FL MEC®

Option QUC1LPCE & QUC1LPN1
- Ultrasonic Insert
- Electronic Module with 4-20mA & Pulse Output
- Q9 Computer Display
- External Power-4 Wire
- Option QUC1LPN1 is NSF Certified

Options QUDSBACE & QUDSBAN1
- Ultrasonic Insert
- Electronic Module
- Q9 Computer Display
- Battery Power
- Option QUDSBAN1 is NSF Certified

UM Ultrasonic Electronics

NSF & Non-NSF Versions

For All FLOMEC® UM Ultrasonic Tee & Saddle Meters

Please save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described.

Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage.

Please refer to back cover for information regarding this product's warranty and other important information.

DO NOT RETURN THIS PRODUCT TO THE STORE!

Please contact Great Plains Industries, Inc.® before returning any product. If you are missing parts, or experience problems with your installation, contact our Customer Support Department. We will be happy to assist you.

Call: 888-996-3837 or 316-686-7361

Email: Support-Meters@gplains.com

SAVE FOR YOUR RECORDS

Model #: _____

Serial#: _____

Purch. Date: _____

TABLE OF CONTENTS

BEFORE YOU BEGIN

Usage Requirements

• These ultrasonic electronics assemblies are for use with UM Tee Ultrasonic Flowmeters and UM Saddle Meters only.

• **When QUDSBAN1C or QUC1LPN1 ultrasonic electronics options are used in a UM Tee Ultrasonic Flowmeter assembly, the flowmeter assembly is NSF Certified.**

• These ultrasonic electronics assemblies have permanent factory settings for measuring water only, and are for use with water only.

• These ultrasonic electronics assemblies are not legal for trade applications.

• Flow must go uphill through the insert, never downhill, to avoid air bubbles or air pockets captured in the Tee or Saddle meter in which the ultrasonic electronics assemblies are installed.

Power Source Requirements

• All ultrasonic electronics assemblies are DC powered either by battery or external power. Power requirements are dependent on the version of the ultrasonic electronics assembly in your meter.

• Specific versions are powered by a 3.6V lithium battery.

• Other versions require DC power from a customer-provided power supply.

• See the Specifications section for information specific to your version of electronics.

Tools and Materials Needed

• Wire strippers, wire cutters for external powered versions.

• 7/64 (.109) hex L-key, wrench

UNPACKING

Inspect

• After unpacking the unit, inspect carefully for any damage that may have occurred during transit. Check for loose, missing or damaged parts. Shipping damage claims must be filed with carrier.

• See General Safety Instructions, and all Cautions, Warnings, and Dangers as shown.

FLOMEC®

GENERAL SAFETY INSTRUCTIONS

IMPORTANT: It is your responsibility to:

- Ensure that all equipment operators have access to adequate instructions concerning safe operating and maintenance procedures.

⚠ **CAUTION** — *This product is not approved for use with petroleum products (diesel fuel, unleaded gasoline, jet fuel, kerosene, etc.), aromatic hydrocarbons or other incompatible chemicals.*

⚠ **WARNING** — *This product is NOT INTENDED for use with flammable liquids.*

⚠ **CAUTION** — *This product is not approved for use in hazardous locations.*

⚠ **WARNING** — *When applying power, adhere to specifications listed in appropriate electronics manual.*

⚠ **CAUTION** — *Disconnect external power before attaching or detaching input or output wires.*

⚠ **WARNING** — *Compatibility of this product's material and the process fluid and/or environment should be considered prior to putting into service.*

⚠ **WARNING** — *Product should never be operated outside its published specifications for temperature or pressure. See specifications for your model.*

⚠ **WARNING** — *Make sure flow and pressure have been eliminated from process pipe prior to installing or removing product.*

⚠ **CAUTION** — *Installation near high electromagnetic fields and high current fields is not recommended and may result in inaccurate readings.*

⚠ **CAUTION** — *Do not allow water to freeze in or around installed insert. Ice expansion may burst the plastic housing.*

⚠ **CAUTION** — *Do not allow this ultrasonic electronics assembly to be used with steam.*

⚠ **WARNING** — *The apparatus enclosure contains aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.*

⚠ **WARNING** — *When handling hazardous liquids, always follow the liquid manufacturer's safety precautions.*

- *When working in hazardous environments, always exercise appropriate safety precautions.*

- *Be sure O-rings and seals are kept in good repair.*

INTRODUCTION

There are various different versions of FLOMEC® Ultrasonic Electronics assemblies. Each version consists of an insert, an electronic module (a housing with internal electronics of varied capabilities) mounted on top of the insert, and a Q9 computer display mounted on top of the electronic module.

All versions are DC powered. Some versions are powered by an internal battery, while other versions require a customer provided external DC power source, via a multiconductor cable.

In operation, fluid flow through sensors embedded in the submerged end of the ultrasonic insert generate a voltage (or pulses). The pulses are processed by the electronic module to generate usable flow information for the Q9 computer display and other electronic features that are included in that version.

Externally powered versions use the multiconductor cable to send flow information back to customer equipment, such as a pulse counter, secondary flow computer/display, or Programmable Logic Controller (PLC).

Each version has a unique option code assigned for ease of identification (see below).

Option Code	Description
QUDSBACE	Ultrasonic insert, module housing with electronics and battery, and Q9 computer display. (Battery power)
QUDSBAN1	Same as QUDSBACE - NSF Certified.
QUC1LPCE	Ultrasonic insert, module housing with 4-20mA & pulse output electronics, and Q9 computer display. 4-conductor cable (10 ft.). (Loop power)
QUC1LPN1	Same as QUC1LPCE - NSF Certified.

FLOMEC® Ultrasonic Electronics assemblies can be used with UM Tees, UM Saddles, or can be ordered as a complete separate replacement ultrasonic electronics assembly.

Using This Manual

This manual has separate sections covering the three major components of the ultrasonic electronics assembly.

> Section A: Ultrasonic insert.
> Section B: Ultrasonic electronic module.
> Section C: Q9 computer display.

A typical model number is shown below for a replacement display for a UM100 meter.

*UM100XXXXXXXXXX-**QUDSBAXX**-GMB*

The (8) characters between the dashes denote the electronic option (replacement display).

For clarity of manual references:

- *Q9 refers to the computer display.*
- *QUDSBACE & QUC1LPCE refers to the "standard" electronic option.*
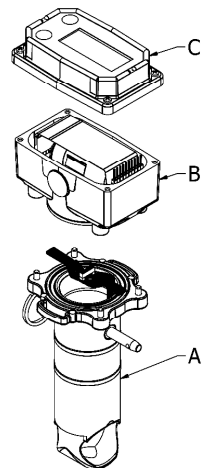- *QUDSBAN1 & QUC1LPN1 refers to the "NSF Certified" electronic option.*

Figure A
Option QUDSBACE Shown

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Using This Manual (cont.)

The table below describes special features, their descriptions, and where to quickly locate them in this manual.

Special Feature	Description	Manual Location
Built in flow meter diagnostics	Diagnostic features that allow the user to troubleshoot application issues	Q9 Display: Operation: Diagnostic Mode
Selectable volume and time-base units	User configurable accumulated volume units and flow rate time-base	Q9 Display: Operation: Configuration Mode: Volume Unit
Custom saddle pipe inner dimension	User configurable pipe inner diameter to allow proper velocity calculations when used in saddle configurations	Q9 Display: Operation: Configuration Mode: Inner Pipe Diameter
Adjustable scaled pulse output K-factor	User configurable pulse output K-factor (pulses/volume) value can be adjusted for interoperability with various customer equipment	Q9 Display: Operation: Configuration Mode: Electronic Module Options
Adjustable 4-20mA output	User configurable zero and span settings to adjust product for specific application flow rates *	Q9 Display: Operation: Configuration Mode: Electronic Module Options
Field calibration	User calibration of the flow meter using one of three available methods (Dispense/Display, Percentage Adjustment, or K-factor Entry)	Q9 Display: Operation: Field Calibration Mode

"Zero" refers to the flow rate at which the product will output 4mA. "Span" refers to the flow rate at which the product will output 20mA.

COMMON SPECIFICATIONS – Overall Electronics

Mechanical				
Operating Temp. Process Fluid	+32°F to +140°F (0°C to +60°C)			
Operating Temp. Ambient Air	+0°F to +130°F (-18°C to +55°C)			
Storage Temp. Ambient Air	-40°F to +158°F (-40°C to +70°C)			
Electrical				
Accuracy	+/- 2% of Reading			
Uncertainty	1" Meter 0.04 GPM 0.018 ft/sec	1-1/2" Meter 0.10 GPM 0.018 ft/sec	2" Meter 0.17 GPM 0.018 ft/sec	3" Meter 0.37 GPM 0.018 ft/sec	4" Meter 0.65 GPM 0.018 ft/sec

GENERAL

Two types of ultrasonic inserts are used. One type has circuits designed for use with battery power (Electronic option QUDSBACE); the other type has circuits designed for use with external power (Electronic option QUC1LPCE). Both types are also available as NSF certified inserts.

Both types (including NSF certified versions) are visually identical. For identification, each insert has two labels below the inside rim; one has a part number barcode, the other has a serial number barcode. The barcodes are human readable (see Figure AA).

NOTE: The insert receives power to operate through a 10-pin ribbon cable from the electronic module. Therefore, the ultrasonic inserts are not interchangeable between power types (i.e., battery power type insert will not operate using an external power electronic module and vice versa).
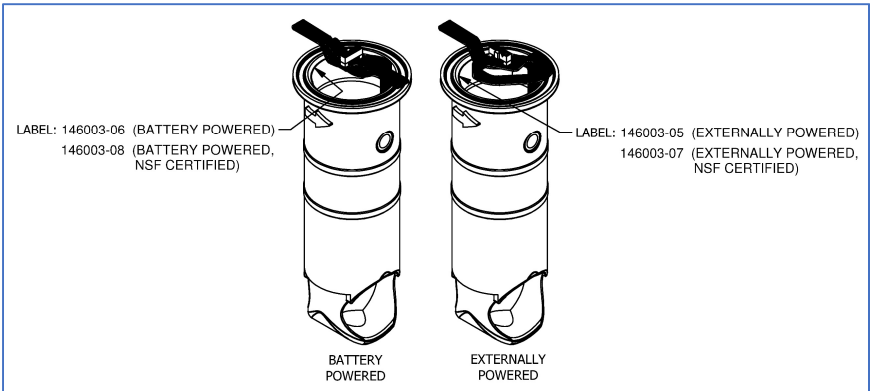

LABEL: 146003-06 (BATTERY POWERED)
146003-08 (BATTERY POWERED, NSF CERTIFIED)

LABEL: 146003-05 (EXTERNALLY POWERED)
146003-07 (EXTERNALLY POWERED, NSF CERTIFIED)

BATTERY POWERED

EXTERNALLY POWERED

Figure AA

SPECIFICATIONS - Insert

Mechanical	
Insert Housing Material	**PPS (Polyphenylene sulfide) / ULTEM® (Polyetherimide)**
Type	**Ultrasonic Insert**

SPECIFICATIONS (cont.)

