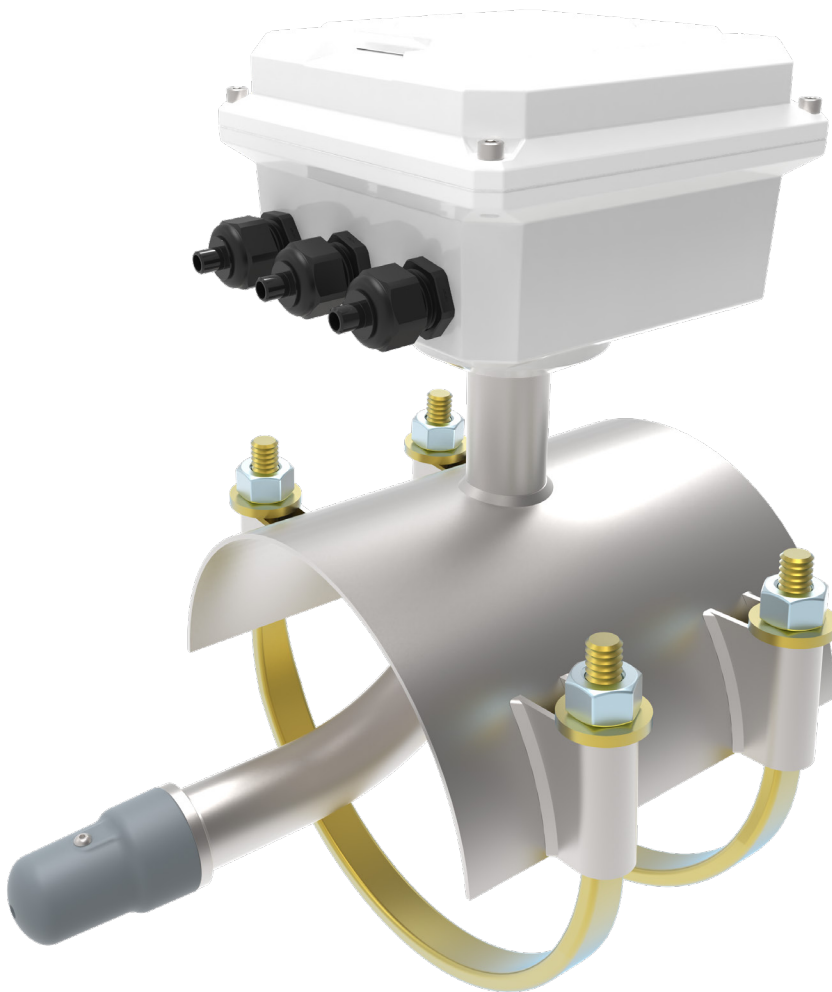


# McMag<sup>2000</sup><sup>™</sup> Battery Powered Electromagnetic Flow Meter

## Installation, Operation and Maintenance Manual



30124-77 Rev. 2.2  
March 20, 2024

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### 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:



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



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

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.



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



**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.



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



**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.



**Cutting into a pressurized pipe may cause injury or death. Always ensure the pipe is empty BEFORE cutting.**

## 1.0 INTRODUCTION

The McMag<sup>2000</sup> bolt-on saddle meter offers the convenience of installation and operation of a propeller meter with the accuracy and ease of use of a mag meter. It combines a single point sensor with a battery powered electronic converter to provide accurate flow measurement for full-pipe flow monitoring applications.

The saddle mounted sensor (available for pipe sizes from 4 to 16 inches) uses electromagnetic technology to measure the water flow and correct for shifting velocity in the pipe by constantly obtaining a mean velocity from the sensor.

The electronic converter is powered by a replaceable three cell lithium-thionyl chloride (Li-SOCl<sub>2</sub>) battery that can provide flow measurement for five years (including a five-year battery warranty). Optional AC and DC power supplies are also available.

## 2.0 PRINCIPLE OF OPERATION

The McMag<sup>2000</sup> uses Faraday's Law of electromagnetic induction to measure water velocity. Faraday's Law states that a conductor, moving through a magnetic field, produces a voltage.

Charge carriers in the fluid produce a voltage when passing through a magnetic field. The magnitude of the voltage is directly proportional to the velocity at which the fluid moves through the magnetic field. Electromagnetic coil inside the sensor produces a magnetic field, and electrodes on the sensor's surface measure the voltage generated by the moving fluid. The individual velocity measurements are averaged together providing the average velocity across the pipe center line. Flow is calculated by multiplying the average velocity by the cross-sectional area of the pipe.

## 3.0 PREPARING FOR A NEW INSTALLATION

### 3.1 General Installation Considerations

Proper meter installation is the first step to ensure excellent meter performance. Follow these instructions closely. Consult an authorized service representative or the Factory for any circumstances encountered which are not covered in this manual.

All McCrometer products are tested and inspected during manufacture and prior to shipping. An inspection should be performed at the time of unpacking to detect any damage that might have occurred during shipment.



#### **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.

- Any person installing, inspecting, or maintaining a McCrometer flow meter should have a working understanding of piping configurations and systems under pressure.
- Before adjusting or removing any meter, be certain the system has depressurized completely.
- Be careful when lifting meters. Meters can cause serious injury if lifted incorrectly or dropped. All magnetic flow meters are calibrated for a full pipeline only; if less, the flow meter will over measure the flow.
- Although a minimum line pressure is not necessary for an accurate measurement, a full pipe is necessary.
- With the meter installed, check the rate-of-flow indicator. It should be stable to the point that it can be easily read. Some indicator movement is normal due to variations in flow. Erratic movement of the indicator is normally caused by flow variations and the system should be checked. Drastic variations in flow can decrease meter accuracy. If you suspect a problem with the meter, please contact your local McCrometer representative.

### 3.2 Sensor 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, RFI, or EMI.

### 3.3 Remote Mount Converter Location

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 25 feet. For applications with extended lengths, consult factory.

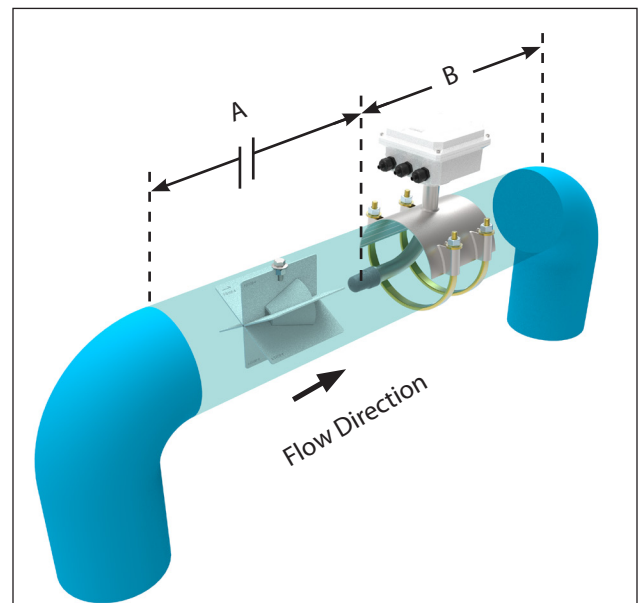
### 3.4 Flow Direction

It is very important to install the flow meter relative to the flow of the water. The sensor must face the flow direction in order for it to make proper measurements. (Figure 1)

### 3.5 Pipe Run Requirements

Flow meters are velocity sensing devices and are vulnerable to certain upstream disturbances. Because of this, meters need certain lengths of straight pipe before and after the meter. These distances relate to the diameter of the pipe used. Obstructions can include elbows, valves, pumps, and changes in pipe diameter. The uneven flow created by these obstructions can vary with each system.

Both upstream and downstream distances are measured from the center of the sensor as shown below. In a typical installation to achieve  $\pm 2\%$  accuracy the McMag<sup>2000</sup> flow meter should be installed a minimum of five diameters upstream from most flow disturbers and two diameters downstream of the meter. (Figure 1)



**Figure 1. Pipe run requirements**

Configuration	A	B
With or without straightening vanes	5	2
With flow straightener	1.5	1

## 4.0 FLOW METER INSTALLATION

### 4.1 Basic Installation Steps

The McMag<sup>2000</sup> is a saddle type meter. It may be installed directly onto an existing pipe. Follow these steps for a new flow meter installation.

