GUIDANT

Electronic Flow Computer

Smith Meter®
microFlow.net Liquid

Operations Manual

Issue/Rev. 0.2 (5/09)

Bulletin MN06157

microFlow.net

Caution

The default or operating values used in this manual and in the program of the microFlow.net are for factory testing only and should not be construed as default or operating values for your metering system. Each metering system is unique and each program parameter must be reviewed and programmed for that specific metering system application.

Disclaimer

Guidant hereby disclaims any and all responsibility for damages, including but not limited to consequential damages, arising out of or related to the inputting of incorrect or improper program or default values entered in connection with the microFlow.net.

Proprietary Notice

Guidant will not be held responsible for loss of liquid or for damage of any kind or from any cause to the person or property of others, or for loss or profit, or loss of use, or any other special, incidental, or consequential damages caused by the use or misapplication of the contents stated herein.

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Product Description

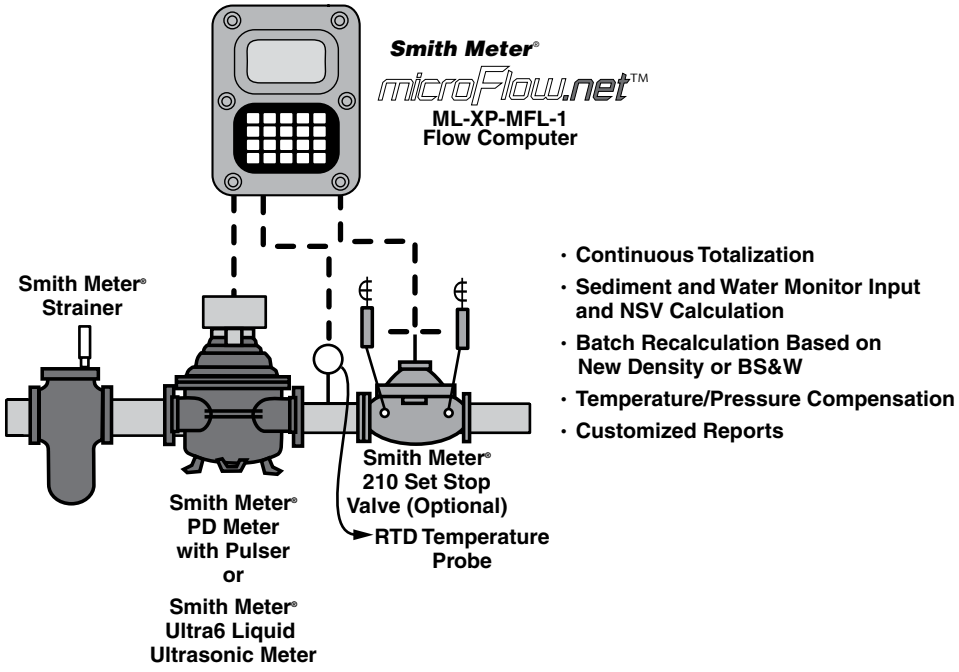
The Smith Meter® microFlow.net is a micro-processor based single meter, single product electronic flow computer instrument that monitors continuous flow applications and supports up to four (4) recipes, additive injection, sampler control, and batching. The unit can operate either as a stand-alone instrument or part of a SCADA system.

Optimum measurement accuracy is attained through continuous linearization of the meter factor with changes in flow rates. The microFlow.net is also capable of maintaining back pressure on the measurement system using automatic flow optimization. Volumetric correction is calculated directly from published API equations providing precise volumetric measurement results. Precise temperature, pressure compensation (using programmed maintenance pressure), and density correction are options that are available in the instrument.

The dynamic real-time display of the current actual operating conditions of the system provides the operator with valuable system information while the system is operating.

The microFlow.net provides several loading system control functions: Additive injection, pump control, alarm control, valve control, back-pressure control, and a variety of totalizers and batching information. Other significant features are as follows:

- Ethernet Connectivity
- Three Multi-Drop Serial Communications Ports
- Event Logging / Audit Trail
- User Configurable I/O
- Three Security Levels
- Optional Battery Backed Display per OIML
- Programmable Language/Messages
- API Tables from LPG to Crude Oil
- Sampler Control
- Batch Recalculation
- Smith Meter Ultra[6] Liquid Ultrasonic Meter



Note: *The microLoad.net has the capability to control flow rates using a digital valve. Normal pipeline operations do not start and stop flow. Refer to standard pipeline operating procedures and use the control valve, (if one is present) for flowrate control; as the intention is not to start or stop product flow.*

How To Use This Manual

This manual is to be used as an operators guide for the microFlow.net.

This manual is divided into the following sections: Introduction, Display and Controls, Run Mode, Program Mode, Batch Recalculation, Diagnostics and Index.

The “Display and Controls” section describes the microFlow.net’s physical display screen and keypad as well as some of the basic messages that would initially occur.

The “Run Mode” section describes the typical operation of a microFlow.net.

The “Program Mode” section describes the mechanics of marking configuration changes to a microFlow.net using the integral display and keypad. See the Reference Manual for details of the parameters that are affected in the Program Mode.

The “Batch Recalculation” section describes how historical batch volumes can be recalculated based on lab accurate S&W and density readings.

The “Diagnostics” section describes the main menu diagnostics that are available during the run mode operation.

The “Index” is a comprehensive listing, with page numbers, of all subjects covered in this manual.

The examples presented in this manual are for clarity and operator convenience. The values might vary for specific installations and/or operations.

microFlow.net Display and Controls

Figure 1. microFlow.net Display and Controls

The user interfaces with the microFlow.net through either through one of its several communications ports or via the display and keypad found on the face of the instrument. The display and keypad alter the format and function based upon the mode (Run Mode, Programming Mode…) that the instrument is currently operating in. The following provides previews to the various screens as well as the keypad functions associated with the various modes.

Power Up

The following describes the events which occur when the power is applied to a microFlow.net. Upon power up the microFlow.net goes through a start up sequence. The start up screen will be displayed while a RAM test is being performed.

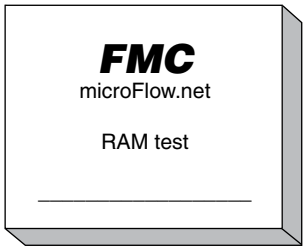
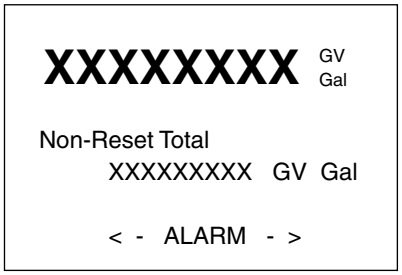


Figure 2. Power Up Screen.

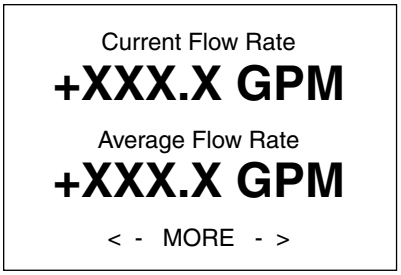
Once the start up sequence is complete the microFlow.net will go into its normal operating mode. Depending upon how the instrument is configured, one of two screens will be seen next. If the microFlow.net does not have the Power Fail Alarm configured the instrument will go directly to the Ready Screen. The Ready Screen is the launching point for all the microFlow.net functions.

