

# Dresser Micro Series Volume Converter Model MC2-197 PTZ

## Software Manual

UK Version





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## 1 Information

This manual details the installation and operation of all varieties of the Dresser Micro Series Converter. The Micro Series Converter and the Dresser User Terminal Software are manufactured by:

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All printed material contained within this manual is for information only and is subject to change without notice. This manual should be read in conjunction with firmware version **2.00 and higher** and Micro Converter User Terminal software version 3.0.0.0 or higher.

For the purpose of this document the terms PC and laptop should be considered as being interchangeable.

## 2 General Overview

The Dresser Micro Series Volume Converter (MC2) combines 2 devices; an electronic counter and a volume converter. The MC2 is compatible with all Roots meters and meters from other manufacturers that have a low frequency pulse output provided by a reed switch or Wiegand sensor.

The MC2 is designed to measure live pressure and temperature to calculate volume at base conditions. In addition optional features are available and include:

- Data and Audit Logging.
- Trim Table options (only with Wiegand version).

The Micro Converter User Terminal (MCUT) enables the operator to configure, calibrate, extract data and monitor alarms. A logging facility is also available; data logging and audit logging. The operator is able to specify which parameters are logged within the data log and the logging interval at which the logs are taken.

The audit log provides a tracking facility detailing any parameter changes; only the parameter changes that will affect billing are included within the audit log. To ensure the integrity of the billing period, the audit log cannot be deleted.

## 3 Safety

Where an MC2 installation must meet Intrinsic Safety requirements, ensure that installation is carried out in an appropriate manner in accordance with any National Codes of Practice dealing with Intrinsically Safe (I.S.) installations. Refer to the Micro Series Volume Converter Manual (Model MC2 Hardware Manual) (sections 4 (Safety) and 5.2 (Installation Safety Requirements)).

Connection to intrinsically safe equipment must be properly assessed by the user. The manufacturer (Dresser) is not responsible for the overall safety of the system.

The serial port may only be connected to an intrinsically safe modem as shown by the system approval drawing. For commissioning and reading data the serial port may also be connected to a laptop computer under the following conditions:

1. Laptop computers, generally, are not intrinsically safe. Therefore, before using an uncertified laptop in the hazardous area, a gas test should be performed to prove that no potentially hazardous gas mixture exists in the area. If this is not possible the laptop must not be used in the hazardous area.
2. The laptop computer must be powered by batteries alone and these must be incapable of supplying more than 25 Volts. No connection is to be made to an external supply (e.g. charger) even if non-operational. (The presence of the connection can itself create a hazardous condition).

An intrinsically safe barrier (or Dresser Micro Modem) must be installed between a PC in a non-hazardous area and the MC2 in the hazardous area.

## **4 Installation and Getting Started**

### **4.1 System Requirements**

The Micro Converter User Terminal is designed to run on Windows® based PC's running Windows 95, 98, 2000, ME, NT4, XP and Windows 7, 8, 8.1 and 10.

If internal PC modem is used then Windows XP or higher must be the operating system.

### **4.2 Installation**

The Micro Converter User Terminal software is supplied on a USB stick.

Insert the USB stick into the PC.

If the set up program does not start automatically the following steps should be performed:

From Windows Explorer, open the folder on the USB stick

- Double click SETUP.EXE from the contents list.
- Follow the on-screen instructions thereafter.

NOTE: Installation of the software on the PC is subject to the terms of the licence agreement displayed during the installation process. You should not use the software until you have read the licence agreement. By using the software you signify that you have read the licence agreement and accept its terms. Please refer to Appendix B (User Terminal Software Licence).

### **4.3 Operating the MCUT**

Communications to the MC can be carried out either directly or remotely.

An intrinsically safe barrier (or Dresser Micro or GSM Modem) must be installed between a PC in a non-hazardous area and the MC2 in the hazardous area.

It is possible to specify which communications port is to be utilized when operating in the direct mode. The procedures contained within this handbook are identical regardless of whether communications to the MC2 are carried out directly or remotely via the modem, however the operator will be prompted to enter some additional details if remote communications are to be established (e.g. select the type of PC modem, enter telephone numbers etc). Please refer to section 12 (Modem Communications) for further details.

All of the procedures outlined below (with the exception of sections 9.7 (Monitor Calls) and 12 (Modem Communications)) are described using the direct method of communication and therefore assume that the communications cable (AW169) (supplied in the communications pack) is connected between the PC and MC2.

### 4.3.1 Connecting the MC2 and PC via Direct Communications

For direct communications connect the 9 way “D” type connector of the communications cable (AW169) to the PC; connect the round connector to the serial port connector located in the right hand corner on the bottom of the MC2. If a 9 way serial D connection is not available on the PC, use a Serial to USB adapter, and connect to USB port on the PC. To start the user terminal:

- Locate and run the icon created on the desktop during the installation process. Alternatively select the MC UT icon from the Micro Series User Terminal folder in the Start, Programs menu.
- Once either icon has been selected the Welcome screen will be displayed. Select the Configuration tab.
- Select UT Comms Settings. The UT Comms Settings dialog will be displayed.
- From within the Direct section select, the Com Port drop down selection box. Select the appropriate com port (that which the PC has assigned to the port or serial cable adapter).
- Select OK within the UT Comms Settings dialog. The Configuration screen will be displayed.
- Select Connect with MC2.
- Communication will be established. A progress bar will begin to move from left to right across the screen as the data is downloaded.

## 5 Welcome Screen

The software version and release date of the user terminal is displayed within the Welcome screen. In order to connect to the MC2 it is necessary to select the Configuration tab to display the Configuration Screen.

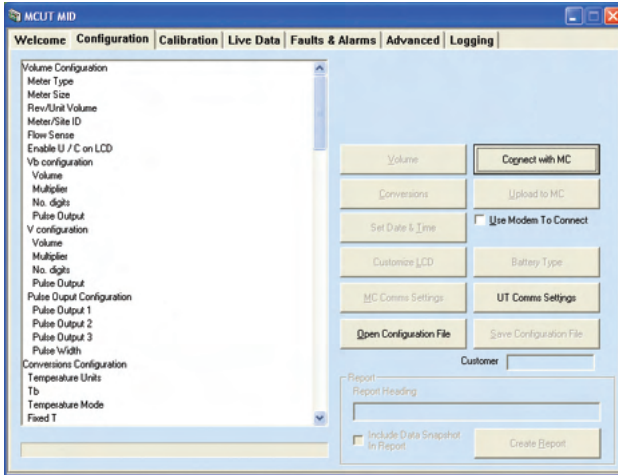
**Figure 1 - Welcome Screen**



Please NOTE the software version if customer support is requested.

## 6 Configuration Screen

The Configuration screen is divided into 3 main sections; the left hand parameter selection list, options which allow the operator to connect and configure the MC2, and the report generation section.



**Figure 2 - Configuration Screen\***

\*The Configuration screen displayed in Figure 2 may be displayed with different parameters. Once successful communications have been established the relevant list will be displayed.

Before communications have been established between the PC and MC2 several of the options within the Configuration screen will not be selectable. This is because the contents of these dialogs depend on the information stored within the MC2. Incidentally, before changes can be made to the configuration data stored within the MC2, the existing configuration data must be downloaded from the unit. Therefore, once the PC and MC2 have successfully established communications, the previously unavailable options within the Configuration screen will become available, and changes to the configuration data can be made and uploaded.

To display the configuration screen:

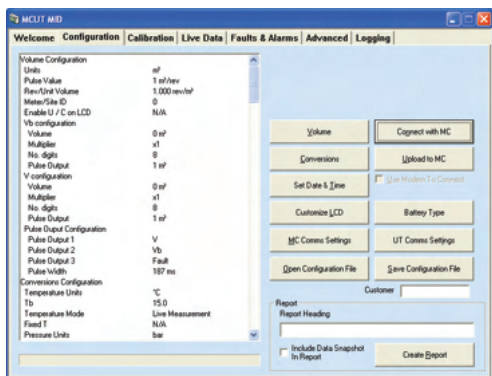
- From within the user terminal select the Configuration tab. The Configuration screen will be displayed.
- The options available on this screen depend on the model and configuration of the MC2.
- It is necessary to download the configuration data from the MC2 every time the user terminal is run, so that the current settings stored within the MC2 are displayed within the user terminal.

- Select the UT Comms Settings option. The UT Comms Settings dialog will be displayed.
- From within the Direct section select the Com Port drop down select box. Select the appropriate com port that the PC has assigned to the port or serial cable adapter.
- Select OK within the UT Comms Settings dialog. The Configuration screen will be displayed.
- Select Connect with MC2. For further details refer to section 6.1 (Connect with MC2 – Direct Connection to the MC2).

### 6.1 Connect with MC2 – Direct Connection to the MC2

To connect to the MC2 directly select Connect with MC2. Please refer to section 12 (Modem Communications) for details about connection to the MC2 via a modem.

Once the download is complete a dialog will be displayed stating that Configuration Downloaded OK, select OK.



**Figure 3 - Configuration Downloaded OK Dialog**

All options within the Configuration screen will become available; it is now possible to setup and configure the unit.

### 6.2 Upload to MC2

When the configuration data has been changed within the user terminal it is necessary to upload the new parameter details to the MC2. Prior to upload, any parameters that have been changed are highlighted yellow in the parameters selection list; after the parameters have been uploaded to the MC2 the yellow highlights will be removed.

If a parameter is highlighted red the value entered within that text box is out of range. If the operator attempts to proceed a dialog will be displayed informing them of the appropriate valid range that should be entered for that parameter.

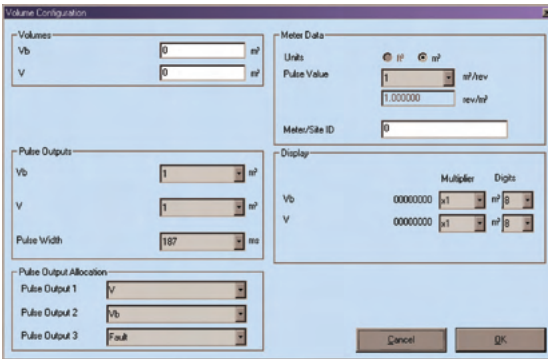
**To upload any changes made within the user terminal, select Upload to MC2.**

If the MC2 is protected by the hardware link (read / write link (Weights and Measures legislation)) it may not be possible to upload the changes made. Please refer to section 14 (Weights and Measures Link Protection) for further details.

**6.3 Volume Configuration**

The parameters that can be changed within this dialog are as follows:

- Volumes – enables the operator to specify total volume at base conditions or total volume at measurement conditions.
- Pulse Outputs – enables the operator to specify the ratio of input pulses to output pulses for either volume at base or measurement conditions, and the pulse width of both of these output pulses in milliseconds.
- Meter Data – enables the operator to specify pulse value. In addition the operator is able to allocate a Meter/Site ID to each specific MC2.
- Display – enables the operator to specify how the volume at base conditions and volume at measurement conditions are displayed.
- Pulse Output Allocation – enables the operator to select volume at measurement conditions, volume at base conditions, or fault pulses separately for each Pulse Output i.e. 1, 2 and 3.



**Figure 4 - Volume Configuration Dialog**

To display the volume configuration dialog:

- From within the Configuration screen select Volume, the Volume Configuration dialog will be displayed.

### 6.3.1 Volumes

It is possible to change the volume at base conditions and the volume at measurement conditions once the data within the MC2 has been downloaded to the user terminal.

The Volumes section on the Volume Configuration dialog contains 2 text boxes labeled Volume at Base Conditions ( $V_b$ ) and Volume at Measurement Conditions ( $V$ ); these text boxes enable the operator to change the values of the volume at base and measurement conditions.