1. Cut or hole-saw a round hole minimum 3" in diameter in the pipe and remove all burrs, slag, and rough edges from the inside and outside of the cutout section.
2. Loosen and remove the nuts and washers from the straps. Remove the straps from the saddle.
3. Apply lubrication to the gasket and inner diameter of U-bolts with MolyKote lubricant or equivalent.
4. Place saddle with gasket in place over the cut out.
5. Place U-bolts underneath the pipe and through the saddle clips.
6. Place the provided washers and nuts on the U-bolts that have been installed through the saddle clips.
7. Start tightening down the nuts evenly in a figure 8 pattern.
  - 7a. Tighten the nuts to **40 ft. lbs.** evenly using a figure 8 pattern.
  - 7b. Tighten the nuts to **60 ft. lbs.** evenly using a figure 8 pattern.
  - 7c. Tighten the nuts to **80 fts. lbs.** evenly using a figure 8 pattern.



**Ensure that the line is depressurized before beginning installation!**



The McMag2000 generally does not require grounding, particularly when the piping itself is conductive (metal) and common to earth ground. However, grounding can be helpful in some circumstances involving high noise environments, line powered installations, and/or electrically isolated piping. It is recommended to install the meter without grounding unless it is found necessary for the application or as required by local electrical code(s).

8. Go back around and loosen all of the nuts. Do not back the nuts completely off of the U-bolts. The goal is to release force and tension off of the saddle and the gasket.
9. Repeat steps 7a through 7c exactly as described. Any step that is skipped may result in an improper seal.
10. Apply pressure/turn on pump.
11. Verify the saddle is not leaking water. If it is, repeat steps 8 through 10 until the saddle has sealed.

## 4.2 Replacing an Existing Mc Propeller Saddle Meter

The McMag<sup>2000</sup> has been designed for easy replacement in the field for Mc Propeller flow meters. When the existing saddle meter has been removed, follow the basic installation instructions in section 4.1. The replacement flow meter will be fully assembled and ready to install.

## 4.3 Installing a Flow Straightener or Straightening Vanes

McMag<sup>2000</sup> can be used with a flow straightener or straightening. Installation instructions can be found in a separate document, [30125-39, Flow Straightener Installation](#), which can be found on the McCrometer Web site.

After installation, the converter must be configured for use with one of three types of flow straighteners. See section 9.0 for configuration.

## 4.4 Mc Propeller-to-Mc Mag<sup>2000</sup> Conversion Kit

Check the parts received against the parts list and Figure 2 and Figure 3. Contact the factory to report any discrepancies.

**NOTE** The Mc Mag<sup>2000</sup> can be used to replace existing 4" to 16" Mc Propeller saddle meters. The meter CANNOT be used to replace a Water Specialties bolt on saddle meter.

## 4.5 Retrofitting an Existing Mc Propeller Flow Meter

Mc Propeller 4" to 16" saddle flow meters can be retrofit to a Mc Mag<sup>2000</sup> flow meter. When the existing saddle meter has been removed, follow the instructions below for converting and reinstalling the flow meter.

The Mc Mag<sup>2000</sup> flow meter reuses the saddle and U bolts from an existing flow meter. The converter, canopy, base plate, propeller, and bearing housing are not used. You may wish to keep these components as replacement parts for other propeller flow meters you have.

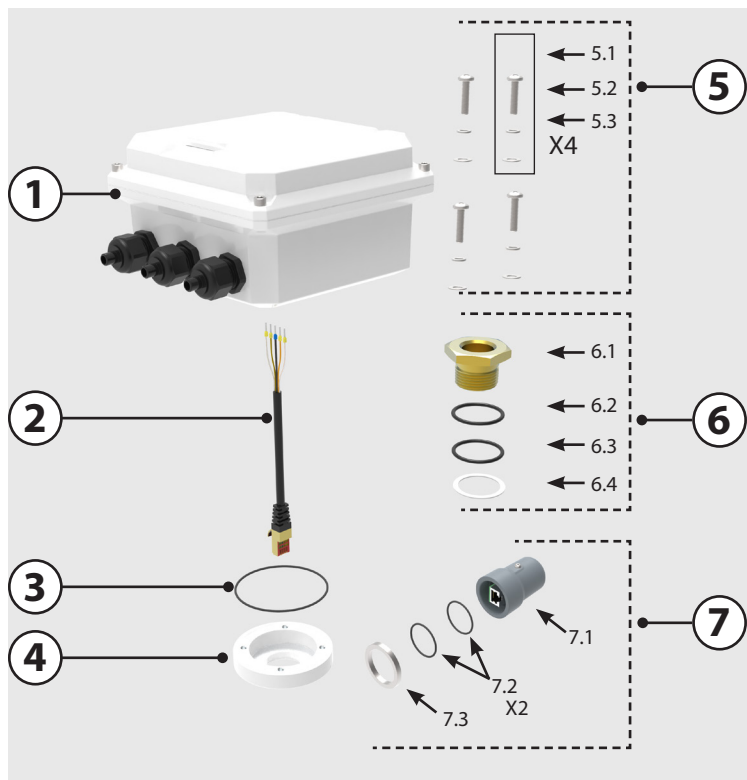


Figure 2. Conversion kit

Item #	Description	Part #
1	Converter Unit	G2-PCGO
2	Ethernet cable	1-1709-01-22
3	O-Ring (039 Buna)	1-1551-29
4	Adapter plate	R0161-00
5	<b>Screws and washers</b>	
5.1	Screw	10784
5.2	Lock washer	10774
5.3	Flat washer	10780
6	<b>Bushing and O-Ring Assembly</b>	
6.1	Bushing	R0155-00
6.2	O-Ring (021 Buna)	10273
6.3	O-Ring (121 Buna)	10274
6	Gasket	10023-00
7	<b>Sensor Assembly</b>	
7.1	Sensor	EA540-10
7.2	O-Ring (024 Buna)	10110-10
7.3	Sensor collar ring	10903
--	Tamper-proof seal	55016-08
--	IOM Manual	30124-77
--	Quick Start Guide	30124-79
--	Labels: 1 converter, 1 saddle	--

**I** During the retrofit procedure, make sure you insert all four screws when attaching the converter unit to the adapter plate. (See exploded view in Figure 2 and Figure 3.)

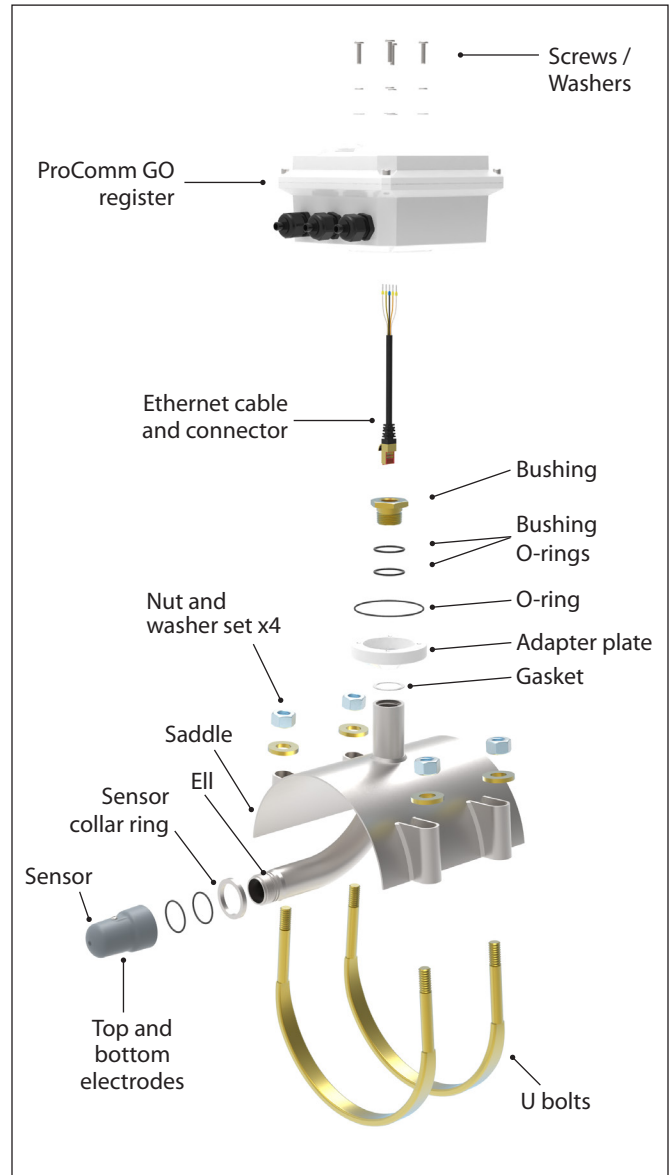
Refer to Figure 2 and Figure 3 for the conversion procedure.

### Removing the flow meter

1. Remove the flow meter that will be converted to an McMag2000.
2. Remove all parts from the saddle. Keep the saddle, U-bolts and U-Bolt nuts/washers. All other parts will not be used.
3. Connect the adapter plate (#4) to the saddle with the bushing (#6.1), two O-rings (#6.2 & 6.3), and gasket (#6.4). Ensure to adequately tighten the bushing (>50ft-lbf) to avoid loosening over time.
4. Replace and lubricate the two O-rings (#7.2) on the threaded end of the ell.
5. Install the sensor collar ring (#7.3) onto the threaded end of the ell.

