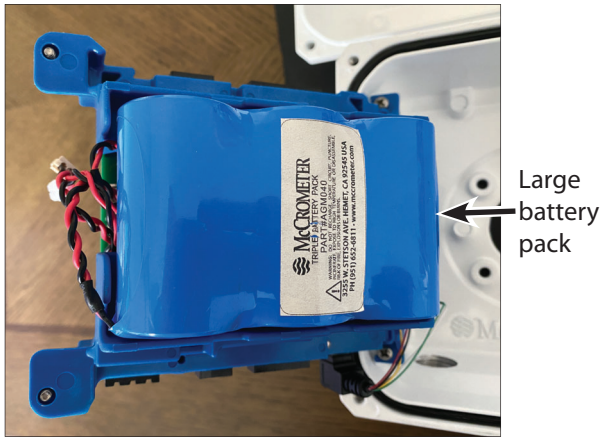
5. Unplug the batteries.



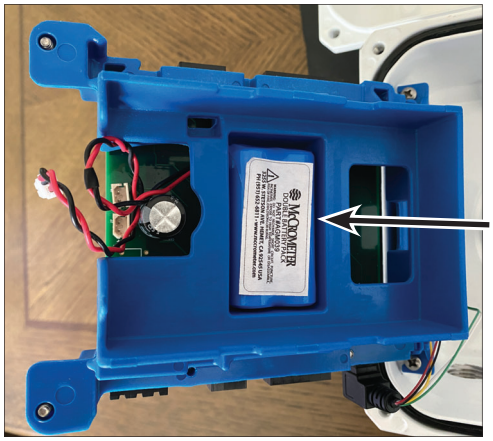
6. Cut the two zip ties securing the batteries.



7. Remove the large battery pack.



8. Remove the small battery pack located underneath. Pull the wires carefully from underneath the battery tray.

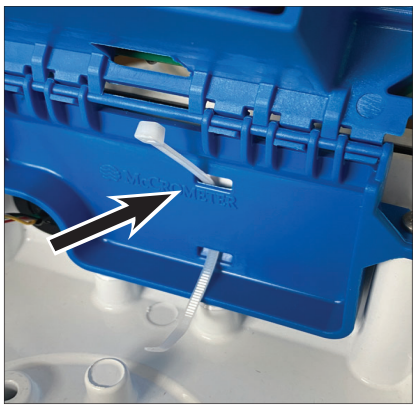


III. Installing the batteries and restoring the power

9. Cut the zip tie holding the dry pack to the hinge on the converter base.



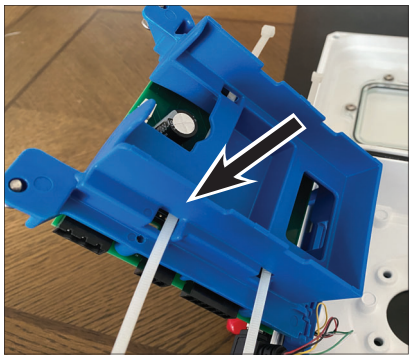
10. Pass the new zip tie through the slots in the internal hinge.



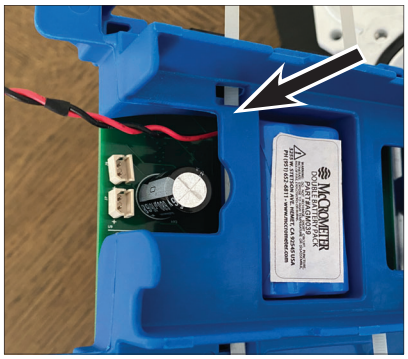
11. Wrap the new zip tie around the new dry pack and cut off the excess.



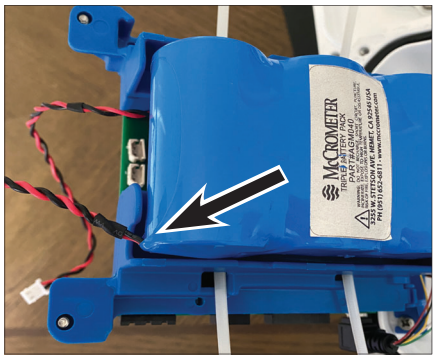
12. Pass the two large zip ties through the slots in the internal tray holder.



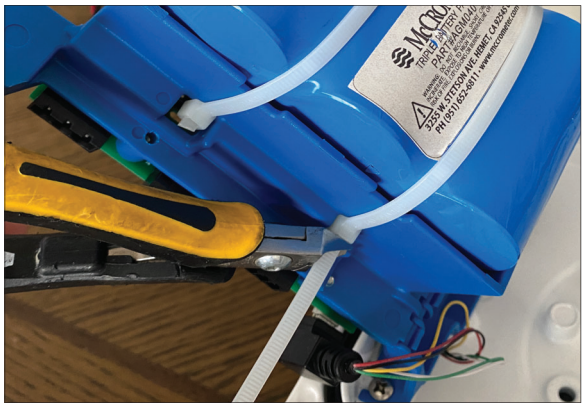
13. Place the small battery pack in the center pocket, making sure the wire leads go out through the opening.