To set the Volume at Base Conditions and Volume at Measurement Conditions:

- From within the Configuration screen select Volume, the Volume Configuration dialog will be displayed.
- From within the Volumes section enter the desired value in the appropriate text box. The new value will be highlighted yellow. A maximum of 9 digits can be entered in the user terminal for the volume at base conditions and the volume at measurement conditions. NOTE: The LCD of the MC2 can only display a maximum of 8 digits; the value that is to be displayed on the LCD is shown in the Display section of the Volume Configuration dialog.
- Select OK within the Volume Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK, select OK, and the uploaded parameters will be displayed with the default white background. This color change from yellow to white indicates that the values displayed on the screen matches the values in the unit, therefore the upload was successful.

### 6.3.2 Pulse Outputs

The pulse output can be configured as 0.1, 1, 10, and 100 ( $m^3$ ). In addition the pulse width of the output pulses can be set to 62.5, 125, 187 or 315 milliseconds.

NOTE: The Pulse Outputs for Volume at Base Conditions and the Pulse Outputs for Volume at Measurement Conditions are independent of one another; hence the base conditions and measurement conditions pulse outputs may be set as different values. This is particularly useful when working with high conversion factors.

The Pulse Outputs section on the Volume Configuration dialog contains 3 drop down selection boxes labeled  $V_b$ ,  $V$ , and Pulse Width.

**To set the pulse outputs:**

- From within the Configuration screen select Volume, the Volume Configuration dialog will be displayed.
- From within the Pulse Outputs section select the appropriate volume (at Base or Measurement Conditions) drop down selection box and select the desired option. The new value will be highlighted yellow.
- Select OK within the Volume Configuration dialog
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.

- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK, select OK, and the uploaded parameters will be displayed with the default white background.

### To set the pulse width:

- From within the Configuration screen select Volume, the Volume Configuration dialog will be displayed.
- From within the Pulse Outputs section select the Pulse Width drop down selection box and select the desired option. The new value will be highlighted yellow.
- Select OK within the Volume Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK, select OK, and the uploaded parameters will be displayed with the default white background.

### 6.3.3 Meter Data

The Meter Data section on the Volume Configuration dialog contains 2 options; drop down selection box labeled pulse value, a text box labeled Meter/Site ID.

The number of revolutions per  $m^3$  (rev/ $m^3$ ) or  $m^3$  per revolution ( $m^3$ /rev) is dependant on the pulse value selected. This number is automatically displayed when the appropriate pulse value is selected from the appropriate drop down selection box, these details should reflect the meter type and size that the MC is fitted to.

A second drop down selection box (labeled rev/ $m^3$ ) located below the pulse value field is displayed. This additional field remains uneditable until the Manual option within the pulse value field is selected.

If the appropriate pulse value required is not shown in the drop down selection box the Manual option from within the pulse value drop down selection box should be selected. If the Manual option is selected within the pulse value drop down selection box the text box below will be enabled, this will allow the operator to enter the desired number of revolutions per  $m^3$ .

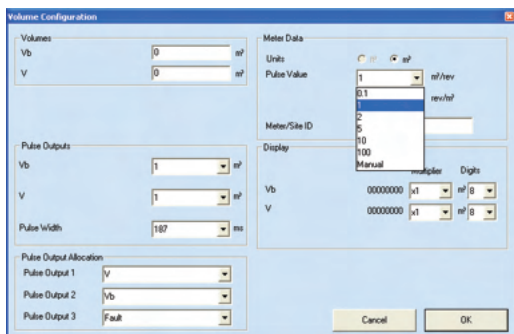


Figure 5 - Volume Configuration Screen

**To set the pulse value:**

- From within the Configuration screen select Volume, the Volume Configuration dialog will be displayed.
- From within the Meter Data section select the pulse value drop down selection box and select the desired option. The new value will be highlighted yellow.
- Select OK within the Volume Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2. (Enter the password if appropriate, and select OK, otherwise select Cancel).
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK, select OK, and the uploaded parameters will be displayed with the default white back ground.

**To set the meter/site ID:**

- From within the Configuration screen select Volume, the Volume Configuration dialog will be displayed.
- From within the Meter Data section select the Meter/Site ID text box and enter the desired meter/site ID reference. The new value will be highlighted yellow.
- Select OK within the Volume Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK, select OK, and the uploaded parameters will be displayed with the default white back ground.

### 6.3.4 Display

The LCD is capable of displaying up to 8 digits for the various volumes, with a maximum volumes value equal to 99999999. On receipt of the next input pulse the LCD will display 00000000; if the configuration data within the MC2 is then uploaded to the user terminal the appropriate volume register will display 100000000 - the volume registers within the MC2 are capable of storing up to 9 digits. The user terminal will also display up to 9 digits; hence the maximum volumes value is equal to 999999999. On receipt of the next input pulse the volume register will be equal to 000000000.

It is possible to independently configure the volume at base conditions and the volume at measurement conditions on the LCD; both the multipliers and number of digits displayed on the LCD (between 5 and 8) can be altered. An increase to the Multiplier will effectively shift the appropriate volume value to the left on the LCD, revealing the most significant figure of the volumes value; if no further significant values are to be revealed a 0 is placed in front of the volumes value. A decrease to the Digits will effectively 'remove' the most significant figure of the volumes value. The affect of the various Multiplier and Digits options is detailed in Table 1 (Volume Multiplier and Digits Reference Table), in addition a sample volume at base conditions and volume at measurement conditions is displayed within the Display section on the Volume Configuration dialog.

**Table 1 – Volume Multiplier and Digits Reference Table**

Volume Reading	Multiplier Option	Digits Option	Volume Displayed on LCD
123456789	x1	8	23456789
	x10		12345678
	x100		01234567
	x1000		00123456
123456789	x1	7*	3456789
	x10		2345678
	x100		1234567
	x1000		0123456
123456789	x1	6*	00456789
	x10		00345678
	x100		00234567
	x1000		00123456
123456789	x1	5*	00056789
	x10		00045678
	x100		00034567
	x1000		00023456

\* On the LCD, a U can be displayed for the volume at measurement conditions and a C for the volume at base conditions. This feature is user configurable.

The Display section on the Volume Configuration dialog contains 4 drop down selection boxes;  $V_b$  Multiplier,  $V_b$  Digits, V Multiplier and V Digits.

**To set the Volume at Base Conditions and Volume at Measurement Conditions multiplier:**

- From within the Configuration screen select Volume, the Volume Configuration dialog will be displayed.
- From within the Display section select the appropriate Multiplier drop down selection box and select the desired option. The new value will be highlighted yellow.
- Select OK within the Volume Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK, select OK, and the uploaded parameters will be displayed with the default white back ground.

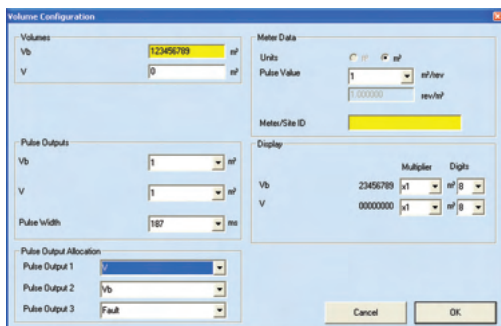
**To set the Volume at Base Conditions and Volume at Measurement Conditions digits:**

- From within the Configuration screen select the Volume option, the Volume Configuration dialog will be displayed.
- From within the Display section select the appropriate Digits drop down selection box and select the desired option. The new value will be highlighted yellow.
- Select the OK option within the Volume Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK, select OK, and the uploaded parameters will be displayed with the default white back ground.

**6.3.5 Pulse Output Allocation**

- From within the Configuration screen select the Pulse Output 1 or 2 or 3 option, the required Pulse Output Allocation Configuration dialog will be displayed.
- From within the Pulse Output Allocation section select the required Pulse Output drop down selection box and select the desired option, i.e., Volume at Base Conditions ( $V_b$ ), Volume at Measurement Conditions (V), or Fault. The new value will be highlighted yellow.

- Select OK within the Volume Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK, select OK, and the uploaded parameters will be displayed with the default white background.



**Figure 6 - Pulse Output Configuration**

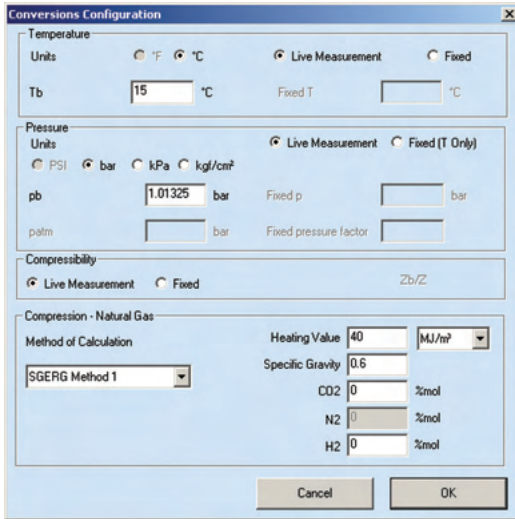
## 6.4 Conversions Configuration

To display the Conversions Configuration dialog select Conversions from within the Configuration screen. Table 2 - Conversion Configuration Parameter Reference Table is provided as a quick reference indicating the accepted ranges for the conversion configuration parameters.

The Conversions Configuration dialog is divided into 4 sections and the parameters that can be changed within this dialog are those associated with volume conversion:

- Temperature – the operator is able to specify the base temperature value, and whether to utilise either live temperature measurement via the temperature probe or a specified fixed temperature value.
- Pressure – the operator is able to specify the pressure units, base pressure value, and whether to utilise either live pressure measurement via the pressure transducer or values for specified fixed line pressure and fixed pressure factor values.
- Supercompressibility – the operator is able to specify whether a fixed Supercompressibility value is to be utilised or calculated by live measurement using gas constituent values supplied by the operator.
- Compression - Natural Gas – if Live Measurement is selected for method of Supercompressibility calculation, than the operator may specify the Method of Calculations. The following 8 methods are available for selection:
  1. AGA8 Gross Method 1
  2. AGA8 Gross Method 2
  3. SGERG88 Method 1
  4. SGERG88 Method 2
  5. SGERG88 Method 3
  6. SGERG88 Method 4
  7. NX19 Low Heating Value
  8. NX19 High Heating Value.

**Table 3 (Supercompressibility Configuration Parameter Reference Table)** is provided as a quick reference indicating the accepted ranges for the configuration parameters for each calculation method.



**Figure 7 - Conversions Configuration Screen**

**Table 2 – Conversion Configuration Parameter Reference Table**

Parameter	Minimum	Maximum
Base Temperature ( $T_b$ )	0 °C	30 °C
Fixed Temperature (Fixed T)	-40 °C	60 °C
Base Pressure ( $p_b$ )	0.621 bar	1.034 bar
	62.052 kPa	103.420 kPa
	0.63293 kgf/cm <sup>2</sup>	1.05488 kgf/cm <sup>2</sup>
Atmospheric Pressure (patm)	0.552 bar	1.034 bar
	55.157 kPa	103.420 kPa
	0.56260 kgf/cm <sup>2</sup>	1.05489 kgf/cm <sup>2</sup>
Fixed Line Pressure* (fixed p)	See NOTE below	
Fixed Pressure Factor*	See NOTE below	
Supercompressibility ( $Z_b/Z$ )	0.9	1.2

\* The acceptable ranges for Fixed Line Pressure and Fixed Pressure Factor are variable and depend on the pressure transducer reference type.