### Replacing the converter on the flow meter

6. Remove the ProCommGo converter lid by loosening the four captive screws at each corner until the lid can be lifted from the converter enclosure base.
7. Loosen the two captive screws that secure the unhinged end of the internal bracket from the lower converter housing. The internal bracket (which holds the main circuit board and battery pack) should now swing freely over to one side, thus exposing the bottom of the converter enclosure base, large pass through and four mounting holes.
8. Place the lubricated O-ring (#3) into the groove on top of the adapter plate (#4) and mount the base plate of the ProCommGo converter onto the adapter plate with the four mounting screws (#5.1), lock washers (#5.2), and flat washers (#5.3).
9. Insert Ethernet cable assembly (#2) down through the bushing (#6.1) and ell until the Ethernet plug end extends 2-3 inches beyond the threaded portion of the saddle elbow.
10. Plug the cable into the sensor (#7.1).
11. Push the sensor onto the elbow (threaded end) until the skirt of the sensor has extended past the first O-ring. The sensor should stop against the threads.
12. Screw the sensor onto the ell. Hand tighten only. Do not cross thread when attaching sensor.
13. Reconnect unhinged end of internal bracket to converter base using captured screws. Ensure the green reference wire lug is held securely under screw.



**Figure 3. Mc Mag<sup>2000</sup> assembly**

14. Route cable under bracket and connect the electrode and coil plugs into main circuit board.
15. Reattach converter lid; ensure enclosure O-ring is in place, lubricated and not pinched.
16. Install tamper proof seal (#XX) once assembly is complete.

### Re-inserting the flow meter

17. Loosen and remove the nuts and washers from the straps. Remove the straps from the saddle.
18. Apply lubrication to the gasket and inner diameter of U-bolts with MolyKote lubricant or equivalent.
19. Place saddle with gasket in place over the cut out.
20. Place U-bolts underneath the pipe and through the saddle clips.
21. Place the provided washers and nuts on the U-bolts that have been installed through the saddle clips.
22. Start tightening down the nuts evenly in a figure 8 pattern.
  - 22a. Tighten the nuts to **40 ft. lbs.** evenly using a figure 8 pattern.
  - 22b. Tighten the nuts to **60 ft. lbs.** evenly using a figure 8 pattern.
  - 22c. Tighten the nuts to **80 fts. lbs.** evenly using a figure 8 pattern.
23. Go back around and loosen all of the nuts. Do not back the nuts completely off of the U-bolts. The goal is to release force and tension off of the saddle and the gasket.
24. Repeat steps 22a through 22c exactly as described. Any step that is skipped may result in an improper seal.
25. Apply pressure/turn on pump.
26. Verify the saddle is not leaking water. If it is, repeat steps 23 through 25 until the saddle has sealed.

## 5.0 INTERNAL WIRE CONNECTION

This section describes cable and wire harness connection inside the converter. Section 6.0 describes wire connection for all peripherals outside of the converter, including pulse output and external power options.

### 5.1 Cable Gland Assignment for Wiring Harnesses

**Port assignment**

- 1 - Outputs
- 2 - Outputs
- 3 - Power
- 4 - Coils
- 5 - Electrodes

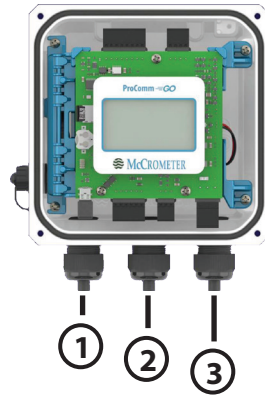


Figure 4. Meter mount view

### 5.2 Terminal Block Diagram and Grounding Lug

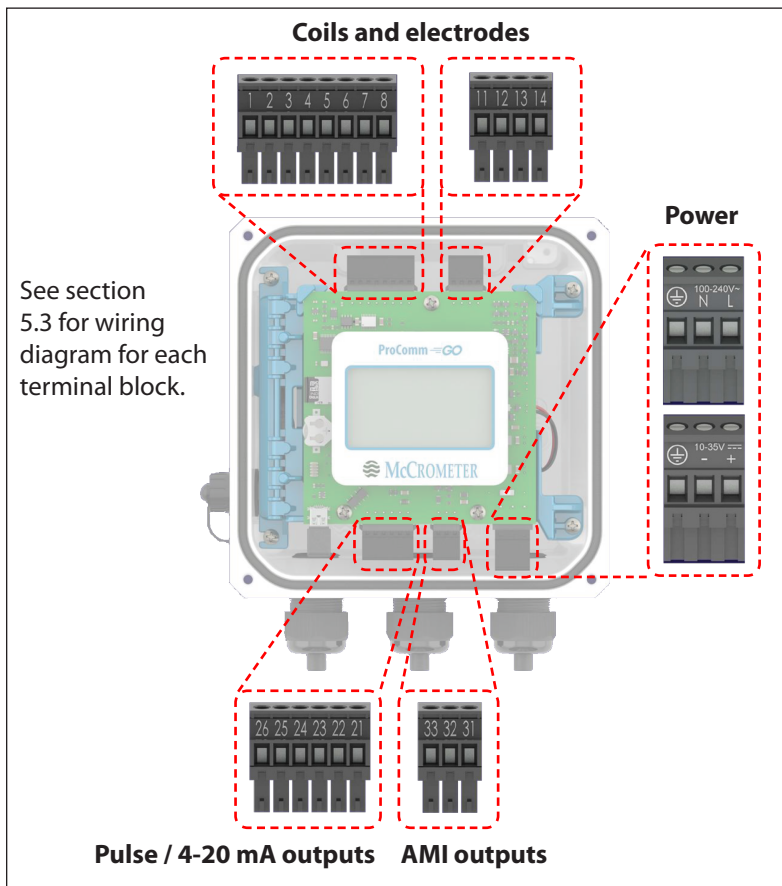


Figure 5. Terminal blocks

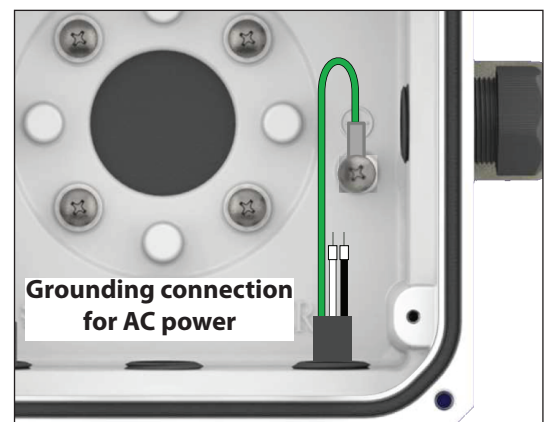
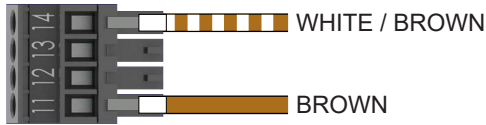


Figure 6. Grounding lug

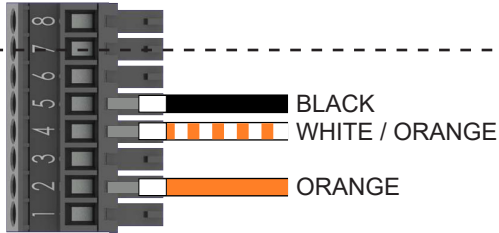
## 5.3 Wiring Diagrams

### TERMINAL BLOCK ASSIGNMENTS

#### Coils Harness

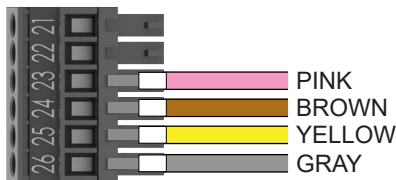


Terminal	Port	Wire Color
11	4	Brown
14	4	White/Brown



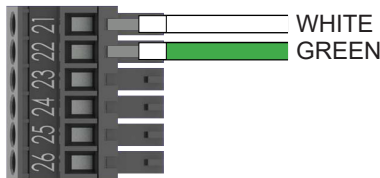
#### Electrodes Harness

Terminal	Port	Wire Color
2	5	Orange
4	5	White/Orange
5	5	Black



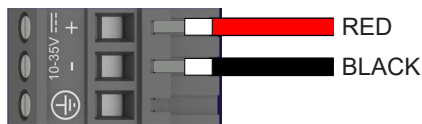
#### Pulse Output Harness

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
Chassis lug	3	Green
Negative	3	White
Load	3	Black

ATTACHES TO CHASSIS LUG GREEN

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

### 5.4 Optional Smart Output Hook Up

The converter 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 converter's interface cable and make direct connection via the wiring table shown at right. (Figure 7)

- 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 7. AMI interface pinout**

## 6.0 EXTERNAL WIRE CONNECTION

### 6.1 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

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 8) or through a screw locking-type waterproof connector (quick connect option, Figure 9 - see next section).