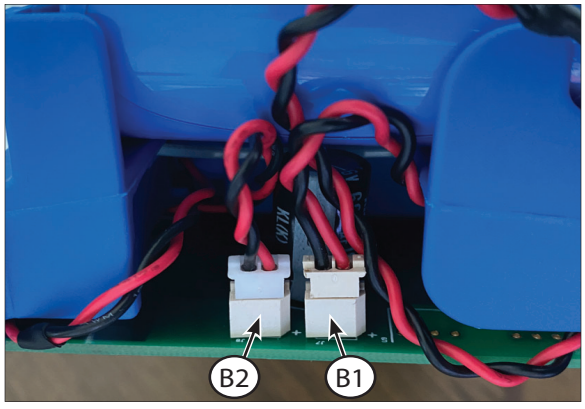
14. Place the large battery pack on the the internal tray with wire leads passing through the slot.



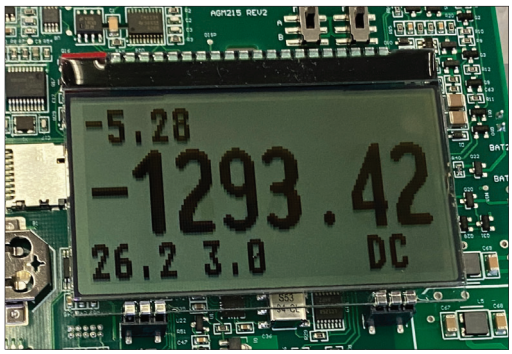
15. Secure the battery packs to the internal tray with the two large zip ties. Cut off the excess of each of the zip ties.

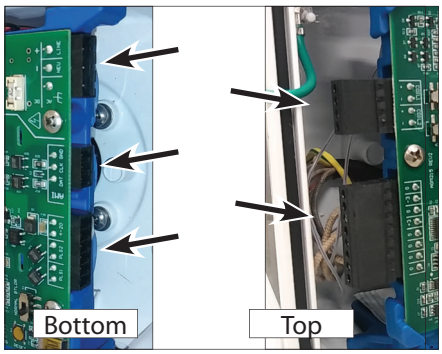


16. Plug the batteries into the circuit board.
    - The large battery pack goes to connector B1.
    - The small battery pack goes to connector B2.

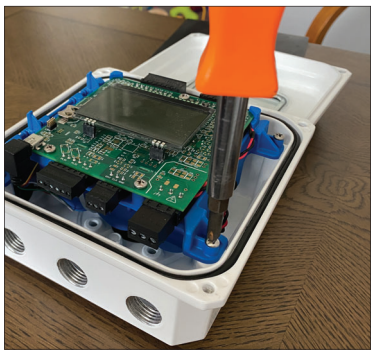


17. Set the hinged LCD/internal battery cover back in place to see the display. The unit will start to power up. Plug in all of the connectors to the board. Ensure that the unit is powered normally and there are no alarms.





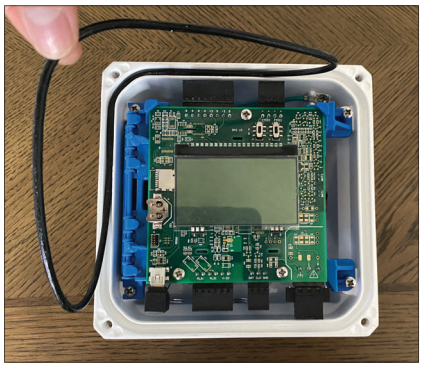
18. Replace the two screws that hold the LCD/battery cover in place.



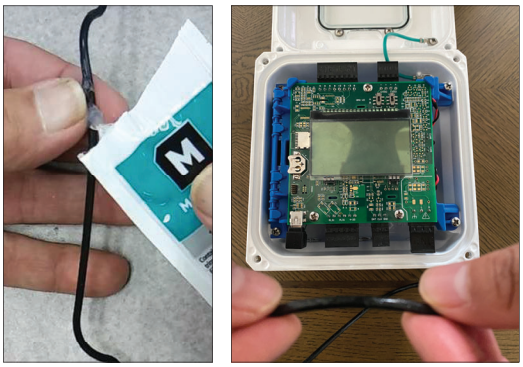
IV. Replacing the gasket

If you installed replacement batteries, we recommend that you replace the gasket.
If you installed new batteries, you must set the gasket in place before replacing the cover and closing up the unit.

19. If your unit has a gasket, remove it.



20. Apply a light coating of Molykote to the replacement gasket.



21. Place the gasket in the groove and press it in.

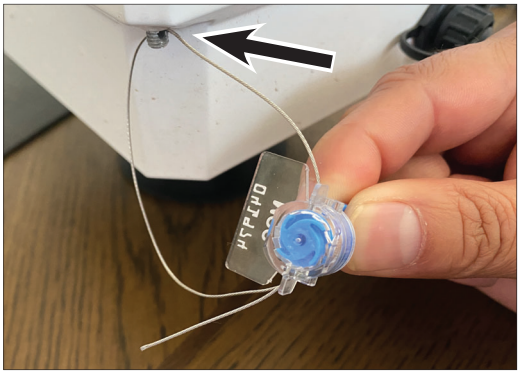


V. Replacing the cover

22. Place the converter lid onto the housing. Tighten the screws firmly. Be careful not to pinch any wires between the lid and the base.



23. Fasten the tamper proof seal as follows:
    a. Guide the wire through the hole in the screw.
    b. Thread the wire through the body of the tamper proof seal.



24. Rotate the blue part on the tamper proof seal to bring in the wire and secure the seal close to the screw.



10.0 OPERATION

10.1 General

The flow meter comes pre-configured from the factory based on the installation parameters provided to McCrometer at the time of order. Other than activating the display, there is nothing required of the user for the basic operation of the flow meter.

