McCROMETER

ML255
Electromagnetic
Flow Meter Converter

Installation, Operation and
Maintenance Manual

McCROMETER

www.mccrometer.com

Contents

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.

ℹ️ 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.

> ⚠️ *WARNING!*
> **Incorrect installation or removal of FPI Mag 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.

> ⚠️ *WARNING!*
> **Pressurized pipes should only be hot tapped, cut, or drilled by qualified personnel. If possible, depressurize and drain the pipe before attempting any installation.**

> ⚠️ *WARNING!*
> **Carefully read all safety warning tags attached to the meter.**

At the end of its lifetime, this product shall be disposed of in full compliance with the environmental regulations of the state in which it is located.

1.0   CONVERTER OVERVIEW

Read this entire manual prior to installation and/or changing any settings. Retain this manual in your records, DO NOT DISCARD.

The signal converter is the reporting, input and output control device for the sensor. The converter allows the measurements, functional programming, control of the sensor and data recording to be communicated through the display and inputs & outputs. The microprocessor-based signal converter has a multi-point curve-fitting algorithm to improve accuracy, an 8-line graphical LCD display with three-button touch programming, and a rugged enclosure that meets IP67. In addition to a menu-driven self-diagnostic test mode, the microprocessor continually monitors the converter's functionality. The converter will output rate of flow and total volume. The converter also comes standard with password protection and many more features.
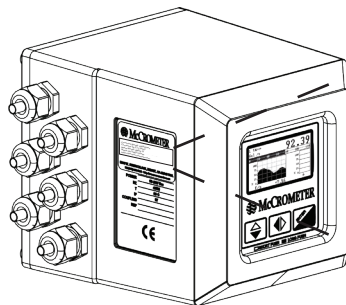
2.0   INSTALLING THE CONVERTER AND CABLES

2.1   Verify Serial Numbers

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

The tag on the side of the converter has the converter model number, the converter serial number, the meter model number and the meter serial number. An example is shown below (Figure 1).

> **i** **IMPORTANT**: Verify the Meter Serial Numbers on both the converter and sensor match. This will ensure a properly calibrated system. The Meter Serial Number is located on the side of the sensor, and the Converter Serial Number and the Meter Serial Number are located on a label on the side of the converter. Ensure the Meter Serial Number on the sensor and the converter tags match.

Converter Model: 880003xxx
Converter SN: E12-34567
Meter Model: UM08-10
Meter SN: UM20130xxx
http://www.mccrometer.com

Figure 1. Converter serial number tag

2.2   Mounting The Converter

If possible mount the converter in an electronics shed or environmental enclosure. If the converter is mounted outdoors a sun shield is recommended. The sun shield should be oriented in a direction to reduce sun damage and ensure readability. The converter is mounted using 2 bolts. (See Figure 21) A service loop in the cables is required. (See Section 2.3) This electronic unit is rated IP67 for temporary flooding.

2.3   Installing Cables To Converter And Service Loop

Conduit of any kind *CANNOT* be attached directly to the electronics enclosure. Attaching conduit directly to the enclosure will introduce dangerous gasses and moisture into the enclosure creating a dangerous condition, and will remove the enclosure's IP67 rating. **Attaching conduit to the enclosure or altering the enclosure in any way will void the warranty.**

Any cable running through a conduit must exit the conduit and have a minimum of an 8" service loop before entering the electronics enclosure through the cable glands. All cable compression glands must be properly tightened to prevent moisture intrusion and maintain the IP67 rating. This allows the electronics enclosure to be rotated and the rear panel to be accessed. If electrically bonding (grounding) the enclosure to metallic conduit or raceways, secure a lead wire to the enclosures back panel screw and attach the lead to a listed and approved conduit grounding bushing. (See Figure 2) To insure IP67 rating use only round cable 0.125" to 0.375" in diameter.

> ⚠️ **WARNING:** Do not connect any form of conduit directly to the converter enclosure. Doing so will allow moisture and potentially dangerous gasses to enter directly into the converter. Attaching any conduit to the enclosure, or altering the enclosure in any way will void the warranty.

IMPORTANT: All cables must have a minimum 8" service loop.

Figure 2. Cable installation, a service loop and bonding to metallic conduit

2.4   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 the factory supplied cable cover, or similar method, to seal the end of the cable against water when pulling the cable through conduit. See Figure 3. This will ensure proper operation of the meter.

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 converter 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.

Secure rope or snake to this area of the cable cover

Rip Wire

Cable Cover

Figure 3. Cable cover

3.0   BATTERY INSTALLATION AND SYSTEM START-UP

3.1   Battery Life

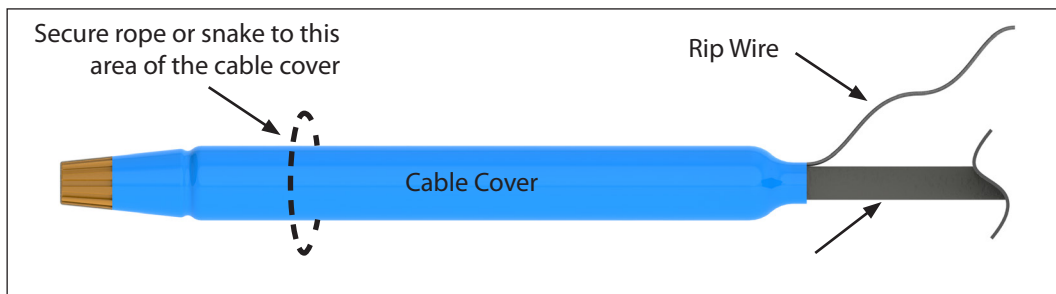The estimated battery life with standard use and recommended sampling frequency (see section 3.7) is 3-5 years. Additionally, there is a battery life calculator available to estimate battery life in your specific application. Contact your local McCrometer representative or the McCrometer technical support team for a consultation on battery life.

3.2   Installing Batteries and Starting Up

Follow this procedure if you are installing batteries in the unit for the first time. If you are replacing batteries, go to section 3.4, "Replacing Batteries".

Note: Ensure there is no power connected externally and that the battery DIP switches are in the OFF position.

1. Remove the battery holder from the ML255 converter by removing the two screws and lock washers holding it in place.
2. Place two battery packs (part number AGM009) on the ML255 battery holder as shown in Figure 4.
3. Secure new battery packs to the battery holder using tie wraps.
4. Re-install the battery holder into the converter using the previously removed screws and washers.
5. Plug the battery pack connectors into the B1 and B2 sockets on the main board.
6. Wait one minute.
7. Move battery DIP switch B1/B2 to ON. The converter will begin booting and the red CPU LED will turn on solid. It will then begin flashing after it completes booting. Booting may take 2-3 minutes.
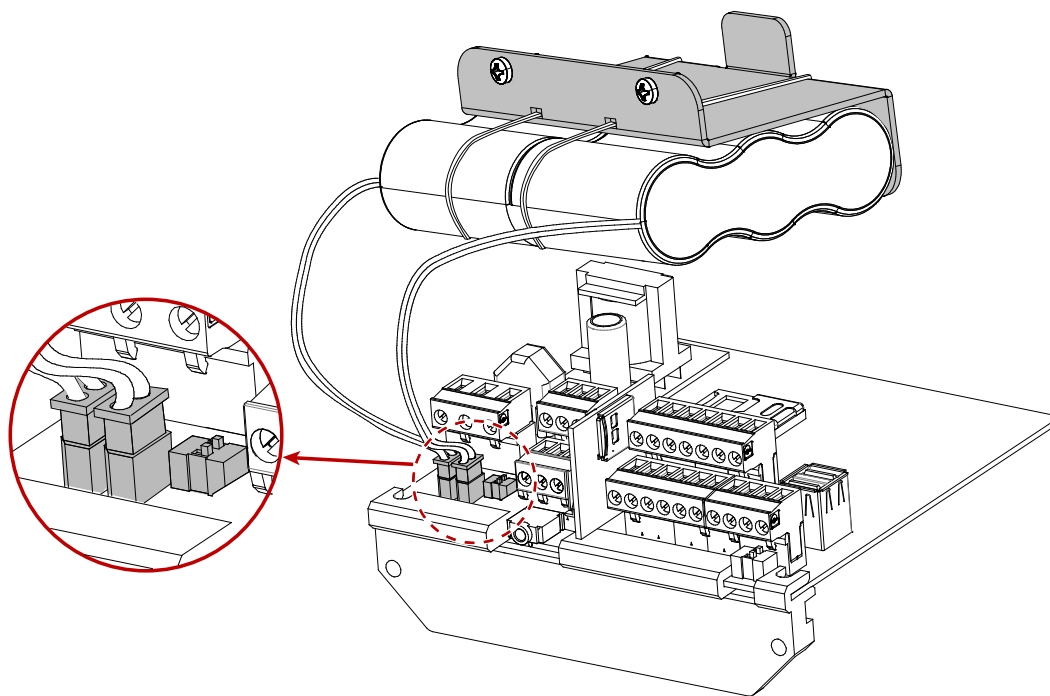

Figure 4. ML255 batteries

3.3   Setting the Time and Date

Each time the ML255 is powered up, the time and date need to be set immediately after the system finishes initialization because it does not retain time information when it is powered down. The correct time setting is necessary for data logging and event logging functions.