**Figure 8. Standard cable gland**

## 6.2 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. For repairs or added lengths of cable, the entire cable between the sensor and the converter must be replaced. (Contact factory for replacement cable.)

When quick connect cables are used both the meter and converter must have connector ports.

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.

To remove cables:

1. Turn the knurled collar on the cable to the left until it is completely detached.
2. Replace the protective cap firmly on the connector port.



### IMPORTANT

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

Do not position the meter in a manner that would make it difficult to disconnect from power supply.



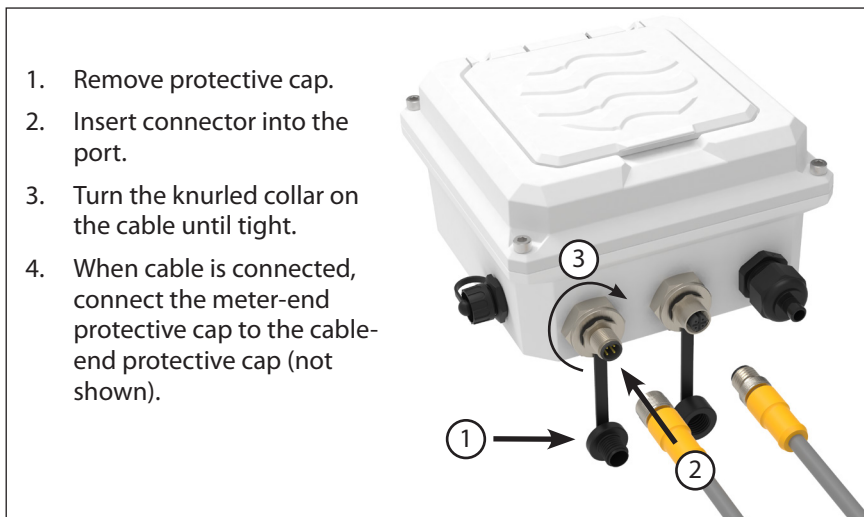
### IMPORTANT

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.



### WARNING

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



Note: Exact location of connectors may depend on converter configuration.

**Figure 9. Converter optional quick connect cable ends**

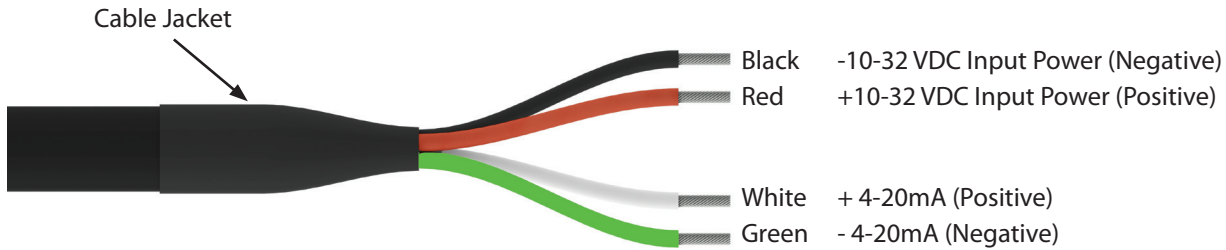
## 6.3 Power Options

Depending on output options and specific application position, you may choose to add additional power options to the battery powered converter. Additionally, you have the option of connecting external power of 10-32VDC or 100-240VAC.

## 6.4 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 10)

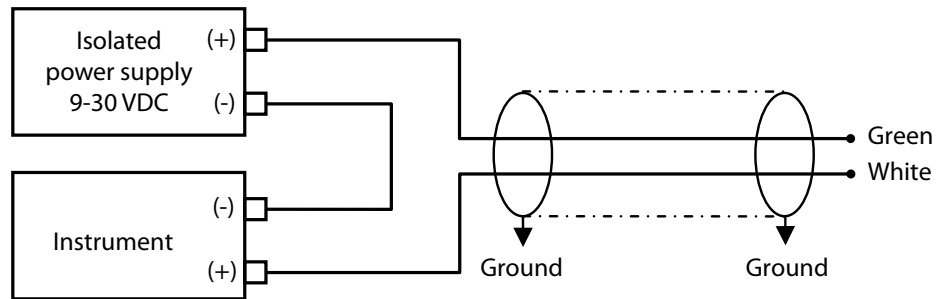
Note: Input power is for the converter only if that option was selected at time of purchase. The 4-20mA loop requires its own power supplied to the loop, not be used with red/black wires.



**Figure 10. DC power cable**

## 6.5 4-20mA Current Loop

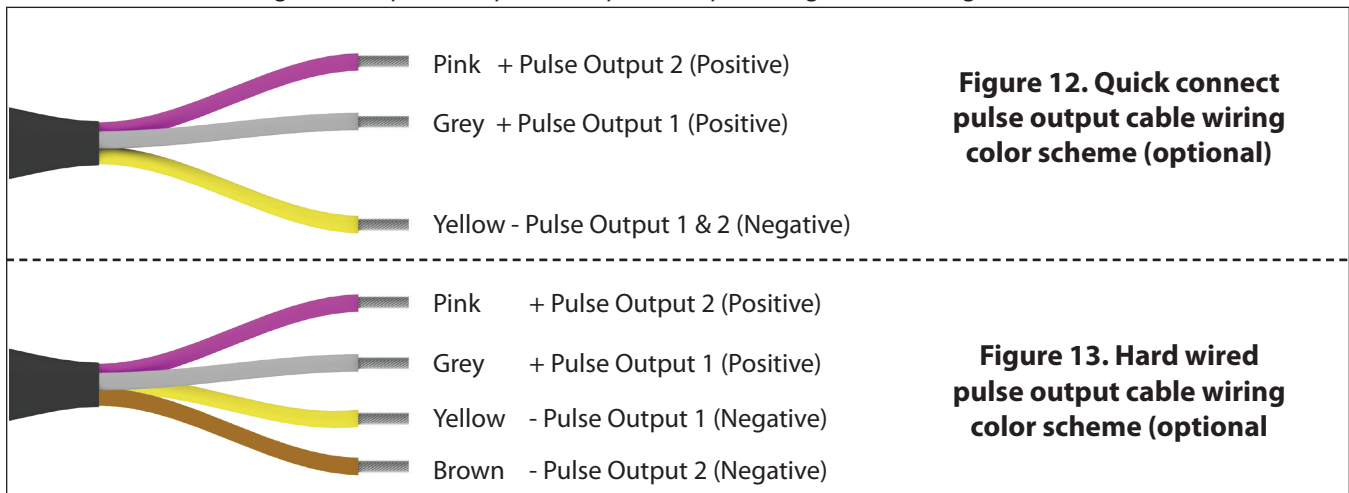
Output type: 4-20mA current loop



**Figure 11. 4-20mA current loop**

## 6.6 Pulse Output Cable (Optional)

The cable contains wiring for both pulse output 1 and pulse output 2. (Figure 12 and Figure 13)



**Figure 12. Quick connect pulse output cable wiring color scheme (optional)**

**Figure 13. Hard wired pulse output cable wiring color scheme (optional)**

## 6.7 Solar Panel Option (for use with standard model only)

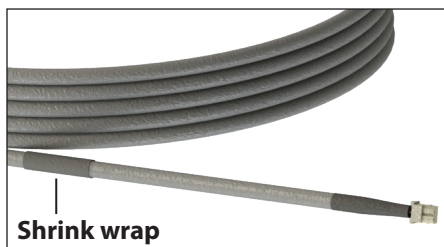
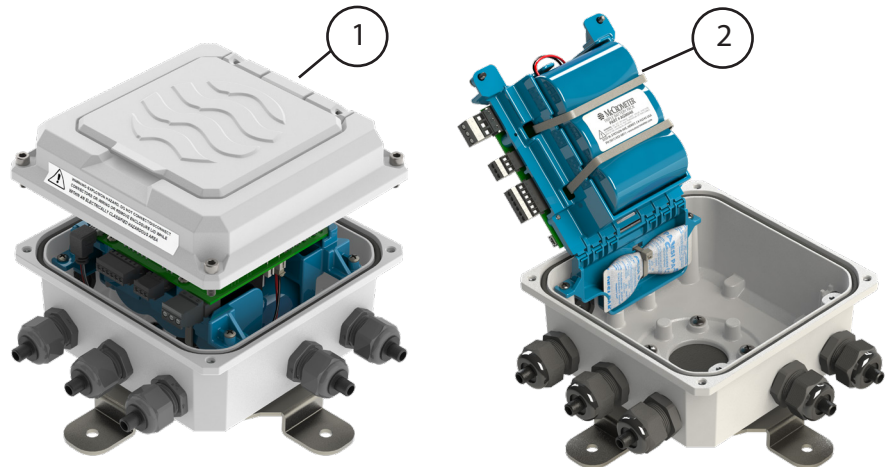
The solar panel provides power to the converter by converting sunlight into electrical energy to recharge the solar panels' rechargeable battery. Its nominal power output is 5W.