10.2 Activating the Display

The display is activated when the lid is opened. (Figure 31) The display will remain active for 30 seconds.

The various parts of the interface screen is shown below. (Figure 32) Depending on how the transmitter is configured with the configuration tool (see section 11.0) the display will show either single direction or bidirectional total flow quantities. Bidirectional flows are represented as either positive (POS) or negative (NEG), as shown at right.

CAUTION:
If the lid is broken off, contact the Factory for a lid replacement kit. In the meantime, set the lid on the meter in its proper position and use the boot to hold it in place.

NOTE The transmitter display is light activated and requires a minimum amount of light to appear. Environments where light is low, such as in dimly lit buildings or outdoors after sundown may prevent the display from appearing when the lid is raised.

There is an optical sensor embedded in the display located under the McCrometer "swirl" logo at the lower left. If the display does not appear, a flashlight will provide sufficient light to bring



Figure 31. Lift lid to activate display

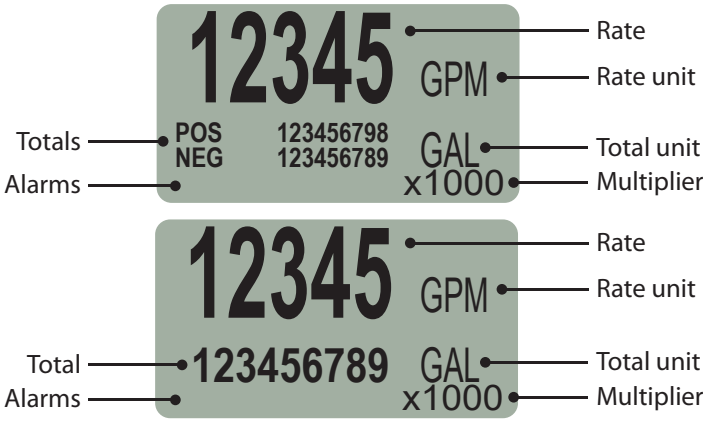


Figure 32. Interface screen, bidirectional and single direction flow

10.3 Transmitter Boot

The boot simply slips over the electronics enclosure. When installing the boot, insure the corners of the boot fit snugly over the lip of the enclosure. See Figure 33. To remove the boot, grip two corners and pull them away from the lip of the enclosure and then pull upwards. See Figure 34.

NOTE It is HIGHLY recommended that transmitter is covered by the boot at all times when the meter is not being read. The boot adds protection to the transmitter.

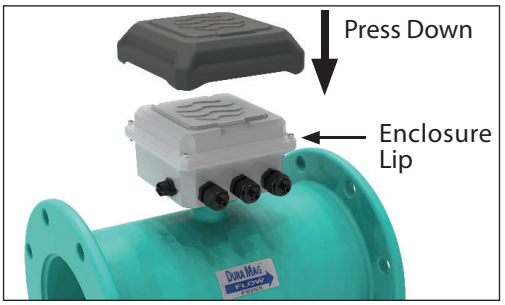


Figure 33. Boot installation

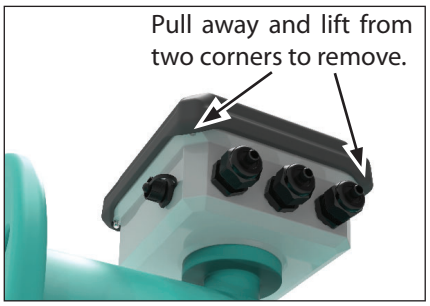


Figure 34. Boot removal

11.0 Transmitter CONFIGURATION

The transmitter can be programmed to customize how the data is measured and stored. The configuration tool runs only on Windows 7, 8, or 10 and requires a computer with a USB port.

To access the transmitter's USB port, unscrew the cap at the left side of the transmitter. You will need a cable with a mini USB type B connector. (Figure 35)

WARNING
EXPLOSION HAZARD. DO NOT CONNECT/DISCONNECT CONNECTORS OR WIRING OR REMOVE ENCLOSURE LID WHILE WITHIN AN ELECTRICALLY CLASSIFIED HAZARDOUS AREA.

You must have your flow meter's serial number before you begin. There are no installation files. The program and support files can be copied or unzipped into a folder and run from there.

This is only a summary of the configuration tool's functionality. The software has complete set-up and operation instructions included. The software can be downloaded from the McCrometer Web site.

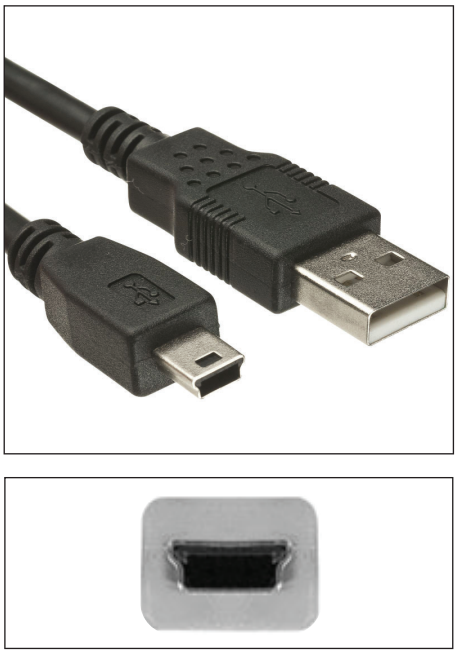


Figure 35. Mini USB type B connector

Software Operation

1. Remove the cap that protects the USB port and plug in a mini USB type B cable. (Figure 36) Connect the other end to a laptop computer.
2. Start the software. Follow the instructions shown before setting up your customized configuration. (Figure 37)
3. When you have set up your configuration file, you can change the settings listed below. Using the configuration tool is mostly self-explanatory.
   - Flow rate unit of measure
   - Totalizer unit of measure
   - Multiplier
   - Totalizer presets
   - Forward/reverse pulse enable: 1 pulse per x per unit of measure
   - Pipe ID
   - Clock time and date
   - Pulse output
   - Automated meter reading



Figure 36. Plug in mini-USB cable

When configuration is complete, remove the USB connector and replace the protective cap.