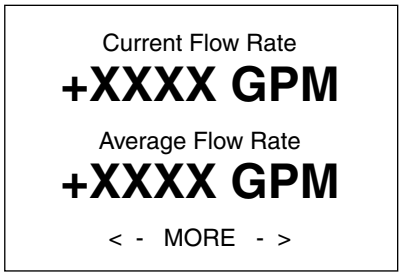
After the initialization has completed, the default GV, the default GSV, the default mass, or a user configured screen will be displayed depending on the programmed selection.

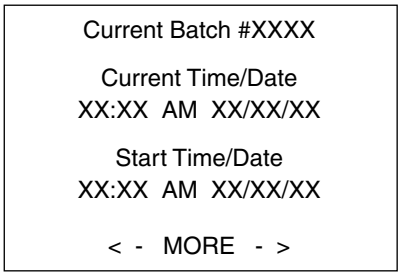


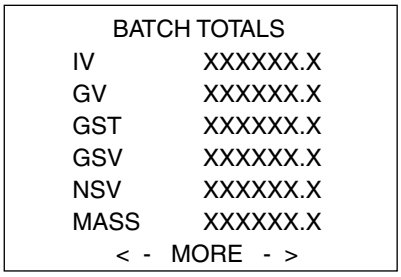
The “ALARM” message will blink at the bottom of all run-time screens if an alarm conditions exists. Otherwise, the “MORE” message will be present at the bottom of all run-time screens.

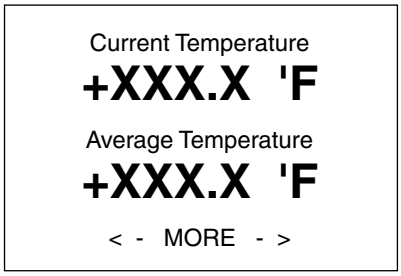
Once the initial screen is displayed, the operator can scroll through other run-time screens by pressing the right/left cursor buttons. This will sequence through the following screens. If the programming calls for a user configured display to be the initial run-time screen shown at power-up, it will be included in the following sequence of displays.



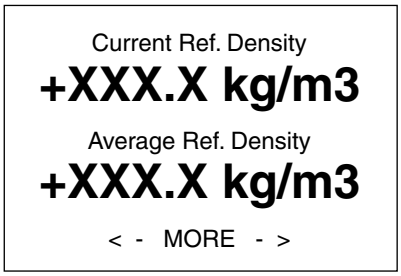




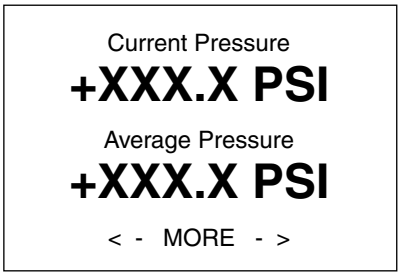




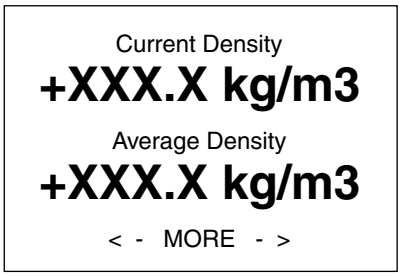
Note: *This screen will not be displayed if a temperature input is not configured.*



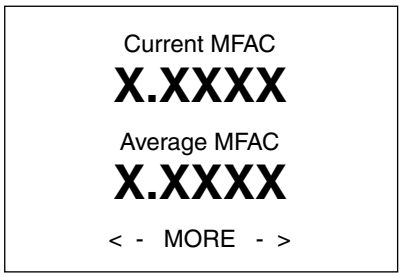
Note: *This screen will not be displayed if temperature compensation is not configured.*



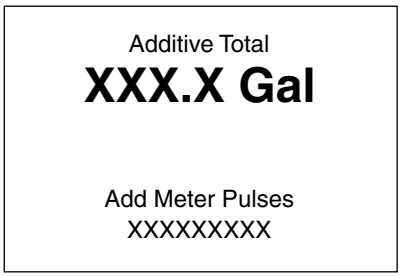
Note: *This screen will be displayed only if live pressure is configured.*



Note: *This screen will be displayed only if live density is configured.*



Note: *This screen will be displayed only if more than one meter factor is configured.*



Note: *This screen will be displayed only if an additive is configured.*

Run Mode

The “RUN” Mode is the normal operator-controlled mode of operation where a batch volume is displayed. The flow is controlled, and batching can be started by the microFlow.net.

All control operations can be performed either locally through the keypad or through communications. The operation described in this section assumes that the microFlow.net is being operated locally through the keypad. For information on operating through communications, refer to the microFlow.net Communications and Reference Manuals.

Overview

The “RUN” Mode permits the operator to observe the dynamic variables such as flow rate, temperature, volume correction factors, and transaction (batch) totals.

Resetting/Starting a New Batch

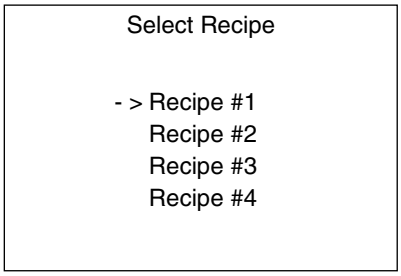
Unlike crude oil and natural gas pipelines that are dedicated to a single product service, refined product services can simultaneously transport several different products through the same pipeline. When moving multiple products through a common pipeline, each product may need to be totalized separately. Batching in the microFlow.net allows the operator to reset or start whenever needed. Batching will not stop flow and restart when reset, but will “on the fly” allow for a new batch totalization while allowing for flow rate control. The following steps are required to reset a batch (for example when a different product is being sent down the pipeline from what is currently being measured).

Resetting a Batch

Step 1
Press the “ENTER” key from the “RUN” Mode.

Step 2
The Main Menu will appear. With the cursor (arrow) beside the “RESET BATCH” press “ENTER”.

Step 3
When prompted for the passcode, enter the programmed passcode set in the programming. (If multiple recipes are configured you get a prompt to select the recipe.)



Step 4
A new batch will now begin as the “RUN MODE” totalizers reset to zero (0) and begin incrementing as flow is present.

Viewing Historical Batch Logs

To view historical batch logs on the microFlow.net using the local keypad follow these steps:

Step 1
From the “RUN MODE” screen (or any flow display screen), press the “ENTER” button to access the main menu.

Step 2
From the Main Menu screen, use the ↑ (2 button) or ↓ (8 button) buttons on the keypad to scroll through the selections until the arrow on the screen is to the left of the “DIAGNOSTICS” menu. Press “ENTER” on the keypad.

Step 3
Once in the “DIAGNOSTICS” menu, use the ↑ or ↓ buttons on the keypad until the cursor on the screen is beside the “BATCH RECORD LOG”; then press “ENTER” on the keypad.