1.   Allow the converter to complete its initialization sequence.

2.   Press the **Enter** button to open the *Quick Start* menu. If the *Quick Start* menu is not enabled, skip step 3.

3.   Navigate to the *Main Menu* using the **Up/Down** arrow key and press **Enter**.

4.   Enter your level 2 access code (default is 000002) and press **Enter**.

5.   Navigate to *9-Data logger* with the **Up/Down** arrow key and press **Enter**.

6.   Press **Enter** to edit the date and time.

7.   Using the **Right/Left** arrow key to navigate and the **Up/Down** arrow key to change the data, enter the date and time. Press **Enter** to accept the date and time.

8.   Long press the **Enter** key twice to return to the main display.

3.4   Replacing Batteries

Contact your local McCrometer representative or McCrometer Customer Service (customerservice@mccrometer.com) to order replacement batteries.

1.   **Power down the system.**

   a.   If there is external power applied to the converter, unplug it.

   b.   Press the **Enter/Esc** button for two seconds to turn on the front panel display.

   c.   Press the **Enter/Esc** button again to display the menus.

   d.   Select *Main Menu* and press **Enter**.

   e.   Enter the L2 access code.

   f.   Navigate to menu *10-Diagnostic* and press **Enter**.

   g.   Select *Stand-By* and press **Enter**.

   h.   Long press **Enter** to execute. The display will indicate "**Stand-By"** momentarily and then go blank.

   i.   Move battery DIP switch B1/B2 to OFF.

The unit is now safely powered down.

2.   **Remove the batteries.**

   a.   Disconnect the battery connectors from the B1 and B2 sockets on the Main Board.

   b.   Remove the two screws and washers securing the battery holder to the converter housing.

   c.   Remove the holder from the converter.

3.   **Installing Batteries:**

   a.   Cut the tie wraps from the batteries and dispose of the battery packs.

   b.   Secure new battery packs to the battery holder using tie wraps.

   c.   Re-install the battery holder into the converter using the previously removed screws and washers.

   d.   Plug the battery pack connectors into the B1 and B2 sockets on the main board.

4. Power up the system.

    a.   Wait one minute after plugging in the battery pack connectors.

    b.   Move battery DIP switch B1/B2 to ON.

    c.   The converter will begin powering up and the red CPU LED will turn on solid. It will then begin flashing after it completes booting.

Note: Powering up may take two to three minutes.

3.5   Powering-Down and Powering-Up the System

Note: This power-down procedure will only stop the system from operating. If you need to replace the batteries or prepare the unit for shipping, follow section 3.4.

Powering-Down:

1. Press the **Enter/Esc** button for one second to turn on the front panel display.

2. Press the **Enter/Esc** button again to display the menus.

3. Select *Main Menu* and press **Enter**.

4. Enter the L2 access code.

5. Navigate to menu *10-Diagnostic* and press **Enter**.

6. Select *Stand-By* and press **Enter**.

7. Long press **Enter** to execute. The display will indicate **Stand-By** momentarily and go blank.

The unit is now powered down.

Powering-Up:

1. Move battery DIP switch B1/B2 to OFF.

2. Wait one minute.

3. Move battery DIP switch B1/B2 to ON.

4. The converter will begin powering up and the red CPU LED will turn on solid. It will then begin flashing after it completes booting.

Note: Powering up may take two to three minutes.

3.6   Power Options

Depending on the sampling frequency (described in section 3.7), output options, and specific application position, you may choose to add additional power options to the battery powered converter. The 5W solar panel option (described in section 4.0) can extend battery life to 10-15 years. Additionally, you have the option of connecting external power of 12-60VDC or 100-240VAC.

3.7   Sampling Frequencies

The battery powered converter can be programmed to measure in these modes (Figure 5):

Figure 5. Sampling frequency modes

Each sampling frequency mode has a different effect on battery life. Note that the battery life shown below is under optimal conditions:

- Continuous sampling: < 6 months
- Average sampling: > 5 years
- Max life sampling: > 7 years
- Smart sampling: 1-5 years depending on flow profile

Note: Continuous sampling is only available if energy saving is turned off. Energy saving can only be accessed through the IF2 communication cable.

4.0   SOLAR PANEL OPTION

4.1   Description

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. The solar panel comes complete with all accessories, except for the fixing rod. (Figure 6 and Figure 7)

Figure 6. Solar panel dimensions

Solar panel plugs into circuit board HERE

Figure 7. Plug location for solar panel

5.0   ELECTRICAL CABLE CONNECTIONS

5.1   Converter Electrical Cable Connections

⚠	**CAUTION** - Always disconnect the power cord before attempting any electrical connections.

All electrical cables enter the converter through compression fittings located on the side of the converter. Ensure that all compression glands are properly tightened and all unused fittings are plugged so the case remains sealed.

5.2   Terminal Board

All connections are made on the terminal board (Figure 8). To access the terminal board, loosen the four screws on the back of the converter to remove the rear cover.

  NOTE: The terminal blocks unplug from the circuit board for easy connection.

External power 12-60VDC or 100-240VAC connector block battery socket

M1 connector block

IF2X socket

SD memory card

DIP switch for keyboard block

Figure 8. Terminal board inputs, outputs, and other components

The sensor, hardwired inputs and outputs are connected to the converter through three terminal blocks. (Figure 9) To locate the terminal blocks, remove the rear cover plate, removing the four screws (5mm Allen key). When the cover is removed, the terminal blocks are visible as shown in the figure above. These terminal are the converter hardwire connections to the external equipment, including the sensor.

The following figure shows numbering and the respective connecting of the sensor cables, and input/outputs.

Figure 9. Terminal board descriptions

5.3   FPI Mag and Ultra Mag 4" through 48"

Black Ground
To Chassis Lug

Terminal Block Assignments

Cable	Terminal	Wire Color	Connected To
A	#1 (E1)	Blue	Right Sensing electrodes
A	#2 (E2)	Pink	Left Sensing Electrodes
A	#3 (C)	Black	Reference Ground
A	#4 (SH)	Green/Yellow	Cable Shield Ground
B	Chassis Lug	Black	Ground To Chassis Lug*
B	#11 (SH)	Green Yellow	Cable Shield Ground
B	#12 (B1)	Red	Coil
B	#13 (B2)	Yellow	Coil

1 2 3 4   11 12 13

BLUE PINK BLACK GREEN/YELLOW   CHASSIS | BLACK   GREEN/YELLOW RED YELLOW

> *i* ***IMPORTANT:** See *Section 5.6.1, "Converter Grounding For FPI Mag Ultra Mag 4" - 48"", Figure 13* for instructions on attaching the chassis ground wire to the converter ground lug.

Shrink Tube

Cable Diameters:
Cable A (15035): 0.248"
Cable B (15036): 0.248"

CABLE A - ELECTRODES

CABLE B - COILS

Cable Jacket

Figure 10. FPI Mag and Ultra Mag 4" - 48" sensor cable connections

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5.4 Ultra Mag 2" & 3"

Black Ground To Chassis Lug

Terminal Block Assignments

Cable	Terminal	Wire Color	Connected To
A	#1 (E1)	Blue	Right Sensing electrodes
A	#2 (E2)	Pink	Left Sensing Electrodes
B	#3 (C)	Black	Reference Ground
A	#4 (SH)	Green/Yellow	Cable Shield Ground
B	Chassis Lug	Black	Ground To Chassis Lug*
B	#11 (SH)	Green Yellow	Cable Shield Ground
B	#12 (B1)	Red	Coil
B	#13 (B2)	Yellow	Coil

i ***IMPORTANT:** See *Section 5.6.2, "Converter Grounding For Ultra Mag 2" & 3"", Figure 14* for instructions on attaching the chassis ground wire to the converter ground lug.

Shrink Tube

Cable Diameters:

Cable A (15035): 0.248"

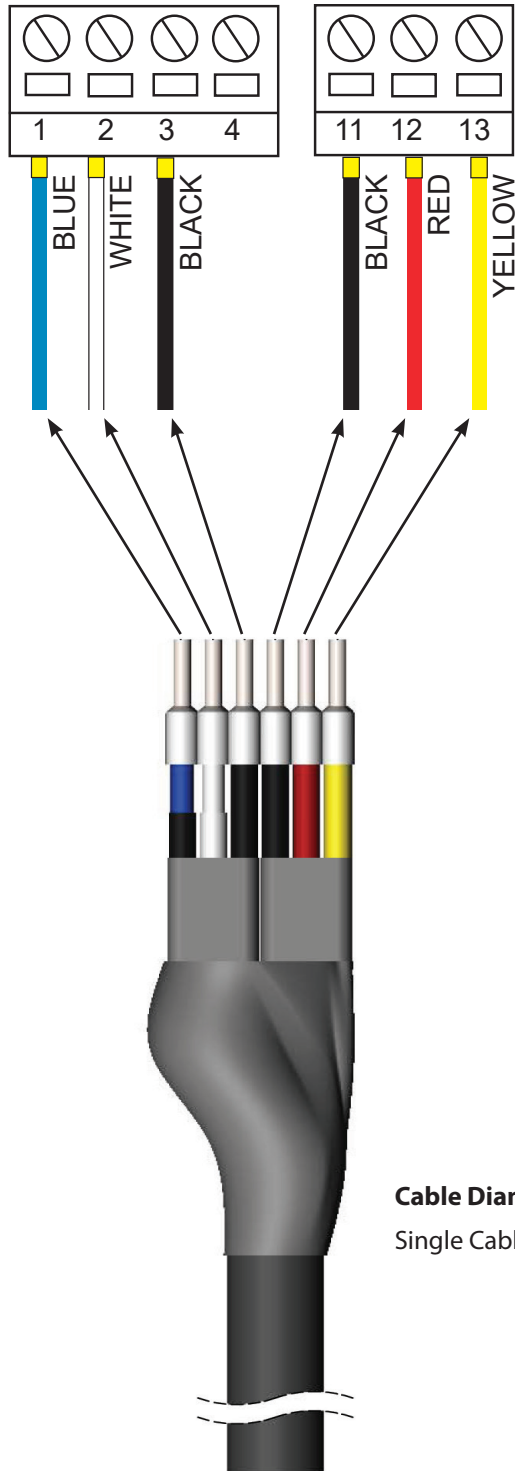Cable B (15036): 0.248"