When the solar panel is installed and the cable has been run to the converter, connection inside the converter is the same as installing batteries. See Figure 14 below.

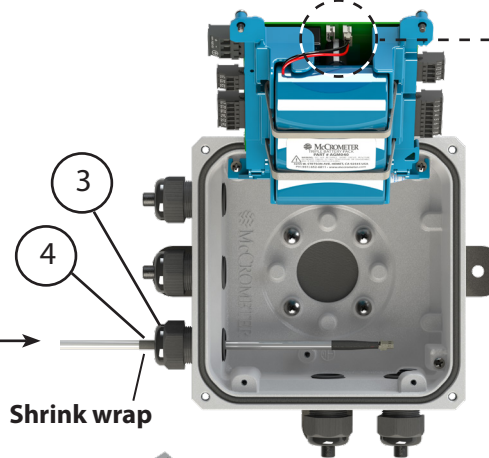
The solar panel comes complete with all accessories, except for the fixing rod.

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

1. Remove lid from converter 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.

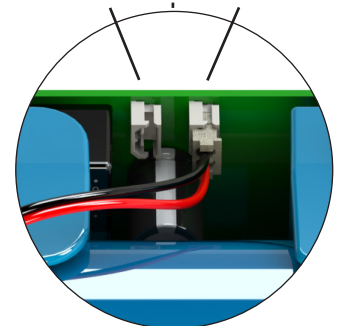


Detail A



5  
BAT1

6  
BAT2



Detail B



**Figure 14. Solar panel electrical connection in converter**

## 7.0 BATTERY INSTALLATION 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



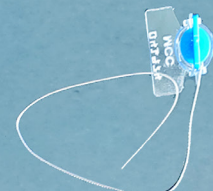
Zip ties:  
• 2 large  
• 1 small



Dry pack




Tamper proof wire seal



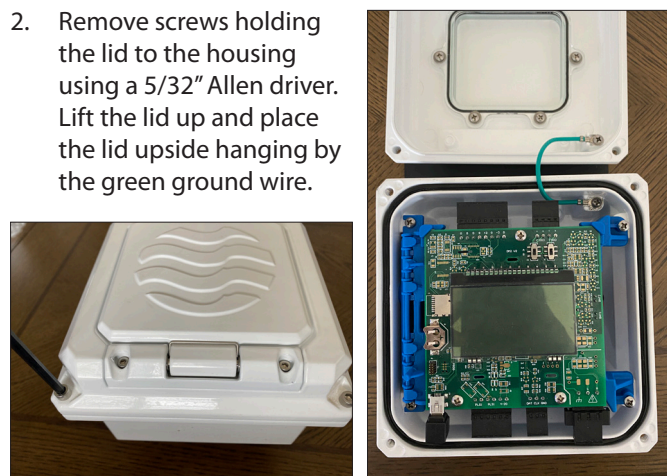
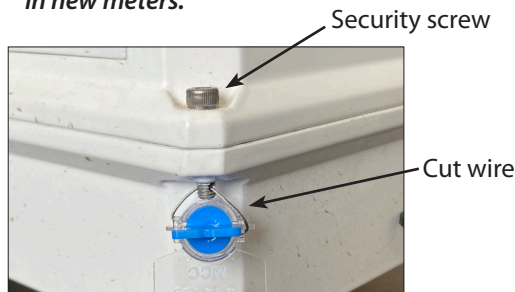
**Tool Required**

Wire cutters  
Phillips screwdriver  
5/32" Allen driver



### I. Removing the cover

- 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.**
- 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.

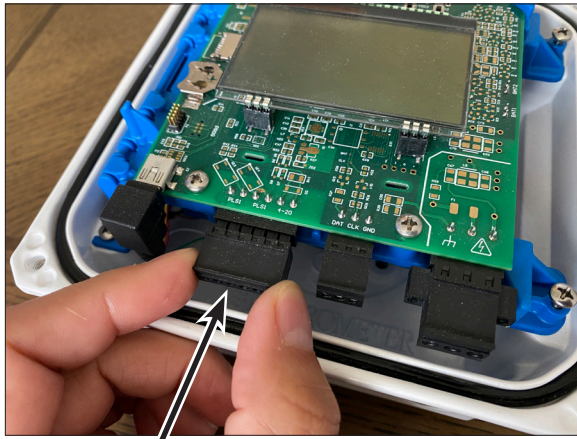


If you are replacing batteries with fresh batteries, continue to step 3.

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

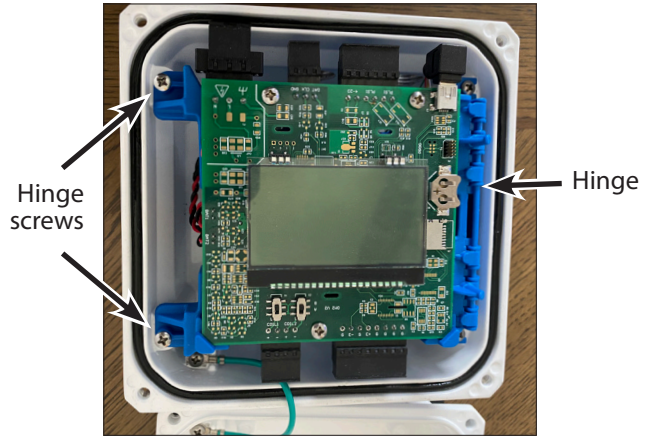
## II. Removing the batteries

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

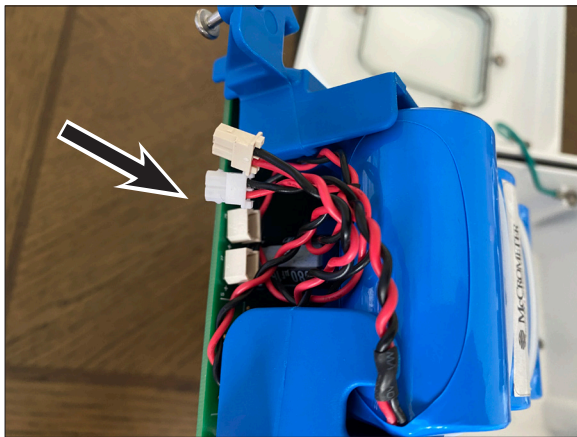


Connectors

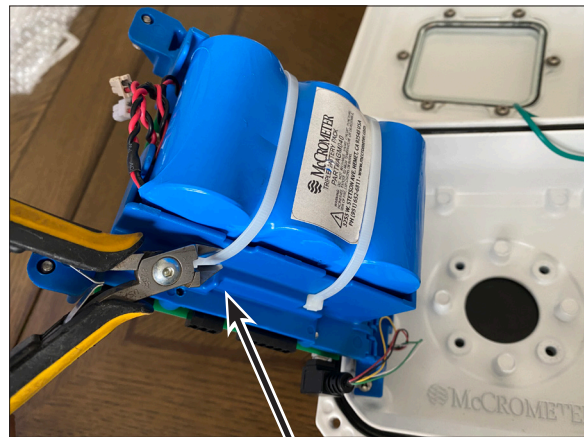
4. Loosen the captive screws opposite of the hinge and lift the battery cover.



5. Unplug the batteries.



6. Cut the two zip ties securing the batteries.



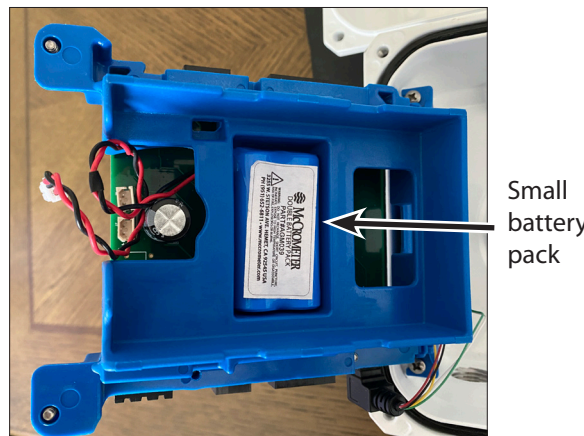
Zip ties

7. Remove the large battery pack.



Large battery pack

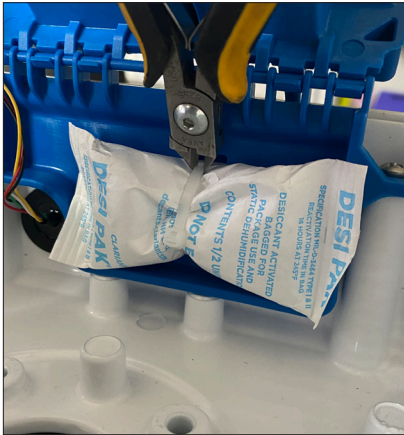
8. Remove the small battery pack located underneath. Pull the wires carefully from underneath the battery tray.