Step 4
A screen will now appear that will prompt the operator to enter the number of batches back to view the corresponding log. Enter the desired number using the keypad. (For example: if the last batch is to be viewed, simply press the “1” key and the last batch ran will be displayed.)

Step 5
After the batch log has been properly chosen; the next screen will allow the user to select the batch totals or Boalean/Algebraic functions. For viewing the batch totals, ensure that the cursor is to the left of the “BATCH TOTALS” menu selection and press <ENTER>.

Step 6
The next screen will display all of the totals for the selected historical path. The ↑ and ↓ buttons on the keyboard will allow different totals and batch information to be reviewed.

Displayed values for historical batch data include:

Time and Date Stamp for starting and ending
IV, GV, GST, NSV, Mass and Recipe Number
Avg. Meter Factor, Avg. CTL, Avg. CPL and Alarms Present
IV, GV, GST, GSV, NSV and Mass Non-Resettables

Batch Log Stats

Batch Log Stats will provide a numerical representation of how many batches are stored in the microFlow.net and how many maximum batches are allowed to be stored in the unit (based on how much information is stored with each batch, determines how many logs are stored. The more information stored in each batch (such as additives) will use up memory, this will determine how many batches are stored.

Stopping the Flow Using the Keypad

The only way to stop the flow locally at the keypad using the digital control valve, is to enter the program mode and set the flow rate to zero (0). This operation is not practiced in normal pipeline applications, but is available if needed. To prevent the operator from performing this operation the flow rate parameter is under passcode protection.

Additive Monitoring

Additive injector feedback provides the capability of the microFlow.net monitoring the additive products that are being injected. The microFlow.net monitors the injector feedback switches for a change of state and counts the errors if no change is detected before the next injection. An alarm will be set if the number of errors exceeds the programmable maximum.

With Smart or metered injectors, the additive volume injected is actually measured, providing the ultimate in feedback. The microFlow.net communicates with the Additive Injector System where the microFlow.net is the master. The microFlow.net constantly monitors the Additive System for its status, polls for additive totals, and signals the system when to inject the additive – all through the communications line.

The microFlow.net communications package has also been designed with a pass-through communications mode. In this mode of operation, the supervisory computer can talk to the Additive Injector System through the communication lines that have been run to the microFlow.net and from the microFlow.net to the Additive Injector System(s). (This is further described in the microFlow.net Communications Manual.)

microFlow.net interfaces with smart additive injector systems. A system may incorporate one metered injector along with digital outputs to energize additive pumps and injector solenoids.

Keypad Functions

The push-buttons on the keypad perform the following preset functions in the Run Mode:

0 – 9	Used for entering numeric data.
↑	Used to navigate backwards through the menu to get into the displays. When in the dynamic displays, the up arrow also moves backward through displays.
←	Once in the dynamic displays, this works like the up and down arrow to move forward through the displays.
→	Once in the dynamic displays, this works like the down arrow to move forward through the displays.
↓	Used to navigate forward through the menu to get into the displays. When in the dynamic displays, the down arrow also moves forward through the displays.
CLEAR	Used to exit the Dynamic Display.
ENTER	Used to enter the Dynamic Display menu and to enter the dynamic displays from the menu.

Program Mode

The microFlow.net has a significant number of customizable features which are selectable by the user. The process of selecting these features and customizing the microFlow.net to each application is performed in the Program Mode. All programming information is entered via the keypad or through communications. This section will describe the procedure for entering via the keypad. The program codes for microFlow.net are divided into several main directories plus Diagnostics. The main directories and their contents are discussed in detail in the microFlow.net Reference Manual.

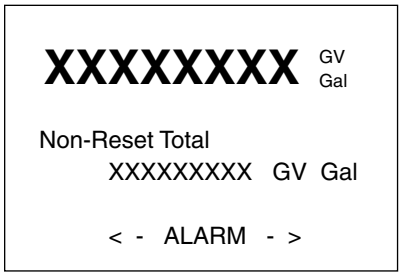
Keypad Data Entry

The push buttons on the keypad perform the following functions while the instrument is in the Program Mode:

0 – 9	Used to enter the access code and data entries.
CLEAR	Used for clearing incorrect entries or for getting to an exit point.
ENTER	Used to enter the Program Mode security access code, to enter the subdirectory, and to enter program data.
START	Not used in Program Mode.
SET	Page Scrolling.
PRINT	Used to access Help Messages.
STOP	Used to set the security level.
F1	Not used in Program Mode.
F2	Not used in Program Mode.
↑	Used to move up through the menus and rows for alphanumeric entries.
↓	Used to move down through the menus and rows for alphanumeric entries.
+ / -	Used for adding signs to values being programmed.
.	Decimal point, for values requiring one.
← →	Used for alphanumeric entries.

Entry to Main Directories

1. Assert the security input if configured. This will provide the first step for access to program codes.



2. Press “ENTER.” This displays the main menu.

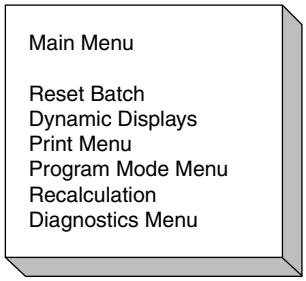


Figure 5. Accessing Main Menu.

3. Move the arrow to the Program Mode menu and press “ENTER.” This will display the “Enter Pass code” screen.

4. Enter the access code. (The access code preset at the factory is “0”.) For security, any digit entered will be displayed as an “X”. (Access codes can be up to four digits long.)

5. Press “ENTER.” This procedure checks for the proper access code. If it is correct, the following will be displayed.

6. If an incorrect access code was entered, an “Access Denied, CLEAR = re-enter” message will appear. Press CLEAR to return the display to the “Enter Pass code Screen” in Step 3. Repeat Steps 3, 4, and 5 to re-enter Program Mode.

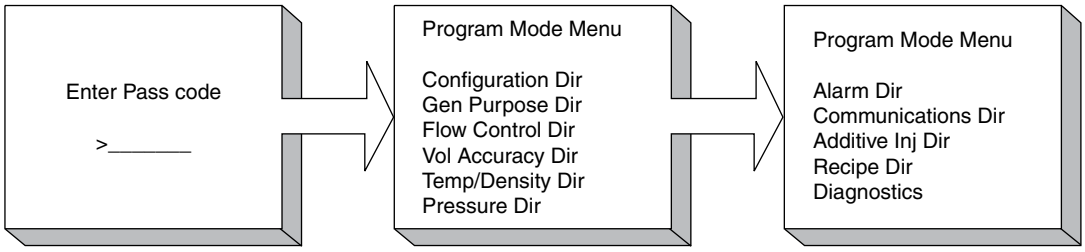


Figure 6. Opening Program Mode.

Changing Program Mode Parameters

The program codes represent parameters that can be changed either to enhance the performance of the microFlow.net or to accommodate application changes. There are three types of parameters in microFlow.net: codes that require numerical data, codes where an option can be selected from a list, and codes where alphanumeric data is entered. Once a code has been selected, change the programmed contents by entering a new value through the keypad.