Cable Jacket

Figure 11. Ultra Mag 2" & 3" sensor cable connections

5.5   SPI Mag 282L Cable Connection

Terminal Block Assignments

Terminal	Wire Color	Connected To
#1	Blue	Sensing electrode
#2	White	Sensing electrode
#3	Black	Reference ground
#11	Black	Magnet shield / overall cable shield
#12	Red	Coil
#13	Yellow	Coil

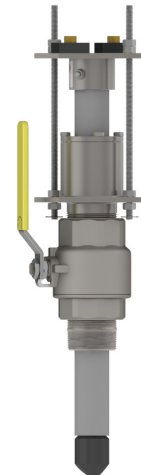**Cable Diameter:**

Single Cable (36002): 0.250"

Figure 12. SPI Mag 282L sensor cable connections

5.6   Converter Grounding

5.6.1   Converter Grounding For FPI Mag Ultra Mag 4" - 48"

On converters attached to the 395L and Ultra Mag body style 2 flow meters, the sensor cable has a ground wire fitted with a loop. Attach the wire with the loop to the enclosure's ground terminal lug as shown in Figure 13.

Enclosure Ground Lug

Cable B

Black Ground Wire With Loop From Cable B

Figure 13. Converter grounding with cable lug for FPI Mag and Ultra Mag 4" - 48"

5.6.2   Converter Grounding For Ultra Mag 2" & 3"

On converters attached to the Ultra Mag body style 1 flow meters, the sensor cable has a ground wire fitted with a loop and a terminal extension. Attach the wire to the enclosure's ground terminal lug as shown in Figure 14 via the wire end loop, then connect the wire extension to Terminal #3.
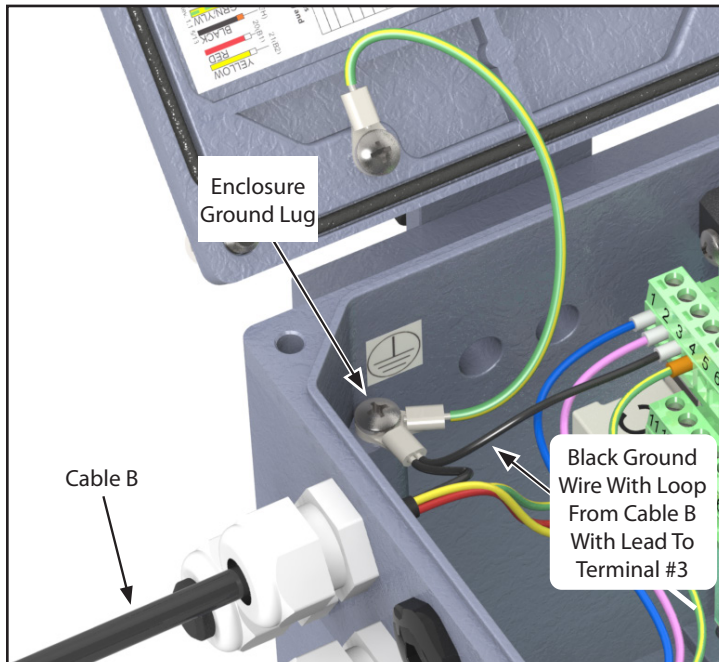

Enclosure Ground Lug

Cable B

Black Ground Wire With Loop From Cable B With Lead To Terminal #3

Figure 14. Converter grounding with cable lug for Ultra Mag 2" & 3"

5.7   Opto-Isolated Pulse Output Hook-Up

Both outputs are open drain outputs used to communicate with external devices. (Figure 15)

- Maximum switching voltage: 40 VDC
- Maximum switching current: 100mA
- Maximum Ron = 70Ω
- Maximum switching frequency (load RL=240Ω, VOUT=24VDC): 50Hz
- Isolation: 500 V

> **i** IMPORTANT
>
> Outputs are not isolated from each other. All outputs MUST use the same power source.
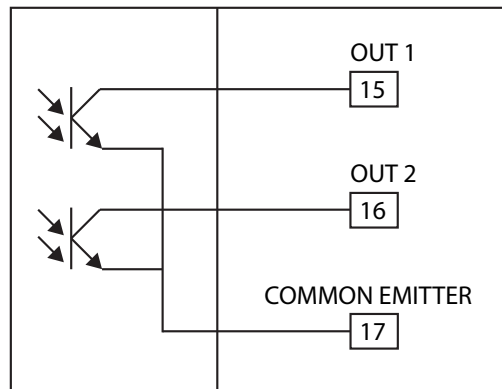
OPTO ISOLATED OUTPUTS

Figure 15. Opto-isolated pulse output diagram

5.8   Opto-Isolated Pulse Input

- Opto-isolated pulse input
- 500 V isolation
- 3-40 VDC on voltage
- Input programming per input menu, will perform functions set to ON.

Input example (Figure 16):

Figure 16. Opto-isolated pulse input diagram

5.9   Converter Power Hook-Up

> ℹ️ **WARNING!**
> Hazardous supply voltage can shock, burn, or cause death.

The power supply line must be equipped with external surge protection for current overload (fuse or circuit breaker with limiting capacity not greater than 10A). It must be easily accessible for the operator and clearly identified.

Power connection is made using the power terminal block on the upper right side of the terminal board. (Figure 17 and Figure 18)

NOTE: The terminal block uplugs from the circuit board for easy connection. Connect earth ground to the protective grounding terminal before making other connections. The power supply of this converter is 100 - 240 VAC, 44 - 66 Hz at maximum 4 W or 12-60 VDC.

Figure 17. AC power supply terminal block   **Figure 18. DC power supply terminal block**

6.0   CONVERTER START-UP - ALL SENSORS

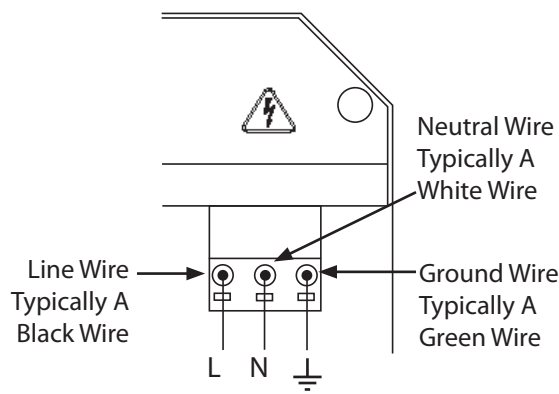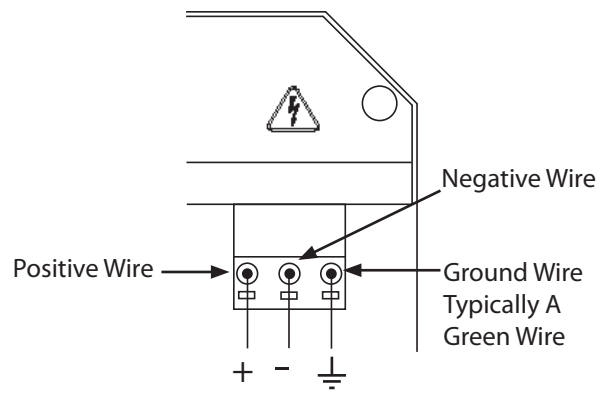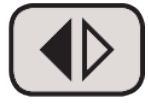Before starting up the converter please verify the following:

• Power supply voltage must correspond to that specified on the data plate (located on the side of the converter)

• Electric connections must be wired as described in this manual

• Ground connections must be properly installed

When the converter is powered it initiates a verification cycle of the converter. During the verification cycle the converter displays an incrementing diagnostic number. When the diagnostic is complete, if an error is found, an error number will be displayed referencing the chart at the back of this manual. A text message will also be displayed on the alarm screen.

NOTE: To view alarms, press the RIGHT arrow key from the main display screen.