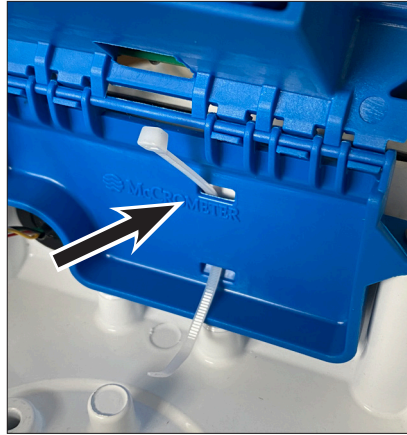
Small battery pack

## III. Installing the batteries and restoring the power

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



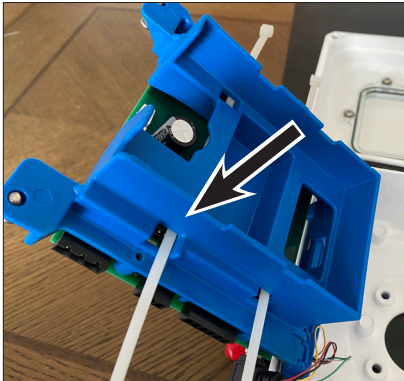
10. Pass the new zip tie through the slots in the internal hinge.



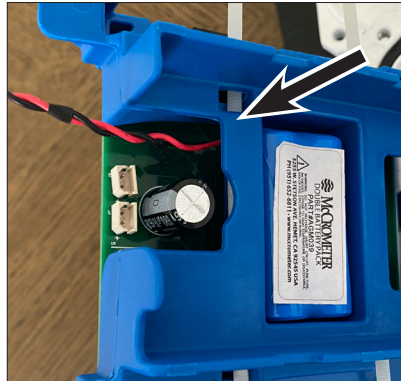
11. Wrap the new zip tie around the new dry pack and cut off the excess.



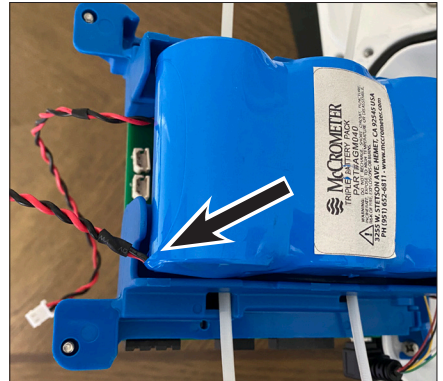
12. Pass the two large zip ties through the slots in the internal tray holder.



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 internal tray with wire leads passing through the slot.

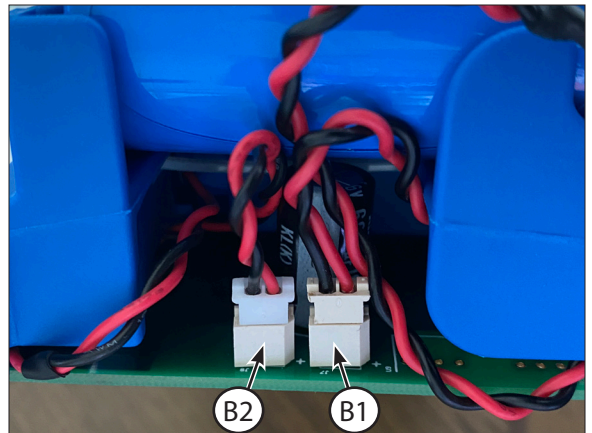


15. Secure the battery packs to the internal tray with the two large zip ties. Cut off the excess of each of the zip ties.

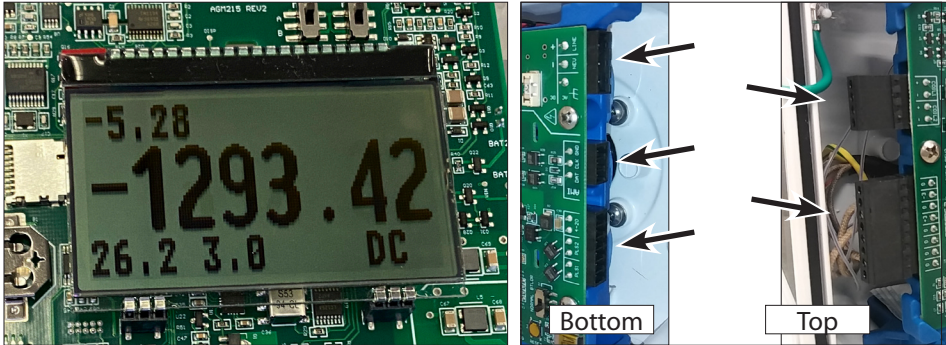


16. Plug the batteries into the circuit board.

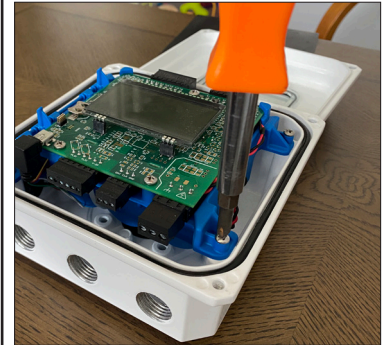
- The large battery pack goes to connector B1.
- The small battery pack goes to connector B2.



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.

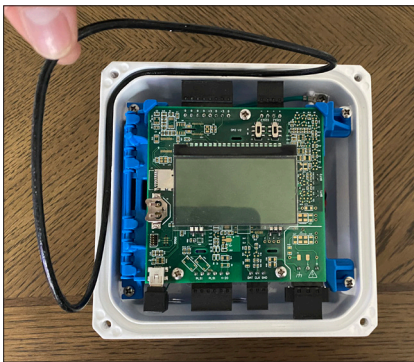


#### IV. Replacing the gasket

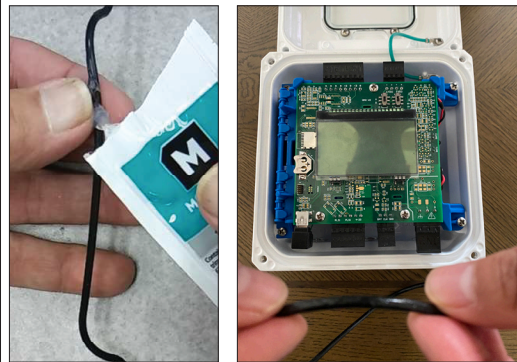
*If you installed replacement batteries, we recommend that you replace the gasket.*

*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.

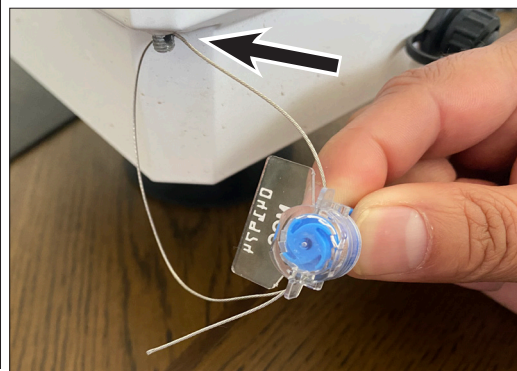


#### V. Replacing the cover

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.



## 8.0 OPERATION

### 8.1 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.

### 8.2 Activating the Display

The display is activated when the lid is opened. (Figure 15) The display will remain active for 30 seconds.

The various parts of the interface screen is shown below. (Figure 16) Depending on how the converter is configured with the configuration tool (see section 9.0) 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.