**Table 3 – Supercompressibility Configuration Parameter Reference Table**

<b>Method</b>	<b>Parameter</b>	<b>Minimum</b>	<b>Maximum</b>
<b>AGA 8 Methods 1 &amp; 2</b>	Heating Value	18.7 MJ/m <sup>3</sup>	45.1 MJ/m <sup>3</sup>
	Specific Gravity	0.554	0.87
	%CO <sub>2</sub>	0	30%
	%N <sub>2</sub>	0	50%
NOTE: Conversion calculations are only valid if the following gas composition is maintained. Ethane: 0% to 10%. Propane: 0% to 4%. Hydrogen: 0% to 10%.			
<b>SGERG88 Methods 1, 2, 3 &amp; 4</b>	Heating Value	20 MJ/m <sup>3</sup>	48 MJ/m <sup>3</sup>
	Specific Gravity	0.55	0.9
	%CO <sub>2</sub>	0%	30%
	%N <sub>2</sub>	0%	50%
	%H <sub>2</sub>	0%	10%
	NOTE: Conversion calculations are only valid if the following gas composition is maintained. Methane: 50% to 100%. Ethane: 0% to 20%. Propane: 0% to 5%.		
<b>NX19 Low Heating Value</b>	Specific Gravity	0.554	1.0
	%CO <sub>2</sub>	0%	15%
	%N <sub>2</sub>	0%	15%
<b>NX19 High Heating Value</b>	Heating Value	39 MJ/m <sup>3</sup>	47 MJ/m <sup>3</sup>
	Specific Gravity	0.55	0.7
	%CO <sub>2</sub>	0%	2.5%
	%N <sub>2</sub>	0%	7%
	NOTE: Conversion calculations are only valid if the following gas composition is maintained. H <sub>2</sub> : 0% to 4%.		

### 6.4.1 Temperature Measurement

Live temperature measurement is performed by a 4-wire Class A 100 ohm platinum resistance thermometer. For further details refer to the Micro Series Volume Converter MC2 Hardware Manual or contact your Dresser Representative for further details. Alternatively, if live temperature readings can not be taken, the operator is able to specify a fixed temperature; this constant value is then used for calculating supercompressibility.

**To set the base temperature:**

- From within the Configuration screen select the Conversions option, the Conversions Configuration dialog will be displayed.
- From within the Temperature section select the Base Temperature ( $T_b$ ) text box and enter the desired value. The new value will be highlighted yellow.  
NOTE: See Table 2 - Conversion Configuration Parameter Reference Table for acceptable range.
- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK, select OK, and the uploaded parameters will be displayed with the default white back ground.

**To set a fixed temperature value:**

- From within the Configuration screen select Conversions, the Conversions Configuration dialog will be displayed.
- From within the Temperature section select the Fixed radio button option. The new option will be implied as the Fixed Temperature text box will be enabled.
- Select the Fixed Temperature text box and enter the desired value. The new value will be highlighted yellow.  
NOTE: See Table 2 (Conversion Configuration Parameter Reference Table) for acceptable range.
- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK, select OK, and the uploaded parameters will be displayed with the default white back ground.

NOTE: When a fixed temperature value is used the temperature alarm limits and settings (accessible through the Faults & Alarms screen) are disabled.

**To utilise live temperature measurement:**

- From within the Configuration screen select the Conversions option, the Conversions Configuration dialog will be displayed.
- From within the Temperature section select the Live Measurement radio button option. The new option will be implied as the Fixed Temperature text box will be disabled.
- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.

**6.4.2 Pressure Measurement**

Live pressure measurement is conducted via a factory fitted pressure transducer (pressure transducer range is order specific). For further details regarding the pressure transducer and alternative ranges refer to the Micro Series Volume Converter Model MC2 Hardware Manual or contact your Dresser Representative.

It is possible to set the pressure units to enable the display of pressure readings in bar, kgf/cm<sup>2</sup> or kPa.

**To set the pressure units:**

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Pressure section select the desired Units radio button option (bar, kgf/cm<sup>2</sup> or kPa). The new option will be implied as the Base Pressure (p<sub>b</sub>) value will be highlighted yellow, and the new pressure unit will be displayed to the right of the Base Pressure text box.
- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.

The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white background.

**To set the base pressure ( $p_b$ ):**

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Pressure section select the Base Pressure text box and enter the desired value. The new value will be highlighted yellow.  
NOTE: See Table 2 - Conversion Configuration Parameter Reference Table for acceptable range.
- Select the OK option within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white background.

**To set a fixed line pressure value:**

- The value entered for the Fixed Line Pressure determines the value for the Fixed Pressure Factor and vice versa; these values are automatically updated when either of the two parameters is changed.
- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Pressure section select the Fixed (T only) option.
- Select the Fixed Pressure text box and enter the desired value. The new value will be highlighted yellow.  
NOTE: The accepted Fixed Pressure range will depend on other parameter settings; if an invalid value is entered the operator will be advised of the acceptable range.
- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white background.

NOTE: When a fixed temperature value is used the temperature alarm limits and settings (accessible through the Faults & Alarms screen) are disabled.

### To set a fixed pressure factor value:

- The value entered for the Fixed Pressure Factor determines the value for the Fixed Line Pressure and vice versa; these values are automatically updated when either of the two parameters is changed.
- From within the Configuration screen select Conversions, the Conversions Configuration dialog will be displayed.
- From within the Pressure section select the Fixed (T Only) option.
- Select the Fixed Pressure Factor text box and enter the desired value. The new value will be highlighted yellow.

NOTE: The accepted Fixed Pressure Factor range will depend on other parameter settings; if an invalid value is entered the operator will be advised of the acceptable range.

- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.



Figure 8 - Setting Fixed Factor Values

NOTE: When a fixed pressure value is used, the pressure alarm limits and settings (accessible through the Faults & Alarms screen) are disabled.

### To utilise live pressure measurement:

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Pressure section select the Live Measurement radio button option. The new option will be implied as the Fixed Line Pressure and Fixed Pressure Factor text boxed will be disabled.
- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK, select OK, and the uploaded parameters will be displayed with the default white back ground.

### 6.4.3 Supercompressibility

Volume conversion is calculated on the basis of live pressure and temperature measurement, fixed pressure and temperature measurement or any combination of fixed and/or live pressure and/or temperature measurement.

The operator is able to specify whether supercompressibility is to be calculated using gas constituents selected by the operator and from the live pressure and temperature readings, or if a fixed ( $Z_b/Z$ ) value is to be used with the pressure and temperature. The gas compressibility calculations depend on the composition of the gas and this information is entered when utilising the Live Measurement method.

The measured volume at measurement conditions is converted to the volume at base conditions using the following formula:

$$V_b = V \times (p/p_b) \times (T_b/T) \times (Z_b/Z)$$

Where

<b>V</b>	is the metered volume	at measurement conditions
<b>p</b>	is the absolute pressure*	
<b>T</b>	is the absolute temperature	
<b>Z</b>	is the compressibility	
<b>V<sub>b</sub></b>	is the volume	at base (or reference) conditions
<b>p<sub>b</sub></b>	is the absolute pressure	
<b>T<sub>b</sub></b>	is the absolute temperature	
<b>Z<sub>b</sub></b>	is the compressibility	

Calculation accuracy is typically better than 0.01%.

### To set a fixed supercompressibility value:

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Supercompressibility section select the Fixed radio button option. The new option will be implied as the Supercompressibility ( $Z_b/Z$ ) text box will be enabled.
- Select the Supercompressibility ( $Z_b/Z$ ) text box and enter the desired value. The new value will be highlighted yellow.

NOTE: See Table 2 (Conversion Configuration Parameter Reference Table) for accepted range.

- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.

### To set a supercompressibility value calculated from live measurement:

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Supercompressibility section select the Live Measurement radio button option. The Supercompressibility ( $Z_b/Z$ ) text box will be disabled.
- Continue to Compression – Natural Gas in order to select the desired Supercompressibility method.

## 6.4.4 Compression – Natural Gas

The following methods are available for calculating live supercompressibility:

1. AGA8 Gross Method 1
2. AGA8 Gross Method 2
3. SGERG88 Method 1
4. SGERG88 Method 2
5. SGERG88 Method 3
6. SGERG88 Method 4
7. NX19 Low Heating Value
8. NX19 High Heating Value

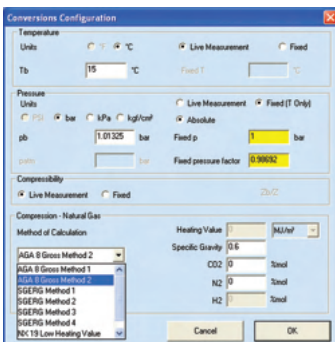


Figure 9 - Supercompressibility Options

### **To utilise AGA 8 Gross Method 1 for Live Supercompressibility Measurement:**

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Supercompressibility section select the Live Measurement radio button option. Various compressibility calculation methods and radio button options will be enabled.
- Select the AGA 8 Gross Method 1 radio button option. The Heating Value, Specific Gravity and %CO<sub>2</sub> boxes will be displayed. See Table 3 (Supercompressibility Configuration Parameter Reference Table) for appropriate input ranges.
- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.

### **To utilise AGA 8 Gross Method 2 for Live Supercompressibility Measurement:**

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Supercompressibility section select the Live Measurement radio button option. Various compressibility calculation methods and radio button options will be enabled.
- Select the AGA 8 Gross Method 2 radio button option. The Specific Gravity, %N<sub>2</sub> and %CO<sub>2</sub> boxes will be displayed. See Table 3 (Supercompressibility Configuration Parameter Reference Table) for appropriate input ranges.
- Select OK within the Conversion Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.

### **To utilise SGERG Method 1 for Live Supercompressibility Measurement:**

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Supercompressibility section select the Live Measurement radio button option. Various compressibility calculation methods and radio button options will be enabled.
- Select the SGERG Method 1 radio button option. The Heating Value, Specific Gravity, %CO<sub>2</sub> and %H<sub>2</sub> boxes will be displayed. See Table 3 (Supercompressibility Configuration Parameter Reference Table) for appropriate input ranges.

- Select OK within the Conversion Configuration dialog
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.

### **To utilise SGERG Method 2 for Live Supercompressibility Measurement:**

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Supercompressibility section select the Live Measurement radio button option. Various compressibility calculation methods and radio button options will be enabled.
- Select the SGERG Method 2 radio button option. The Heating Value, Specific Gravity, %N2 and %H2 boxes will be displayed. See Table 3 (Supercompressibility Configuration Parameter Reference Table) for appropriate input ranges.
- Select OK within the Conversion Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.

### **To utilise SGERG Method 3 for Live Supercompressibility Measurement:**

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Supercompressibility section select the Live Measurement radio button option. Various compressibility calculation methods and radio button options will be enabled.
- Select the SGERG Method 3 radio button option. Following option will be implied as the Specific Gravity , %C02, %N2 and %H2 boxes will be displayed. See Table 3 (Supercompressibility Configuration Parameter Reference Table) for appropriate input ranges.
- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.

### **To utilise SGERG Method 4 for Live Supercompressibility Measurement:**

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Supercompressibility section select the Live Measurement radio button option. Various compressibility calculation methods and radio button options will be enabled.
- Select the SGERG Method 4 radio button option. The Heating Value, %CO<sub>2</sub>, %N<sub>2</sub> and %H<sub>2</sub> boxes will be displayed. See Table 3 (Supercompressibility Configuration Parameter Reference Table) for appropriate input ranges.
- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.

### **To utilise NX-19 Low Heating Value for Live Supercompressibility Measurement:**

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Supercompressibility section select the Live Measurement radio button option. Various compressibility calculation methods and radio button options will be enabled.
- Select the NX19 Low Heating Value radio button option. The Specific Gravity, %CO<sub>2</sub> and %N<sub>2</sub> boxes will be displayed. See Table 3 (Supercompressibility Configuration Parameter Reference Table) for appropriate input ranges.
- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.