Dimensions

10-PIN RIBBON
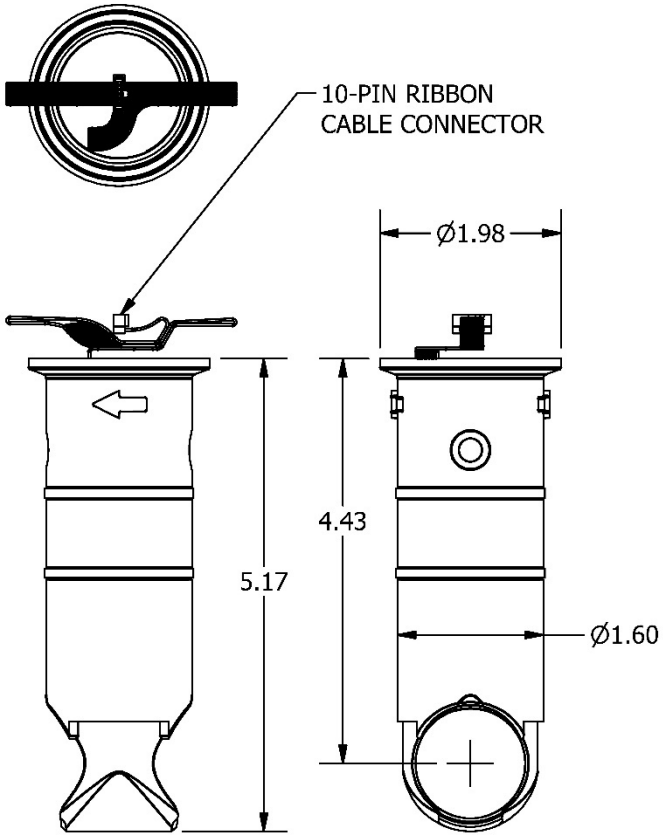CABLE CONNECTOR

Ø1.98

4.43

5.17

Ø1.60

Figure A1

SECTION A - Ultrasonic Insert

INSTALLATION

Below is a typical UM ultrasonic insert. Adjacent components are labeled for reference.

NOTE: Do not install Meter within 20 pipe diameters downstream of pressure regulation equipment. These devices cause any entrained air in the line to expand, and could cause your FLOMEC Ultrasonic Meter to become inaccurate
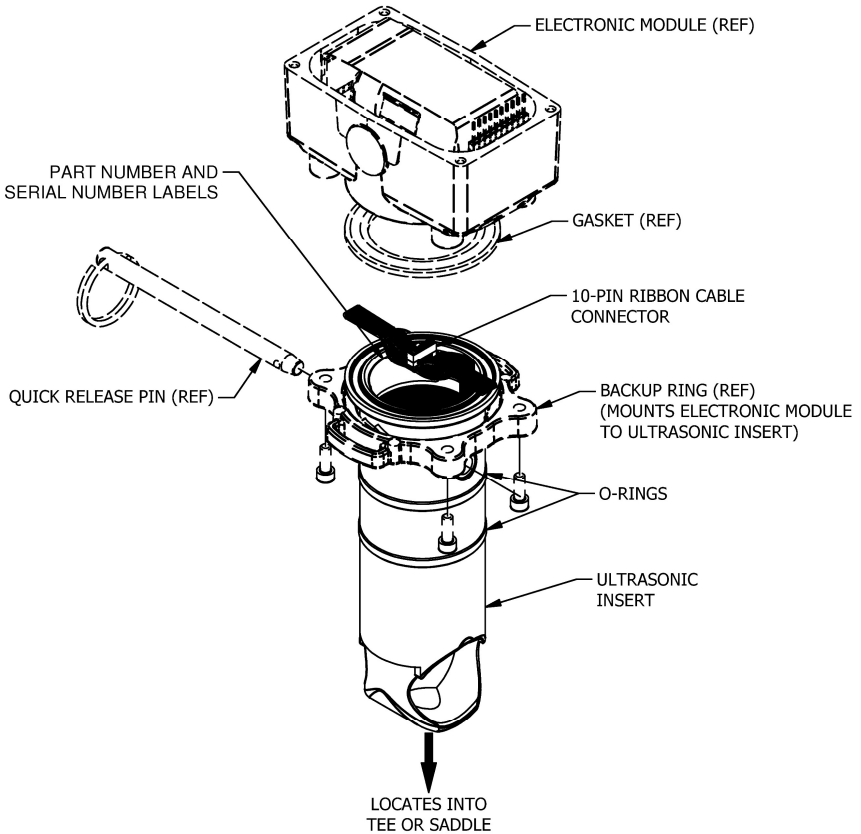

Figure A2

SECTION A - Ultrasonic Insert

OPERATION

The ultrasonic insert is prewired at the factory to the electronic module, so there are no user wiring connections, adjustments, or actions that need to be made to the ultrasonic insert.

TROUBLE SHOOTING

1. Entrained air is air bubbles suspended in the water flow. Entrained air creates errors in accuracy of ultrasonic technology meters. Recommend a maximum of 10% entrained air in the water flow.

2. Flow must go uphill through the insert, never downhill through the insert to avoid air bubbles or air pockets captured in the Tee or Saddle where the insert is installed.

3. The faces of the transducers need to be clean and free of oily substances for accurate operation. Do not touch transducers with fingers, oily rags, etc.

   DO NOT use wire brushes or abrasives to clean the faces of the transducers (see Figure A3).

4. Ensure the flow direction arrow is pointing in the direction of flow for correct functionality.

5. Ensure the quick release pin is inserted through the ultrasonic insert when installed in the Tee or Saddle, to maintain pressure and alignment of the ultrasonic insert.
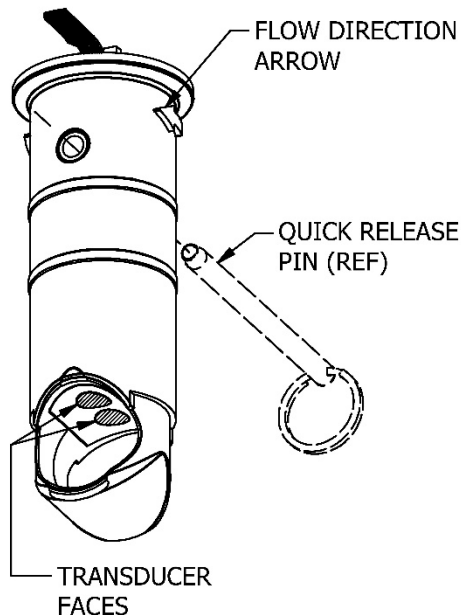

Figure A3

SECTION A - Ultrasonic Insert

REPAIR

The only user repairs that can be made to the ultrasonic insert is replacement of the O-ring seals, the quick release pin, and gasket . Grips have been designed on each side of the backup ring to assist with lifting the insert out of the Tee or Saddle (see Figure A2).

When removing the insert from the Tee or Saddle, lift straight up until it clears.

## REPAIR PARTS ILLUSTRATION – Ultrasonic Insert Only
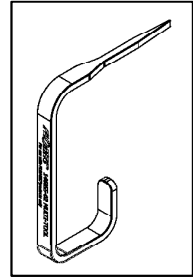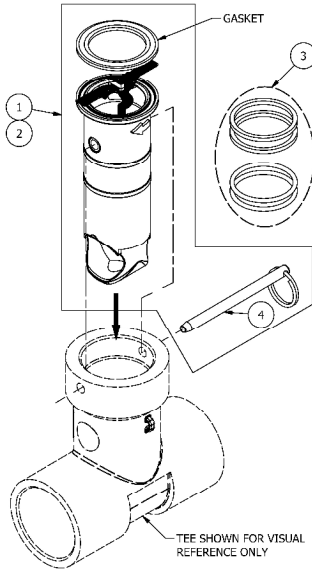
Multi-Tool

REPAIR PARTS LIST

Ref. No.	Description	Part Number
1	Ultrasonic Insert Kit-(Battery powered version) – Includes complete insert assembly, gasket, quick release pin.	146504-01
2	Ultrasonic Insert Kit-(External powered version) – Includes complete insert assembly, gasket, quick release pin.	146504-02
1	Ultrasonic Insert Kit-(**NSF** Battery powered version) – Includes complete insert assembly, gasket, quick release pin.	146504-06
2	Ultrasonic Insert Kit-(**NSF** External powered version) – Includes complete insert assembly, gasket, quick release pin.	146504-07
3	O-Ring Seal Kit - Includes (2) square profile O-rings &(2) round profile O-rings	146500-01
4	Hardware Kit - Includes (1) quick release pin	146500-02
-	Multi-Tool, Spare (For prying, leveraging, pin hole aligning)	146055-501

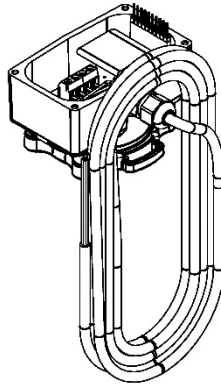**NOTE:** *Parts, service and warranty information is at the end of this manual.*

SECTION B – Electronic Modules

GENERAL
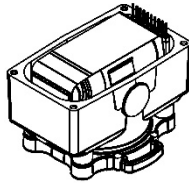
Options QUDSBACE & QUDSBAN1
• **Electronic Module**
• **Battery Power**

Options QUC1LPCE & QUC1LPN1
• **Electronic Module with**
  4-20mA & Pulse Output
• **External Power-4 Wire**

The electronic modules shown above are covered in this section. Electronic modules are either battery powered from an internal battery, or are externally powered by a customer provided power supply. One function of the electronic modules is to distribute the power to the insert and the Q9 computer display, and as a protective housing for other electronic options.

SPECIFICATIONS – ELECTRONIC MODULES

Mechanical		
	Options QUDSBACE & QUDSBAN1	**Options QUC1LPCE & QUC1LPN1**
Type	Electronic Module	
Housing Material	Aluminum Alloy 380	
Port Strain Relief	N/A	Hubble PG7
Strain Relief Grip Range	N/A	0.11"-0.26" (2.79 - 6.6mm)
Backup Ring Material	Aluminum Alloy 380	
Recommended Cable	N/A	Alpha Wire 1294C

SPECIFICATIONS - Options QUDSBACE & QUDSBAN1

Electronic Module
Housing w/Battery. (Battery Power)

This electronic module housing contains a 3.6VDC lithium battery mounted to PC board electronics. The electronic module is the distribution center for pulses generated by the insert, and also regulates the battery power supplied to all electronics.

Electrical

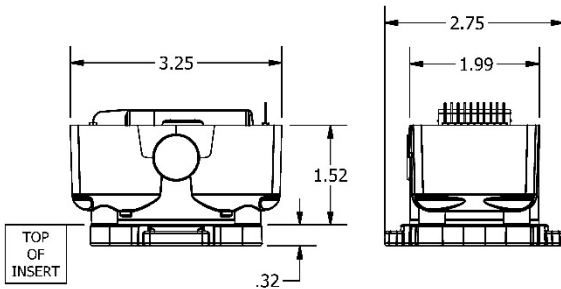| Power Requirement	3.6VDC lithium battery Mounted to PC board inside module housing

Dimensions

Figure B1

Illustration
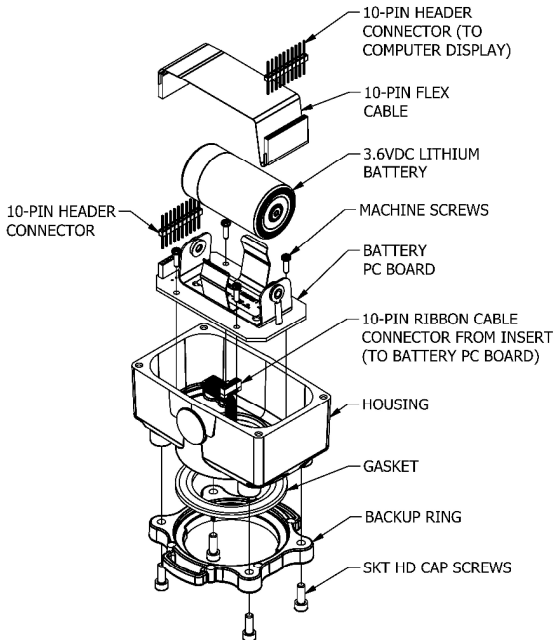
Figure B2

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SPECIFICATIONS - Options QUDSBACE & QUDSBAN1
Electronic Module

Wiring

TOP VIEW
PC Board

COMPUTER DISPLAY

10-PIN
FLEX CABLE

BOTTOM VIEW
PC Board

ULTRASONIC
INSERT

10-PIN
RIBBON CABLE
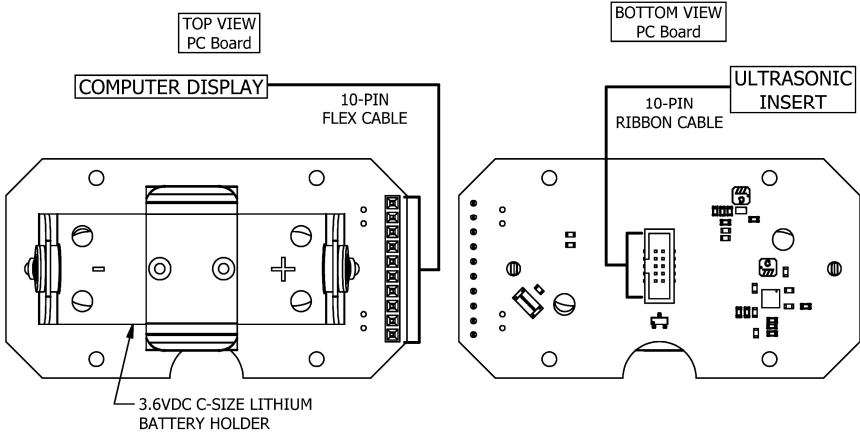
3.6VDC C-SIZE LITHIUM
BATTERY HOLDER

Figure B3

SPECIFICATIONS – Options QUC1LPCE & QUC1LPN1
Electronic Module

Electrical

Housing w/4-20mA & Pulse Output Electronics. (4-conductor cable (10 ft.). (External power)

This electronic module housing contains 4-20mA & pulse out electronics. Power is supplied to the module by a customer provided external power supply using the 4-conductor cable.