**Figure 15. Lift lid to activate display**



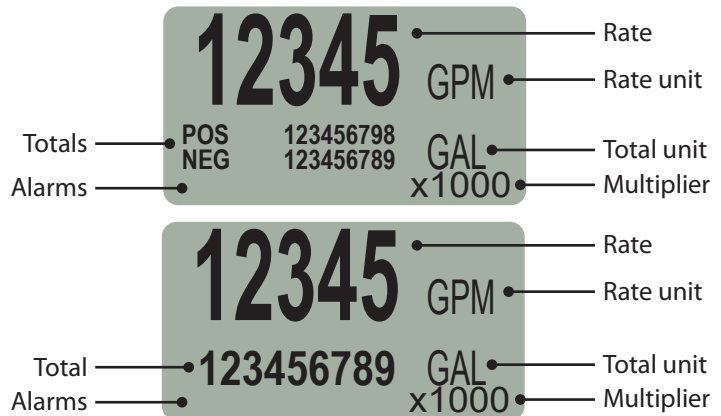
**CAUTION:**

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.



The converter 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 it up.



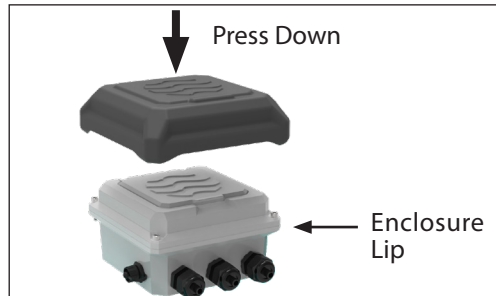
**Figure 16. Interface screen, bidirectional and single direction flow**

### 8.3 Converter Boot

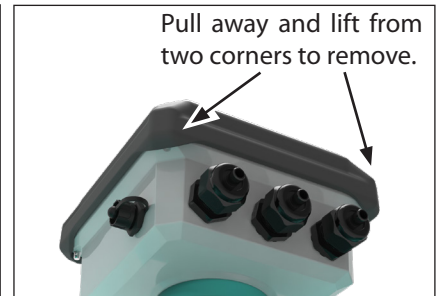
The boot simply slips over the electronics enclosure. When installing the boot, insure the corners of the boot fit snugly over the lip of the enclosure. See Figure 17. To remove the boot, grip two corners and pull them away from the lip of the enclosure and then pull upwards. See Figure 18.



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



**Figure 17. Boot installation**



**Figure 18. Boot removal**

## 9.0 CONVERTER CONFIGURATION

The converter 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 converter's USB port, unscrew the cap at the left side of the converter. You will need a cable with a mini USB type B connector. (Figure 19)

**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.

### Software Operation

1. Remove the cap that protects the USB port and plug in a mini USB type B cable. (Figure 20) Connect the other end to a laptop computer.
2. Start the software. Follow the instructions shown before setting up your customized configuration. (Figure 21)
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

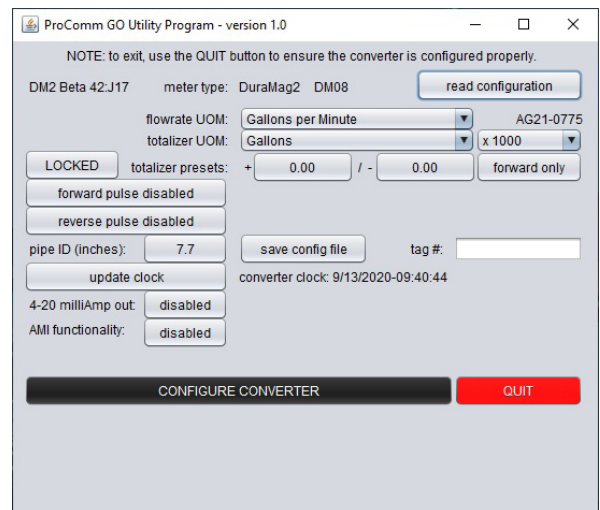
When configuration is complete, remove the USB connector and replace the protective cap.



**Figure 19. Mini USB type B connector**



**Figure 20. Plug in mini-USB cable**



**Figure 21. Configuration tool interface**

### 10.0 ERROR MESSAGES FOR TROUBLESHOOTING

DISPLAY MESSAGE	Troubleshooting
<b>BAT LOW</b>	Battery replacement Kit is needed to replace batteries. The batteries Should last approximately 6-9 months from the time the warning is shown.
<b>420 ERR</b>	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.
<b>COIL XCT</b>	There is an issue with the electro magnetic coils. Check that the internal wiring is correct in the converter for the coil wires.
<b>ADC CLIP</b>	The meter signal exceeds the limit of the converter, likely due to noise. Check the meter grounding meets the IOM guidelines and identify any sources of noise.
<b>HIGH HUM</b>	Humidity inside converter housing has exceeded limits. Check for any loose connections on converter housing that could be creating a leak.
<b>COIN LOW</b>	Datalogger time backup battery is low. This is part of the battery replacement kit and should be replaced with the main battery packs.

## 11.0 SPECIFICATIONS

### Flow Meter Specifications

#### Physical Specifications

<b>Measurement Method</b>	Volumetric flow in filled flow conduits 4" to 12" utilizing saddle installed sensor. Flow indication in English Standard or Metric units
<b>Directionality</b>	Single direction
<b>Pipe Sizes</b>	4", 6", 8", 10", 12"
<b>Body Style</b>	Saddle mount
<b>Materials</b>	<b>Sensor Body:</b> HDPE Plastic
	<b>Electrodes:</b> Stainless steel (316)
	<b>Saddle Mount:</b> Stainless steel (304)
	<b>Electronic Housing:</b> IP-67 Certified diecast aluminum, powder coated enclosure w/ tamper resistant seal, 6½" x 6½" x 43/8" tall
	<b>O-Ring:</b> SBR rubber D-ring <b>Boot Cover:</b> EPDM rubber
<b>Power</b>	<b>Battery:</b> Standard: three 3.6V lithium-thionyl chloride (Li-SOCl <sub>2</sub> ) D size batteries with two AA backup batteries
	<b>AC Power:</b> 100-240VAC
	<b>DC Power:</b> Linear power supply 10-35VDC, 2.4W
<b>Electrical Connections</b>	<ul style="list-style-type: none"> <li>Optional shielded cable for 10-32VDC/4-20 mA output</li> <li>Optional shielded cable for pulse out</li> </ul>
	<b>Digital output:</b> Digital pulse (open collector) output for volumetric <ul style="list-style-type: none"> <li>- Two isolated digital pulse (open collector) outputs for volumetric</li> <li>- AMI output</li> </ul> <b>Analog output:</b> 4-20mA: Galvanically Isolated, 16 Bit resolution. All power configurations (including battery). Note: 9-30 VDC loop power required (not supplied via converter)

#### Performance and Operational Specifications

<b>Operating Temperature</b>	-4° to 140°F (-20° to 60°C) sensor
<b>Storage Temperature</b>	-40° to 149°F (-40° to 65°C)
	<b>Note:</b> During freezing conditions and when meter is not in use, sensor must be removed from pipe and stored in dry conditions. <b>NOTE: Damage to the sensor caused by allowing the sensor freeze in the pipe is not covered by the warranty.</b>
<b>Operating Pressure</b>	150 PSI
<b>IP Rating</b>	IP68 (submersible sensor)
<b>Pressure Range</b>	150 psi (10.3 bar) working pressure
<b>Empty Pipe Detection</b>	Hardware/software, conductivity-based (optional)
<b>Accuracy</b>	± 2% ± .006 ft/sec
<b>Conductivity</b>	Minimum conductivity of 50µS/cm. For lower conductive fluid consult factory.
<b>Battery Life</b>	Five-year expected battery life, five-year battery warranty
<b>Pipe Run Requirements</b>	5D upstream / 2D downstream
	1.5D upstream / 1 downstream

## ProComm GO Converter Specifications

### Physical Specifications

<b>Electronic Housing</b>	Diecast aluminum, powder coated enclosure w/ tamper resistant seal, 6½" x 6½" x 43/8" tall
<b>Converter Dimensions</b>	See "Dimensions" section for meter mount and remote mount converter dimensions.
<b>Power</b>	<b>Battery:</b> Standard: three 3.6V lithium-thionyl chloride (Li-SOCl <sub>2</sub> ) D size batteries with two AA backup batteries <b>AC Power:</b> 100-240VAC/45-66Hz (4W) <b>DC Power:</b> Linear power supply 10-35VDC (4 W)
<b>Electrical Connections</b>	<ul style="list-style-type: none"> <li>• Optional shielded cable for 10-32VDC/4-20 mA output</li> <li>• Optional shielded cable for pulse out</li> </ul>