## To utilise NX-19 High Heating Value Method for Live Supercompressibility Measurement:

- From within the Configuration screen select Conversions. The Conversions Configuration dialog will be displayed.
- From within the Supercompressibility section select the Live Measurement radio button option. Various compressibility calculation methods and radio button options will be enabled.
- Select the NX19 High Heating Value radio button option. The Heating Value, Specific Gravity, %CO<sub>2</sub> and %N<sub>2</sub> boxes will be displayed. See Table 3 (Supercompressibility Configuration Parameter Reference Table) for appropriate input ranges.
- Select OK within the Conversions Configuration dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.

### 6.5 Set Date & Time

It is possible to set the date and time stored in the MC2 from within the user terminal; this may be required if the unit has been left in storage for a period of time without the battery connected. It is also possible to set Date Format. Refer to Figure 10 below.

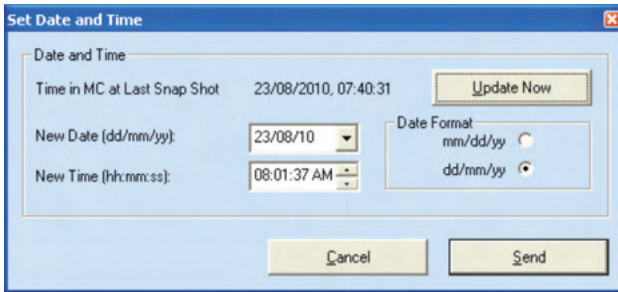


Figure 10 - Set Date and Time Dialog

#### To set the date and time:

- From within the Configuration screen select Set Date & Time. The Set Date and Time dialog will be displayed.
- The date and time stored within the MC is displayed within the dialog and is identified as Time in MC at Last Snap Shot.
- Select the Update Now option; the Time in MC at Last Snap Shot value, New Date (dd/mm/yy)\* and New Time (hh:mm:ss) selection boxes will all be updated.

- If an update to the date is required select the New Date (mm/dd/yy) drop down selection box. A calendar dialog will be displayed. Select the appropriate date. To change the month displayed select the appropriate arrow option located at the top of the calendar dialog. Once a date has been selected the dialog will close and the new date will be displayed within the drop down selection box.
- If an update to the time is required select the New Time (hh:mm:ss) selection box. Each time unit (hours/minutes/seconds) is changed individually, by highlighting the relevant section then selecting either the up or down arrow located at the right hand side of the selection box. Alternatively the new setting for each section may be entered via the keyboard.
- Select Send to upload the new date and time to the MC2.
- If the unit has not made any data log entries the new date and time will be uploaded. If data log entries exist the operator will be advised to download the data logs prior to updating the date and time.

NOTE: All data logs will be cleared when the date and / or time are updated to the MC2. It is therefore recommended that all data logs are downloaded from the MC2 before the new data and / or time settings are uploaded. For information regarding the download of data logs refer to section 11.2 (Download Data Log).

\*The user terminal will display the date format in the same format as configured within the PC it is operating, for example if the default PC setting is DD/MM/YY the user terminal will display the date format in DD/MM/YY.

## 6.6 Customize LCD

The following parameters will always be displayed on the LCD and are not user configurable:

### Main Screens

- Volume at Base Conditions ( $V_b$ )
- Volume at Measurement Conditions (V)
- Conversion Factor (C)
- Pulse Value
- Pressure (p)
- Temperature (T)

### Additional Screens

- Base Temperature ( $T_b$ )
- Compressibility at Base Conditions ( $Z_b$ )
- Firmware Version
- Base Pressure ( $p_b$ )
- Supercompressibility ( $Z_b/Z$ )
- Battery Voltage
- Compressibility at Measurement Conditions (Z) - Refer to Note 1
- Gas Composition & Method of Compressibility - Refer to Note 2

The following parameters are user configurable and may be displayed or disabled:

**Main Screens**

- Flow Rate at Measurement Conditions (Q)

**Additional Screens**

- Volume at Measurement Conditions under Fault (V under Fault)
- Pressure Factor

**Configurable Screens** – Four additional parameters may be selected from the following options, which are located in the drop-down menus:

- Accumulated Volume at Base Conditions Previous Day
- Accumulated Volume at Base Conditions Current Day
- Accumulated Volume at Base Conditions Previous Month
- Accumulated Volume at Base Conditions Current Month
- Highest Daily Volume in the Previous Month
- Highest Daily Volume in the Current Month
- Date of Last Consumption Alarm
- Q MAX
- Volume at Base Conditions ( $V_b$ ) Residual
- Volume at Measurement Conditions (V) Residual
- Current Date
- Current Time

NOTE 1: Z is displayed on the LCD only if compressibility is set at “Live Measurement” (not Fixed) on the converter configuration screen.

When Z is set at Fixed, the LCD display will show it as COnSt. When Z is set at Live Measurement, the LCD display will show the Gas Composition & Method of Compressibility.

NOTE 2: Select AUTO exit from gas composition screen or MANUAL exit from gas composition screen from the drop down menu. The LCD display for method of compression and gas specification are as follows:

**Table 4 - LCD Display for Method of Compression & Gas Specification**

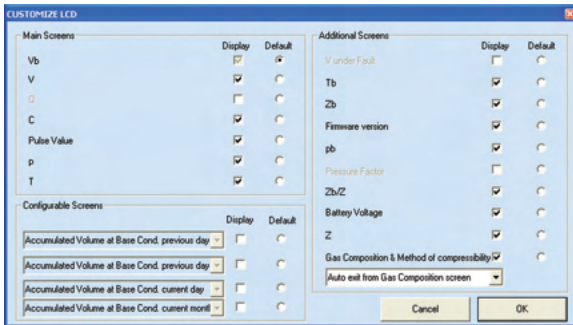
Method of Compression Calculation		Gas Specification	
Displayed	Represents	Displayed	Represents
1AGA8	AGA8 Gross Method 1	XXXXXj	Heating Value (M/m <sup>3</sup> )
2AGA8	AGA8 Gross Method 2		
SG88 1	SGERG 88 Method 1	O.XXX G	Specific Gravity
SG88 2	SGERG 88 Method 2	XX XXX C	mol%CO <sub>2</sub>
SG88 3	SGERG 88 Method 3	XX XXX n	mol%N <sub>2</sub>
SG88 4	SGERG 88 Method 4	XX XXX H	mol%H <sub>2</sub>
n 19 n	NX19 Low Calonific Gases		
n 19 H	NX 19 High Calonific Gases		
COnSt	Fixed value of Supercompressibility Factor		

It is possible to switch the configurable parameters on and off. In addition, the operator is able to specify which parameter should be displayed as the default parameter on the LCD.

By default all available parameters (dependent on model chosen at time of order) will be displayed. The switched on parameter check boxes have a check placed in the associated check box indicating that the parameter is to be displayed on the LCD.

**To set the default screen parameter on the LCD:**

- From within the Configuration screen select Customize LCD, The Customize LCD dialog will be displayed.
- Select the appropriate Default Screen radio button option. If the parameter was previously switched off, selection of that parameter as the Default Screen will cause the parameter to be switched on.
- Select OK within the Customize LCD dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2. The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK.



**Figure 11 - Customize LCD Dialog**

### **To switch off parameters on the LCD:**

- From within the Configuration screen select Customize LCD, the Customize LCD dialog will be displayed.
- Select the parameters that are not required to be displayed on the LCD. Ensure that the check is removed from the check box. Parameters that are set to be switched off on the LCD (not displayed) are disabled.
- NOTE: It is not possible switch the default screen parameter off. If this screen is not required to be displayed on the LCD, the Default Screen radio button option must be set to a parameter that is required to be displayed on the LCD.
- Select OK within the Customize LCD dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2. The new details will be uploaded to the MC. On completion a dialog will be displayed stating Sent OK. Select OK.

### **To switch on parameters on the LCD:**

- From within the Configuration screen select the Customize LCD option. The Customize LCD dialog will be displayed.
- Select the parameters that are required to be displayed on the LCD. Ensure that a check is displayed in the appropriate check box. If a parameter is disabled it may be because it is not available on the MC in question (dependent on model chosen at time of order). For further details contact your Dresser Representative.
- Select OK within the Customize LCD dialog.
- The Configuration screen will be displayed and any changed parameters will be highlighted yellow within the parameters selection list.
- Select Upload to MC2. The new details will be uploaded to the MC. On completion a dialog will be displayed stating Sent OK, select OK.

## **6.7 MC2 Comms Settings**

Selection between Modem/Printer should normally be set to Modem. GSM/GPRS modems can be used with the MC2 to utilise remote communication. The GSM/GPRS modem can be configured for GSM (2-way circuit-switched) communication, or GPRS (1-way packet data email) communication.

- From within the Configuration screen select MC2 Comms Settings. The MC2 Comms Settings screen will be displayed.

NOTE: MC2 Comms Setting has to be selected and saved using direct communication. There is no access to this setup if MCUT is set for remote communication.

### 6.7.1 GSM Communication

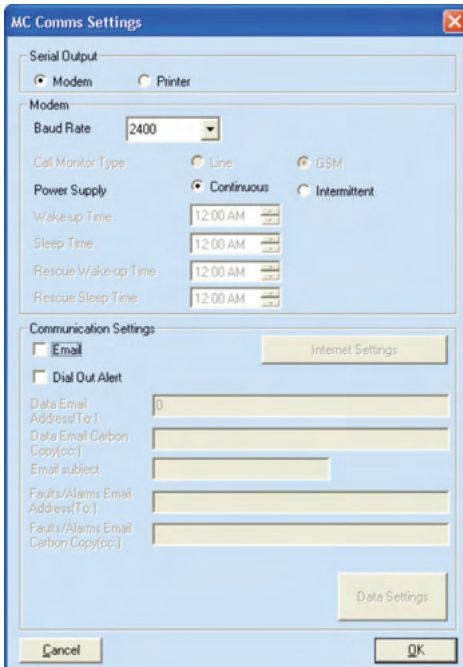
The baud rate of the GSM modem has to be selected (Figure 12). Maximum baud rate speed of the GSM modem is 9600, however lower baud rates can also be selected.

NOTE: The PC modem has to be configured with this same baud rate; otherwise, the remote communication process will not be successful. Refer to chapter 6.10 for details.

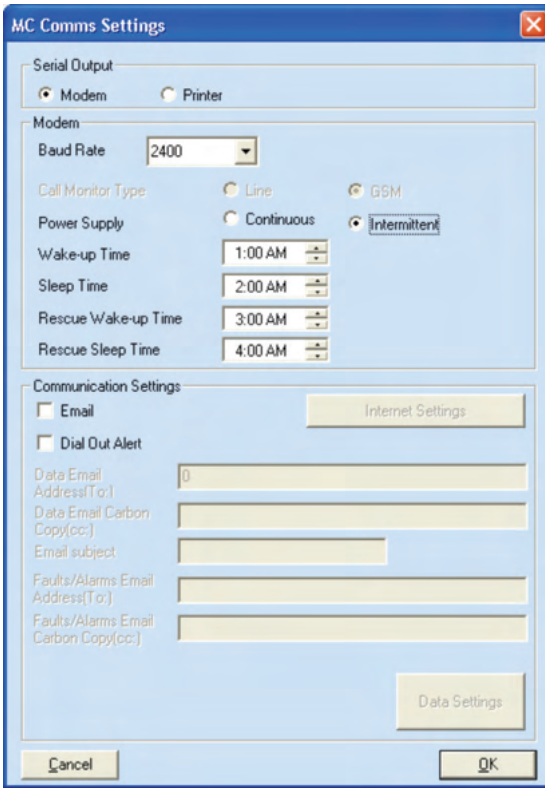
#### To specify the GSM modem baud rate:

- Select the Baud Rate drop down selection box and select the appropriate baud rate.
- Select OK. The Configuration screen will be displayed.