The electronic module is the distribution center for pulses generated by the insert, and also regulates the power supplied to all electronics.

This 4-20mA transmitter complies with ANSI_ISA-50.00.01-1975 (R2012) and is rated as an output isolated Type 2 Class U device.

SPECIFICATIONS – Options QUC1LPCE & QUC1LPN1 Electronic Module (cont.)

Electrical (cont)

| 4-20mA	
Power Requirement	DC power provided by customer equipment via 10 ft. cable supplied with unit. 8VDC min to 36VDC max (See Application Example for more details.)
Max Power Consumption	25mA 0.6 Watts @ 24VDC 0.9 Watts @ 36VDC
Range	200 ft.
Max Load Resistance	640Ω @25mA & 24VDC (See Application Example for more details.)

Pulse Output	
Power Requirement	Pull-up/pull-down resistor provided by customer equipment. 36VDC max
Range	200 ft.
Pulse Type	NPN or PNP

Application Example

The following chart, drawing, & equation are intended for special use cases and for additional information. The "Maximum Load Rating" chart is a pictorial representation of the voltage supply equation below

$$V_S \geq 8 + 0.025 * R$$
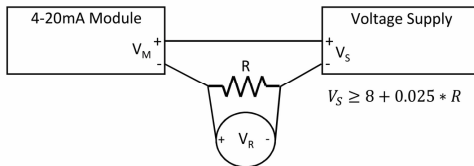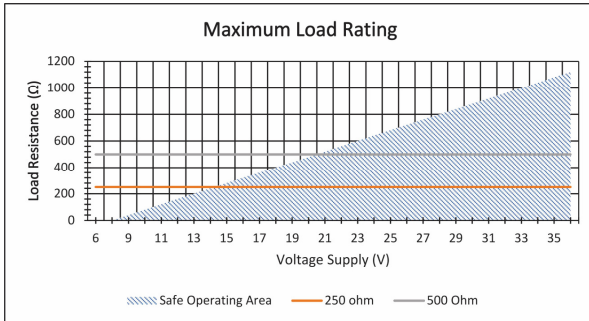
Examples:

1. To generate a 1-5V signal, use a 250Ω resistor and supply a minimum of 15V.
   Where 1V is equivalent to the flow rate set as "Zero" on the Q9 display. (4mA setpoint)
   Where 5V is equivalent to the flow rate set as "Span" on the Q9 display. (20mA setpoint)
   See Section C - Q9 Computer Display - Electronic Module Options.

2. To generate a 2-10V signal, use a 500Ω resistor and supply a minimum of 21V.
   Where 2V is equivalent to the flow rate set as "Zero" on the Q9 display. (4mA setpoint)
   Where 10V is equivalent to the flow rate set as "Span" on the Q9 display. (20mA setpoint)
   See Section C - Q9 Computer Display - Electronic Module Options.

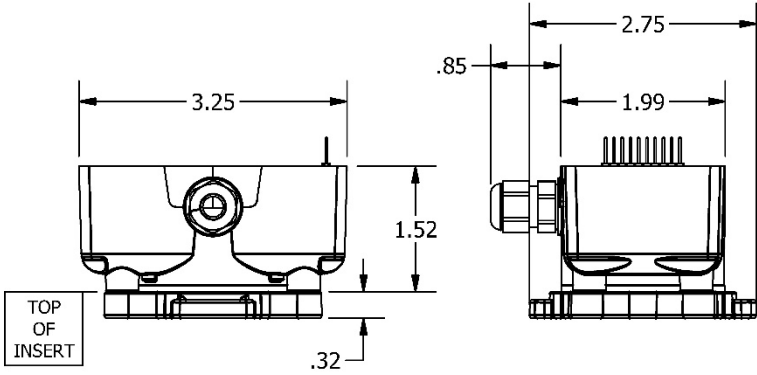## SPECIFICATIONS – Options QUC1LPCE & QUC1LPN1 Electronic Module (cont.)

Dimensions

2.75

.85

3.25

1.99

1.52

TOP
OF
INSERT

.32

Figure B4

Illustration

10-PIN HEADER
CONNECTOR (TO
COMPUTER DISPLAY)

10-PIN FLEX
CABLE

MACHINE SCREWS

MODULE
PC BOARD

10-PIN RIBBON CABLE
CONNECTOR FROM INSERT
(TO MODULE PC BOARD)

STRAIN RELIEF

HOUSING

GASKET

BACKUP RING

SKT HD CAP SCREWS

CABLE
4-CONDUCTOR

Figure B5

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FLOMEC®
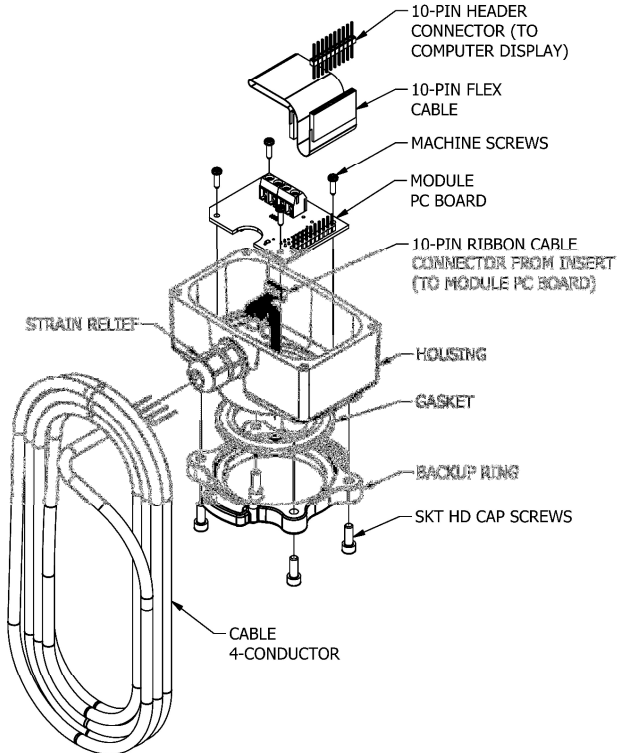
SECTION B – Electronic Modules

SPECIFICATIONS – Options QUC1LPCE & QUC1LPN1 Electronic Module (cont.)
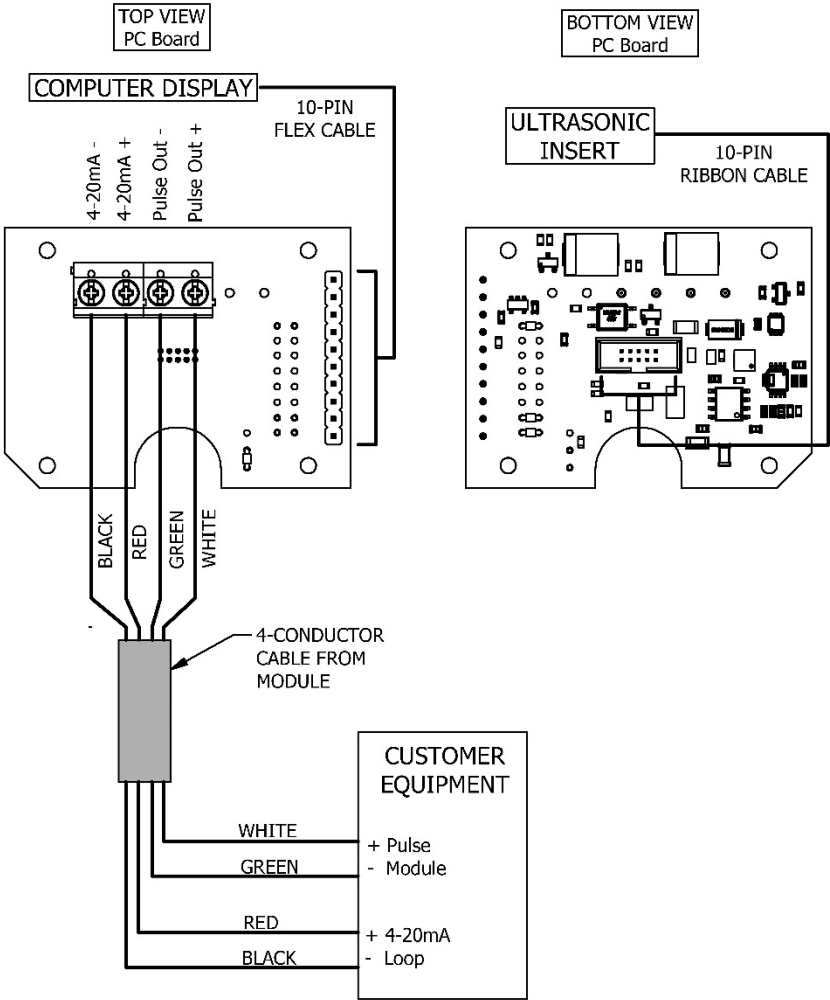
Wiring

Figure B6

NOTE: Alternate wiring diagrams on next page.