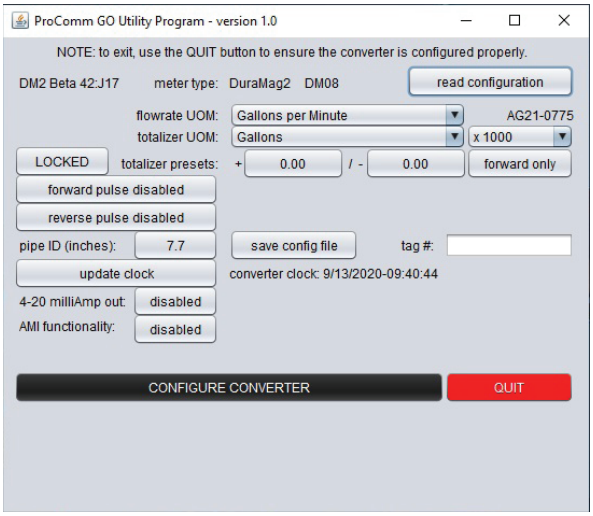
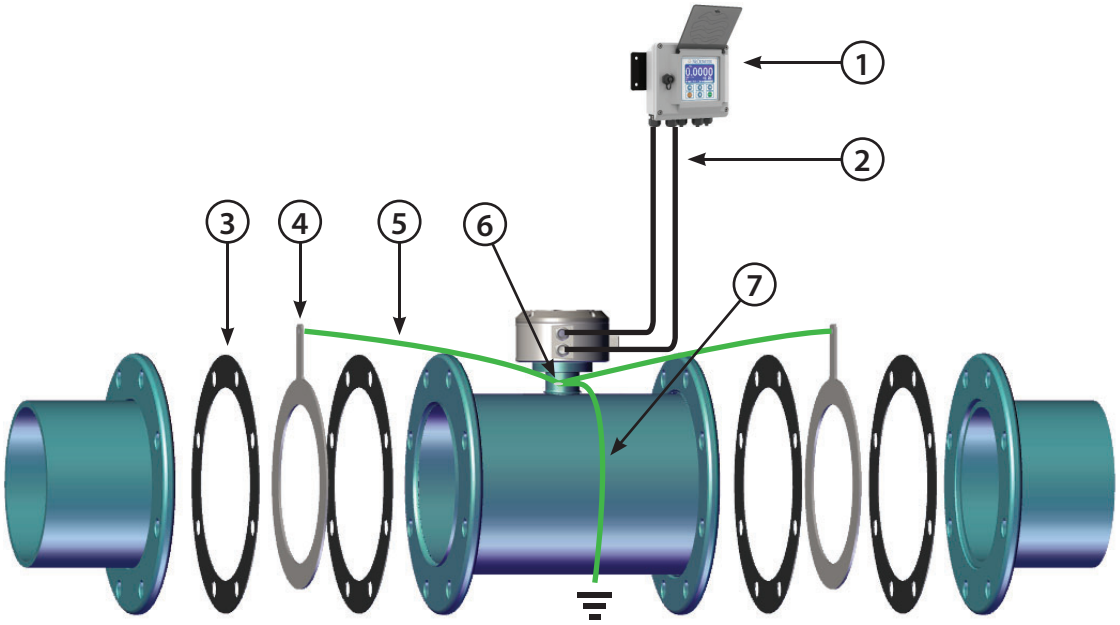


Figure 37. Configuration tool interface

12.0 ERROR MESSAGES FOR TROUBLESHOOTING

DISPLAY MESSAGE	Troubleshooting
BAT LOW	Battery replacement Kit is needed to replace batteries. The batteries Should last approximately 6-9 months from the time the warning is shown.
420 ERR	The 4-20 circuit is not wired correctly. Check the wiring diagram and ensure 9-30VDC power is supplied to the circuit. The output is not source powered.
COIL XCT	There is an issue with the electro magnetic coils. Check that the internal wiring is correct in the transmitter for the coil wires.
ADC CLIP	The meter signal exceeds the limit of the transmitter, likely due to noise. Check the meter grounding meets the IOM guidelines and identify any sources of noise.
HIGH HUM	Humidity inside transmitter housing has exceeded limits. Check for any loose connections on transmitter housing that could be creating a leak.
COIN LOW	Datalogger time backup battery is low. This is part of the battery replacement kit and should be replaced with the main battery packs.

13.0 REPLACEMENT PARTS



The image above is representative for all Ultra Mag meter models and sizes.