Selection of GSM type modem allows also selecting modem Power Supply mode. If Continuous is selected, then the GSM modem is constantly operational and communication can be made at any time (Figure 12). If Intermittent is selected then GSM modem is operational only during two selectable time periods (Figure 13). The first period starts at Wake-up Time and finishes at Sleep Time. The second period starts at Rescue Wake-up Time and finishes at Rescue Sleep Time. Power Supply mode and these four Times are selected on the MC Comms Settings dialog screen. Intermittent Power Supply mode is selected to conserve power taken from the modem power supply source, such as a solar panel.



**Figure 12 – MC Comms Settings Screen  
(GSM Modem – Continuous Power)**



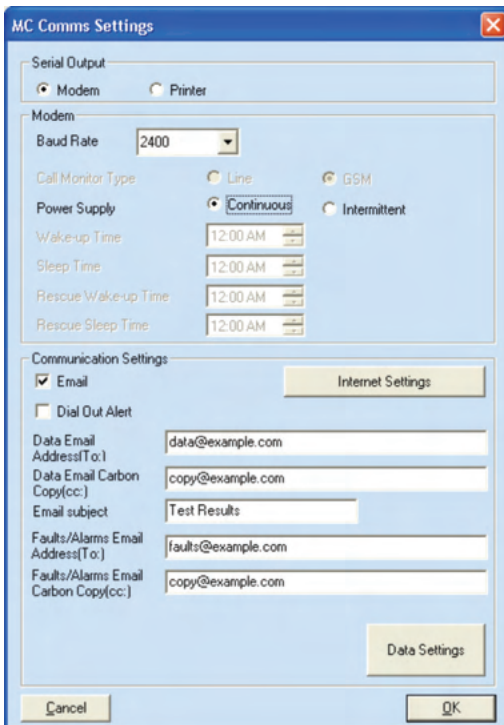
**Figure 13 – MC Comms Settings Screen  
(GSM Modem – Intermittent Power)**

## 6.7.2 GPRS Communication

GPRS (General Packet Radio Service) provides the capability of e-mailing data from the converter. The GPRS modem unit should be fitted with a SIM (Subscriber Identity Module) which is not provided by Dresser. Contact your local wireless provider for a SIM card.

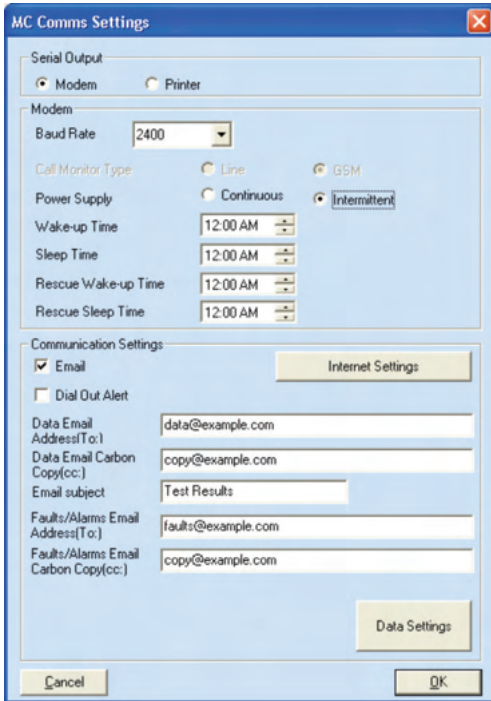
The current baud rate of the Dresser GSM/GPRS Modem is fixed at 2400, so the converter should be set to that rate. If Power Supply is set to Continuous, the converter is accessible for remote connection (Dial up) via MCUT using option 'connect using a modem' at any time. If it is set to Intermittent, the unit will 'wake' and 'sleep' according to the times set. Dial up communication using the MCUT can be done only during the wake-up time slot. Regardless of what wake-up and sleep times have been set for intermittent use, the unit will still wake for sending e-mail.

- On the MC Comms Settings screen, check the Email box and the 'Email' data fields become active. One email address data field must be set to the email account set up specifically for use with the MC Net SQL translation software. The email address must be capable of handling 'POP3' email format. Contact your Dresser Representative for further information on this database software. MC Net software translates the email content into a tabulated form similar to that obtained by direct connection request using the MCUT. The other email data field can optionally be set to any destination of the customer's choosing, but it is not obligatory. Any completed data fields must contain the full email address. Text entered as the Email subject will appear in the recipient's email along with the content information, e.g. Data Log 1 or Alarm, etc.



**Figure 14 – MC Comms Settings Screen  
(Email – Continuous Power)**

NOTE: An additional power savings option is available when Intermittent is selected. If all 4 times are set equal to each other (See Figure 15), the modem will only wake-up for email transfer if any of the configured faults or alarms have occurred, otherwise the modem will remain in standby mode. This is the recommended Power Supply configuration for all GRPS modem installations.



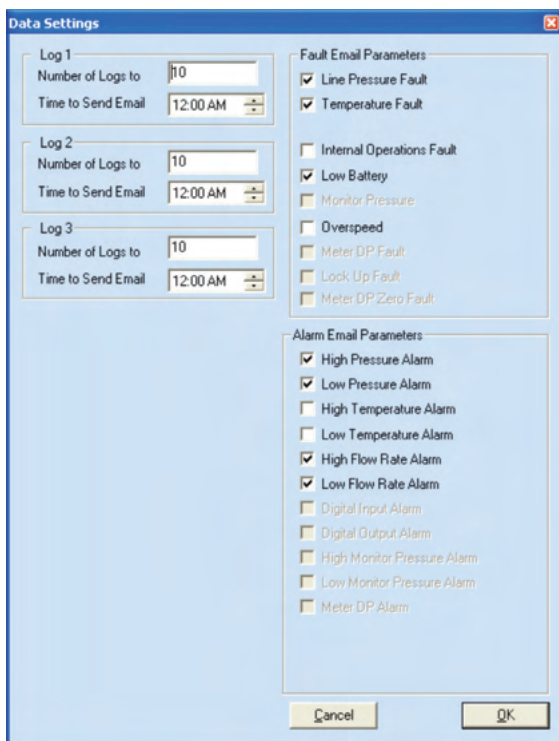
**Figure 15 – MC Comms Settings Screen (Email – Intermittent Power)**

- After selecting the Email check box, the 'Internet Settings' button will become active. Select the 'Internet Settings' button and the screen in Figure 16 appears, containing default information

**Figure 16 – Internet Settings Screen**

- **Modem Model** – Select between eDSoft and WIPSoft wireless protocols.
- **APN Settings** - APN, or Access Point Name, relates to the SIM provider. The User & Password are customer specific as issued by the provider. When the customer purchases their 'Data only' SIM, they will need to obtain this information from their provider. For example, the UK network company **O2** has the following for its SIM cards:
  - Server - Mobile.o2.co.uk
  - User - web
  - Password - password
- Prior entries are stored in the APN HISTORY pull-down menu.

- SMTP Settings - SMTP, or Simple Mail Transfer Protocol, relates to the server settings of the SIM provider being used to transmit data from the converter, i.e. similar to air time on a cell phone. The Port setting is normally 25 for this type of communication, but can in some cases vary. The server is that server allocated to handle communication using the selected SIM. The User and Password are not obligatory. In a majority of cases it is left blank. Sender is the sender's email address, in the form of: data@example.com. Where the sending of non deliverables and other internet warnings are sent, and is obligatory. The Domain is allocated by the email provider on request when a domain is required. In the case of no domain being required, as in a majority of cases, it is obligatory to put something in this field (the word Domain is recommended, as seen in Figure 16).
- Once all fields have been completed, press the OK button. When you have returned to the 'MC Comms Setting' screen, press the 'Data Settings' button.
- The data settings are to be applied according to the customer / end user requirements. See Figure 17.



**Figure 17 – Parameter Settings (For Email)**

Assuming that the logging parameters have already been set (see Chapter 11), select the number of logs and the time each day that an email containing that logging data is required. Also select the fault and alarm conditions for which you require email. Once a selection has been made, press OK, and then OK again on the 'MC Comms Setting' screen. Then upload all setting changes to the Micro Converter.

NOTE: Monitor pressure alarms are only available for units with an external monitoring pressure transducer. Likewise, DP faults/alarms are only available for MC-dp units.

### 6.7.3 Dial Out Alert Option

- After selecting the "Dial Out Alert" check box, the 'Phone Settings' button becomes active. Select the 'Phone Settings' button and the screen in Figure 18 appears. Enter Fault and Alarm telephone numbers, and press OK.

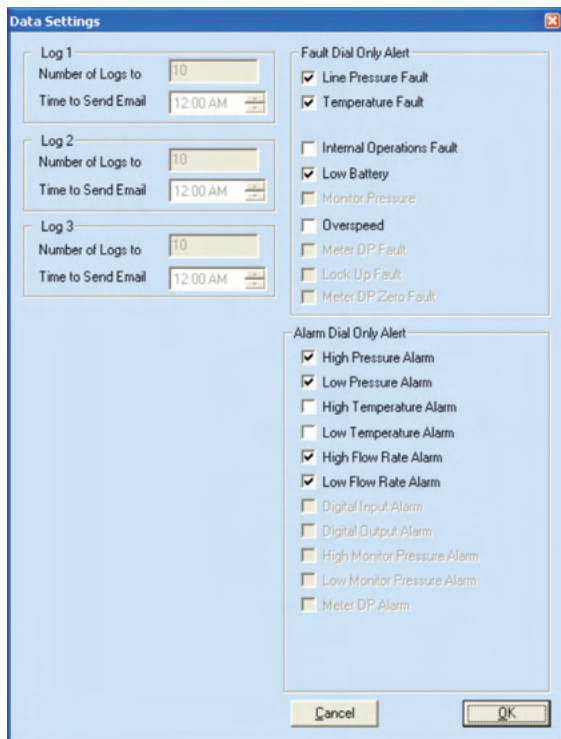
The screenshot shows a 'Phone Settings' dialog box with the following fields and values:

- Modem Protocol: Dial Only Alert (dropdown)
- Telephone Numbers:
  - Fault Dial-out: 123-456-7890
  - Alarm Dial-out: 123-456-7890
- SMTP Settings:
  - Port: 25
  - Server: mail.wyless.net
  - User: user@wyless.net
  - Password: password
  - Sender: sender
  - Domain: domain
  - DNS1: 0 . 0 . 0 . 0
  - DNS2: 0 . 0 . 0 . 0
  - Authentication: PAP (dropdown)

Buttons: Cancel, OK

Figure 18 – Phone Settings

- Once you have returned to the 'MC Comms Setting' screen, press the 'Data Settings' button (refer to Figure 19) to select dialout parameters.  
NOTE: Log 1, Log 2, and Log 3 fields will be inactive for telephone dialout settings (these are only active for Email settings).



**Figure 19 – Parameter Settings (For Dial Out Alert)**

## 6.8 Save Configuration File

The user terminal provides the facility to save configuration files. This may be beneficial when it is necessary to configure several MC's with the same configuration data, as the file can be opened within the user terminal and then uploaded to the MC2.

### To save a configuration to a file:

- From within the Configuration screen select Save Configuration File. The Save As dialog will be displayed.
- Locate the location in which the configuration file is to be saved.
- Enter the desired file name that the configuration file is to be saved to. A default file name will be displayed which may also be used. Please NOTE that the default file name is taken from the Meter/Site ID dialog box.
- Select Save.

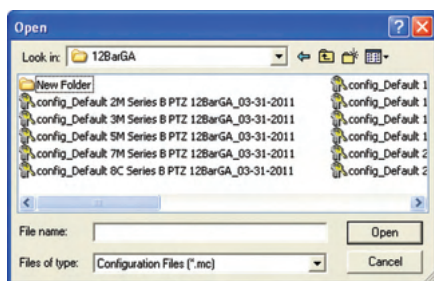
- On completion a dialog will be displayed stating Configuration Saved, select OK.
- The configuration data is now saved to the file. All configuration files are of the type .mc.