SPECIFICATIONS – Options QUC1LPCE & QUC1LPN1 Electronic Module (cont.)
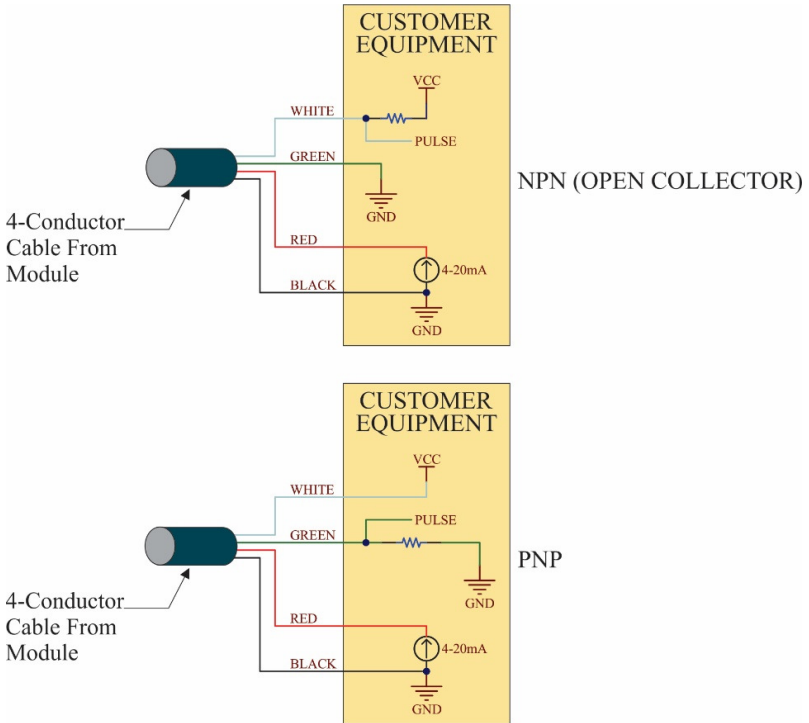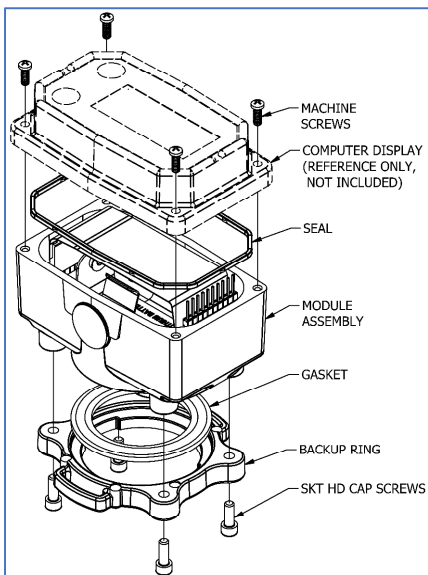
Wiring

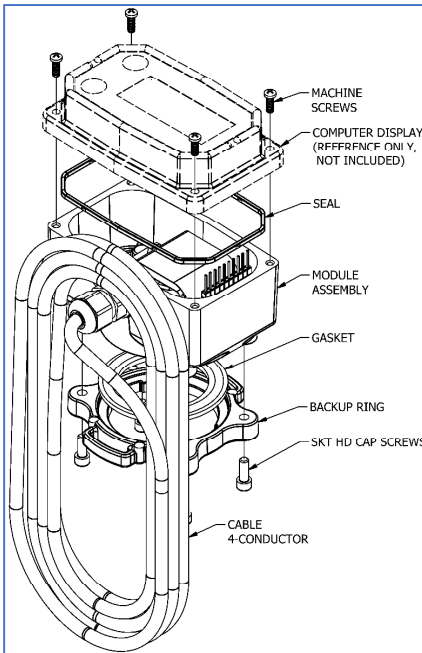### ALTERNATE WIRING DIAGRAMS

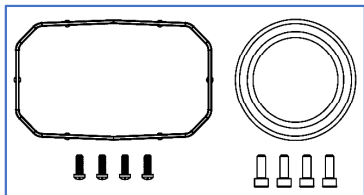

Figure B6-1

SECTION B – Electronic Modules
REPAIR PARTS ILLUSTRATION – Ultrasonic Modules Only

Ref. No. 1

Ref. No. 2

Ref. No. 3

REPAIR PARTS LIST

Ref. No.	Description	Part Number
1	Ultrasonic Module, Electronic Option QUDSBACE & QUDSBAN1 (Replacement) - Includes complete module assembly (battery not incl.), backup ring, gasket, (4) SHCS, (4) machine screws.	146504-04
2	Ultrasonic Module, Electronic Option QUC1LPCE & QUC1LPN1 (Replacement) - Includes complete module assembly w/cable, backup ring, gasket, (4) SHCS, (4) machine screws.	146504-05
3	Seal & Hardware Kit - Includes computer display seal, gasket, (4) SHCS, (4) machine screws.	146504-03

NOTE: *Parts, service and warranty information is at the end of this manual.*

GENERAL

The CMOS, microprocessor-based electronics have extremely low power requirements and data retention capabilities in both RAM and ROM. Information is clearly displayed on a large 6-digit LCD readout with three-point floating decimal for totals from .001 to 999,999 (x1), 9,999,990 (x10), or 99,999,900 (x100). All operations are easily accessed with the two buttons on the front panel.

The model number and serial number of your computer is displayed on the outside wall of the computer housing and also inside the computer housing on the PC board.

SPECIFICATIONS – COMPUTER DISPLAY

MECHANICAL	
Housing Material	Transparent Amorphous Nylon
ELECTRICAL	
Power Requirement	DC power provided by 10-pin flex cable from module
K-Factor	Minimum: 0.001 pulses/unit Maximum: >999,999 pulses/unit
Field Calibration Correction	Minimum: -99.999% Maximum: +99.999%
Readout Totals	Minimum Display: 0.001 Maximum Display: 999,999 (x100)
Field Calibration	Yes
STANDARD FEATURES INCLUDE	

- (2) Totalizing Registers
- (1) Factory Calibration Curve
- (1) Field Calibration Curve
- Rate of Flow Feature
- Flowrate Time Period in Day, Hour, minutes, or Seconds

SPECIFICATIONS (continued)

COMPUTER DISPLAY TERMINAL CONNECTIONS

10-PIN SOCKET CONNECTOR
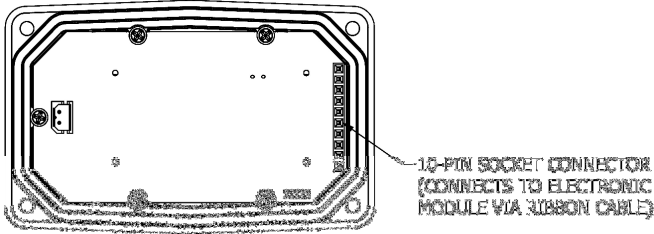(CONNECTS TO ELECTRONIC
MODULE VIA RIBBON CABLE)

Figure C1

DIMENSIONS

Length "A"	Height "B"	Height (Mounted) "C"	Width (Widest Point) "D"
3.40 in. (8.6 cm)	0.85 in. (2.1 cm)	0.72 in. (1.8 cm)	2.14 in. (5.4 cm)

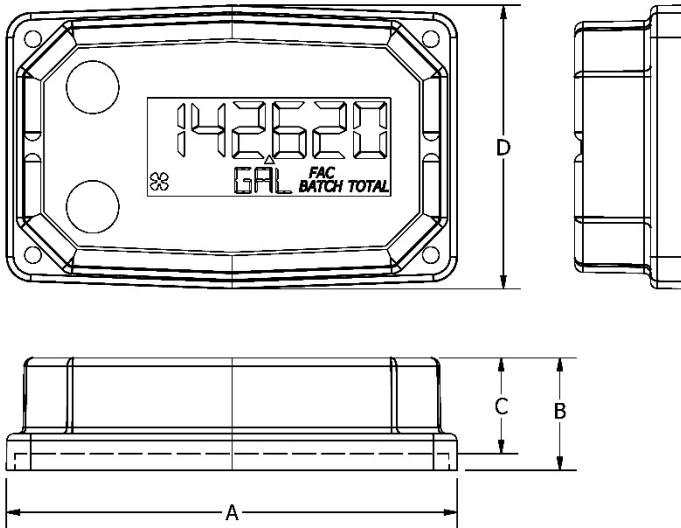**Figure C2**

SPECIFICATIONS (continued)

COMPUTER DISPLAY FEATURES

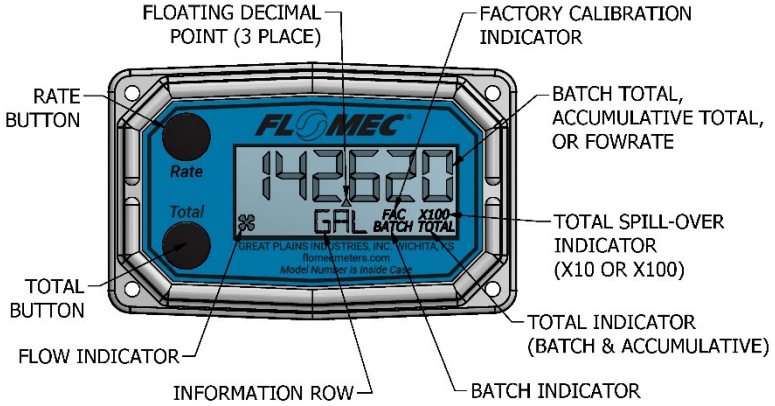**Familiarize yourself with the computer features before installation and use.**

Figure C3

INSTALLATION

INSTALLATION

There are (3) major electronic components comprising the FLOMEC® ultrasonic meter: The ultrasonic insert, the electronic module, and the computer display. All items are assembled and wired at the factory.

The computer display is installed on top of the electronics module. It receives its power through a 10-pin flex cable from the electronic module. The electronic module also supplies the computer display with flow data from the ultrasonic insert via the same 10-pin flex cable.

Since all displays are mounted to the electronic module, please review and thoroughly understand the role of the electronic module in your installation.

All FLOMEC ultrasonic inserts are designed to measure flow in only one direction. The direction is indicated by the arrow on the insert. If the computer display is not oriented as desired for your installation, it can be rotated **by rotating the electronic module.** (See Figure C4)
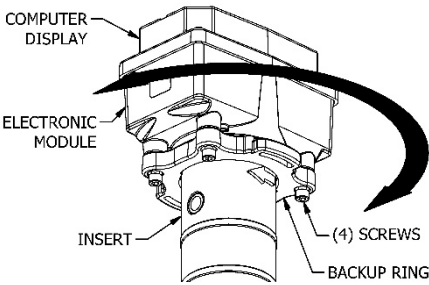

Figure C4

NOTE: To rotate the computer display, loosen the (4) screws retaining the backup ring against the clamping flange of the insert. (See Figures C4 & C4A)

Gently rotate electronic module with attached computer display as a unit, until the computer display is oriented as desired.

Tightening the (4) screws will tighten the backup ring against the clamping flange and the electronic module against the gasket. (See figure C4A)

NOTE: Before tightening the (4) screws, ensure the gasket is seated properly. (See Figure C4A)

The 10-pin ribbon cable connecting the insert to the electronic module will adjust to ensure its connector remains seated to the electronic module during rotation.
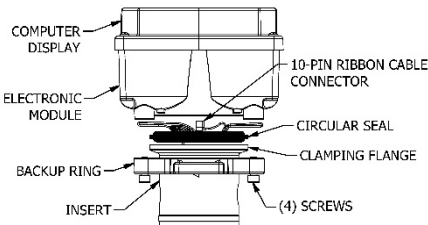

Figure C4A

OPERATION

COMPUTER DISPLAY

All operations are revealed on the LCD using the large 6-characters in the top row and smaller characters and symbols in the second row. These characters and symbols indicate information regarding totals, flow, calibration, units of measure and operational messages

Push button operation varies dependent upon the various modes of operation, i.e. Normal Operation mode, Field Calibration mode, and User Configuration mode. Their operation will be described in their respective sections.

ACTIVATE THE COMPUTER

When powered up, the computer is on continuously and always ready to perform. The computer is powered by the electronics module that it is attached to.
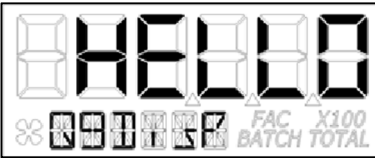

When first powered up, the initialization routine will start the LCD display blank, and then display "HELLO" on the top row and "Q9Disp" on the information row for one second. (See Figure C5)

Figure C5

The LCD will then display "HELLO" on the top row and "FW Vxx" on the information row for one second. The Vxx will be the version of the software installed on the display. Example: "FW V03" indicates firmware version 3 installed on the display. (See Figure C6)

Figure C6

General

The computer maintains two totals; Batch total and accumulative total. The batch total can be reset to measure flow during a single use. The accumulative total provides continuous measurement and cannot be reset.

The button usage map on the next page, and the user configuration process map later in the manual, is useful for understanding where the various menus are located within the software programming and the route to get to a specific menu.