NO.	PART NUMBER	DESCRIPTION
1	PC-RA1	AC Transmitter (Dual 4-20mA Output)
1	PC-RD1	DC Transmitter (Dual 4-20mA Output)
1	PC-RA2	AC Transmitter w/ Modbus RS485 Communications Protocol
1	PC-RD2	DC Transmitter w/ Modbus RS485 Communications Protocol
2	15035 / 15036	Dual Cables - Submersible
3	1-1557-*	Gaskets (Optional)
4	3-2781-*	Grounding Rings, Stainless Steel (Optional on 4"-12")
5	3-2757-‡‡	Grounding Wire Assembly
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

14.0 SPECIFICATIONS, WEIGHTS, AND DIMENSIONS

14.1 Flow Meter Specifications

Physical Specifications

Measurement Method	Electromagnetic flow based on Faraday's Law
Directionality	Forward and reverse flow indication and forward, reverse, net totalization are standard with all meters
Pipe Sizes	Ultra Mag 3000: 1½, 2", 2½, 3", 4", 6", 8", 10", 12", 14", 16", 18", 20", 24" Ultra Mag 5000: 1½, 2", 2½, 3", 4" 6", 8", 10", 12", 14", 16", 18", 20", 24", 30", 36", 42", 48"
Body Style	Flanged tube
Liner	206N
Electrodes	Type 316 stainless steel, Hastelloy optional
Electrode Shape	Standard shape
Electrical Connections	• Compression gland seals • Quick-Connect
Signal Transmitter	• Ultra Mag 3000: ProComm GO transmitter • Ultra Mag 5000: ProComm Max transmitter
Transmitter Mount	Either meter mount or remote mount
Sensor Cable Lengths	• **Standard**: 25'/7.6 m McCrometer supplied submersible cable with each remote mount unit. • **Optional:** Up to 500'/152.4 m, or 25'/7.6 m max for ProComm GO • **Custom Quick Connect:** Available in standard cable lengths: Feet: 25, 50, 75, 100, 125, 150, 175, 200, 500 Meters: 7.6, 15.25. 22.5, 30.5, 38.1, 45.75, 53.3, 61, 152.4 Custom quick connect cables at additional cost.

Performance and Operational Specifications

Operating Temperature	-10 to 60 °C (14 to 140 °F)
Storage Temperature	-15 to 60 °C (5 to 140 ° F)
IP Rating	• Quick Connect (NEMA 6P/IP68 with remote transmitter) • Compression gland seals (NEMA 6P/IP68 with remote transmitter)
Sensor Submersibility Depth	**With standard strain relief cable:** 1.8 m (6 ft.) **With optional quick connect cable:** 9 m (30 ft.)
Pressure Rating	• AWWA CL D, 150 PSI maximum working pressure • ANSI #150, 285 PSI maximum • ANSI #300, 500 PSI maximum
Velocity Range	0.2 to 32 FPS

Flow Meter Specifications (cont.)

Performance and Operational Specifications (cont.)

Accuracy	• Ultra Mag 3000: Battery powered: 1% of measured value ±0.006 ft/s (±0.0018 m/s) • Ultra Mag 5000: Standard: +/- 0.5% of measured value ±0.006 ft/s (±0.0018 m/s) Optional: +/- 0.2% of measured value ±0.006 ft/s (±0.0018 m/s) **IMPORTANT NOTICE ON FLOW METER ACCURACY:** The Ultra Mag 3000 flow meter with remote display's cable and electronics are factory calibrated for accuracy as a single unit. Changing the cable length, even with the splice kit, changes the accuracy of the meter and invalidates the calibration certificate. The Ultra Mag 5000 flow meter does not have this restriction. Multiple point wet flow calibrations are conducted on every complete flow tube with its signal transmitter. If desired, the tests can be witnessed by the customer. The McCrometer test facilities are traceable to the National Institute of Standards & Technology. Uncertainty relative to flow is ±0.15%.
Repeatability	±0.05% or ±.0008ft/s (±0.25mm/s), whichever is greater
Head Loss	None. No obstruction in line and no moving parts
Conductivity	5 µs/cm
Pipe Run Requirements	**3000:** 1½" to 3" Flanged style meters — 0D upstream / 0D downstream 4" - 24" Steel flanged meters — 2D upstream / 1D downstream **5000:** 1½" to 3" Flanged style meters — 0D upstream / 0D downstream 4" - 48" Steel flanged meters — 1D upstream / 0D downstream

Other Specifications

Certifications and Approvals	**Ultra Mag 3000**
	Standard model:
	• ISO 9001:2015 certified quality management system
	• Certified by MET to UL 61010-1
	• Certified to NSF / ANSI Standards*
	HL Model:
	• ISO 9001:2015 certified quality management system
	• Certified by MET to UL 61010-1 and MET C22.2 No. 61010-1-04
	  • Class I, Division 2, Groups A B C D, T4
	  • Class I, Zone 2, IIC T4
	• Certified to NSF / ANSI Standards*
	Ultra Mag 5000
	• ISO 9001:2015 certified quality management system
	• Certified to NSF / ANSI Standards*

System Options	Stainless steel ID tag
Meter Options and Accessories	• Extended warranty • Hastelloy® electrodes • ANSI flanges • Special lay lengths, including ISO standard lay lengths • Additional sensor cable up to 475' • Quick connect cable fittings • Transmitter sun shield • Smart Output™ (Sensus or Itron compatible) • Battery or battery-solar powered transmitter (ProComm GO only)
Warranty	**Meter:** 2 year warranty **Liner:** Lifetime guarantee