## 6.9 Open Configuration File

The user terminal provides the facility to open a previously saved configuration file to an MC. This may be beneficial when it is necessary to configure several MCs with the same configuration data.

### To open a previously saved configuration file:

- From within the Configuration screen select the Open Configuration File option. The Open dialog will be displayed.
- Locate and select the configuration file required to be uploaded to the MC. The configuration file will be of the type .mc.



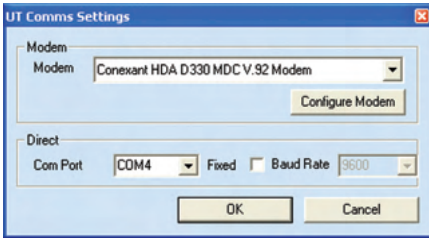
**Figure 20 – Saving or Opening a Configuration File**

- Select Open.
- On completion a dialog will be displayed stating Configuration Restored, select OK.
- The configuration details will now be restored within the user terminal. Any changed parameters will be highlighted yellow within the parameters selection list.
- To ensure that the configuration details are uploaded to the MC select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.

## 6.10 UT Comms Settings

Communications to the MC2 may be conducted directly or remotely, via modem. The operator is able to specify which communications port is to be used for direct communications (Com 1 to Com 255), and the modem configuration for remote communications, refer to Figure 21.

The recommended modem settings are detailed in Table 5 (Modem Settings Reference Table).



**Figure 21 - UT communication settings Dialog.**

**To specify the communications port within the user terminal:**

- From within the Configuration screen select the UT Comms Settings option, the UT Comms Settings dialog will be displayed - Figure 21.
- From within the Direct section select the Com Port drop down selection box. Select the appropriate com port.
- Select OK within the UT Comms Settings dialog.

NOTE: If PC is not equipped with serial communication port then USB serial port adaptor could be used. Follow procedure to find out Com Port assignation.

- Open Control Panel;
- Select System;
- Select Hardware;
- Select Device Manager;
- Check Ports (COM & LPT) to find out Com Port assignation for USB serial port adaptor.

To configure the PC modem settings within the user terminal:

- From within the Configuration screen select UT Comms Settings, the UT Comms Settings dialog will be displayed - Figure 21.
- From within the Modem section select the Modem drop down selection box. Select the PC modem that is to be used for remote communications to the MC.
- Select the Configure Modem option. The connection details will be displayed along with the Modem Settings dialog - Figure 22.
- Set the modem settings to the required configuration (as described in the Modem Settings dialog or Table 5 (Modem Settings Reference Table), and select OK.

**If Dresser GSM Modem is used with MC2 then maximum baud rate for PC modem can be set as 9600. Make sure that this same baud rate is set for GSM modem, refer to chapter 6.7.2.**

- Select OK within the UT Comms Settings dialog.
- The modem is now ready for remote communications. In order to connect to the MC via the modem it is necessary to re-launch the user terminal, and specify that the modem should be used to connect (within the Configuration screen), before selecting Connect with MC2. See section 12 (Modem Communications) for further details.

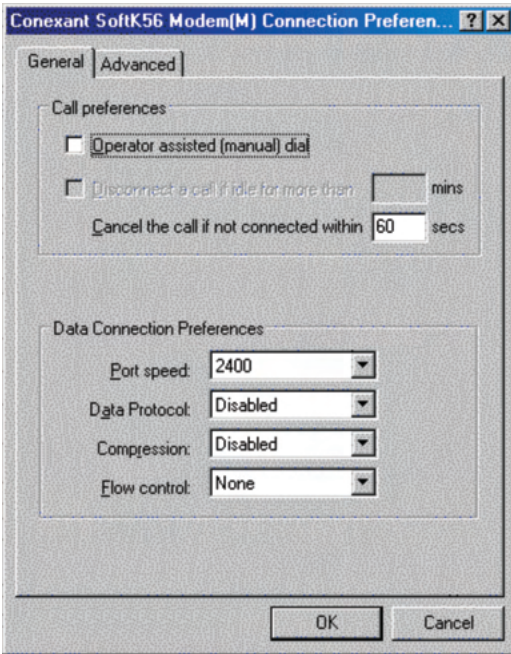


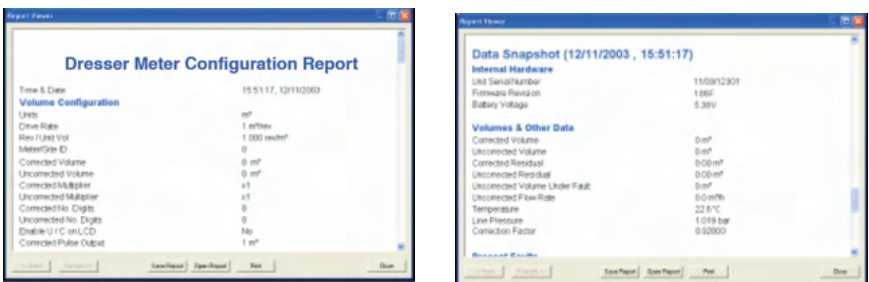
Figure 22 - Configure Modem Dialog (for Windows XP)

**Table 5 – Modem Settings Reference Table**

Windows 95,98		
General Tab	Speed	As Required
Connection Tab	Data bits	8
	Parity	None
	Stop bits	1
	Wait for dial tone before dialling	Off
Advanced Option	Use Error Control	Off
	Use Flow Control	Off
	Modulation Type	Standard
Other Windows versions		
General Tab	Port speed	1200
Advanced Tab	Data bits	8
	Parity	None
	Stop bits	1

**6.11 Create Configuration Report**

The MC2 user terminal provides a Create Report facility; a read only report is generated which details the configuration of the MC2. The operator is able to enter a report heading via the keyboard; this could reflect the meter location reference (e.g. south 1). The report can include a data snapshot of the data stored within the MC2, the additional information displayed within this report is listed below, and includes data specific to the MC that the user terminal is in communication with.



**Figure 23 – Configuration Report**

The information provided in the report includes (dependent on model and configuration of the MC2):

- Volume configuration screen parameters.
- Conversions configuration screen parameters.
- Display Configuration.
- Alarm limits.
- Fault Dialout settings.
- Alarm Dialout settings.
- Logged parameters (including details of log 1, log 2 and log 3).

When a data snapshot is included within the report the following additional information is displayed (dependant on model and configuration of the MC2):

- Unit serial number.
- Firmware revision.
- Battery Voltage.
- Volumes data (including temperature, pressure and conversion factor).
- Present fault(s) details (including line pressure, temperature, volume, internal operation and low battery).
- Occurred fault(s) details (including line pressure, temperature, volume, internal operation and low battery).
- Present alarm(s) details (including high and low pressure, temperature and flow).
- Occurred alarm(s) details (including high and low pressure, temperature and flow).

#### **To create a configuration report:**

- From within the Report section of the Configuration screen select the Report Heading text box. Enter the desired heading of the report.
- To include a data snapshot select the Include Data Snapshot In Report check box (ensure that a check is displayed in the appropriate check box).
- Select the Create Report.
- A report viewer will be displayed, containing all the required data. If the data snapshot is included the details can be found in the second half of the report, and will be entitled Data Snapshot along with the date and time that the data was retrieved.

#### **6.12 Report Viewer/View Release NOTES**

The report viewer contains 6 options; these will enable the operator to Save Report, Open Report and Print reports. Selection of the Save Report, Open Report, and Print options will display the Save As, Open and Print dialogs common to the PC. If more than one report is opened in the report viewer the operator is able to navigate between files via the Forward >> and << Back options. The >> Forward and << Back options will only be enabled once more than one configuration file is displayed within the viewer.

Once selected the View Release NOTES option on the Welcome screen will display a report detailing the changes/new features added to the latest release of the UT. The report is displayed within the Report Viewer: please NOTE that the only options available when viewing the release NOTES in the Report Viewer are Print and Close.

## 7 Calibration Screen

Temperature and pressure recalibration should not be required, however the MC may be temperature and pressure calibrated by the operator, using direct communications between the PC and MC2. Various methods may be used and additional equipment is required. If there is reason to suspect that the temperature or pressure transducers are reading erroneously, or if an authorizing body (e.g. as required by Weights and Measures legislation) requires periodic checks on the transducers, the MC meter should be taken out of the line and transported to a calibration facility.

At this point the procedures outlined in the following sections should be followed (7.1 (Temperature Single Point Calibration), 7.2 (Temperature Zero and Span Calibration), 7.3 (Pressure Single Point Calibration) and section 7.4 (Pressure Zero and Span Calibration)).

NOTE: If using the modem to connect, the options within the Calibration screen will be disabled.

To obtain temperature calibration points use one of the following methods:

1. Use temperature controlled baths with the MC2 temperature probe and a calibrated thermometer for determining the bath temperatures.  
The thermometer's stated accuracy should be  $\pm 0.1$  degree.

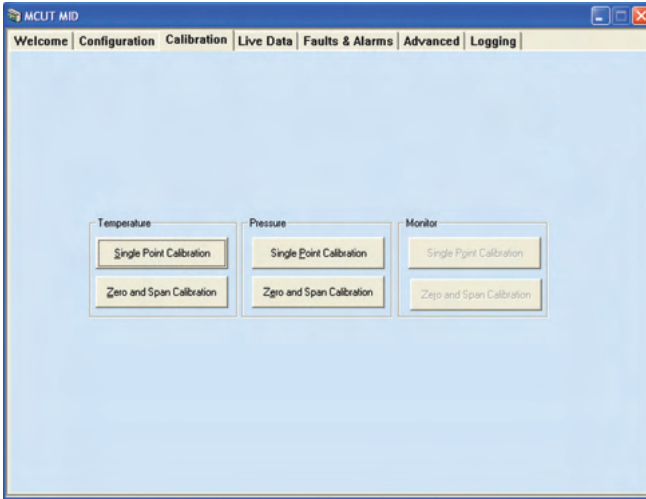
**OR**

2. Simulate the temperature probe using a calibrated resistance box set to values corresponding to 2 different temperatures. If this option is chosen the thermometer probe must be disconnected from the MC2 and the resistance box must be connected as a 4 wire resistor in its place.

NOTE: During calibration multiple temperature readings are automatically compared over a period to ensure that the readings are stable. If stability is not obtained the calibration process will not be successful.

To obtain pressure calibration points an absolute mode dead weight tester or digital pressure controller may be used as a pressure reference. NOTE: The calibration of the reference standard should be traceable to national standards and/or satisfy any national requirements.

Upon selection of the Calibration tab the Calibration screen will be displayed. This screen is divided into 2 sections; Temperature and Pressure. Assuming connection with the MC2 has already been established (see section 6.1 (Connect with MC – Direct Connection to the MC2)), then it is possible to calibrate both the temperature and pressure.



**Figure 24 - Calibration Screen**

**To display the Calibration screen:**

- From within the MCUT select the Calibration tab. The Calibration screen will be displayed.
- The options available on this screen depend on the model and configuration of the MC2.
- If the MC is configured to read a fixed pressure or temperature the associated calibration options will not be available. If a fixed temperature or pressure is used, the measurement modes must be set to live measurement within the MCUT for the appropriate parameter in order to calibrate the desired transducer.

Both Single Point and Zero and Span calibration can be done via the MCUT; this process is only possible via direct communication between the PC and MC2.

**7.1 Temperature Single Point Calibration**

To calibrate a single point temperature:

- Ensure a calibrated predetermined temperature source is connected to the TB2 terminals of the MC2.
- From within the Calibration screen select the temperature Single Point Calibration option. The Temperature Calibration dialog will be displayed.