6.1   Menu Navigation

To navigate through the menus on the converter, the keys on the keypad use the following conventions:

Key: **Function:**

Up/Down Key

UP/DOWN KEY (for moving cursor up or down)

SHORT PRESSING (< 1 SECOND):

Moves the cursor up to the previous subject on the menu
Increases the numeric figure of the parameter highlighted by the cursor

LONG PRESSING (> 1 SECOND):

Moves the cursor down to the next subject on the menu
Decreases the numeric figure of the parameter highlighted by the cursor

Right/Left Key

RIGHT/LEFT KEY (for moving cursor right or left)

SHORT PRESSING (< 1 SECOND):

Moves the cursor to the right on the input field
Moves the cursor to the following subject of the menu
Changes the display of the process data

LONG PRESSING (> 1 SECOND):

Moves the cursor to the left on the input field
Moves the cursor to the previous subject on the menu

Note: Push and hold for eight seconds to cycle through contrast settings.

Enter/Esc Key

ENTER/ESC KEY (for changing settings)

SHORT PRESSING (< 1 SECOND):

Opens the Quick Start menu for the instrument configuration
Enters the selected function
Cancels the selected function under progress

LONG PRESSING (> 1 SECOND):

Confirms the selected function
Leaves the current menu

Figure 19. Converter key conventions

6.2 Front Panel Visualization Pages

"Visualization pages" are different display screens that present specific information.

If there is screen is in "screen saver" mode, long-press the Left/Right arrow key to wake it up. Short-press the Left/Right arrow key to cycle through the different visualization pages.

Figure 20. Examples front panel visualization pages

6.3   Factory Set Key Code

The converter is delivered with key code L2 = **000002**, and with the "Quick start menu" enabled. Press the Enter/Esc key. The "Quick start menu" is enabled from the section: Menu "8-Display", section 10.8.

ℹ️ **ATTENTION**!

It is very important to record any customized code as it CANNOT be retrieved if it is lost! The converter will need to be returned to be reset to factory settings.

6.4   Menu Structure

The following is the menu structure for the converter.
NOTE: Some menus change as options are enabled.

```
MAIN MENU
 1-Sensor
 2-Scales
 3-Measure
 4-Alarms
 5-Inputs
 6-Outputs
 7-Communication
```
→
```
 4-ALARMS
Al.max+=%      000
Al.min+=%      000
Al.max-=%      000
Al.min-=%      000
Hyst.=%         03
```

```
MAIN MENU
 5-Inputs
 6-Outputs
 7-Communication
 8-Display
 9-Data logger
10-Diagnostic
11-Internal data
```
→
```
 5-INPUTS
T+ reset=       ON
T- reset=       ON
Count lock=    OFF
Alarm=         OFF
Wake-up=       OFF
```

```
MAIN MENU
 5-Inputs
 6-Outputs
 7-Communication
 8-Display
 9-Data logger
10-Diagnostic
11-Internal data
```
→
```
 6-OUTPUTS
Out1=         PLS+
Out2=          OFF
```

```
MAIN MENU
 5-Inputs
 6-Outputs
 7-Communication
 8-Display
 9-Data logger
10-Diagnostic
11-Internal data
```
→
```
 7-COMMUNICATION
IF2 prot.=     DPP
```

```
MAIN MENU
 5-Inputs
 6-Outputs
 7-Communication
 8-Display
 9-Data logger
10-Diagnostic
11-Internal data
```
→
```
 8-DISPLAY
Language        EN
D.time=s       060
Quick start=    ON
Disp.lock=     OFF
T+ reset
T- reset
```

```
MAIN MENU
 5-Inputs
 6-Outputs
 7-Communication
 8-Display
 9-Data logger
10-Diagnostic
11-Internal data
```

```
9-DATA LOGGER
2016/07/20  07:31
T.zone=h     -08.0
Acquisition=     ON
Comp.mode=       ON
int.1 = 13h00m00s
Log T+=          ON
Log P+=          ON
Lot T-=          ON
Log P-=          ON
Log NT=          ON
Log NP=          ON
Log Q=           ON
Log STAT=        ON
M.units=         ON
% values=       OFF
```

```
MAIN MENU
 5-Inputs
 6-Outputs
 7-Communication
 8-Display
 9-Data logger
10-Diagnostic
11-Internal data
```

```
10-DIAGNOSTIC
Self test
Simulation=     OFF
Display data
Stand-by
Read SDC info
Firmware rev.
```

```
MAIN MENU
 5-Inputs
 6-Outputs
 7-Communication
 8-Display
 9-Data logger
10-Diagnostic
11-Internal data
```

```
11-INTERNAL DATA
W2 code=    ******
Load fact.data
S/n=        071230
KT=        +1.0000
KR=        +1.0000
KS=        +1.0000
```

7.0   PROGRAMMING EXAMPLE

The steps below demonstrate how to modify the full scale value from 3500 Gal/m to 3000 Gal/m on the "Quick Start Menu". You can enter the "Quick Start Menu" from any Visualization Page (see page 19 for information on this).

Note: The function used in the example is the top menu item, so you will not need to scroll through the *Quick Start* menu. However, to do so, you need to have the full menu item highlighted and press **Left/Right** or **Up/Down**.

Scroll up   Scroll right   Select

You will start with a blank screen.

1.   **Long press on Enter/ESC.**

This will wake up the front panel display.

2.   **Short press on Enter/ESC.**

This will take you to the Quick Start menu.

3.   **Short press on Enter/ESC.**

This will highlight the GAL setting.

4.   **Press Left/Right to find the next selection.**

Press Left/Right until you highlight the **5** as shown.

5.   **Press Up/Down.**

Press Up/Down to change the value to 0.

6.   **Short press on Enter/ESC.**

This will confirm and save the setting.

7.   **Long press on Enter/ESC.**

This will exit programming and return to the visualization page.

8.0   MENU 0 - QUICK START

The Quick Start menu gives you quick access to frequently used functions. It consists of the same functions from **Menu 2 - Scales**.

See page 26 for a complete description of accessing and making programming changes to these menu items.

```
0-QUICK START
Fs=Gal/m    009000
Temp.u.meas.=   °F
Tot1MU=KGL   00001
Pls1=KGL  1.00000
Tpls1=ms    0050.0
Main menu
```

NOTE: The Quick Start menu is configured at the factory. Some menus may not be available in your configuration. If the quick start menu is not present as the first menu option, then it has been disabled. (See Section 9.8 to enable the Quick Start menu.)

9.0   MAIN MENU DESCRIPTIONS

Press the key Enter/Esc key to go to the Main menu directly when the "Quick start menu" is disabled. When it is not disabled you can select the Main menu from the "Quick start menu". The functions in the Quick Start menu and the Main menu are explained below. Please note that some functions are only displayed if other functions are enabled or with the insertion of additional modules.

9.1   Menu 1 - Sensor

ND Inside Pipe Diameter
The inner diameter of the pipe entered in millimeters. NOTE: The flow accuracy will only be as good as the accuracy of the actual pipe ID entered into the converter. The "Nominal Pipe Size" often referred to can be different from the actual pipe ID and if used cause a substantial error in flow reading. Setting the ND value to zero will cause the converter to display the velocity instead of flow rate. Totalizer will then increment in feet or meters.

```
1-SENSOR
ND=mm       00356
KA=     +02.0000
Ins.position=    0
Ki=       1.0000
Kp=       1.0000
KZ=     +000000
KC=       1.0000
TC1=ms       010
TC2=ms       001
E.P.detect=    ON
E.p.thr=     070
Zero cal.
Zero res.
```

KA
Factory calibrated gain for the forward flow. Do not change the value.

Ins. Position
This is for a single point sensor. Position for insertion sensors: 0=1/8DN, 1=1/2DN, 2=7/8DN

Ki
Automatic setting according to ID (insertion meter only).

Kp
Automatic setting according to ID (insertion meter only).

KZ
This is the Zero Calibration constant. The KZ updates every time the Zero Calibration is performed.

KC
This is a coil current adjustment factor for use between sensor families.

TC1
This is the time needed to stabilize coil current when switching from no current.

TC2
This is the time needed to stabilize coil current when switching coil polarity.

E.P.detect
Enables the empty pipe detection function.

E.P.thr.
Sets the empty pipe detection threshold.

Zero cal.
Zero point calibration function for the forward flow. Enables the automatic zero calibration system.

> **i** **IMPORTANT -** The water must be perfectly still before starting the Zero Cal process or an offset will be introduced into the flow report.

To perform the zero point calibration:

1. Select the Zero cal. menu and press the Enter/Esc key. It will ask if you want to execute.

```
 1-SENSOR
ND=mm           00356
KA=        +02.0000
Ins.position=      0
Ki=           1.0000
Kp=           1.0000
KZ=        +000000
KC=           1.0000
TC1=ms          010
TC2=ms          001
E.P.detect=      ON
E.p.thr=        070
Zero cal.
Zero res.
```

2. Long press the Enter/ESC button and release when the message "Measuring. . . " appears. The converter counts up from zero to 700, after which the zero point is set.

```
Z          +0.0000
Zero res.
```

```
Measuring...    685
Zero res.
```

Zero res.
This resets the Zero Calibration.

9.2   Menu 2 - Scales

Fs

The full scale value measure set for flowrate. U.S. Standard and metric units are selectable from this menu. See Appendix 1.0 for available units of measure.

To change the full scale value:

1.   Highlight the Fs menu and press the Enter/Esc key.

The unit will highlight.

2.   Press the Up/Down key.

This will scroll through the different available units. See *Appendix 1.0* for available units of measure. Select the desired unit.