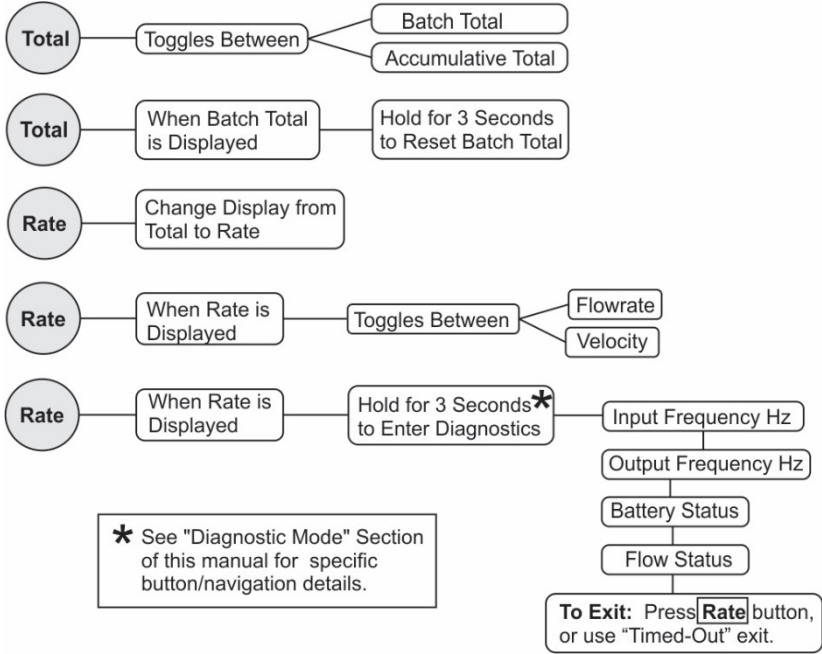Each of these maps are followed by user instructions explaining each menu.

OPERATION (continued)

NORMAL OPERATION MODE

Button Usage Map – Normal Operation Mode

BUTTON

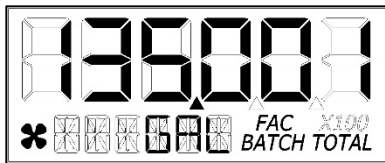**Button Operation (Normal Operation Mode)**

Total Button: Change between batch total and accumulative total.

When a total is displayed, pressing the Total button changes the top row of large display digits between batch total and accumulative total. The corresponding icons will be shown, i.e. **TOTAL** or **BATCH TOTAL**. (See Figures C7-1 and C7-2)

(Batch Total-Litres)

Figure C7-1

(Accumulative Total-Gallons)

Figure C7-2

OPERATION (continued)

NORMAL OPERATION MODE (continued)

Total Button: Batch total reset.

When a batch total (see Figure C8-1) is displayed, press and hold the Total button for 3 seconds; the software will display a three-second count down, and then reset the batch total to zero. (See Figures 8-2 thru 8-4)

Figure C8-1

NOTE: If the Total button is released prior to count down completion, the software returns to batch total screen. (See Figure C8-1)

Figure C8-2

NOTE: After count down completes, display will show 0.000 until user releases the Total button. (See Figure C8-3)

Figure C8-3

NOTE: After the Total button is released, the display will return to Batch Total screen and will increment the total if flow is detected. (See Figure C8-4)

Figure C8-4

NOTE: When the accumulative total is displayed in Normal Operation Mode, it cannot be reset using the Total button.

Accumulative total cannot be reset. If the user attempts to reset it using the Total button, the software will display a "Reset Denied" message on the LCD until the button is released. (See Figure C8-5).

Figure C8-5

OPERATION (continued)

NORMAL OPERATION MODE (continued)

Rate Button: Change display from total to rate.

When a total is displayed, pressing the **Rate** button changes the top row of large display digits from a total to a rate display. The information row will change to the proper units and the corresponding icons will also be shown, i.e. GAL/min, L/hr, etc. (See Figure C9)
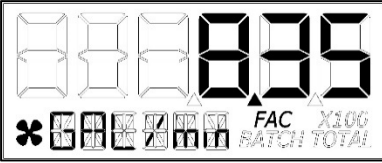

NOTE: To go back to a total when a rate is displayed, press the **Total** button and the display changes to the last shown total, either accumulative or batch. The information row will change to the proper unit and the corresponding icons will also be shown, i.e. TOTAL or BATCH TOTAL.
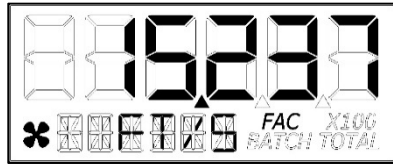
Figure C9

Rate Button: Change display from rate to velocity.

When a rate (see Figure C9) is displayed, pressing the **Rate** button changes the display between flow rate and velocity. The information row will change to the proper units and the corresponding icons will also be shown. (See Figures C10-1 and C10-2)
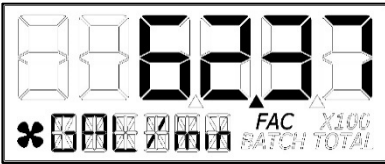
(Flowrate)
Figure C10-1

(Velocity)
Figure C10-2

Diagnostic Mode

Rate Button: Display diagnostic menu.

When a rate is being displayed, press and hold the **Rate** Button for 3 seconds; the software will display a three second diagnostic count down (see Figure C11-1), then display the first diagnostic screen.

Figure C11-1

NOTE: The diagnostic screens are reference information screens only. They cannot be edited.

Within the diagnostic menu: Pressing the **Total** button will advance to the next screen; pressing the **Rate** button at any time will exit the diagnostic menu. Upon exit, the display will return to the rate display.

There is a **90 second "no action" clock** running when in diagnostic mode. After 90 seconds with no button push to reset the clock, the computer will automatically exit and return to the rate display.

OPERATION (continued)

USER CONFIGURATION MODE

General Notes for User Configuration Mode Menus

1. The term "**focus**" as used in this manual indicates an active editable item. Focused items will constantly flash ON/OFF.

2. **Advance focus:** Press the Total button. Advancing focus will move focus to the next editable item to the right. If already on right most item, the focus will go back to the start position in a round robin fashion. If only (1) item is editable, advancing focus will move the focus to next menu.

3. **Increment the value of editable item:** Press the Rate button. If editing a number, the number will increment in a round robin fashion. If editing a text option, focus will advance thru a predefined list of text depending on the active menu and item. Advancing to the next item or menu with a unit in focus will select that unit.

4. **Advance focus to next menu:** Press and hold the Total button and then press the Rate button.

5. **Retrogress focus back to previous menu:** Press and hold the Rate button and then press the Total button.

6. **Exit any user configuration mode menu:** Press and hold the Total button first and immediately press and hold the Rate button, holding both buttons down for 3 seconds.

NOTE: Unless an exception is noted, there is a **90 second "no action" clock** running when in user configuration mode. After 90 seconds with no button push to reset the clock, the computer will automatically exit and return to normal operating mode. There is **no automatic "save"**, all entries made up to that point would be lost.

Entering User Configuration Mode

While in normal operation mode, the user can enter the display user configuration mode by pressing and holding the Total and Rate buttons simultaneously for 3 seconds from any screen; the software will display a three second count down sequence (see Figure C12-1), then reset the display to configuration mode. (See Figure C12-2)
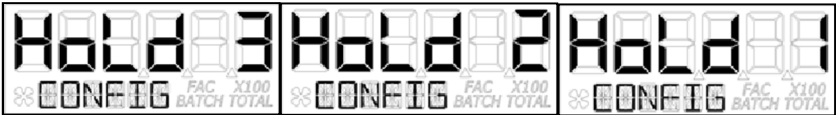

Figure C12-1

NOTE: After three seconds, the LCD will display "ConFig" on the top row and "Mode" on the bottom row until the user releases both of the buttons; the display will then immediately show the first menu (PIN) of the configuration process menus.

Figure C12-2

NOTE: If the user releases both or either button before the countdown completes, the display will return to normal operation mode.

OPERATION (continued)

USER CONFIGURATION MODE (continued)

General Notes for User Configuration Mode Menus

Once in configuration mode, the user can then proceed thru the configuration process menus as shown on the "configuration process map" below.

The software will retain your entries as you progress through the user configuration menus, however, there is **no automatic "save"** when exiting. Instead, you will be shown a "save" screen to enter "yes or no" to save your entries. (See Figure C13)
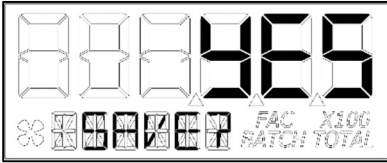

Figure C13

Use the Rate button to change between "yes" or "no". Use the Total button to advance to the next display. Advancing to the next display will perform the "save" selection you made and return the display to normal operation mode. The last shown screen in that mode will be displayed.

NOTE: The Total button must be pressed twice (to verify the end user is "certain" of selection).

#### Configuration Process Map – User Configuration Mode
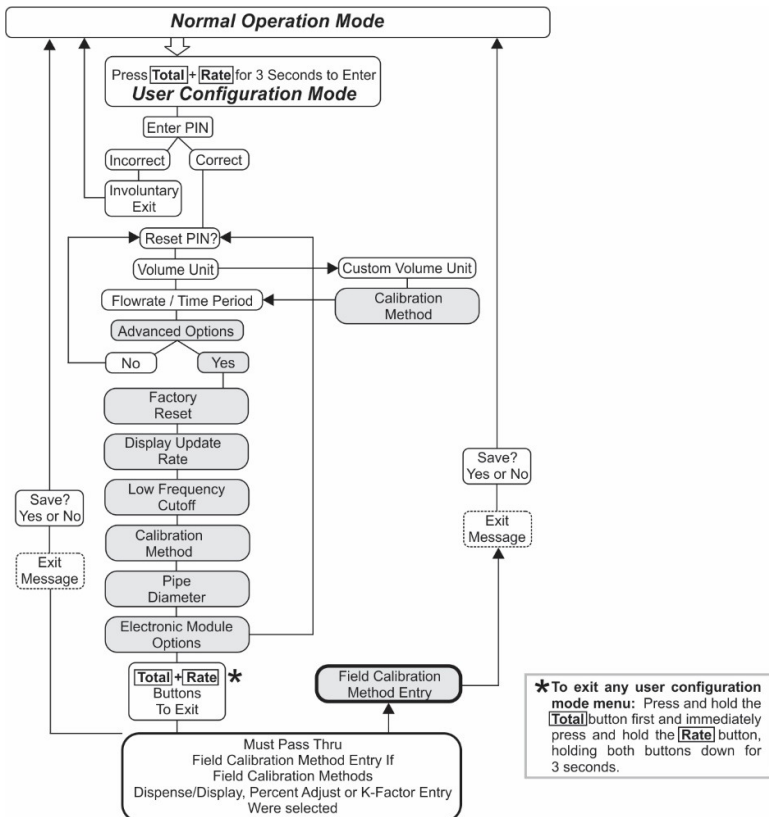
OPERATION (continued)

USER CONFIGURATION MODE (continued)

PIN Menu

The first menu in the configuration mode is for the user to enter a Personal Identification Number (PIN) to secure the configuration of the computer and continue with making changes.

The default user PIN is 0000. Using this default PIN will unlock the meter unless the PIN has been reset by the user.
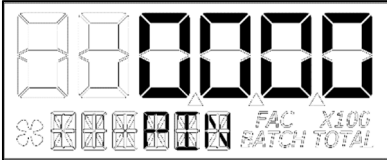
The initial user PIN entry screen will show 0000. The left most digit will be flashing ON/OFF to indicate focus if the user wants to change the PIN. (See Figure C14-1)

Figure C14-1
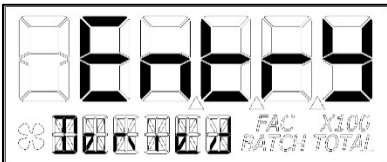
If the entered PIN was incorrect, the screen momentarily displays "Entry Denied" (See Figure C14-2) then returns automatically to normal operation display.

Figure C14-2

NOTE: Using the user default PIN, or the user specific PIN (if previously reset), and advancing focus to the next menu, the software will compare the entered PIN with the PIN stored in the computer. If a match is found, the next menu will be shown allowing the user to reset the PIN if desired.