- Select Update Live Temperature. The MC2 temperature reading will be updated, displayed as read only text and labeled on the screen as Live Temperature.
- Select the Offset Reference Temperature text box, and enter the new temperature value.
- Select Upload Temperature Changes.
- Once complete, a dialog box will be displayed stating Offset Calibration Successful, select OK. The Temperature Calibration selection will be displayed.
- NOTE: The difference between the Offset Reference Temperature and Live Temperature reading should be  $< \pm 5^{\circ}\text{C}$ .
- From the Temperature Calibration screen, select Return to Calibration Screen. The Calibration screen will be displayed

### **To restore single point temperature calibration factory defaults:**

- On the Calibration screen select temperature Single Point Calibration. The Temperature Calibration dialog will be displayed.
- Select Restore Factory Defaults.
- Once complete a message will be displayed stating Factory temperature calibration restored. Select OK.
- The Temperature Calibration dialog will be displayed. Select Return to Calibration Screen; the Calibration screen will be displayed.

For further details please contact your Dresser Representative.

## **7.2 Temperature Zero and Span Calibration**

### **To calibrate the temperature zero and span:**

- Ensure a calibrated predetermined temperature source is connected to the TB2 terminals of the MC2.
- On the Calibration screen select the temperature Zero and Span Calibration option. The Temperature Calibration screen will be displayed.
- Select Update Live Temperature. The MC2 temperature reading will be updated, displayed as read only text, and labeled as Live Temperature.
- Select the Zero Reference Temperature text box and enter the desired zero reference temperature value. If the temperature you select is not feasible, a message to this effect will be displayed. NOTE: The range between zero and span must be at least 32 degrees C.
- Select Send Zero Calibration.
- Once complete, a dialog box will be displayed stating Zero Calibration Successful, select OK.
- The Send Span Calibration option will now be available.

- Select the Span Reference Temperature text box and enter the desired span reference temperature. If necessary the operator will be informed of the accepted range. NOTE: The range between zero and span must be at least 32 degrees C.
- Select Send Span Calibration.
- Once complete, a dialog box will be displayed stating Span Calibration Successful, select OK. The Temperature Calibration screen will be displayed.
- From within the Temperature Calibration dialog select Return to Calibration Screen. The Calibration screen will be displayed.

#### **To restore temperature zero and span calibration factory defaults:**

- From within the Calibration screen select the temperature Zero and Span Calibration option. The Temperature Calibration dialog will be displayed.
- Select Restore Factory Defaults.
- Once complete, a dialog box will be displayed stating Factory temperature calibration restored. Select OK.
- The Temperature Calibration screen will be displayed. Select Return to Calibration Screen; the Calibration screen will be displayed.

For further details please contact your Dresser Representative.

### **7.3 Pressure Single Point Calibration**

#### **To calibrate a single point pressure:**

- Ensure a calibrated predetermined pressure source is connected to pressure transducer of the MC2.
- On the Calibration screen, select the pressure Single Point Calibration option. The Pressure Calibration screen will be displayed.
- Select Update Live Pressure. The MC2 pressure reading will be updated, displayed as read only text and labeled as Live Pressure.
- Select the Offset Reference Pressure text box, and enter the new pressure transducer value.
- Select Upload Pressure Changes.
- Once complete a dialog will be displayed stating Offset Calibration Successful, select OK. The Pressure Calibration dialog will be displayed.
- NOTE: The difference between the Offset Reference Pressure and Live Pressure reading should be  $< \pm 0.12$  bar.
- On Pressure Calibration screen select Return to Calibration Screen. The Calibration screen will be displayed.

### **To restore single point pressure calibration factory defaults:**

- On the Calibration screen, select pressure Single Point Calibration. The Pressure Calibration screen will be displayed.
- Select Restore Factory Defaults.
- Once complete, a dialog box will be displayed stating Factory temperature calibration restored. Select OK.
- The Pressure Calibration dialog will be displayed. Select Return to Calibration Screen; the Calibration screen will be displayed.

### **7.4 Pressure Zero and Span Calibration**

#### **To calibrate the pressure zero and span:**

- Ensure a calibrated predetermined pressure source is connected to the pressure transducer of the MC2.
- On the Calibration screen select the pressure Zero and Span Calibration option. The Pressure Calibration screen will be displayed.
- Select Update Live Temperature. The MC2 pressure will be updated, displayed as read only text and labeled as Live Pressure.

For further details please contact your Dresser Representative.

- Select the Zero Reference Pressure text box and enter the desired zero reference pressure value. If necessary the operator will be informed of the acceptable range. NOTE: The difference between the zero and span pressure readings must be at least 50% of the F.S. range of the line transducer installed in the MC2.
- Select Send Zero Calibration.
- Once complete, a dialog box will be displayed stating Zero Calibration Successful, select OK.
- The Send Span Calibration option will now be available.
- Select the Span Reference Pressure text box and enter the desired span reference pressure. If necessary the operator will be informed of the acceptable range. NOTE: The difference between the zero and span pressure readings must be at least 50% of the F.S. range of the line transducer installed in the MC2.
- Select Send Span Calibration.
- Once complete, a dialog box will be displayed stating Span Calibration Successful, select OK. The Pressure Calibration screen will be displayed.
- On the Pressure Calibration screen, select Return to Calibration Screen. The Calibration screen will be displayed.

**To restore pressures zero and span calibration factory defaults:**

- On the Calibration screen select the pressure Zero and Span Calibration option. The Pressure Calibration screen will be displayed.
- Select Restore Factory Defaults.
- Once complete, a dialog box will be displayed stating Factory temperature calibration restored. Select OK.
- The Pressure Calibration dialog will be displayed. Select Return to Calibration Screen; the Calibration screen will be displayed.

For further details please contact your Dresser Representative.

**7.5 Monitor Pressure Single Point Calibration****To calibrate a single point monitor pressure:**

- Ensure a calibrated predetermined pressure source is connected to monitor pressure transducer of the MC2.
- On the Calibration screen select pressure Single Point Calibration. The Pressure Calibration dialog will be displayed.
- Select Update Live Pressure. The MC2 pressure reading will be updated, displayed as read only text and labeled as Live Pressure.
- Select the Offset Reference Pressure text box, and enter the new pressure transducer value.
- Select Upload Pressure Changes.
- Once complete, a dialog box will be displayed stating Offset Calibration Successful, select OK. The Pressure Calibration screen will be displayed.
- NOTE: The difference between the Offset Reference Pressure and Live Pressure reading should be  $< \pm 0.12$  bar.
- On the Pressure Calibration screen select Return to Calibration Screen. The Calibration screen will be displayed.

**To restore single point monitor pressure calibration factory defaults:**

- From within the Calibration screen select the pressure Single Point Calibration option. The Pressure Calibration dialog will be displayed.
- Select Restore Factory Defaults.
- Once complete a dialog will be displayed stating Factory temperature calibration restored. Select OK.
- The Pressure Calibration dialog will be displayed. Select Return to Calibration Screen; the Calibration screen will be displayed.

For further details please contact your Dresser Representative.

## **7.6 Monitor Pressure Zero and Span Calibration**

### **To calibrate the monitor pressure zero and span:**

- Ensure a calibrated predetermined pressure source is connected to the monitor pressure transducer of the MC2.
- On the Calibration screen select the pressure Zero and Span Calibration option. The Pressure Calibration screen will be displayed.
- Select Update Live Temperature. The MC2 pressure will be updated, displayed as read only text and labeled as Live Pressure.
- Select the Zero Reference Pressure text box and enter the desired zero reference pressure value. If necessary the operator will be informed of the acceptable range. NOTE: The difference between the zero and span pressure readings must be at least 50% of the F.S. range of the line transducer installed in the MC.
- Select Send Zero Calibration.
- Once complete, a dialog box will be displayed stating Zero Calibration Successful, select OK.
- The Send Span Calibration option will now be available.
- Select the Span Reference Pressure text box and enter the desired span reference pressure. If necessary the operator will be informed of the acceptable range. NOTE: The difference between the zero and span pressure readings must be at least 50% of the F.S. range of the line transducer installed in the MC2.
- Select Send Span Calibration.
- Once complete, a dialog box will be displayed stating Span Calibration Successful, select OK. The Pressure Calibration dialog will be displayed.
- Select Return to Calibration Screen. The Calibration screen will be displayed.

### **To restore monitor pressure zero and span calibration factory defaults:**

- On the Calibration screen select the pressure Zero and Span Calibration option. The Pressure Calibration dialog will be displayed.
- Select Restore Factory Defaults.
- Once complete, a dialog box will be displayed stating Factory temperature calibration restored. Select OK.
- The Pressure Calibration dialog will be displayed. Select Return to Calibration Screen; the Calibration screen will be displayed.

For further details please contact your Dresser Representative.

## 8 Live Data Screen

Upon selection of the Live Data tab the Live Data screen is displayed. This read only function provides the operator with a read only screen from which it is possible to view a data snapshot (which may be updated as often as required). The information provided by the data snapshot includes (dependent on model selected):

- Unit Serial Number.
- Meter / Site ID
- Firmware and PCB Revision
- Battery Voltage
- Battery Life (in months) for Lithium Battery Applications
- Monitor Pressure
- Volume at Base Conditions
- Volume at Measurement Conditions
- Residual Volume at Base Conditions
- Residual Volume at Measurement Conditions
- Flow Rate at Measurement Conditions
- Volume at Measurement Conditions under Fault
- Temperature Reading
- Line Pressure Reading
- Conversion Factor
- Supercompressibility
- Compression Factor at Base Conditions
- Compression Factor at Measurement Conditions
- Details of all present faults and alarms.
- Details of all occurred faults and alarms.

In a fault condition the appropriate Present Fault indicator is displayed as a red square with a 1. (Figure 25 - Live Data Screen) displays the Present Faults register as clear, i.e. there are no faults present; the appropriate indicators are displayed as a green square with a 0. Please refer to section 9 (Faults & Alarms Screen) for further details.

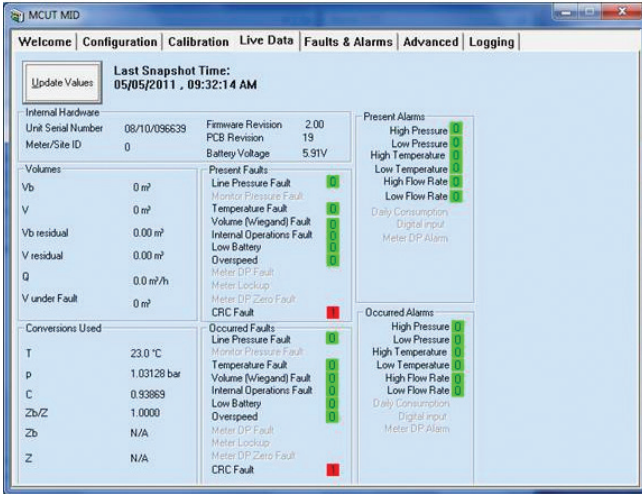


Figure 25 - Live Data Screen

**To display the live data screen:**

- From within the user terminal select the Live Data tab. The Live Data screen will be displayed.
- The options available on this screen depend on the model and configuration of the MC.

**To update values:**

- From within the Live Data screen select Update Values.
- The values within the screen will be updated.

## 9 Faults & Alarms Screen

Upon selection of the Fault & Alarms tab the Faults & Alarms screen is displayed. This screen is divided into 2 sections; Faults and Alarms. From within the various dialogs within this screen it is possible to set the alarm limits, specify the information to be displayed on the LCD in an alarm condition, specify whether telemetry pulse output is to be generated in alarm conditions, clear the volume at measurement under fault, clear occurred alarms and faults.