3.   Press the Right/Left key twice.

This will highlight the lower case letter that represents the time unit.

4.   Press the Up/Down key.

This will scroll through the available time units.

5.   Press the Right/Left key.

This will select the numeric value. Pressing the Up/Down key to set the digit and Right/Left key to move to the next digit.

6.   Press the Enter/Esc key.

This will save the selection.

If a unit you are looking for is not in the current list press the Right/Left key and scroll to the "/" between the unit of measure and time unit selections and press the Up/Down key to switch between U.S. Standard and Metric units.

Once the desired value is entered quick push the Enter/Esc key to save the changes and then long push Enter/Esc to exit back to the display.

Temp.u.meas

This sets the unit of measure of temperature.

```
 2-SCALES
Fs=Gal/m
Temp.u.meas.=    °F
Tot1MU=KGL   00001
Pls1=KGL   1.00000
Tpls1=ms     0050.0
```

Tot1MU

The totalizer unit/multiplier as well as the visible decimal place is set here.

To change the totalizer unit/multiplier:

1. Highlight the menu and press the Enter/Esc key.

This will highlight the unit/multiplier. See *Appendix 1.0* for available units of measure.

```
 2-SCALES
Fs=Gal/m      009000
Temp.u.meas.=    °F
Tot1MU=GAL   00001
Pls1=KGL   1.00000
Tpls1=ms     0050.0
Main menu
```

2. Press the Up/Down key.

This will scroll through the different available units.

NOTE: The totalizer multiplier is built into the unit of measure, so for gallons multiplied by 1000, select Kgal.

```
 2-SCALES
Fs=Gal/m      009000
Temp.u.meas.=    °F
Tot1MU=KGL   00001
Pls1=KGL   1.00000
Tpls1=ms     0050.0
Main menu
```

3. Press the Right/Left key twice.

This will highlight the numeric value to the right.

```
 2-SCALES
Fs=Gal/m      009000
Temp.u.meas.=    °F
Tot1MU=KGL   00001
Pls1=KGL   1.00000
Tpls1=ms     0050.0
Main menu
```

4. Press the Up/Down key.

This will change the decimal resolution displayed for the totalizers. Changing the decimal resolution will not change the multiplier. The available selections are 00001, 001.0, 01.00, and 1.000.

```
 2-SCALES
Fs=Gal/m      009000
Temp.u.meas.=    °F
Tot1MU=KGL   001.0
Pls1=KGL   1.00000
Tpls1=ms     0050.0
Main menu
```

If the desired unit of measure is not in the current list, press the Right/Left key and scroll to the blank space between the unit/multiplier and the numeric decimal resolution selection and press the Up/Down key to switch between U.S. Standard and Metric units.

```
 2-SCALES
Fs=Gal/m      009000
Temp.u.meas.=    °F
Tot1MU=KGL  ■001.0
Pls1=KGL   1.00000
Tpls1=ms     0050.0
Main menu
```

Pls1

The pulse increment value and unit of measure for the pulse output 1. This option is only available when "out1" in Menu 6 - Outputs is set to PLS+, PLS-, or PLS.

The pulse increment can be set to 0.00001 to 99999.9.

```
2-SCALES
Fs=Gal/m      009000
Temp.u.meas.=      °F
Tot1MU=KGL    00001
Pls1=KGL    1.00000
Tpls1=ms      0050.0
```

Tpls1

Duration of the pulse output 1 expressed in milliseconds. This option is only available when "out1" in Menu 6 - Outputs is set to PLS+, PLS-, or PLS. The pulse duration can be set from 8.0 to 7999.9.

```
2-SCALES
Fs=Gal/m      009000
Temp.u.meas.=      °F
Tot1MU=KGL    00001
Pls1=KGL    1.00000
Tpls1=ms      0050.0
```

IMPORTANT

i

The converter cannot detect the type of device it is connected to so it is up to the user to verify the setting is compatible with the external device receiving the pulse. Incorrect settings can damage the receiving device. See section 10.6 Menu 6 - Outputs for output specifications.

9.3 Menu 3 - Measure

Cut-off

Cutoff point which all flow is reported as zero. This value is set as a percentage of the full scale. (Note: Default cut-off point = 3.0% of full scale.)

```
 3-MEASURE
Cut-off=%       03.0
Prof  =    MAX LIFE
Damping=        OFF
```

Prof
Measurement Profile

> 0 = Continuous Power
> 1 = Smart
> 2 = Average
> 3 = Max Life

Continuous Power uses more battery power and is not recommended. Max Life uses the least battery power and is the default.

Damping
Measure Filter Damping Profile Enable is only valid in the Smart Profile setting. This applies a fixed filter to the reading.

9.4 Menu 4 - Alarms

Al.max+
Maximum Forward flow rate exceeded. Can be 0-125% of Full Scale.

```
 4-ALARMS
Al.max+=%        000
Al.min+=%        000
Al.max-=%        000
Al.min-=%        000
Hyst.=%           03
```

Al.min+
Minimum Forward flow rate exceeded. Can be 0-125% of Full Scale.

Al.max-
Maximum Reverse flow rate exceeded. Can be 0-125% of Full Scale

Al.min-
Minimum Reverse flow rate exceeded. Can be 0-125% of Full Scale.

Hyst.
Alarm Hysteresis. Set 0-25%. This sets the lag in response based on a percentage of the full scale. Example if the alarm triggers at 100% and the hysteresis is set to 2% then once triggered the current rate must change beyond 2% to exit out of the current alarm state. This setting applies to all alarms.

9.5   Menu 5 - Inputs

```
5-INPUTS
T+ reset=          ON
T- reset=          ON
Count lock=        OFF
Alarm=             OFF
Wake-up=           OFF
```

T+ reset

Positive Totalizer Reset Enable. Set by turning on or off. This allows for the positive total totalizer to be reset through the input.

T- reset

Negative Totalizer Reset Enable. Set by turning on or off. This allows for the negative total totalizer to be reset through the input.

Count lock

Totalizer Count Lock Input Enable, Set by turning on or off. This allows for the totalizers to be locked (frozen) when the input is active.

Alarm

Allows the input to be wired to an external alarm output such as a water intrusion alarm.

Wake-up

Wake up the display with an input.

9.6   Menu 6 - Outputs

```
6-OUTPUTS
Out1=             PLS+
Out2=             OFF
```

Out 1

Transistor output channel 1. See tables on the next page for available settings.

Out 2

Transistor output channel 2. See tables on the next page for available settings.

Outputs available for open collector transistor outputs #1 and #2:

OFF	DISABLED
PLS	PULSE FOR POSITIVE AND NEGATIVE FLOW VOLUME
PLS-	PULSE FOR NEGATIVE FLOW VOLUME
PLS+	PULSE FOR POSITIVE FLOW VOLUME
F.SIGN	FLOW DIRECTION OUTPUT (ENERGISED = -)
DIRECT. DR.	DIRECT OUTPUT DRIVE
ALL ALARMS	ALL ALARMS
OVR.RANGE.	OUT OF RANGE ALARM OUTPUT (ENERGISED = FLOW RATE OK)
HARDW.AL.	CUMULATIVE ALARM OUT interrupt coils, empty pipe, meas. error (ENERG. = NO ALARMS)
P.EMPTY	EMPTY PIPE ALARM OUTPUT (ENERGISED = FULL PIPE)
MX+MN ALL	MAX AND MIN ALARM OUTPUT (ENERGISED=AL. OFF)
*MX+MN TEMP	MAX AND MIN TEMPERATURE OUTPUT (ENERGISED= AL. OFF)
*MIN TEMP	MIN TEMPERATURE OUTPUT (ENERGISED= AL. OFF)
*MAX TEMP	MAX TEMPERATURE OUTPUT (ENERGISED= AL. OFF)
*MX+MN P12	MAX AND MIN PRESSURE 1 AND 2 OUTPUT (ENERGISED= AL. OFF)
*MX+MN DP	MAX AND MIN DIFFERENTIAL PRESSURE OUTPUT (ENERGISED= AL. OFF)
*MIN DP	MIN DIFFERENTIAL PRESSURE OUTPUT (ENERGISED= AL. OFF)
*MAX DP	MAX DIFFERENTIAL PRESSURE OUTPUT (ENERGISED= AL. OFF)

*These outputs are not available.

*MX+MN P2	MAX AND MIN PRESSURE 2 OUTPUT (ENERGISED= AL. OFF)
*MIN P2	MIN PRESSURE 2 OUTPUT (ENERGISED= AL. OFF)
*MAX P2	MAX PRESSURE 2 OUTPUT (ENERGISED= AL. OFF)
*MX+MN P1	MAX AND MIN PRESSURE 1 OUTPUT (ENERGISED= AL. OFF)
*MIN P1	MIN PRESSURE 1 OUTPUT (ENERGISED= AL. OFF)
*MAX P1	MAX PRESSURE 1 OUTPUT (ENERGISED= AL. OFF)
MX+MN Q	MAX AND MIN FLOW RATE ALARM OUTPUT (ENERGISED=AL. OFF)
MX+MN Q-	MAX AND MIN NEGATIVE FLOW RATE ALARM OUTPUT (ENERGISED=AL. OFF)
MIN Q-	MIN NEGATIVE FLOW RATE ALARM OUTPUT (ENERGISED=AL. OFF)
MAX Q-	MAX NEGATIVE FLOW RATE ALARM OUTPUT (ENERGISED=AL. OFF)
MX+MN Q+	MAX AND MIN POSITIVE FLOW RATE ALARM OUTPUT (ENERGISED=AL. OFF)
MIN Q+	MIN POSITIVE FLOW RATE ALARM OUTPUT (ENERGISED=AL. OFF)
MAX Q+	MAX POSITIVE FLOW RATE ALARM OUTPUT (ENERGISED=AL. OFF)

* These outputs are not available.