Numeric Data

The numeric data is entered into the program codes via the keypad just as numbers are entered into a calculator.

Alphanumeric Data

The parameters that require alphanumeric data are the codes that display Product Messages, Prompt Messages, or Permissive Messages on the displays of microFlow.net, or provide information to be printed out on the Bill of Lading Emulation. When adding or changing information in these alphanumeric program codes, the keys listed below perform the following functions:

KEY	DESCRIPTION
ENTER	Moves the character from the character set to the ID line. Also enters the data into the instrument's memory after END has been selected from the character set.
SET	Moves the cursor six positions to the right.
→	Moves the cursor one position to the right each time it is pressed.
←	Moves the cursor one position to the left each time it is pressed.
↑ **and** ↓	Selects the next block of characters. An example of this is changing from uppercase letters to lowercase letters.

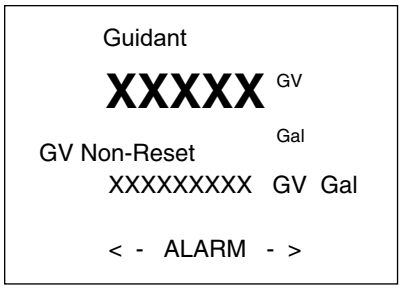
The blocks of characters available in microFlow.net are as follows:

- A B C D E F G H I J K L M N O P Q R S T U V W X Y Z # *
- a b c d e f g h i j k l m n o p q r s t u v w x y z & @
- 0 1 2 3 4 5 6 7 8 9 < > ( ) ? ! . , ' - " / + = _ END

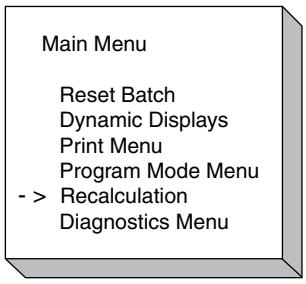
Batch Recalculation

In most flow computers, it is common to recalculate volume totals based on lab accurate S&W and density readings, therefore the microFlow is equipped with the ability to recalculate these volumes. The recalculations will only be applied to historical batches and will allow the operator to enter in NEW S&W and density values. The microFlow will take the new values and recalculate the volume and store that information in the historical batch values. See the process below to apply the new Batch recalculations.

1. From Run Time display press ENTER.

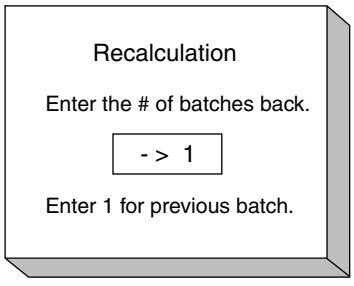


2. Use the ↑ and ↓ arrows to scroll to the “Recalculation” function and press ENTER.

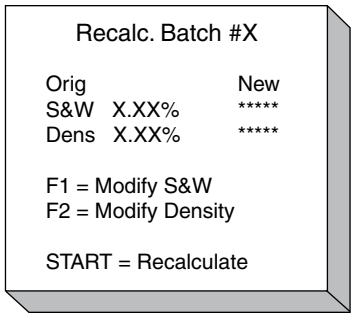


3. Enter passcode at the highest level of security to do any S&W Recalculations.

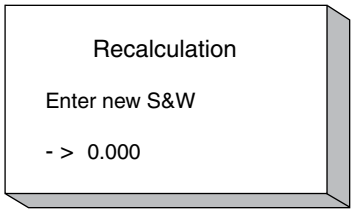
4. The next screen (below) will prompt the user on how many batches back the recalculation should occur. The Recalculation cannot be performed on a current batch being run, only historical batches.



5. Upon entering how many batches back the user would like the recalculation to be performed, the following screen will appear:

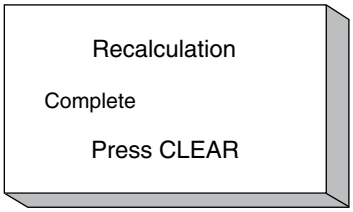


6. If the S&W is to be changed from the original percentage shown, press the (F1) key. A new prompt will appear for the S&W shown below. (Press CLEAR button to return back to previous screen).



Enter in the new value for the new NSV Calculation to include, then press ENTER. The new value should now appear in the “New” column under S&W.

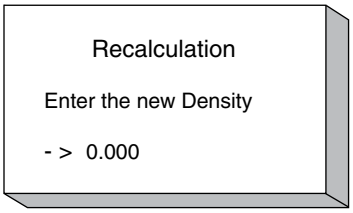
For the recalculation to occur after the new value(s) for either S&W and/or Density, press the START key. Upon completion of the recalculation the below screen should appear.



As shown, press CLEAR to return back to the recalculation screen. The numbers entered in before the recalculation was performed will no be placed in the column under “Orig” for original values.

If this is acceptable, press CLEAR to back out to the Run Time Display.

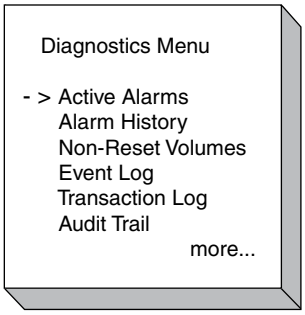
6. The same steps apply for a new density to be entered in for recalculation purposes. Press F2 to enter a new density value shown below.
*(**Note:** there must be an API Table programmed into the unit for the density to be changed.)*



Enter in the new value for the new NSV Calculation to include, then press ENTER. The new value should now appear in the “New” column across from Density.

Main Menu Diagnostics

Main Menu Diagnostics allow the operator to review current configurations, identify causes of system errors, and analyze data collected by the microFlow. Selecting "Diagnostics" from the main menu, and then choosing a specific diagnostic, usually results in the screen shown directly below. Position the cursor beside the appropriate selection, and then press ENTER to reach the desired diagnostic screen.



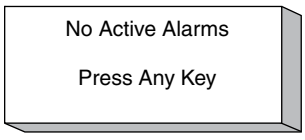
Note: *The diagnostics available through the Main Menu are run-time diagnostics only. Program mode diagnostics are accessed from the Program Mode Main Menu.*

The Diagnostics menu available through the Main Menu consists of the following:

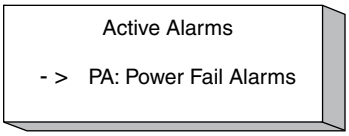
- Active Alarms
- Alarm History
- Non-Resettable Volumes
- Event Log
- Batch Record Log
- Audit Trail
- Digital Inputs
- Digital Outputs
- Analog Inputs
- Pulse Inputs
- Communications Monitor
- Download Directory
- Boolean/Algebraic
- Batch Log Stats
- Summary Data
- Software Version
- Ultrasonic Data
- Contrast Adjust

Active Alarms

The Diagnostics menu provides the selection "Active Alarms" where all active alarms for the load arm can be viewed with the arrow in front of "Active Alarms." Press ENTER, and one of the following will be displayed. If no alarms are active, the following screen will be displayed.