Reset PIN Menu

If the PIN was entered correctly, the next menu will be displayed and allow reset of the PIN if desired. (See Figure C15-1)

Figure C15-1   **Figure C15-2**

The "N" will be in focus (flashing). To decline resetting the PIN, advance focus to next menu.
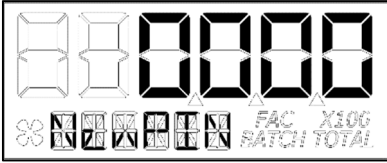
To reset the PIN, increment the "N" to "Y" (see figure C15-2) and advance focus to next screen. (See Figure C16)

OPERATION (continued)

USER CONFIGURATION MODE (continued)

Reset PIN Menu (continued)

Figure C16

If "Y" was selected, the previous PIN will be shown. The left most digit of PIN is in focus. Increment the value of each digit as desired as you advance focus through the digits.

After reset of the PIN, advance focus to next menu.

Volume Unit Menu

On this menu the user will be allowed to enter their volume unit of measure from a list of options. (See Figure C17).

Volume Unit	Abbreviation	Volume Unit	Abbreviation
Gallon	GAL	Litre	L
Imperial Gallon	IGAL	Millilitre	mL
Custom	Set by user	Cubic Metre	m3
Acre-Foot	Ac--Ft	Cubic Centimetre	cm3
Quart	Qt	Cubic Foot	FT3
Ounce	OZ	Barrel	bbl

Figure C17

Figure C18

On the volume unit menu (see Figure C18) the bottom row of characters will be in focus to indicate they are editable.

Advancing to the next menu with a unit in focus will select that unit of measure.

Changing between different volume units will not corrupt the Total's contents. For example, in GAL (gallon) mode, the computer totalizes 10.000 gallons, if the user changes to L (litre) mode, the display will read 37.854 litres (the same volume, different unit).

Custom Volume Unit Label Menu

Figure C19

The software also allows the user to create their own "Custom" volume unit (see Figure C19). Advancing to the next menu with the "Custom" volume unit in focus will shunt the user to a new menu (see below) that will allow the user to create a new label, or reuse one already stored in computer memory.

OPERATION (continued)

USER CONFIGURATION MODE (continued)

Custom Volume Unit Label Menu (continued)

If the computer is new or has no previous custom volume unit label stored in memory, the screen will appear with three dashes. (See Figure C20)
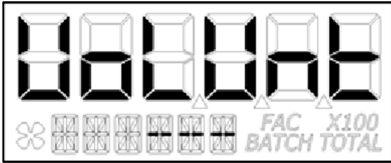

Figure C20

The left most of the dashes will be in focus and the user can select a letter from the list of upper case letters. An empty space will be shown on the menu screen as an underscore "_"during creation, but the underscore will not show when displaying the unit label in operation.
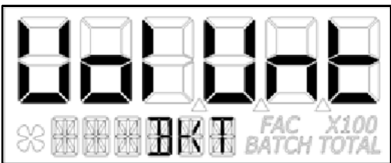

Figure C21

If the user has previously entered a custom volume unit label, it will be read from computer memory and the unit label will be displayed (see Figure C21) with the left most character in focus. The label can then be changed if desired.

NOTE: Once the custom volume unit label is created, the user will be required to enter a calibration method for the custom volume unit created. Therefore, upon advancing focus to next menu, the user will be shunted to the calibration method menu to select a method of calibrating their custom volume unit.

NOTE: The calibration method section that defines the methods of calibration can be found later in this manual.

After selecting the calibration method, advance focus to the next menu that will be flow rate/ time period menu.

NOTE: The computer will remember your calibration method selection. If you selected field calibration methods dispense display, percent adjust, or K-factor method, you will be given the opportunity to configure that method at the point you decide to exit the user configuration mode. At that point, the software will automatically shunt you to the field calibration method entry menu.

The field calibration method entry section that defines the field calibration procedure of the selected method can be found later in this manual.

NOTE: The factory calibration stored in the unit will never be lost.

OPERATION (continued)

USER CONFIGURATION MODE (continued)

Flow Rate / Time Period Menu

This menu is used to choose the period of time over which the flow rate is calculated. The options for this menu are: per day, hour, minute, or second. (See Figure C22-1)

Time Base	Abbreviation
Day	d
Hour	h
Minute	min
Second	s

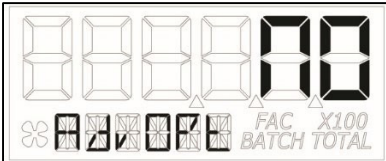**Figure C22-1**   **Figure C22-2**

When the screen is displayed, the software will show the current selected volume unit and time period (see Figure C22-2) and will display both in the bottom row with a back-slash between them. The time period unit will be in focus and can be edited by the user.

After advancing to the next configuration menu, the time period will be temporarily stored (see Figure C13 and its description for permanently saving) to computer memory.
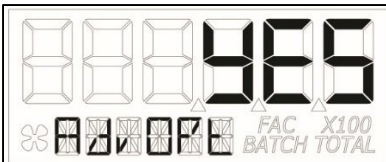
Advanced Options Menu

This menu is used to access the Advanced Options. The **Rate** button is used to change between NO and YES selections. The **Total** button is used to select either NO or YES for the Advanced Options menu.

Select NO to return to Normal User Configuration menu (See Figure C23-1).

Figure C23-1

Select YES to enter into the Advanced Options menu (See Figure C23-2).

Figure C23-2

OPERATION (continued)

USER CONFIGURATION MODE (Advanced Options)

Factory Reset Menu

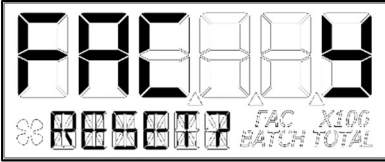This menu allows a validated user to reset all configuration settings to a factory default.

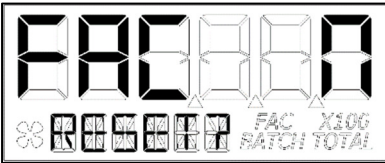Select Y to reset all configuration settings (See Figure C23-3).

Figure C23-3

Select N to leave settings as they are (See Figure C23-4).

Figure C23-4

Display Update Rate Menu

This menu allows a validated user to change the update rate of the display for flow rate, velocity, batch total, and accumulative total.
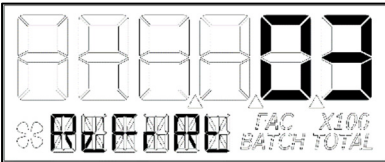

The range of this menu is from 1 to 60 seconds. Although the computer is maintaining constant calculations, the rate that the new information is displayed is controlled by this menu. (See Figure C24)

NOTE: "00" may be selected, but that value will represent "01" (1 second).

Figure C24

Low Frequency Cutoff Menu

This menu allows a validated user to enter a minimum allowed pulse input frequency to filter out any low frequency input pulses which can be generated when the meter is subject to mechanical vibrations. These vibrations could cause the totalizer to add "phantom" volume to the display totalization values. (See Figure C25)

The software will read the minimum input frequency from the computer and display it on the top row with the left most digit in focus. Increment range is from 0 Hz to 255 Hz.
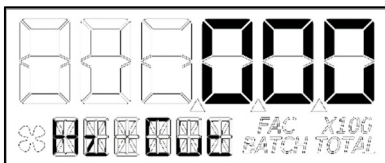

If 0 is set, the software will disable the input frequency filtering algorithm.

When advancing to the next menu, the software will temporarily store (see Figure C13 and its description for permanently saving) the selected value to the computer.

Figure C25

OPERATION (continued)

USER CONFIGURATION MODE (Advanced Options) (continued)

Calibration Method Selection Menu

This menu is used to define which calibration method will be used in normal operation. The calibration method the user previously selected (if any) will be shown on the display first. The bottom row of characters will be in focus indicating that the user can change the calibration method. Use the **Rate** button to move through the various calibration method options, and use the **Total** button to make "Calibration Method" selection/advance to next menu option.

Factory Calibration: All units are configured with a "factory" calibration. This factory calibration (FAC icon displayed below 6-digit display) is permanently programmed into the computer and is not user adjustable.

NOTE: The factory calibration stored in the unit will never be lost

Figure C26-1

Factory calibration is the typical use method (see Figure C26-1). Prior to shipping from the factory, the display will be configured and calibrated to the meter on which it is installed (or going to be installed).

When the user selects this option the FAC icon will be "ON" to indicate that the display is using its factory calibration table. This method does not support field calibration.
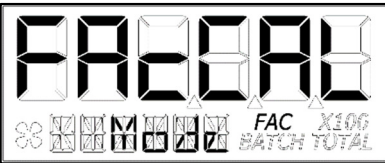
Field Calibration: If one of the following calibration methods is selected (dispense display, percent adjust, or K-factor entry), the user will be routed through the field calibration method entry menu, before saving configuration options, to make specific entries for the selection.

Figure C26-2

Dispense/Display is a field calibration method by which the user will dispense a known volume of fluid and the software will keep track of the pulse count during the dispense operation. The user will then enter the known volume into the display and the software will calculate a K-factor for the volume dispensed. (See Figure C26-2)

Figure C26-3

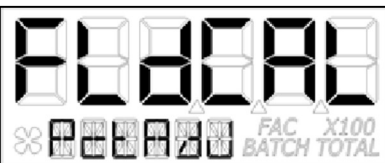**Percent Adjust** method is a field calibration method by which the user will enter a percentage amount to adjust K-factor values in the factory programmed K-factor table. Once the percentage is input by the user, the software will apply this percentage adjustment to all calculated and displayed values. (See Figure C26-3)

This method is good for users who simply want to adjust their meter by a percentage amount.

OPERATION (continued)

USER CONFIGURATION MODE (Advanced Options) (continued)

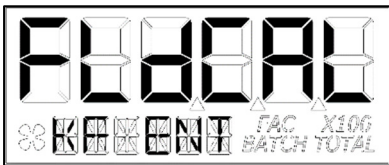#### Calibration Method Selection Menu (continued)

Figure C26-4

K-Factor Entry method (see Figure C26-4) is a field calibration method by which the user can input either a single point or multipoint calibration table.

From 1 to 5 unique K-factor and frequency values can be entered and will be stored in the custom K-factor table in the computer.

Inner Pipe Diameter Menu

This menu is to allow the user to enter a pipe inner diameter (ID) which will allow the display to calculate and display the fluid velocity thru the meter. The pipe dimension unit can be selected as either inches (IN) or millimetres (mm) as preferred by user (see Figure C27-1).
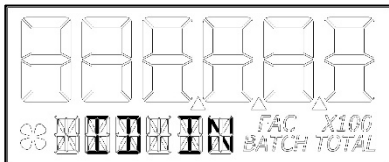

Figure C27-1

On this screen, the software will read the pipe ID measurement unit label from the computer and display it on the bottom row as either English (IN) or metric (mm) units. The unit label (IN or mm) will have the focus to indicate that it can be changed.

Pressing the Rate button will change between inches (IN) and millimetres (mm). Pressing the Total button will temporarily store (see Figure C13 and its description for permanently saving) the selection and allow the user to edit the pipe inner diameter value.
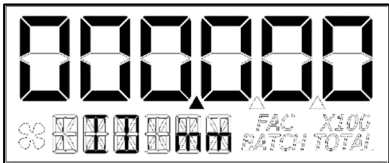

Figure C27-2

The software will also read the pipe ID numeric value including decimal point from the computer. The left most decimal point is in focus to indicate it can be changed (see Figure C27-2).

Pressing the Rate button moves the decimal point focus to the next decimal point to the right until reaching the end, then, turns off all three. An additional button press will cycle the focus back to the left most decimal point in a round robin fashion. When the decimal point is in the correct position, pressing the Total button will lock its location. The screen then advances focus to the left most numeric value digit to allow the user to edit the pipe ID value.

Pipe ID values can be from 0.001 to 999999. The inner pipe diameter entries will be used in the fluid velocity rate calculation during normal operation.