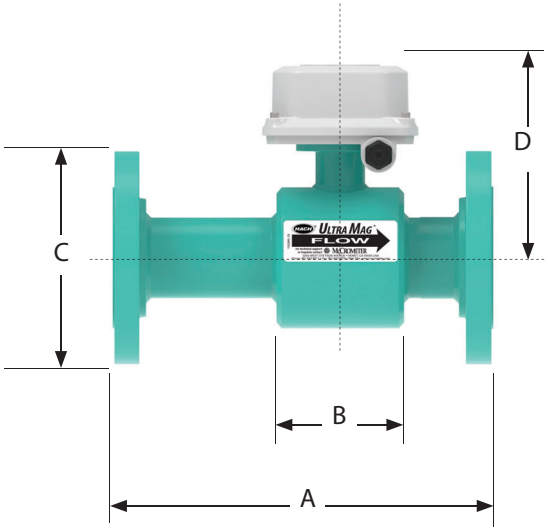
* Certified by IAPMO R&T to NSF/ANSI 61 for material safety and NSF/ANSI 372 for low lead content.

14.2 Flow Meter Dimensions and Weights

1½" to 3" Models

Pipe Size (Nominal)	Flow Ranges (0.2 to 32 FPS) Min-Max GPM	DIMENSIONS (Lay Lengths)							Est. Shipping Weight (lbs.)*	
		A		B	C		D			
		CL150 ANSI 150#	CL300 ANSI 300#		CL150 ANSI 150#	CL300 ANSI 300#	CL150 ANSI 150#	CL300 ANSI 300#	CL150 ANSI 150#	CL300 ANSI 300#
1 ½"	1.29-200	11	14	4.5	5.0	6.1	6.5	7.25	93	not offered
2"	1.29-200	11	14	4.5	6.0	6.5	6.5	7.25	93	70
2 ½"	3.25-510	13.4	15.5	4.5	7.0	7.5	7.0	7.75	94	not offered
3"	3.25-510	13.4	15.5	4.5	7.5	8.25	7.0	7.75	94	80

* For remote mount meters, add 4 lbs for ProComm Max transmitter.

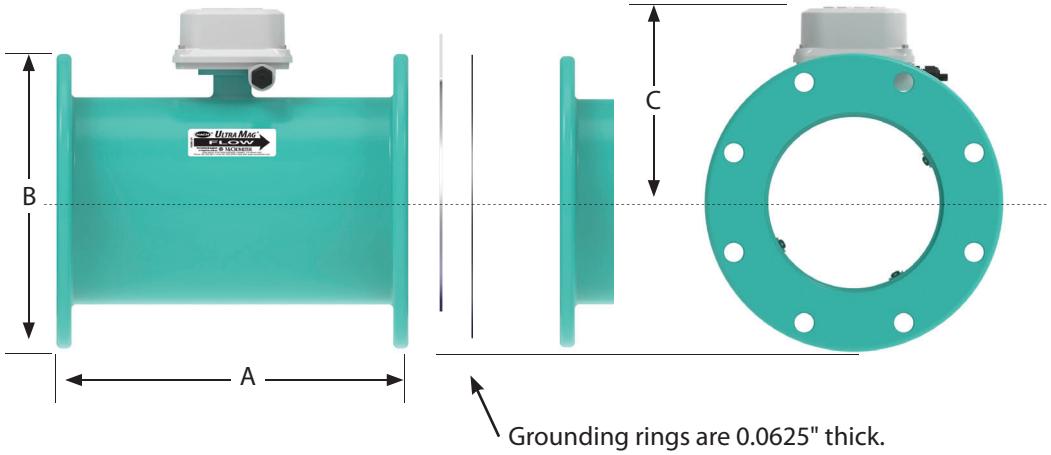


Flow Meter Dimensions and Weights (cont.)

4" to 12" Flanged End Body Style

Pipe Size (Nominal)	Flow Ranges (0.2 to 32 FPS) Min-Max GPM	DIMENSIONS (Lay Lengths)									Est. Shipping Weight (lbs.)*		
		A			B			C					
		AWWA	ANSI		AWWA	ANSI		AWWA	ANSI		AWWA	ANSI	
		150# Class D	150# CL150	300# CL300	150# Class D	150# CL150	300# CL300	150# Class D	150# CL150	300# CL300	150# Class D	150# CL150	300# CL300
4"	6.97-1110	13.4	13.4	13.4	9.0	9.0	10.0	9.25	9.25	9.25	86	167	167
6"	16.1-2560	14.6	14.6	14.6	11.0	11.0	12.5	10.25	10.25	10.25	98	186	186
8"	29.2-4670	16.1	17.25	17.25	13.5	13.5	15.0	11.25	11.25	11.25	118	250	250
10"	46.3-7400	18.5	18.5	18.5	16.0	16.0	17.5	12.5	12.5	12.5	168	290	290
12"	67.3-10760	19.7	19.7	19.7	19.0	19.0	20.5	13.5	13.5	13.5	210	350	350

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

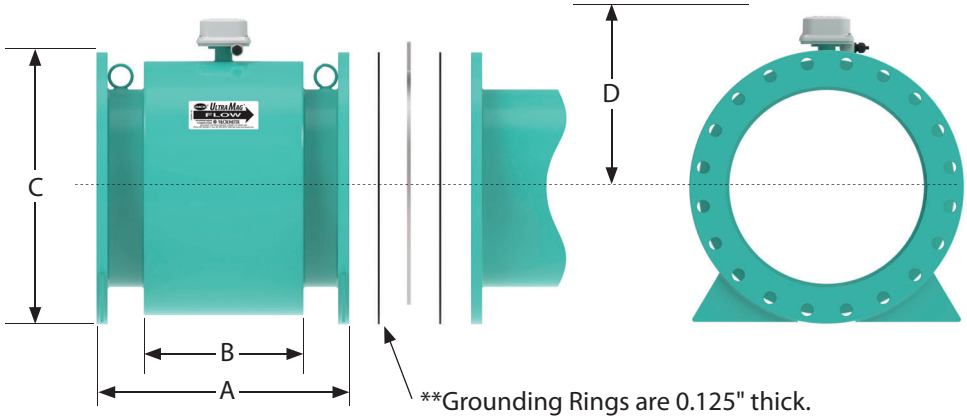


Flow Meter Dimensions and Weights (cont.)