If there are active alarms, they will be displayed as follows:



The active alarms can be cleared from this display by moving the arrow to the alarm and pressing "ENTER." The microFlow will then ask for the passcode. When the passcode is entered, the alarm will clear.

Pressing the CLEAR key will return the system to the Diagnostic menu.

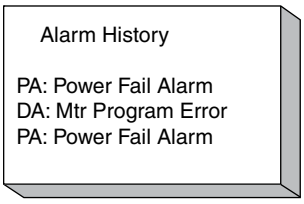
Alarm History

The Diagnostics menu provides the selection "Alarm History" where the most recent alarms can be viewed. With the arrow in front of "Alarm History," press ENTER, and the historical alarms will be displayed. The alarms will be listed in order of occurrence.

This is an alarm history for the transaction. For a more complete history of alarms, please access the Event Log.

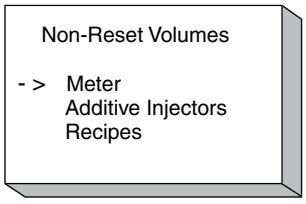
Pressing the up and down arrow keys will allow the operator to page through the Alarm History displays. If "More…" is not displayed, then there is only one screen of alarms in the alarm history.

Pressing the CLEAR key will revert to the Diagnostic menu.

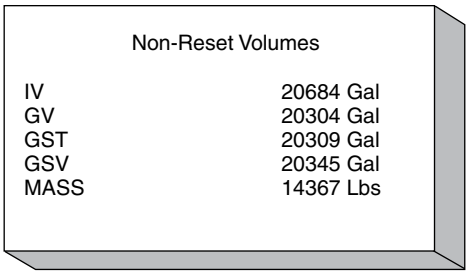


Non-Resettable Volumes

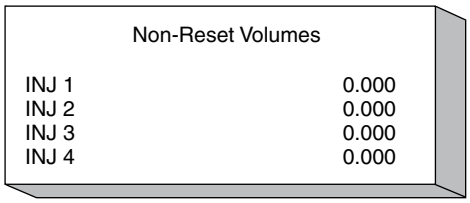
The Diagnostics menu provides the selection "Non-Reset Volumes" where the meter and additive injector volumes can be viewed. With the arrow in front of "Non-Reset Volumes," pressing ENTER will display a menu to allow the operator to view either the meter, the additive volumes or recipes. Choosing either the meter, additive injectors or recipe by moving the arrow and pressing ENTER will display the non-resettable volumes.



Meter volumes are displayed as follows:

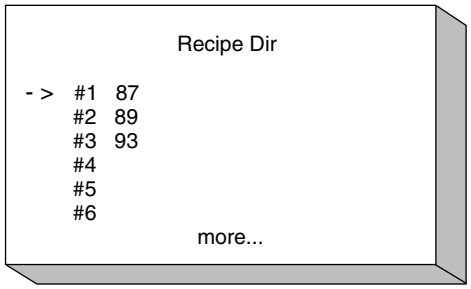


Additive injector values are displayed as follows: additives 1 through 4 are displayed. Using the arrow keys on the keypad will allow the operator to move through all 4 of the additives.

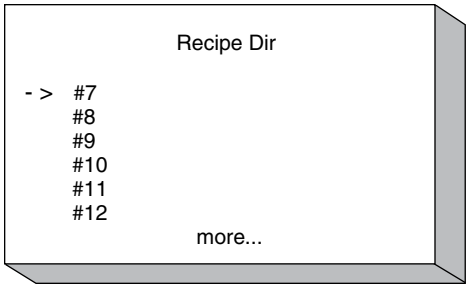


Pressing the CLEAR key will return the display to the Non-Reset Volumes screen.

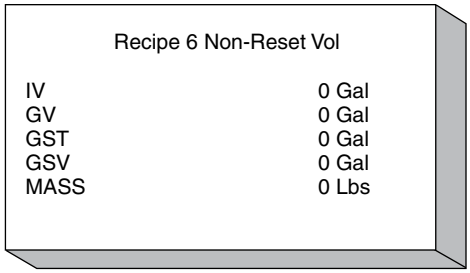
Choosing "Recipes" from the "Non-Reset Volumes" menu results in the following screen:



To view the other six available recipes, simply scroll with the arrow keys up or down.



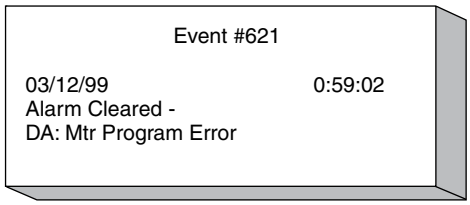
The following is displayed after the desired Recipe is selected by moving the arrow in front of the name and pressing ENTER:



Pressing clear repeatedly will revert back to the diagnostic menu.

Event Log

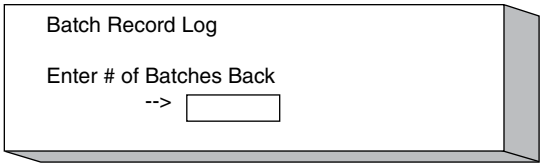
The View Only Diagnostics menu displays "Event Log" where past events can be viewed. With the arrow in front of "Event Log," pressing ENTER will display the last event that occurred in the microFlow. The "Event Log" includes alarms, transaction start and end, and program mode parameter changes.



From the display, the operator can go back through the events using the up and down arrow keys. Pressing the CLEAR key will display the Diagnostics menu.

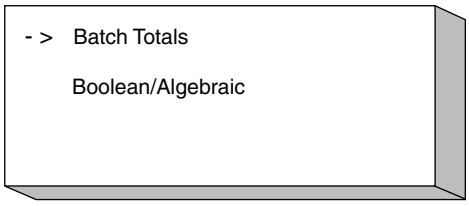
Batch Record Log

This diagnostic shows the selected batch data such as Batch Volumes, Averages and Non-Resettable Totalizers.

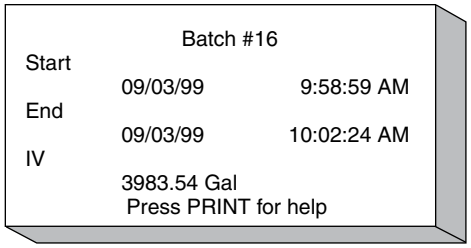


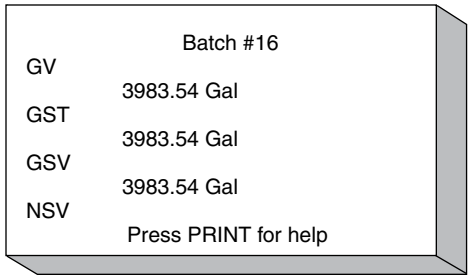
Press Clear to return to the Diagnostics Menu.