9.7 Menu 7 - Communication

IF2 pr.
Protocol for IF2 port. Set to DPP or HTP. This sets the protocol used for communication to the IF2 device, either Data Packet Protocol (DPP) or Hyper Text Protocol (HTP). Default is DPP. This should not be changed.

```
7-COMMUNICATION
IF2 prot.=      DPP
```

9.8 Menu 8 - Display

Language
Converter language. This sets the converter language EN (English), IT (Italian), FR (French), SP (Spanish), or DE (German).

D.Time
Energy Saving Display Time will turn the display off after 20-250 seconds. 60 is default.

Quick start
Quick Start Menu enable. This setting toggles between on and off. If set to "off" it will hide the quick start menu.

Disp.lock
Locks the front panel display so you can't switch between displays

T+ reset
Totalizer reset, forward. Resets the forward flow totalizer.

T- reset
Totalizer reset, reverse. Resets the reverse flow totalizer.

```
8-DISPLAY
Language        EN
D.time=s        060
Quick start=    ON
Disp.lock=      OFF
T+ reset
T- reset
```

To reset the totalizer:

1. Highlight the totalizer reset option to be reset.

2. Quick press the Enter/Esc key. The display will show "EXECUTE?".

3. Press and hold the Enter/Esc key to continue. The display will flash "Done".

The visualization pages will now show the totalizer as reset.

NOTE: There is no function to reset the Net Totalizer. To reset the Net Totalizer, both the "+" and the "-" totalizers must be reset.

```
8-DISPLAY
Language        EN
D.time=s        060
Quick start=    ON
Disp.lock=      OFF
T+ reset
T- reset
```

```
8-DISPLAY
Language        EN
D.time=s        060
Quick start=    ON
Disp.lock=      OFF
EXECUTE?
T- reset
```

```
8-DISPLAY
Language        EN
D.time=s        060
Quick start=    ON
Disp.lock=      OFF
DONE
T- reset
```

9.9   Menu 9 - Data Logger

Note: See the McLogger manual, literature no. 30121-87, for software details and downloading data.

```
 9-DATA LOGGER
2016/07/20  07:31
T.zone=h.    -08.0
Acquisition=     ON
Comp.mode=       ON
int.1  = 13h00m00s
Log T+=          ON
Log P+=          ON
Lot T-=          ON
Log P-=          ON
Log NT=          ON
Log NP=          ON
Log Q=           ON
Log STAT=        ON
M.units=         ON
% values=       OFF
```

YYYY/MM/DD
Date and time. This sets the date and time in the converter. The format for entering the date and time is year / month / day and time is hours : minutes.

T.zone=h
Time Zone. ±12 hours. GMT ± the number of hours. Pacific time is -8.

Acquisition
Enable Data Logging Function.

Comp.mode
Format the Data Logging Data to the previous version of this converter. Default=Off

int.1
Data Logging Interval. HH:MM:SS

Log T+
Include the T Positive Totalizer for Data Logging.

Log P+
Include the P Positive Totalizer for Data Logging.

Lot T-
Include the T Negative Totalizer for Data Logging.

Log P-
Include the P Negative Totalizer for Data Logging.

Log NT
Include the Net T Totalizer for Data Logging.

Log NP
Include the Net P Totalizer for Data Logging.

Log Q
Include the Flow Rate for Data Logging.

Log STAT
Include Statistics like the board temperature and cycles/h for Data Logging.

M.units
Include the Units of Measure for Data Logging.

% values
Include the Flow Rate % of full scale and optional analog inputs for Data Logging.

9.10   Menu 10 - Diagnostic

```
10-DIAGNOSTIC
Self test
Simulation=     OFF
Display data
Stand-by
Read SDC info
Firmware rev.
```

Self-test
Converter self test. Executed command. Running the self-test will cause the converter to run an internal diagnostic test that will check for internal hardware and software errors. Once the self-test is complete if any errors are found then the error code for each error will be displayed. Refer to section *9.0 Alarm Messages* for a list of possible error codes.

Simulation
Simulation enable. Setting this menu to ON will generate an internal signal that simulates flow and allows the outputs and all connected instruments to be tested. After simulation is set to ON, the flow can be set to a percentage based on the current FS1 setting of -125% to 125%.

To enable the simulation function highlight the Simulation menu and press the (enter/esc) key. Toggle the simulation function from OFF to ON using the Up/Down key. Press and hold the (enter/esc) key to exit back to the main menu and once again to exit to the visualization page.

NOTE: you will now have an "S" in the upper left corner, this indicates the simulation mode is active.

```
10-DIAGNOSTIC
Calibration
Sensor test
Self test
Simulation=     OFF
Display data
Stand-by
Gprs test
Read SDC info
Format SDC
Firmware rev.
```
```
10-DIAGNOSTIC
Calibration
Sensor test
Self test
Simulation=      ON
Display data
Stand-by
Gprs test
Read SDC info
Format SDC
Firmware rev.
```

```
S      +            0
Gal/m
  10*F          0.00%
T+KGL             .0
T-KGL             .0
```

Press the Enter/Esc key. This will bring up the flow simulation set up screen. Use the Right/Left key and the Up/Down key to enter in the flow rate percentage value for the simulation. Press the Enter/Esc key to enter that value.

The converter will start to read flow. It may take a few seconds for the readings to appear. Repeat the above steps as needed to observe the different flow rates desired.

```
F1.rate=% 010.00
```

To exit out of simulation mode, press enter to get into the simulation set up screen (see above) and then press and hold the Enter/Esc key. This will exit out to the visualization screen, and the "S" in the upper left corner of the screen will disappear.

```
1      +            0
Gal/m
  10*F          0.00%
T+KGL             .0
T-KGL             .0
```

Display data
Numeric display for various internal settings and raw measured signals.   This is a Factory service menu.

Stand-by
Use this function before powering down the converter. This will save any unsaved data and turn off the converter. Once the converter is in Stand-by, you can switch the batteries off or change the batteries. To turn the converter back on you must switch the battery switch to off and after approximately 5 minutes, turn the switch to ON.

Read SDC info
Displays the total capacity and the capacity free of the SD Memory card.

Firmware rev.
This temporarily displays the model and Firmware of the converter.

9.11   Menu 11 - Internal Data

```
11-INTERNAL DATA
L2 code=     ******
Load fact.data
S/n=         071230
KT=          +1.0000
KR=          +1.0000
KS=          +1.0000
```

L2 code
Level 2 passcode. This menu changes the 2 level passcode. The factory default
is 000002.

> *i* **CAUTION** - if the passcode is changed from the default value and is lost, it CANNOT be recovered. In the event the passcode is lost, the converter can be returned to the factory to be reset.

Load fact.data
This will configure the converter to the configuration when it left McCrometer.

S/n
Displays the board serial number.

KT
Used to adjust gain errors. This factor is generated by the converter at power up.

KS
Field adjustment coefficient. This value is a direct multiplier that is used as a field adjustment / correction coefficient.

10.0 ALARM MESSAGES

During meter setup, you may see error messages and codes. These messages and codes are explained below.

CODE	MESSAGE	CAUSE	ACTION	ALARM VIA SMS *
000	NO ALARMS	-----	-----	NO
001	SYSTEM STARTUP	The system was started	-----	YES
003	PRESS.1>FS	The Pressure at input 1 is higher than the full scale set	Check the maximum full scale set and the process conditions	YES
004	FLOW>FS	The flow rate is higher than the full scale set	Check the maximum full scale set and the process conditions	YES
005	PULS.1>F.MAX	The pulse frequency at output 1 is too high	Reduce the pulse duration if the connected counter allow this or increase the pulse unit value	YES
006	B3 LOW	The battery B3 powering the MODEM is exhausted	Replace the battery	YES
007	B2 LOW	The battery B2 powering the main board is exhausted	Replace the battery	YES
008	B1 LOW	The battery B1 powering the main board is exhausted	Replace the battery	YES
077	SYSTEM RESTART	The system was restarted after a reset signal	If this message appears after an AUTO-TEST command, it is not an error indication, otherwise check all the connections, the batteries and the grounding	YES
094	ALARM INPUT ACT.	The digital input detected an alarm signal condition	Check the process condition	YES
103	B.TEMP.OUT R.	The measured board temperature is out of the allowed range	Ensure that the instrument is operating within the specified temperature conditions	YES
113	FIRMW.FILE ERR	The file containing the firmware was received with errors	Re-send the firmware file	YES
115	S.OUT OVERLOAD	An overload condition is present in the power source that feeds the external sensors and inputs	Check the connections and the external sensors (pressure, temperatures, input circuitry)	YES
117	ERR.SENS.TEMP	The external temperature sensor is not working properly	Check the external temperature sensor and its connections	YES
118	MAIL S.FAILED	The last email sending process has failed for some reasons	Check the transmitting conditions (antenna signals, GPRS parameters, server status and configurations)	YES
119	SMS NOT AUTH	A SMS from a not authorized number was received	Check the events log for the sender number and do the appropriate actions	YES

*Not available at this time.