### Performance and Operational Specifications

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

### Display and Measurement

<b>Display</b>	<ul style="list-style-type: none"> <li>• 2-Line LCD display (no backlight)</li> <li>• Non-volatile memory</li> <li>• Anti-reverse totalizer (standard)</li> <li>• Total (to 9 digits of precision)</li> </ul>	<ul style="list-style-type: none"> <li>• Flow rate and velocity (to 5 digits of precision)</li> <li>• Two alarms: low battery and empty pipe (optional)</li> <li>• Opening lid activates display</li> </ul>																																																
<b>Digits</b>	5 Rate, 9 Total																																																	
<b>Units</b>	<table border="0"> <tr> <td>GPM</td><td>Gallons per minute</td> <td>IGM</td><td>Imperial gal per minute</td> <td>CFM</td><td>Cubic feet per minute</td> </tr> <tr> <td>MGD</td><td>Mega gal per day</td> <td>MI9</td><td>Miners inch (9G)</td> <td>B5M</td><td>Barrels per minute (55G)</td> </tr> <tr> <td>CFS</td><td>Cubic feet per second</td> <td>MI1</td><td>Miners inch (11.22G)</td> <td>B5H</td><td>Barrels per hour (55G)</td> </tr> <tr> <td>MLD</td><td>Megaliters per day</td> <td>APD</td><td>Acre feet per day</td> <td>B5D</td><td>Barrels per day (55G)</td> </tr> <tr> <td>LPS</td><td>Liters per second</td> <td>KLH</td><td>Kiloliters per hour</td> <td>B4M</td><td>Barrels per minute (42G)</td> </tr> <tr> <td>CMH</td><td>Cubic meters per hour</td> <td>LPH</td><td>Liters per hour</td> <td>B4H</td><td>Barrels per hour (42G)</td> </tr> <tr> <td>LPM</td><td>Liters per minute</td> <td>CMM</td><td>Cubic meters per minute</td> <td>B4D</td><td>Barrels per day (42G)</td> </tr> <tr> <td>GPH</td><td>Gallons per hour</td> <td>CFM</td><td>Cubic feet per minute</td> <td></td><td></td> </tr> </table>		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		
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GPH	Gallons per hour	CFM	Cubic feet per minute																																															

**ProComm GO Converter Specifications (cont.)**

<b>Totalizer Units</b>	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)		
	<b>Data Logger</b>	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**

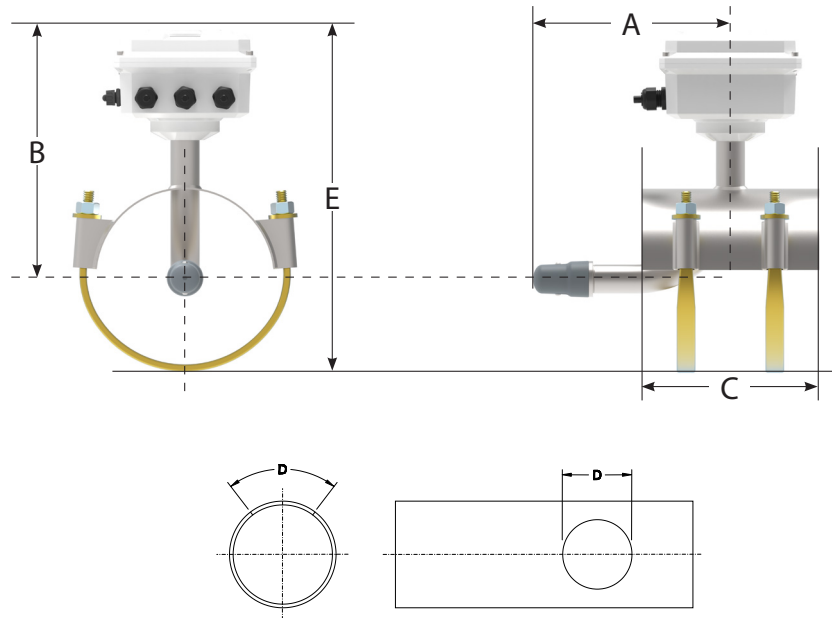
- ISO 9001:2015 certified quality management system
- Certified by MET to UL 61010-1

**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, T5
  - Class I, Zone 2 IIC T5



## 12.0 DIMENSIONS AND WEIGHTS



DIMENSIONS							
Meter and Nominal Pipe Size	4	6	8	10	12	14	16
Minimum Flow U.S. GPM	20	45	75	125	175	225	300
Maximum Flow U.S. GPM	600	1350	2350	3700	5300	6700	8800
Approx. Shipping Weight-lbs.	13	15	18	20	24	28	31
A (inches)	5 1/2	9	9	9	9	9	9
B (inches)	9	11 1/2	11 1/2	11 1/2	12 1/2	14 1/2	14 1/2
C (inches)	7	8	8	9 1/2	9 1/2	9 1/2	9 1/2
D (inches)	3	3	3	3	3	3	3
E (inches)	11 1/2	14 3/4	15 3/4	17 3/4	19 3/4	21 3/4	23 3/4

## 13.0 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 (located inside the front panel of converter), 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.
- 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 STATEMENT**

McCrometer warrants that this product will be free from defects in material and workmanship for a period 5 (five) years from the date the equipment was first installed for all parts and components including hardware, electronics, sensor, and battery.

Repairs shall be warranted for 12 months or, if the repair is performed under this warranty, for the remainder of the original warranty period, whichever is less.

Buyer shall report any claimed defect in writing to McCrometer immediately upon discovery and in any event, within the warranty period. McCrometer shall, at its sole option, repair the equipment or furnish replacement equipment or parts thereof, at the original delivery point.

McCrometer shall not be liable for costs of removal, reinstallation, or gaining access. If Buyer or others repair, replace, or adjust equipment or parts without McCrometer prior written approval, McCrometer is relieved of any further obligation to Buyer under this Article with respect to such equipment.

No equipment furnished by McCrometer shall be deemed to be defective by reason of normal wear and tear, failure to resist erosive or corrosive action of any fluid or gas (unless otherwise specified in Quotations/ Purchase Order Specifications), Buyer's direct or indirect failure (or the failure of its agents or contractors) to properly store, install, operate, or maintain the equipment in accordance with good industry practices or specific recommendations of McCrometer, or Buyer's failure to provide complete and accurate information to McCrometer concerning the operational application of the equipment.

**THE FOREGOING LIMITED WARRANTIES WITH RESPECT TO EQUIPMENT AND PRODUCTS ARE EXCLUSIVE AND IN LIEU OF ANY AND ALL OTHER WARRANTIES OF QUALITY OR PERFORMANCE, EXPRESS, IMPLIED OR STATUTORY, INCLUDING, WITHOUT LIMITATION, ANY AND ALL WARRANTIES OF MERCHANTABILITY OR FITNESS OF SAID EQUIPMENT AND PRODUCTS FOR ANY PARTICULAR PURPOSE.**

**MCCROMETER DISCLAIMS ANY WARRANTY, WHETHER EXPRESS OR IMPLIED, REGARDING THE SUITABILITY OF PRODUCTS AND EQUIPMENT SUPPLIED PURSUANT TO ANY PURCHASE ORDER FOR INSTALLATION IN ANY PARTICULAR SYSTEM OF SYSTEMS. MCCROMETER MAKES NO WARRANTY OF ANY KIND WITH RESPECT TO ANY SERVICES PERFORMED BY MCCROMETER OR ITS AGENTS PURSUANT TO ANY QUOTATION.**

Purchaser's sole remedy and manufacturer's sole obligation for alleged product failure, whether under warranty claim or otherwise, shall be the aforesaid obligation of manufacturer to repair or replace products returned within twenty-four months after date of original shipment. The manufacturer shall not be liable for, and the purchaser assumes and agrees to indemnify and save harmless the manufacturer in respect to, any loss or damage that may arise through the use by the purchaser of any of the manufacturer's products.

All product warranties and guarantees set forth herein shall only be enforceable if (a) all equipment is properly installed, inspected regularly and is in good working order, (b) all operations are consistent with Supplier recommendations, (c) operating conditions at the Customer site have not materially changed and remain within anticipated specifications, and (d) no reasonably unforeseeable circumstances exist or arise.

McCrometer does not authorize any person or entity (including, without limitation, McCrometer agents and employees) to make any representations (verbal or written) contrary to the terms of this limited warranty or its exclusions. Such terms of this limited warranty and its exclusions can only be effectively modified in writing and only by the President of McCrometer.

**BATTERY GUARANTEE:**

Main power batteries will be replaced at no charge should they fail within 5 (five) years from the date of purchase with the meter. Guarantee is not valid for replacement batteries. Guarantee is limited to the a one-time replacement of the main power batteries. McCrometer is not responsible for any lost data or any other direct or indirect losses resulting therefrom. The batteries and their configuration are specific to the Dura Mag flow meter and only McCrometer batteries can be used. Any use of batteries other than those supplied from McCrometer will void the above Warranty.

OTHER McCROMETER PRODUCTS INCLUDE:

Propeller Flow Meters



Differential Pressure Flow Meters



Magnetic Flow Meters



Connected Solutions



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