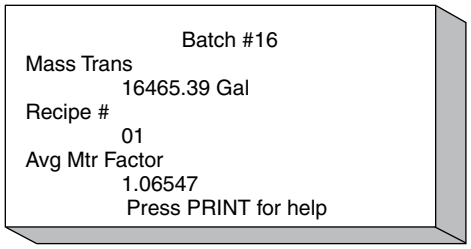
Entering the number of batches back, the microFlow will display the following screen:

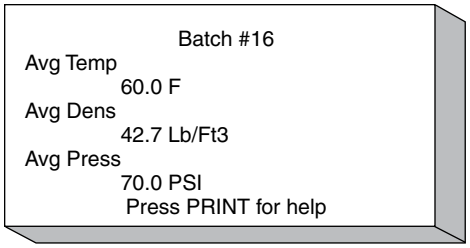


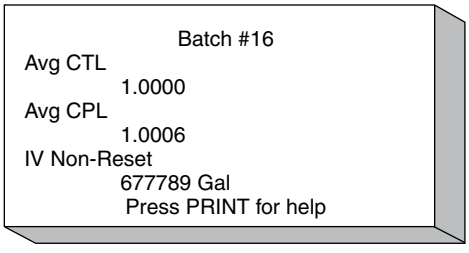
From this display, the operator can choose either "Batch Totals" or "Boolean Algebraic." The following information is displayed for Batch Totals.



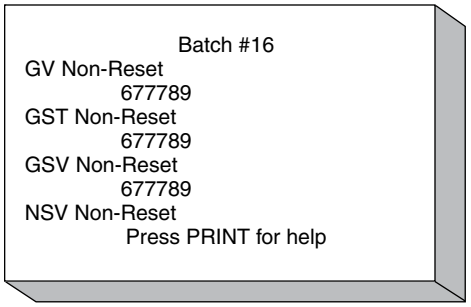


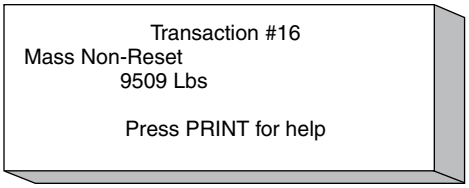




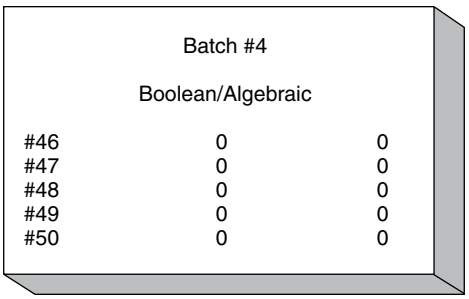


Note: *Additive totals will be displayed only for those injectors used in the transaction.*





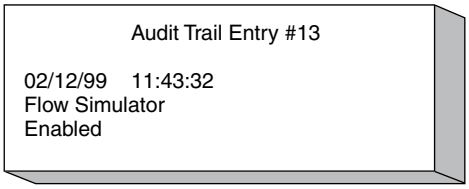
When "Boolean/Algebraic" is selected from the previous menu, the following data will be displayed.



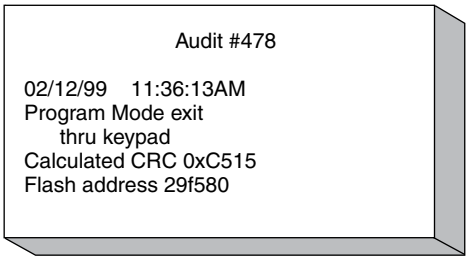
The first column is the last 5 (#46-50) USERBOOL valves and the second column is the last 5 (#46-50) USERFLOAT valves recorded at the time the batch was reset.

Audit Trail

The View Only Diagnostics menu provides the selection "Audit Trail" where audit trail data is available for viewing. With the arrow in front of "Audit Trail," pressing ENTER will display the last audit trail entry that occurred in the microFlow.



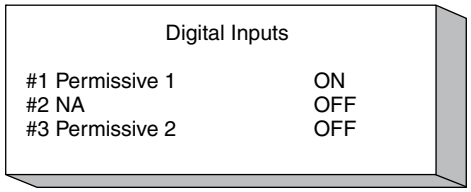
The audit trail provides the date, time, and description of Program Mode changes. Note that only changes to parameters secured at the two highest security levels programmed are logged in the audit trail. Pressing the up and down arrows on the keypad will allow the operator to step through the audit trail.



Pressing the CLEAR key will display the Diagnostic menu.

Digital Inputs

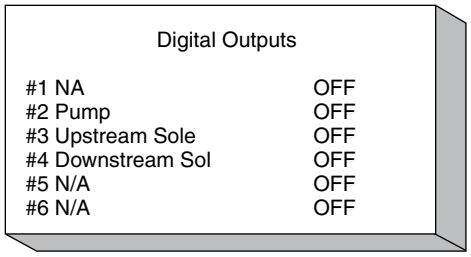
The Diagnostics menu provides for the selection of "Digital Inputs" where the current status of the digital inputs can be viewed. With the arrow in front of "Digital Input," pressing ENTER will display the digital inputs, the programmed function, and their status.



Viewing the above displays provides information on digital input #1. It is used as a permissive and the current status is ON. Likewise, the functions and status of digital inputs #2 and #3 are also available. Pressing the CLEAR key will display the Diagnostics menu.

Digital Outputs

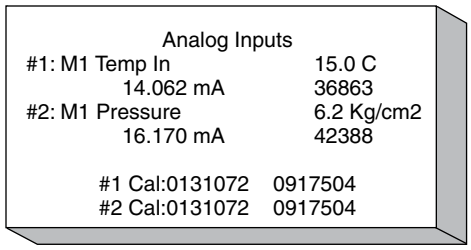
The Diagnostics menu provides the selection "Digital Outputs" where the function and status of the digital outputs can be viewed. With the arrow key in front of "Digital Outputs," pressing ENTER will display all six digital outputs and their status.



Pressing the CLEAR key will display the Diagnostics menu.

Analog Inputs

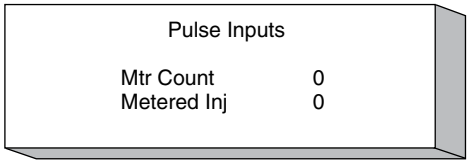
The Diagnostics menu provides the selection "Analog Inputs," where the function and status of the analog inputs can be viewed. With the arrow in front of "Analog Inputs," pressing ENTER will display the two analog inputs, their current reading in engineering units, current, or voltage, and raw analog input value.



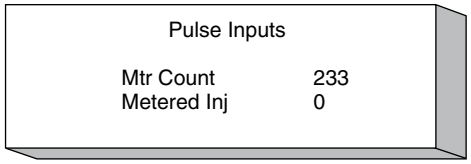
Pressing the CLEAR key will display the Diagnostics menu.

Pulse Inputs

The Diagnostics menu provides the selection "Pulse Inputs" where the meter pulses and the metered injector pulses are displayed. With the arrow in front of "Pulse Inputs," pressing ENTER will display the pulse inputs.