Pressing the Rate button will increment the digit in focus. Pressing the Total button will advance focus to the next digit. To advance focus to the next menu, press and hold the Total button and then press the Rate button (see Configuration Process Map).

NOTE: Upon entering the next menu, the software will temporarily store the pipe ID entries in the computer.

NOTE: Failure to save your entries on the "save" screen will cause the entries to be discarded.

OPERATION (continued)

USER CONFIGURATION MODE (Advanced Options) (continued)

ELECTRONIC MODULES

Output K-Factor Menu
(Requires Pulse Access or 4-20mA Electronic Module)

The scaled pulse output K-factor menu allows the user to enter a K-factor for the pulse output of the meter or advance focus to the next menu.

The software will read the pulse output K-factor from the computer and display it on the top row. The **Total** and **Rate** button presses for this menu function the same as the button presses for the Inner Pipe Diameter Menu shown on the previous page. (See Figure C28: The zero values shown represent an unscaled Pulse Output.)

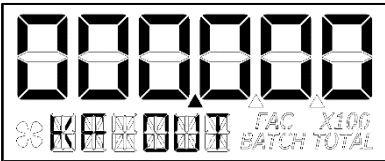**NOTE:** Pulse output values cannot exceed pulse input values. Pulse output can only be scaled down.

When advancing focus to the next menu the software will temporarily store (see Figure C13 and its description for permanently saving) the Scaled Pulse K- factor to the computer.

Figure C28

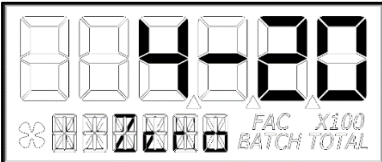**4-20mA Menu (Requires 4-20mA Electronic Module)**

Figure C29-1

"Zero" Setting: This figure will flash for 1 second before allowing the user to change the 4mA or "zero" setting (see Figure C29-1). This setting will already be configured for the minimum flowrate of the meter this Q9 was attached to, when shipped from the factory.

The **Total** and **Rate** button presses for this menu function the same as the button presses for the Inner Pipe Diameter Menu shown on the previous page.

Figure C29-2

NOTE: Figure C29-2 shows the display when changing "zero" or 4mA Flowrate Settings.
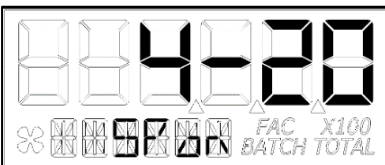
Figure C29-3

"Span" Setting: This figure will flash for 1 second before allowing the user to change the 20mA or "span" setting (see Figure C29-3). This setting will already be configured for the maximum flowrate of the meter this Q9 was attached to when shipped from the factory.

The **Total** and **Rate** button presses for this menu function the same as the button presses for the Inner Pipe Diameter Menu shown on the previous page.
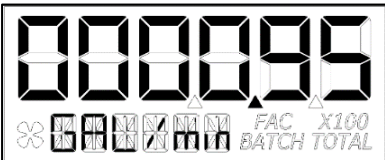
OPERATION (continued)

USER CONFIGURATION MODE (Advanced Options) (continued)

ELECTRONIC MODULES (continued)

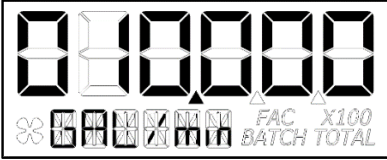**4-20mA Menu (Requires 4-20mA Electronic Module) (continued)**

Figure C29-4

NOTE: Figure C29-4 shows the display when changing "span" or 20mA Flowrate Settings.

USER CONFIGURATION MODE (Field Calibration Mode)

Field Calibration Method

General

The field calibration method may be set by the user, and can be changed or modified at any time using a field calibration method described in this section. Totals or flowrate derived from the field calibration are being invoked when the (FAC) icon is no longer visible below the 6-digit display.

Factory calibration settings are programmed into each computer during manufacturing. All UM Ultrasonic Inserts are factory calibrated using water at 70° F (21° C).

Settings are correct for use with water. Readings using the factory calibration (FAC) may not be accurate in some situations, for example, under extreme temperature conditions, non-standard plumbing configurations or with water based diluted chemical mixture fluids.

For improved accuracy, the computer allows for field calibration, that is, user entry of custom calibration parameters. A "single point" field calibration curve may yield acceptable accuracy when used in a non-standard application; however, the computer is capable of programming a "five point" field calibration curve.

NOTE: If the calibration method is changed when in user configuration mode, i.e., not using the default factory calibration (FAC), the programming will allow the user to adjust the user programmable calibration table for the calibration method selected. This is done by shunting the user to the field calibration method entry menu specific to that calibration method upon exit from the user configuration mode.

Verify Accuracy before Beginning Field Calibration

For the most accurate results, dispense at a flowrate which best simulates your actual operating conditions. Avoid "dribbling" more fluid or repeatedly starting and stopping the flow. This can result in less accurate calibrations. Make sure you meet the meter's minimum flowrate requirements.

The use of a uniformly dependable, accurate calibration container is recommended for the most accurate results. For best results, the meter should be installed and purged of air before field calibration.

Due to high flowrates on meters 2 inch and larger, it is strongly recommended that field calibration be completed with a combination of volume and weight determined with fine resolution scales.

OPERATION (continued)

USER CONFIGURATION MODE (Field Calibration Mode) (continued)

Field Calibration Method Entry

At the beginning of the calibration method entry menu, the software will allow the user to start the calibration process or to exit back to normal operation. (See Figures C30-1 & C30-2)

The bottom row of characters will be in focus to indicate that the user can select between either "Start" or "Exit" by advancing focus. The Rate button changes between START & EXIT while the Total button makes the actual selection.

NOTE: The Total button must be pressed twice (to verify the end user is "certain" of selection).

If "Start" is in focus when advancing to the next menu, the software will automatically advance to the calibration menu for the calibration method the user previously selected.
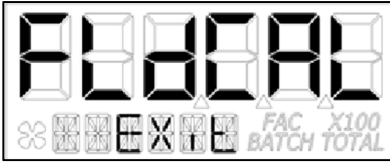
Figure C30-1

If "Exit" is in focus when advancing to the next menu, the software will display a "save" screen (see Figure C13) to enter "yes or no" to save your entries.

Figure C30-2

Dispense Display Method

Dispense/Display is a field calibration method by which the user will dispense a known volume of fluid and the software will keep track of the pulse count during the dispense operation. The user will then enter the known volume into the display and the software will calculate a K-factor for the volume dispensed. (See Figure C31-1)
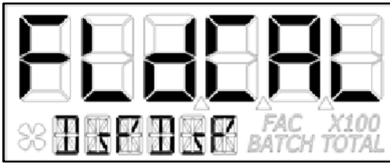
The software will allow the user to dispense a known volume in order to create a custom K-factor. This will not over write the existing factory calibration table.
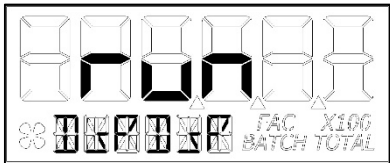
Figure C31-1

The first screen in this calibration method will show "run" indicating that the computer is waiting for flow to start. (See Figure C31-2)

NOTE: Pressing any single button while on this screen will not have any effect. Pressing and holding the Total button first and immediately pressing and holding the Rate button, holding both buttons down for 3 seconds, will allow the user to exit the calibration mode.

Figure C31-2

OPERATION (continued)

USER CONFIGURATION MODE (Field Calibration Mode) (continued)

Dispense Display Method (continued)

Figure C31-3

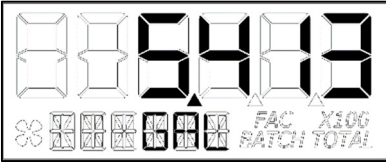Begin dispensing into a container of known accurate volume. As soon as pulses are detected by the software, the screen will change to display the volume being dispensed on the top row and the volume unit on the bottom row. (See Figure C31-3)

NOTE: The user is permitted approximately 10 minutes to dispense fluid into the container. Dispensing fluid longer than 10 minutes will prompt a configuration mode exit, and any configuration mode edits/changes the user made will **NOT BE SAVED**.

When the user is finished with the run, press and hold the Total button until the left most digit begins to flash indicating it is in focus, then release the Total button.

Pressing the Rate button will increment the digit in focus. Pressing the Total button will advance focus to the next digit.

To advance focus to the next menu, press and hold the Total button and then press the Rate button.

NOTE: Advancing focus to the next menu will lock in the entered volume.

The software will then calculate the K-factor for the volume entered based on the pulse count for the run and the volume entered. The average frequency and the K-factor will be entered into the custom user K-factor table for "run".
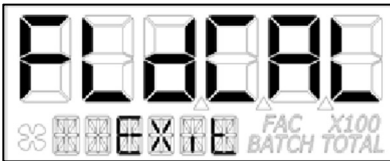
Exit Dispense Display Method

Figure C32

NOTE: "FldCAL" will then be displayed on the top row and "Exit" on the bottom row (see Figure C32). The software will temporarily store the sorted table of frequencies and K-factors, then display the "Save" screen. (See Figure C13)

NOTE: Failure to save your entries on the "save" screen will cause the entries to be discarded.

OPERATION (continued)

USER CONFIGURATION MODE (Field Calibration Mode) (continued)

Percent Adjust Method (Correction Factor)

Percent adjust method is a field calibration method by which the user will enter a percentage amount to adjust K-factor values in the factory programmed K-factor table. Once the percentage is input by the user, the software will apply this percentage adjustment to all calculated and displayed values. (See Figure C33-1)
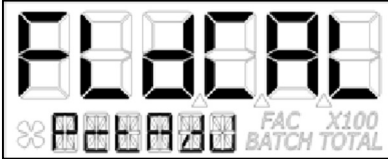
This will not over write the existing factory calibration table, instead, it applies a calculation to the existing values for use by the computer.

This method is good for users who simply want to adjust their meter by a percentage amount.

Figure C33-1
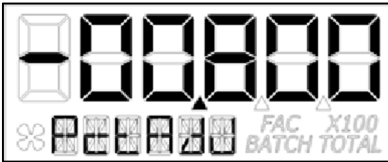
The top row left most character will be in focus to indicate the user can change the value. The left most character is the sign of the value. The decimal point is not adjustable. The range for the values are: -99.999% to +99.999%. The software will display the user applied percent adjustment on the top row. (See Figure C33-2)

Figure C33-2

Press the **Rate** button to change between (dash "-") and (underscore "_"). A dash indicates a negative value. An underscore indicates a positive value. Press the **Total** button to select/lock dash "-" (*negative value*) or underscore "_" (*positive value*). The focus will then advance to the left most digit.

NOTE: A selected positive value will show no sign while a negative value will show a solid dash.

Once the left most digit is in focus, pressing the **Rate** button will increment the digit in focus. Pressing the **Total** button will advance the focus to the next digit.

When all digits are entered correctly, exit by pressing and holding the **Total** button and then pressing the **Rate** button.

NOTE: "FldCAL" will then be displayed on the top row and "Exit" on the bottom row (see Figure C32). The software will temporarily store the adjusted percentage correction, then display the "Save" screen. (See Figure C13)

**NOTE:** Failure to save your entries on the "save" screen will cause the entries to be discarded.

OPERATION (continued)

USER CONFIGURATION MODE (Field Calibration Mode) (continued)

K-Factor Entry Method - Frequency

K-factor entry method (see Figure C34-1) is a field calibration method by which the user can input either a single point or multipoint calibration table.
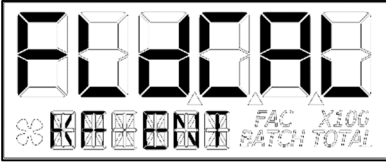
Figure C34-1

From 1 to 5 unique K-factor and frequency values can be entered and will be stored in the custom K-factor table in the computer. This will not over write the existing factory calibration table.

Figure C34-2

The software will read the existing K-factor table from the computer and will display the first frequency on the top row (see Figure C34-2) with the left most character in focus to indicate the user can change the value. Minimum frequency value allowed is 0.25 Hz and the maximum allowable frequency value is 3000.00 Hz. The decimal point for the frequency value is fixed.