CODE	MESSAGE	CAUSE	ACTION	ALARM VIA SMS *
135	V.MODEM LOW	The internal voltage of the MODEM is not sufficient for to guarantee a proper operation	Check the battery B3 and its connections, verify if any visible damage has occurred to the board or the MODEM	YES
144	NO CMD RECEIVED	The command list sent to the instrument does not contain any executable commands	Check the command list and re-send it again	YES
150	MAX Q+	The Positive flow rate is higher than the maximum threshold value set	Check the maximum threshold positive flow rate alarm value and the process conditions	YES
151	MIN Q+	The Positive flow rate is lower than the minimum threshold value set	Check the minimum threshold positive flow rate alarm value and the process conditions	YES
153	MAX Q-	The Negative flow rate is higher than the maximum threshold value set	Check the maximum threshold negative flow rate alarm value and the process conditions	YES
154	MIN Q-	The Negative flow rate is lower than the minimum threshold value set	Check the minimum threshold negative flow rate alarm value and the process conditions	YES
157	MAX P1	The pressure at input 1 is higher than the maximum threshold value set	Check the maximum threshold pressure 1 alarm value and the process conditions	YES
158	MIN P1	The pressure at input 1 is lower than the minimum threshold value set	Check the minimum threshold pressure 1 alarm value and the process conditions	YES
160	MAX P2	The pressure at input 2 is higher than the maximum threshold value set	Check the maximum threshold pressure 2 alarm value and the process conditions	YES
161	MIN P2	The pressure at input 2 is lower than the minimum threshold value set	Check the minimum threshold pressure 2 alarm value and the process conditions	YES
163	MAX DP	The pressure difference (delta) P1-P2 is higher than the maximum threshold set	Check the maximum threshold pressure difference (delta) alarm value and the process conditions	YES
164	MIN DP	The pressure difference (delta) P1-P2 is lower than the minimum threshold set	Check the minimum threshold pressure difference (delta) alarm value and the process conditions	YES
167	MAX TEMP	The external temperature is higher than the maximum threshold value set	Check the maximum threshold temperature alarm value and the process conditions	YES
168	MIN TEMP	The external temperature is lower than the minimum threshold value set	Check the minimum threshold temperature alarm value and the process conditions	YES
171	P.EMPTY	The system detected an empty pipe alarm condition	Check the empty pipe settings and the process conditions	YES

*Not available at this time.

McCROMETER

CODE	MESSAGE	CAUSE	ACTION	ALARM VIA SMS *
193	CONFIG.ENTERED	The system detects an access to the configuration parameters	Check the events log and do the appropriate action depending on your data protection policy	YES
194	CLOCK S.FAIL	The clock synchronization with the remote server failed	Check the server configuration, the GPRS network conditions and antenna signal	YES
195	POWER FAILURE	The system experienced a power failure (loss of power)	Check the status of the batteries and all their connections. THIS MESSAGE MAY APPEAR WHEN THE SYSTEM IS SWITCHED OFF WITHOUT PRIOR PUTTING IT IN STAND-BY MODE	YES
206	F.SENSOR ERROR	The system detected one or more errors in the flow sensor	Check the error code in the events log	YES
207	TEMP.>FS	The external temperature is higher than the full scale set	Check the maximum full scale set and the process conditions	YES
208	PULS.2>F.MAX	The pulse frequency at output 2 is too high	Reduce the pulse duration if the connected counter allow this or increase the pulse unit value	YES
209	PRESS.2>FS	The Pressure at input 2 is higher than the full scale set	Check the maximum full scale set and the process conditions	YES
210	EL.SIG.ERROR	The system detected an error condition on the measuring electrodes	Check the flow sensor cables, the electrodes surface, the grounding and the process condition	YES
211	EXCIT.ERROR	The system detected an error in the coils excitation circuit	Check the flow sensor cables, the coils insulation and resistance	YES
212	SD MEMORY FULL	The SD card memory is full (no more space for new data)	Change the SD card memory or erase all the unwanted data	YES
215	POWER SUPPLY OFF	The power coming from the universal power supply went off	Check the power supply source and the relative cables	YES
216	SD MEMORY ERROR	The SD card installed is missing, not valid, not formatted or incompatible with the system	Replace the SD memory, format it or check if it is properly inserted	YES

*Not available at this time.

CODE	ANOMALIES DESCRIPTION	ACTION
0001	Keyboard error (key stuck detected)	ADDRESS TO SERVICE
0002	Hardware parameters stored in F-RAM not valid	
0004	Sensor parameters stored in F-RAM not valid	
0008	Converter parameters stored in F-RAM not valid	
0200	Coils excitation current driver error	
0400	Measure input stage error	
1000	Internal time reference error	
0010	Sensor coils resistance out of tolerance	Check the flow sensor status, its working conditions and all the connections with the converter and with the reference ground
0020	Time TC2 out of tolerance	
0040	Time TC1 out of tolerance	
0080	Sensors coils insulation out of tolerance	
0100	Excitation drive phases difference error	
0800	Coils excitation circuit interrupted	
2000	Temperature reference error	Check the connections and the external temperature sensor
4000	External sensors power source overload	Check all the connections between the external sensors (pressure, temperature, digital inputs) and the converters
8000	SD memory error	Check the SD card placement and verify if a compatible type is used

11.0 SPECIFICATIONS

BATTERY POWER:

Two D-cell lithium battery packs
Estimated life of batteries: 3-5 years, standard use

STANDARD OUTPUTS:

- Volumetric Pulse Output
- Hardware Alarm
- High/Low Flow Alarms
- Empty Pipe
- Directional Indication
- Range Indication

Maximum switching voltage: 40 VDC
Maximum switching current: 100mA
Maximum switching frequency: 50 Hz
Insulation from other secondary circuits: 500V

OPTIONAL OUTPUTS:

- Smart Output (Sensus or Itron)

ENGINEERING UNITS:

cm3	Cubic centimeter	bbl	Standard barrel
ml	Milliliter	BBL	Oil barrel
l	Liter	IKG	Imperial Kgallons
dm3	Cubic decimeter	KGL	US Kgallons
dal	Decaliter	Aft	Acre feet
hl	Hectoliter	MGL	USA mega gallons
m3	Cubic meter	IMG	Imperial mega gallon
in3	Cubic inch	Ml	Megaliter
Gal	American gallon	hf^3	Hundreds of cubic feet
IGL	Imperial gallon	kf^3	Thousands of cubic feet
ft3	Cubic foot	ttG	Tens of thousands of gallons

STANDARDS:

IP67 Die Cast Aluminum Converter

ELECTRICAL ACCESS:

Converter: Compression gland seals for 0.125" to 0.375" Diameter round cable.

GALVANIC ISOLATION:

All inputs / outputs are galvanically isolated from power supply up to 500V

ENVIRONMENTAL:

Pressure / Temperature Limits:
Electronics: Operating and storage temperature:
-4˚ to 140˚ F (-20˚ to 60˚ C)
Sensor is continuously submersible (IP68), with a standard quick-connect cable to 6 ft., and optional strain relief at 30 ft.

KEYPAD AND DISPLAY:

Can be used to access and change set-up parameters using three membrane keys and an LCD display

COMPATIBLE PRODUCTS:

The battery powered converter works with all UltraMag meters, Full Profile Insertion (FPI) meters (except the 394), and Single Point Insertion (SPI) meters. This converter does not work with MC Mag 3000 sensors.

*NOTE REGARDING CABLE LENGTH: McCrometer recommends minimizing cable length. Electromagnetic flow meters may have unfavorable signal strength to noise ratio in electrically noisy environments. Longer lengths of cable increase the likelihood of interference.

ELECTRICAL CHARACTERISTICS:

Power supply version	Power supply	Power supply frequency	Max power
AU	12V - 60V === *	//	4W
	100V - 240V~*	44-66Hz	
LITHIUM BATTERY NOT RECHARGEABLE	3.6v-19aH	//	30mW

* Voltage must not exceed ±10% of the above limits.