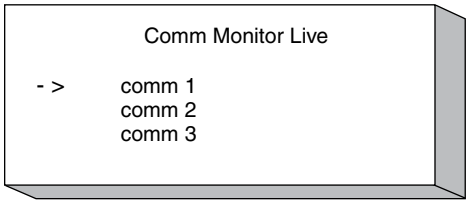
Note: *Metered Injector counts are only displayed if a metered injector is configured.*



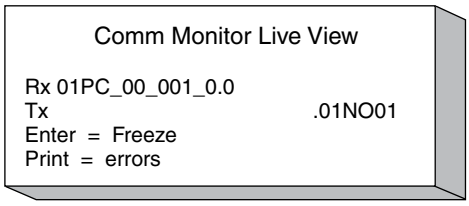
Pressing the CLEAR key will display the Diagnostics menu.

Communications Monitor

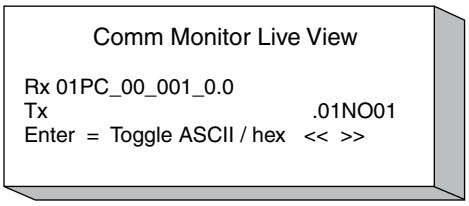
The Diagnostics menu provides the selection "Comm Monitor" to review messages being sent and received across the communications lines. With the arrow in front of "Comm Monitor," pressing ENTER will display the following:



This display allows the operator to choose the communication port to be viewed. Pressing the ENTER key when the arrow is in front of the desired communications port will display the data that is being received by the microFlow and the response of the microFlow.

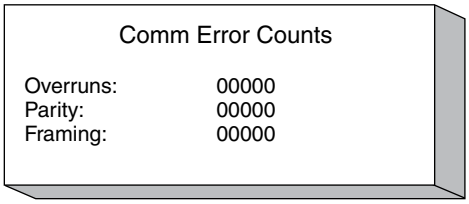


This display indicates that microFlow address 01 received a PC command from the host and responded with a "no response," indicating that it is in Program mode. To freeze a command or response for further viewing, press "ENTER."



On this display, the operator can toggle the message between the ASCII and hex characters. The decimal point key allows toggling between page scrolling ("<< >>") and character scrolling ("< >"). To return to the previous display, press CLEAR.

Pressing the PRINT key in the live view will display the following screen.



From this display, the overrun errors, parity errors, and framing errors can be viewed. Pressing CLEAR will return to the Live View display.

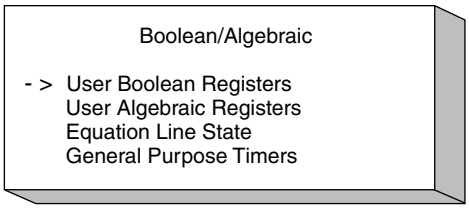
When completed, press CLEAR until the Diagnostics menu is displayed.

Download Directory

This directory will give a listing of all files that have been downloaded from the Flowmate. Some examples would be Translations, Configurable Batch Reports (factory default also), html webpages, Driver Database, Boolean Equations, etc. Simply press ENTER on the menu to view the listing and use the up and down arrows to navigate all downloads if they exist. Press CLEAR to get back to the Diagnostics Menu.

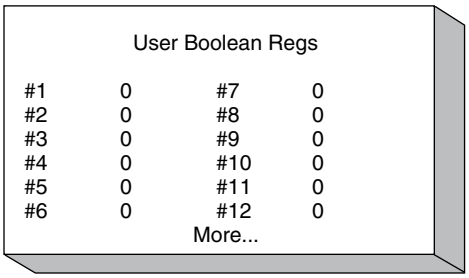
Boolean Algebraic

The Diagnostics menu provides the selection "Boolean Algebraic" to view Boolean/Algebraic registers and their results. General-purpose timers can also be viewed from this screen. With the arrow in front of "Boolean Algebraic," pressing ENTER will display the Boolean/Algebraic Processing menu.



User Boolean Registers

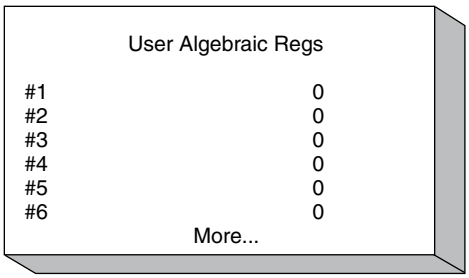
The User Boolean Registers display indicates the registers and their current True or False value, where 0 is False and 1 is True.



Using the up and down arrows, the 50 User Boolean Registers can be viewed. Pressing CLEAR will return to the Boolean/Algebraic Processing menu.

User Algebraic Registers

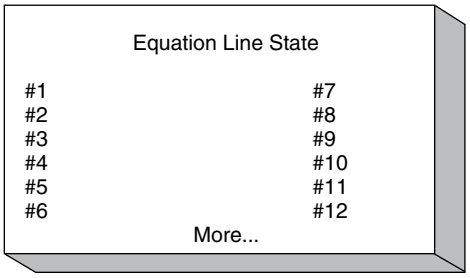
The User Algebraic Registers display the current values of the variables in the register. This display is read-only, but the registers can be modified via Boolean/Algebraic equations or via communications. These registers are used to check the values of the variables that have been set up and/or downloaded from the Flowmate.



Using the up and down arrow keys, all fifty User Algebraic Registers can be viewed. Pressing CLEAR will return to the Boolean/Algebraic Processing menu.

Equation Line State

The Equation Line Status displays the current status of the equations, where "D" indicates that the equation is disabled, "T" is True, and "F" is False. All equations without an "IF" statement will have a "True" status. Those with an "IF" will indicate the result of the "IF" expression: either "True" or "False."



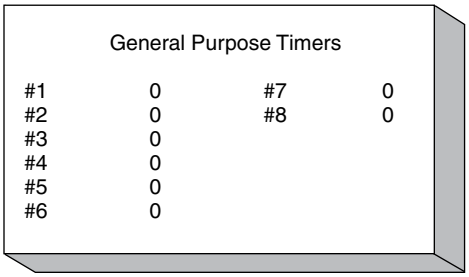
Using the up and down arrow keys, view all 50 equations. Pressing CLEAR will return to the Boolean/Algebraic Processing menu.

General Purpose Timers

The General Purpose Timers display the current time on the timers. The timers are broken down as follows:

Timer Numbers	Resolution	Range
1-2	0.1 second	109 minutes
3-4	1.0 second	18.2 hours
5-6	1.0 minute	45.5 days
7-8	1 hour	7.5 years

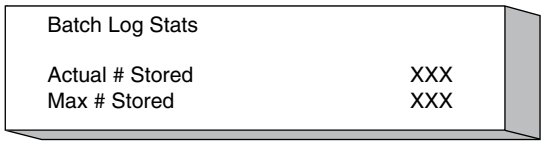
Clear the timer by writing a zero to the database location of the desired timer.



Using the up and down arrow keys will display the remaining timers. Pressing CLEAR will return to the Boolean/Algebraic Processing menu. Pressing CLEAR again will return the display to the Display menu.

Batch Log Stats

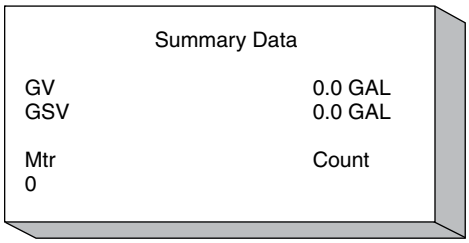
This diagnostic shows the actual number of Batch Records currently stored and the maximum number that can be stored.