14+" Flanged End Body Style

Pipe Size (nom.)	Flow Ranges (0.2 to 32 FPS) Min-Max GPM	DIMENSIONS										Est. Shipping Weight (lbs.)*			
		A				B	C				D**				
		AWWA		ANSI			AWWA		ANSI			AWWA		ANSI	
		150# Class D	300# Class F	150# CL150	300# CL300		150# Class D	300# Class F	150# CL150	300# CL300		150# Class D	300# Class F	150# CL150	300# CL300
14"	90.1-14410	21.70	22.75	22.75	22.75	10.38	21.00	23.00	21.00	23.00	13.56	290	370	370	550
16"	117-18670	23.60	25.25	25.25	25.25	12.38	23.50	25.50	23.50	25.50	14.31	352	443	443	639
18"	149-23820	23.60	25.25	25.25	25.25	12.38	25.00	28.00	25.00	28.00	15.31	400	492	492	801
20"	186-29600	25.60	28.25	28.25	28.25	14.38	27.50	30.50	27.50	30.50	16.25	465	603	603	973
24"	269-43040	30.70	35.75	35.75	35.75	18.88	32.00	36.00	32.00	36.00	18.25	658	864	864	1373
30"	418-66740	35.80	41.75	41.75	41.75	22.38	38.75	43.00	38.75	43.00	21.87	1067	1463	1463	2150
36"	607-97000	46.10	46.10	46.10	46.10	21.38	46.00	50.00	46.00	50.00	24.87	1529	2083	2083	3125
42"	831-132900	48.05	not offered	48.05	not offered	21.38	52.75	not offered	52.75	not offered	27.56	2113	2852	contact factory	
48"	1091-174440	50.00		50.00		21.38	59.50		59.50		30.56	2445	3139		

*Shipping weights are estimated and may change due to specific order packaging
** DIM D represents the remote transmitter height in relation to the meter centerline.



14.3 ProComm GO Transmitter Specifications

Physical Specifications

Electronic Housing	Diecast aluminum, powder coated enclosure w/ tamper resistant seal, 6½" x 6½" x 43/8" tall
Transmitter Dimensions	See "Dimensions" section for meter mount and remote mount transmitter dimensions.
Power	**Battery:** Standard: three 3.6V lithium-thionyl chloride (Li-SOCI2) D size batteries with two AA backup batteries **AC Power:** 100-240VAC/45-66Hz (4W) **DC Power:** Linear power supply 10-35VDC (4 W)
Electrical Connections	• Optional shielded cable for 10-32VDC/4-20 mA output • Optional shielded cable for pulse out

Performance and Operational Specifications

Battery Life	Five-year expected battery life, five-year battery warranty
Location	Indoor or outdoor use
Altitude	Operating: 2000 meters Storage: 12,000 meters
Operating Temperature	-4° to 140° F (-20° to 60° C)
Storage Temperature	-4° to 140° F (-20° to 60° C)
Relative Humidity	0% to 100%
IP Rating	IP67 Die cast aluminum transmitter
Outputs	**Digital output:** Digital pulse (open collector) output for volumetric - Two isolated digital pulse (open collector) outputs for volumetric - AMI output **Analog output:** 4-20mA: Galvanically Isolated, 16 Bit resolution. All power configurations (including battery). Note: 9-30 VDC loop power required (not supplied via transmitter)

Display and Measurement

Display	• 2-Line LCD display (no backlight) • Non-volatile memory • Anti-reverse totalizer (standard) • Total (to 9 digits of precision)	• Flow rate and velocity (to 5 digits of precision) • Two alarms: low battery and empty pipe (optional) • Opening lid activates display
Digits	5 Rate, 9 Total	

Units

GPM	Gallons per minute	IGM	Imperial gal per minute	CFM	Cubic feet per minute
MGD	Mega gal per day	MI9	Miners inch (9G)	B5M	Barrels per minute (55G)
CFS	Cubic feet per second	MI1	Miners inch (11.22G)	B5H	Barrels per hour (55G)
MLD	Megaliters per day	APD	Acre feet per day	B5D	Barrels per day (55G)
LPS	Liters per second	KLH	Kiloliters per hour	B4M	Barrels per minute (42G)
CMH	Cubic meters per hour	LPH	Liters per hour	B4H	Barrels per hour (42G)
LPM	Liters per minute	CMM	Cubic meters per minute	B4D	Barrels per day (42G)
GPH	Gallons per hour	CFM	Cubic feet per minute		

Display and Measurement (cont.)