12.0 DIMENSIONS

CONVERTER ENCLOSURE:

IP67 Die Cast Aluminum
5.76" H x 5.76" W x 6.73" D
(14.6 cm. H x 14.6 cm. W x 17 cm D)
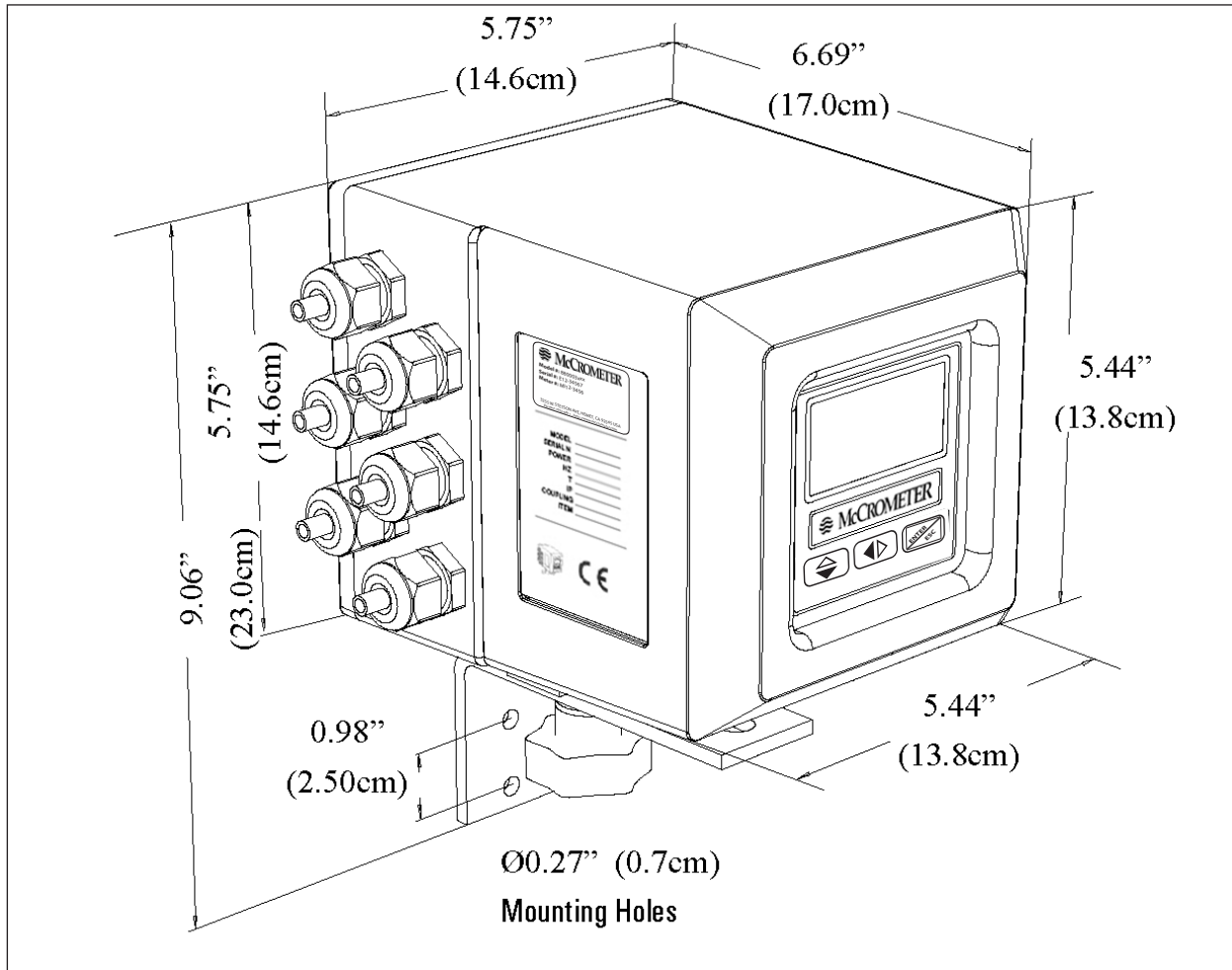

Figure 21. Electronic converter dimensions

13.0 <u>RETURNING A UNIT FOR REPAIR</u>

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.

• Call the McCrometer Customer Service Department at 1-800-220-2279 and ask for a Return Authorization (RA) number.

• Ship the meter in the original packaging, if possible. Do not ship manuals, power cords, or other parts with your unit unless required for repair.

• Please make sure the meter is clean and free from foreign debris prior to shipping.

• 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

14.0 <u>TROUBLESHOOTING GUIDE</u>

Problem	Troubleshooitng Steps
Excitation Fail (0800) Alarm	• Ensure the wiring is firmly connected • Disconnect the coil wires from the converter and check their resistance with a standard multi-meter. Contact the factory for the proper value for the sensor. • Ensure the wiring is firmly connected to any PreAmp being used.
Noisy Input Alarm	• Verify there is a jumper on terminals 3 and 4 • Verify the converter ground is to earth ground • Check for damaged cable between the sensor and converter
Empty Pipe Alarm	• Confirm the pipe is full • Verify there is a jumper on terminals 3 and 4 • Check EP Threshold. Set to 192 if short cable (less than 50 ft.), set to <120 if longer cable (50 ft. to 100 ft.). Consult the factory for assistance in selecting the correct value. • Conduct a bucket test to confirm the EP Threshold value is set correctly. Consult the factory for assistance. • Check for damaged cable between the sensor and converter
Unstable Flow Readings	• Check grounding connections • Check power circuit. What other devices are on the circruit • Install dedicated ground circuit
Menu Not Accessible	• Confirm the password being used is 000002 • Verify dip switches in the back panel next to the terminals 1 and 2 are both down.
Rate Of Flow Report Is Not As Expected	• Confirm the unit is programmed correctly by requesting a program setting report from the factory.

APPENDIX 1.0 UNITS OF MEASURE

The tables below show the units of measure available for selection.

U.S. Standard	
in3	Cubic Inches
Gal	U.S. Gallons
IGL	Imperial Gallons
ft3	Cubic Feet
bbl	Standard Barrels
BBL	Oil Barrels
KGL	Kilo Gallons
IKG	Imperial Kilo Gallons
Aft	Acre Feet
MGL	Mega Gallons
IMG	Imperial Mega Gallons
hf³	Hundreds of cubic feet
kf³	Thousands of cubic feet
ttG	Tens of thousands of gallons

Metric	
ml	Milliliters
cm3	Cubic Centimeters
l	Liters
dm3	Cubic Decimeter
dal	Decaliter
hl	Hectoliter
m3	Cubic Meter
Ml	Megaliter

Time	
s	Seconds
m	Minutes
h	Hours
d	Days

APPENDIX 2.0 CONVERSION TABLES

Table of Decimal Equivalents

Fraction	Decimal
1/8	.125
1/4	.25
3/8	.375
1/2	.5
5/8	.625
3/4	.75
7/8	.875

Table of Conversions

Multiply	By	To Get
Centimeters	0.3937	Inches
Centimeters	0.03281	Feet
Inches	25.4	Millimeters
Feet	30.48	Centimeters
Square Feet	144.0	Square Inches
Square Inches	0.006944	Square Feet
Cubic Inches	0.0005787	Cubic Feet
Cubic Feet	7.481	Gallons
Cubic Feet	1728.0	Cubic Inches
Cubic Feet	0.02832	Cubic Meters
Cubic Feet	28.32	Liters
Cubic Meters	35.31	Cubic Feet
Cubic Meters	264.2	Gallons
US Gallons	3.785	Liters
US Gallons	0.1337	Cubic Feet
US Gallons	0.003785	Cubic Meters
US Gallons	.8326748	Imperial Gallons
Liters	0.2642	Gallons
$°F = (°C \times 9/5) + 32$	$°C (°F - 32) \times 5/9$	

WARRANTY STATEMENT

Manufacturer warrants all products of its manufacture to be free from defects in workmanship and material under normal use and service. The warranty for the ML255 Converter extends for a period of twelve (12) months after date of shipment (if the converter is purchased alone), unless altered by mutual agreement between the purchaser and manufacturer prior to the shipment of the product. If the ML255 converter is purchased with a flow sensor system, the Warranty Statement for the flow sensor shall apply. Neither this warranty, nor the flow sensor system warranty, covers consumable items, such as batteries or solar panels.

If this product is believed to be defective and is within its warranty period, purchaser shall notify the manufacturer, and will return the product to the manufacturer, postage paid, within twelve (12) months after date of shipment by the manufacturer. If the purchaser believes the return of the product to be impractical, manufacturer shall have the option, but will not be required, to inspect the product wherever located. In any event, if the purchaser requests the manufacturer visit their location, the purchaser agrees to pay the non-warranty expenses of travel, lodging and subsistence for the field service response. If the product is found by the manufacturer's inspection to be defective in workmanship or material, the defective part or parts will either be repaired or replaced, at manufacturer's election, free of charge, and if necessary the product will be returned to purchaser, transportation prepaid to any point in the United States. If inspection by the manufacturer of such product does not disclose any defect of workmanship or material, manufacturer's regular service repair charges will apply.

THE FOREGOING WARRANTY IS MANUFACTURER'S SOLE WARRANTY, AND ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE NEGATED AND EXCLUDED. THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, GUARANTEES, REPRESENTATIONS, OBLIGATIONS OR LIABILITIES ON THE PART OF THE MANUFACTURER.

Purchaser's sole remedy and manufacturer's sole obligation for alleged product failure, whether under warranty claim or otherwise, shall be the aforestated obligation of manufacturer to repair or replace products returned within twelve 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.

OTHER McCROMETER PRODUCTS INCLUDE:

Propeller Flowmeters

Propeller Meter

WATER SPECIALTIES PROPELLER METER

Differential Pressure Flowmeters

VCONE

Wafer-Cone

VM VCONE

Magnetic Flowmeters

FPI Mag

SPI Mag

ULTRA MAG

DURA MAG

Mag 3000

Mag 2000

Wireless Monitoring System

FlowConnect

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