Pressing CLEAR will return to the Diagnostics menu.

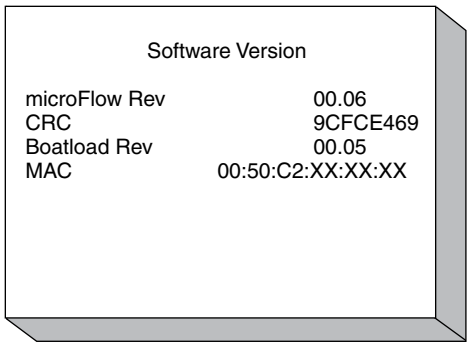
Summary Data

This menu gives the totals for the batch running in the transaction. It displays how much was delivered and the associated pulses from the meter for the batch in progress. If a new batch is started in the same transaction, only the current batch information will be shown.



Software Version

The Diagnostics menu provides the selection "Software Version," which allows the operator to view the version of software that is running in the microFlow. With the arrow in front of "Software Version," pressing ENTER will display the software version, CRC, and MAC address.



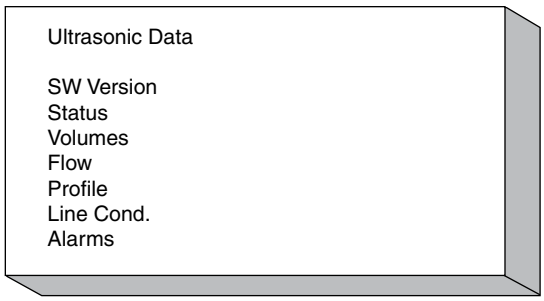
Pressing CLEAR will return to the Diagnostics menu.

Ultrasonic Diagnostics

Ultrasonic Data

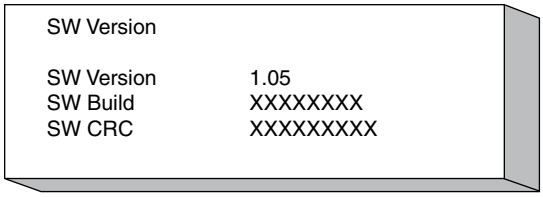
The values shown on these screens are provided by the ultrasonic meter. The microFlow collects this information from the ultrasonic meter via communication on a periodic basis.

For all of these screens, if communications to the Ultrasonic meter fails, the values shown will be all XXX's.



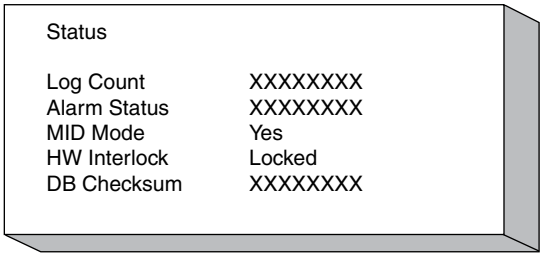
Using the Up and Down arrow keys select the diagnostic:

SW Version – Identifies the software running in the ultrasonic meter.



Press Clear to return to the Ultrasonic Data Diagnostic Menu.

Status – This screen indicates the following statuses:

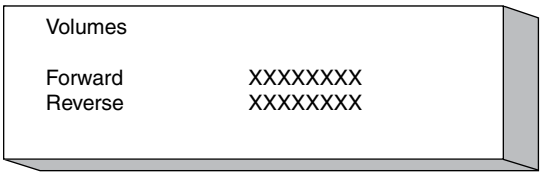


Where:

Log Count	XXXXXXXX - Incremented by the meter each calculation cycle
Alarm Status	XXXXXXXX - Bit encoded, if zero no alarms present on meter
MID Mode	Yes/No - European MID mode indicator
HW Interlock	Locked/Unlocked - Sealing jumper installed
DB Checksum	XXXXXXXX - Configuration database checksum

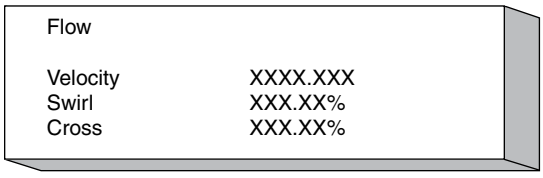
Press Clear to return to the Ultrasonic Data Diagnostic Menu.

Volumes – Indicates current meter volumes



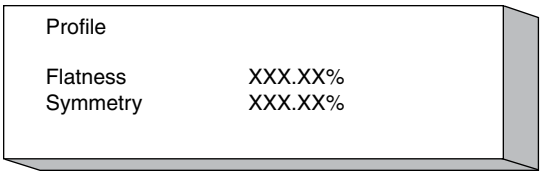
Press Clear to return to the Ultrasonic Data Diagnostic Menu.

Flow – Indicates current flow parameters



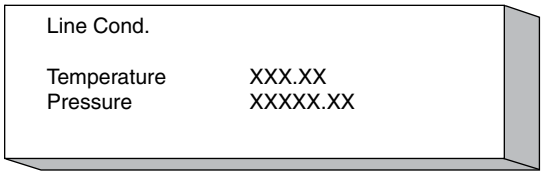
Press Clear to return to the Ultrasonic Data Diagnostic Menu.

Profile – Indicates current meter profiles



Press Clear to return to the Ultrasonic Data Diagnostic Menu.

Line Cond. – Indicates current temperature and pressure



Press Clear to return to the Ultrasonic Data Diagnostic Menu.

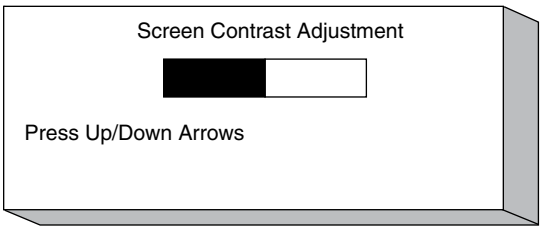
Alarms – Indicates current meter alarms; if no alarms are present the display will indicate:

Alarms available:
HIGH_FLOW
ELECTRONICS FAILURE
TRANSDUCER FAILURE
CALCULATION ERROR
SIGNAL LOW ALARM
GAIN ERROR ALARM
VOS DIFFERENCE ALARM
PATH SUBSTITUTION ALARM
PARAMETER ERROR
SOUND TO NOISE RATIO LOW
HIGH TURBULENCE ALARM
PROFILE DEVIANCE ALARM

Press Clear to return to the Ultrasonic Data Diagnostic Menu.
Press Clear to return to the Diagnostic Menu.

Contrast Adjust

This diagnostics menu provides for adjusting the display contrast.



A

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M

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R

S

T

U

Section VIII – Related Publications

microFlow.net Operator Reference Manual ..... Bulletin MN06156
microFlow.net Specifications ..... Bulletin SS06047

Revisions included in MN06157 Issue/Rev. 0.2 (5/09)
Diagnostics section added, pages 15-28.

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