Totalizer Units

GAL	Gallons	B42	Barrel (42G)	MH1	Miners Inch Hour (11.22G)
CUF	Cubic Feet	B46	Barrel (46G)	MD1	Miners Inch Day (11.22G)
AFT	Acre Feet	B55	Barrel (55G)	MH9	Miners Inch Hour (9G)
CUM	Cubic Meters	IMG	Imperial Gallon	MD9	Miners Inch Day (9G)
LIT	Liters	AIN	Acre Inch	KGL	Kilo Gallons
MML	Megaliter	TON	Ton (Short)	MGL	Mega Gallons
MTT	Metric Ton (KL)	MM1	Miners Inch Minute (11.22G)	IN3	Cubic Inch
B31	Barrel (31G)	MM9	Miners Inch Minute (9G)		

Data Logger

Standard with all models, minimum of five years of data stored

Other Specifications

Options and Accessories

- Data Logger - included as standard with five years of data storage at default (12hr) interval. (Cable sold separately)
- AC, DC, and battery powered with battery backup powered available

Safety

- IEC 61010-1, Pollution Degree II
- Overvoltage protection Category III

Certifications

Standard Model

- ISO 9001:2015 certified quality management system
- CE
- Certified by MET to UL 61010-1

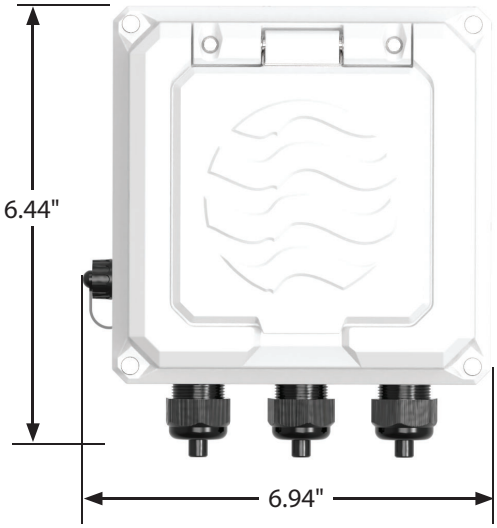
HL Model

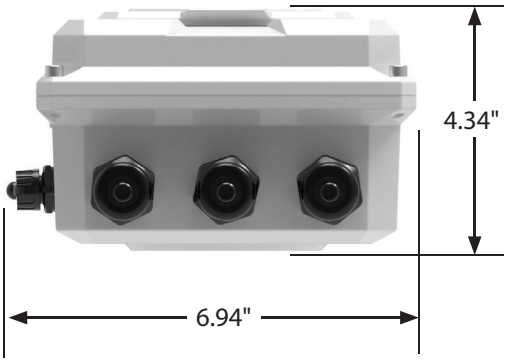
- ISO 9001:2015 certified quality management system
- CE
- Certified by MET to UL 61010-1 and MET C22.2 No. 61010-1-04
  - Class I, Division 2, Groups A B C D, T5
  - Class I, Zone 2, IIC T5

Note: ProComm GO with SmartTrax On Board is not available for hazardous locations.

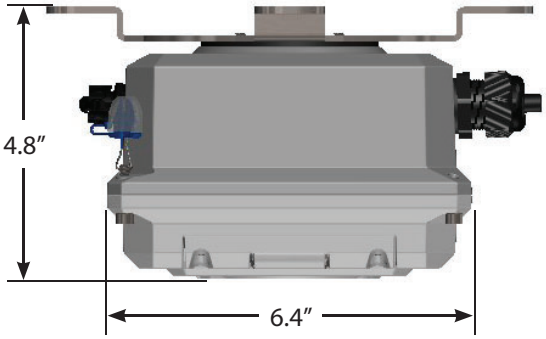
14.4 ProComm GO Transmitter Dimensions

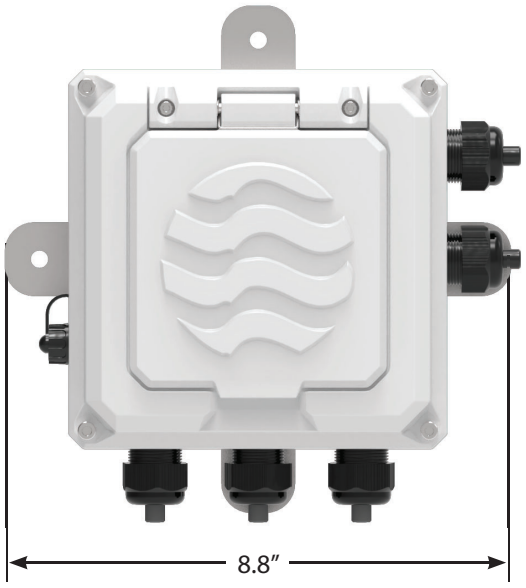
Meter mount converter

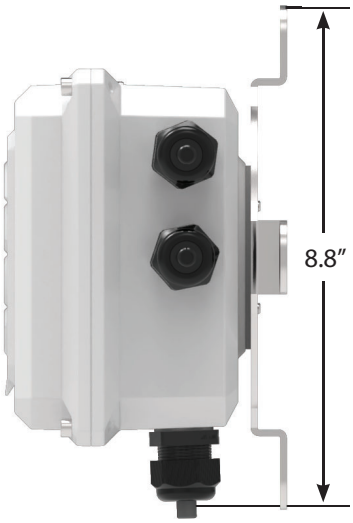




Remote mount converter







15.0 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.
- Contact McCrometer Customer Service Department and ask for a Return Authorization (RA) number.
  - Telephone: 1-800-220-2279
  - Email: customerservice@mccrometer.com
- 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 Inc., Attn: Technical Support, 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.



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