Pressing the **Rate** button will increment the digit in focus. Pressing the **Total** button will advance the focus to the next digit.

Once the correct frequency is entered, pressing and holding the **Total** button, then pressing the **Rate** Button will advance to the next screen. (See Figure C34-3)

NOTE: Entering all zeros (see Figure C34-2) will store the value as a minimum frequency (0.25 Hz).

OPERATION (continued)

K-Factor Entry Method – K-Factor Value

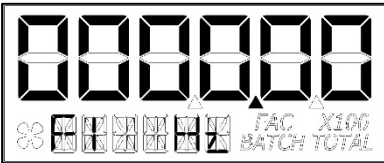The software will read the existing K-factor table from the computer and will display the first K-factor on the top row. The bottom row displays the K-factor table entry position (1 thru 5) for the volume unit shown. (See Figure C34-3.)

Pressing the **Rate** button moves the decimal point focus to the next decimal point to the right until reaching the end, then, turns off all three. An additional button press will cycle the focus back to the left most decimal point in a round robin fashion. When the decimal point is in the correct position, pressing the **Total** button will lock its location. The screen then advances focus to the left most numeric value digit to allow the user to edit the K-Factor value.

Pressing the **Rate** button will increment the digit in focus. Pressing the **Total** button will move the focus to the next digit. Pressing and holding the **Total** button, then pressing the **Rate** button will advance to the next screen (see Figures C34-4 and C34-5).

NOTE: User input K-factor entry values will disable the (FAC) icon. The K-factor range is 0.001 to 999999.
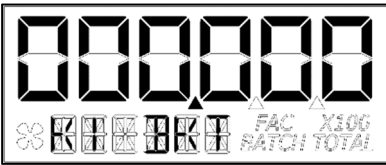
Figure C34-3

After completing the first table entry of frequency and K-factor, the display will ask the user if there are additional points to enter. The **Rate** button changes between Y (Yes) & N (No) while the **Total** button makes the actual selection (See Figures C34-4 & C34-5)
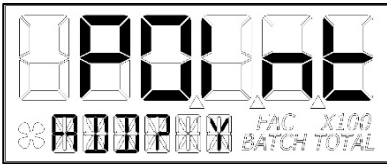
Figure C34-4
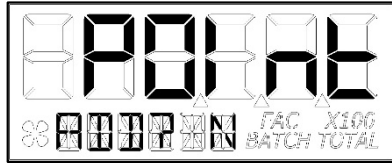
Figure C34-5

If the user chooses YES, the previous screens will repeat for Frequencies 2 – 5 and K-factors 2 – 5.

NOTE: If the table stops short of 5 points, then only the points entered will be used to define the calibration curve.

If the user chooses NO (or after the fifth table entry of frequency and K-factor) the software will show the FLdCAL Exit screen (see Figure C32) for one second, and will then exit field calibration mode. The software will temporarily store the K-factor table values in the computer, and then display the "Save" screen (see Figure C13).

NOTE: Failure to save your entries on the "save" screen will cause the entries to be discarded.

TROUBLESHOOTING

Symptom	Probable Cause	Corrective Action
A. INACCURATE TOTALS / FLOWRATE.	1. Field Calibration not performed properly.	Field calibrate again or select Factory Calibration.
	2. Factory Calibration not suitable for liquid being measured.	Perform a Field Calibration according to Field Calibration Section.
	3. Meter operated below minimum flowrate.	Increase flowrate.
	4. Entrained air suspended in water flow.	Maximum 10% entrained air allowable.
	5. Faces of transducers dirty.	Remove insert. Gently clean faces of transducers. Do not touch faces with fingers, oily rags, etc.
	6. Meter installed too close to fittings.	Install correctly.
	7. Meter installed to close to motors or electrically "noisy" environment.	Install correctly.
B. BUTTON NOT WORKING.	1. Button plunger not fully pressed.	Ensure finger covers entire button.
	2. Button only operates upon release.	Release button to see display change.
	3. Assembly issue.	Contact the factory.
	4. Configuration issue.	Contact the factory.
C. "BA0.000" IS DISPLAYED.	1. Configuration issue.	a. Reset Batch and Accumulative Totals.
		b. Performing a Field Calibration may allow desired performance.
		c. Contact the factory.
D. WEIRD CHARACTERS ON SCREEN.	1. Assembly issue.	Contact the factory.
	2. Bad LCD.	Contact the factory.
E. DISPLAY IS FADED OR BLANK.	1. If battery powered, battery weak, dead, or not connected.	Remove display. Check and replace battery in electronic module.
	2. If external powered, loose or disconnected cables.	Remove display. Check flex cable connections.
	3. Ambient temperature is too cold.	Place bare hand or warmer on display for temporary readability.
	4. Computer defective.	Contact the factory.

TROUBLESHOOTING (continued)

| Symptom	Probable Cause	Corrective Action
F. ENTIRE SCREEN "BLUISH".	1. Ambient / fluid temperature is reaching upper heat limits.	If readable, display is fine. If a nuisance, consider Remote Display kit options.
G. NO FLOW ON SCREEN WHEN FLUID IS MOVING IN PIPE.	1. Field Calibration not performed correctly.	Field calibrate again or select Factory Calibration.
	2. Faces of transducers dirty.	Remove insert. Gently clean faces of transducers. Do not touch faces with fingers, oily rags, etc.
	3. Computer defective.	Contact the factory.
	4. Low flow cutoff set too high.	Reduce value of "Hz Cut" within configuration menu. See USER CONFIGURATION MODE (Advanced Options)
H. EXCESSIVE FLOW ON SCREEN WHEN FLUID IS **NOT** MOVING IN PIPE.	1. Electro-Magnetic Interference (EMI) – Too close to motor or other electrically "noisy" equipment.	Move installation point of meter away from EMI sources.
I. PROBLEMS GETTING INTO FIELD CALIBRATION MODE.	1. Wrong button sequence.	Proceed with calibration using Field Calibration Section instructions that are included in this manual.
J. PROBLEMS NAVIGATING "DIAGNOSTIC MODE", "CONFIGURATION MODE", OR "NORMAL OPERATION MODE".	1. See this owner's manual Table of Contents for page number information for each specific "Mode" Section.	See specific "Mode" Section that is included in this owner's manual.
K. ELECTRONIC MODULE OUTPUT INACCURATE.	1. See specific Electronic Module section of this manual.	See specific Electronic Module section of this manual.

SECTION C – Q9 Computer Display

MAINTENANCE

Battery

UM Computer electronics are powered by (2) methods: external power supplied by a user provided power supply, or by a 3.6VDC lithium battery mounted in the electronic module.

Removing the battery before storing the meter will extend battery life since the computer is always on (either standby or active) when the battery is installed.

If the meter's readout should become dim, blank or the low battery message appears (see below), the battery should be replaced.
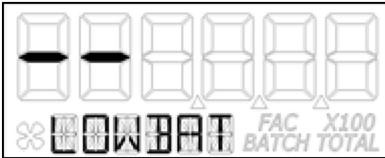
NOTE: If the battery life is sufficiently low, "LOWBAT" will be displayed in the message area on the bottom row of characters. This low battery message will be displayed automatically without running a diagnostic battery check.

Battery Replacement Information

When the UM computer display is a component of a UM meter that has an electronic module that is specifically battery powered, it is shipped with a C size lithium battery (3.6 volts) installed in the electronic module.

Battery replacements are readily available as an off-the-shelf item. To maintain the FLOMEC® warranty, the batteries listed below are approved for use.

> **Lithium (C size, 3.6-volts)**
> Tadiran TL-5920/S
> Tadiran TL-4920/S
> Battery Guy ER26500 NIYA
> Micropower Battery Co. AriCell SCL-14

Do not use an alkaline battery.
Do not use a rechargeable alkaline or lithium-ion battery.

When the battery is disconnected or fails, the computer memory will retain the batch total, accumulative total, factory calibration curve, and field calibration curve indefinitely.
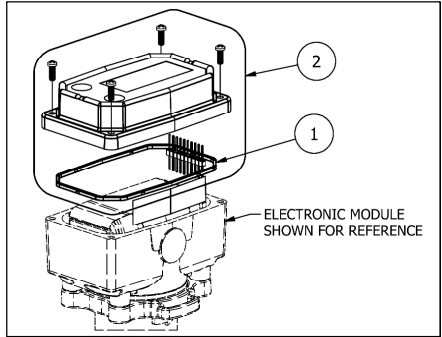
It is strongly recommended that battery checks and terminal cleaning be a part of a routine maintenance schedule. Battery terminals should be cleaned annually. The battery can be replaced without removing the meter from the piping system.

Replace Battery

1. Remove the (4) corner screws attaching the computer display to the electronic module and lift the computer display from the module without dislodging the flex cable connections.

2. Remove the battery.

3. Check the battery terminals and remove any corrosion.

4. Install the new battery and make sure the positive posts are positioned correctly. When the battery is installed correctly, the computer powers on automatically and the display will show information.

5. Make sure the seal is fully seated before placing the computer display back on the electronic module. Tighten the (4) screws previously removed.

6. Do not clean exterior of computer assembly with Isopropyl Alcohol.

SECTION C – Q9 Computer Display

REPAIR PARTS ILLUSTRATION – Q9 Computer Display Only

REPAIR PARTS LIST

Item No.	Part No.	Description	No. Reqd.
1	901002-52	Seal (Display)	1
2	Call Factory	Q9 Computer Display Replacement Kit – Includes Q9 computer display, seal, 10-pin header connector, (4) screws. **Note:** *Call factory to order. Each Q9 Computer Display is custom configured to match your Tee size and process line type (Tube, Pipe, P.I.P.)*	1

SERVICE

For warranty consideration, parts, or other service information, please contact your local distributor. If you need further assistance, contact the GPI Customer Service Department in Wichita, Kansas, during normal business hours.

A toll free number is provided for your convenience.

1-888-996-3837

To obtain prompt, efficient service, always be prepared with the following information:

• The model number and serial number of your computer.
(Printed on label located on the outside wall of the computer housing and also inside the computer housing on the PC board.)

• Part descriptions and numbers.

For warranty work, always be prepared with your original sales slip or other evidence of purchase date.

IMPORTANT: Please contact GPI before returning any parts. It may be possible to diagnose the trouble and identify needed parts in a telephone call.

FLOMEC®

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NOTES

FLOMEC® TWO-YEAR LIMITED WARRANTY

Great Plains Industries, Inc. 5252 E. 36th Street North, Wichita, KS USA 67220-3205, hereby provides a limited warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This product includes a 2-year warranty. Manufacturer's sole obligation under the foregoing warranties will be limited to either, at Manufacturer's option, replacing or repairing defective Goods (subject to limitations hereinafter provided) or refunding the purchase price for such Goods theretofore paid by the Buyer, and Buyer's exclusive remedy for breach of any such warranties will be enforcement of such obligations of Manufacturer. The warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of manufacture or on the date of purchase with an original sales receipt. This warranty shall not apply if:

A. the product has been altered or modified outside the warrantor's duly appointed representative;

B. the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, or for technical assistance or repair, contact your FLOMEC distributor or contact FLOMEC at one of the locations below.

In North or South America contact	Outside North or South America contact
Great Plains Industries, Inc. 5252 East 36th St. North Wichita, KS 67220-3205 USA **888-996-3837** **www.flomecmeters.com** **(North America)**	**GPI Australia** **(Trimec Industries Pty. Ltd.)** 12/7-11 Parraweena Road Caringbah NSW 2229 Australia **+61 02 9540 4433** **www.flomec.com.au**

The company will step you through a product troubleshooting process to determine appropriate corrective actions.

GREAT PLAINS INDUSTRIES, INC., EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE OF THE PRODUCT WARRANTED HEREUNDER.

The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.

This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.

NOTE: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT – Part 702 (governs the resale availability of the warranty terms).