A Monitor Calls facility is also provided which enables the user terminal to run in call monitor mode. Whilst in this mode the user terminal may receive telephone calls via the modem from the MC2 (subject to operator configuration); such dialouts from the MC are invoked in specified alarm conditions. The information displayed within the Call Monitor dialog contains information regarding the alarm condition – date and time, MC serial number, meter/site ID and type of alarm/fault. The call monitor facility required the use of a PC modem along with a Dresser Micro Modem that should be connected to the MC2. For further details refer to section 9.7 (Call Monitor).

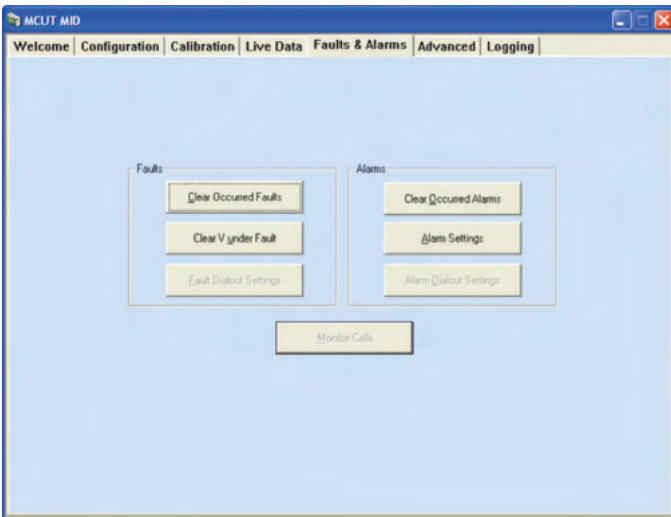


Figure 26 - Faults and Alarms Screen

### To display the faults and alarms screen:

- From within the user terminal select the Faults & Alarms tab. The Faults & Alarms screen will be displayed.
- NOTE: The Monitor Calls function requires the use of a modem, with both the PC and MC2 (the modem used in conjunction with the MC2 must be intrinsically safe (e.g. Dresser Micro Modem)).

## 9.1 Clear Occurred Faults

A fault is described as a measurement reading that exceeds its acceptable range. This may be caused, for example, by exceeding the stated pressure range of the transducer. When a fault condition occurs, an intuitive indication is displayed on the LCD indicating the nature of the fault (see Table 6 - Fault Code Reference Table).

A download from the unit via the user terminal will show that the appropriate icon(s) within Present Faults and Occurred Faults section of the Live Data screen are displayed with a red square with a 1. When the nature of the problem is ascertained, and resolved the icon within the Present Faults section of the Live Data screen will return to green with a 0, the fault code on the LCD will cease to be displayed. The appropriate icon within the Occurred Faults will remain red with a 1 until the occurred faults register has been cleared. This process can be carried out via the Faults & Alarms screen, alternatively, by scrolling through the LCD parameters until the test screen is displayed (scrolling 8's), remain on the test screen until the CLr FLt is displayed. A further press of the MC selector button will clear the occurred faults register, following the selection of the Update Values options within the Live Data screen the icon within the Occurred Faults section will return to green with a 0.

**Table 6 – Fault Code Reference Table**

LCD Fault Code	Fault Condition
Lo Batt	Low Battery
Int FLt	Internal Operations Fault
Pm FLt	Pressure Monitor fault
P FLt	Pressure Fault
t FLt	Temperature Fault
CHEcSunn	CRC Fault

NOTE 1: For additional information on CRC Fault, refer to Section 9.2.

### To clear occurred faults register:

- From within the Faults & Alarms screen select Clear Occurred Faults.
- The faults will be cleared. A dialog will be displayed stating Faults Cleared OK, select OK.
- The cleared fault can be confirmed by selecting Update Values within the Live Data screen. Providing the fault condition has been cleared and the occurred faults register has been cleared all icons within the Present Faults and Occurred Faults sections will be green with a 0.
- If the converter has a checksum (CRC) fault, this fault cannot be cleared using this procedure. Converter must be returned to factory for evaluation.
- If the problem persists, contact your Dresser Representative.

## 9.2.1 EEPROM Cyclic Redundancy Check (CRC) Fault

The Micro Series Volume Converter has a Checksum feature which is a redundancy check. On legally relevant parameters that are stored in EEPROM, a cyclic redundancy check (CRC) is performed every 24 hours and additionally whenever the operator communicates with the converter using the Micro Series User Terminal software. If for any reason the current values do not match the previous values stored in EEPROM memory, then a CRC Fault occurs. If Checksum identifies corrupted memory sectors, the following or similar screen will appear depending on where the corruption has occurred. Refer to Figure 27 that follows.

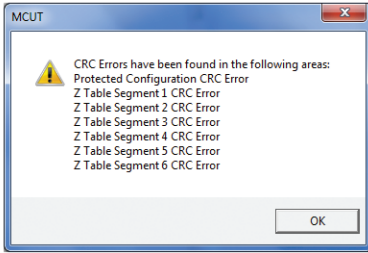


Figure 27 - Corrupted Memory Sectors (Example)

The user can then select the OK button and the converter will allow the downloading of all audit and data logs. If CRC errors are present however, the user will not be able to update any configuration parameters. Additionally, a CRC fault will be displayed both on the LCD of the converter as CHEcSunn, along with the alarm bell icon and on the Live Data Screen. Refer to Figure 28 that follows.

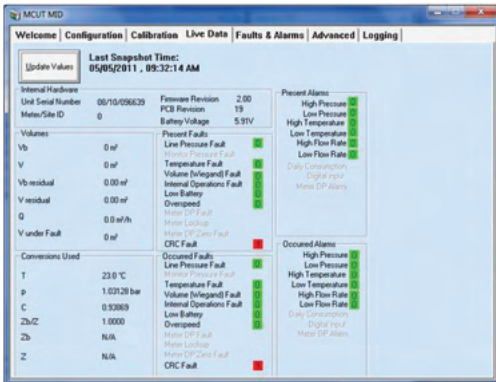


Figure 28 - Live Data Screen with CRC Fault

If CRC errors are present, the fault will be date and time stamped and recorded in the audit log and data log reports. The converter will no longer apply a conversion factor to the Volume at Measurement Conditions, and the Volume at Base Conditions register will not continue to increment. Volume will continue to accumulate in the Volume at Measurement Conditions under Fault register. Please note that the user cannot clear a Checksum (CRC) fault using the User Terminal software. Because a CRC fault only occurs if there is memory corruption present in the converter, the converter should be returned to the factory for evaluation.

### 9.2.2 Firmware Cyclic Redundancy Check (CRC) Fault

A firmware CRC (Cyclic Redundancy Check) is performed every 10.5 minutes. The firmware version and CRC can be read on the display. If a CRC error is detected, "CrC" will be displayed as lower case "crc". In addition, an **Internal Fault** alarm will be raised and an "Int Flt" message displayed.

If CRC errors are present, the fault will be date stamped and recorded in the audit log and data log reports. The converter will no longer apply a conversion factor to the Volume at Measurement Conditions, and the Volume at Base Conditions register will not increment. Other functionality may also be lost. Please note that the user cannot clear an Internal Fault using the User Terminal and the converter should be returned to the factory for evaluation.

### 9.3 Clear Volume at Measurement Conditions Under Fault

In all fault conditions the Volume at Measurement Conditions Under Fault register will be activated showing the total number of accumulated volume at measurement conditions during the period in which the fault was present. Only faults which have an effect on the conversion factor will cause the Volume at Measurement Conditions Under Fault register to be activated. Under such conditions both the Volume at Measurement Conditions and the Volume at Measurement Conditions Under Fault will continue to increment, however the Volume at Base Conditions register will no longer be activated (this register will be re-activated once the fault condition has been cleared). This allows the operator to calculate the average conversion factor for that period from the 3 readings, which could then be applied to the fault counts to give an estimated volume at base conditions for the fault period.

#### To clear Volume at Measurement Conditions Under Fault register:

- From within the Faults & Alarms screen select the Clear Volume at Measurement Conditions Under Fault (Clear V under Fault).
- The Volume at Measurement Conditions Under Fault register will be cleared.
- The cleared register can be confirmed by selecting the Update Values option within the Live Data screen. The Volume at Measurement Conditions Under Fault register value within the Volumes section will be set to 0.

### 9.4 Clear Occurred Alarms

An alarm can be described as a measurement reading exceeding operator configurable limits. This is not a fault on the unit. It may be used as a means of monitoring the system remotely removing the requirement for continual monitoring. When an alarm condition occurs, an appropriate alarm code is displayed on the LCD (see Table 7 - Alarm Code Reference Table). The appropriate icon(s) within Present Alarms and Occurred Alarms section of the Live Data screen are displayed with a red square with a 1. When the nature of the problem is ascertained, and resolved the icon within the Present Alarms section of the Live Data screen will return to green with a 0, the alarm code on the LCD will cease to be displayed. The appropriate icon within the Occurred Alarms will remain red with a 1, until the occurred alarms register has been cleared. Following the selection of the Update Values options within the Live Data screen, once the occurred alarms have been cleared the icon within the Occurred Alarms section will return to green with a 0.

**Table 7 – Alarm Code Reference Table**

LCD Fault Code	Fault Condition
HF AL	High Flow Rate Alarm
LF AL	Low Flow Rate Alarm
Ht AL	High Temperature Alarm
Lt AL	Low Temperature Alarm
HP AL	High Pressure Alarm
LP AL	Low Pressure Alarm
D_In_Al / tAnnPEr	Digital Input / Tamper Alarm
vol AL	High Consumption Alarm

**To clear occurred alarms register:**

- From within the Faults & Alarms screen select Clear Occurred Alarms.
- The alarms will be cleared. A dialog will be displayed stating Alarms Cleared OK, select OK.
- The cleared alarm can be confirmed by selecting the Update Values option within the Live Data screen. Providing the alarm condition has been cleared and the occurred alarms register has been cleared all icons within the Present Alarms and Occurred Alarms sections will be green with a 0.

**9.5 Alarm Settings**

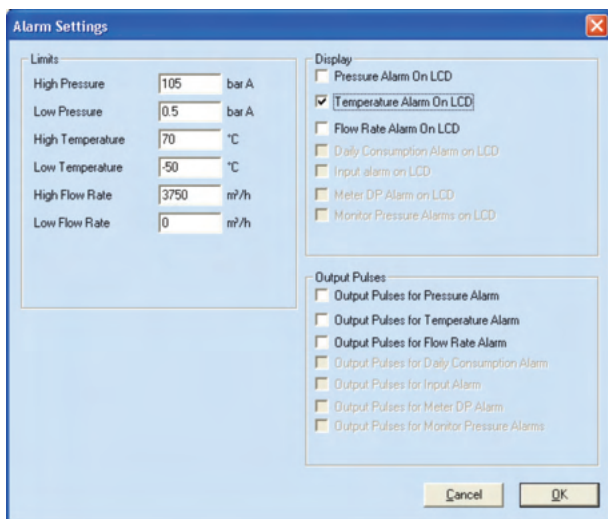
The operator is able to specify alarm limits in the MCUT, for the following:

- High pressure.
- Low pressure.
- High temperature.
- Low temperature.
- High flow rate.
- Low flow rate.

NOTE: Settings for Digital Input, Digital Output (High Consumption Alarm), and Meter Lockup Output are performed on Advanced Screen. The operator is also able to specify which alarms should be displayed on the LCD, and whether or not output pulses should be induced for the various alarm conditions.

**To set the alarm limits:**

- From the Faults & Alarms screen select the Alarm Settings option and the Alarm Settings dialog will be displayed.
- Select the appropriate text box and enter the desired alarm limit; if an invalid value is entered the operator will be advised of the acceptable range. (The new parameters will need to be uploaded to the MC via the Configuration screen).
- Select OK on the Alarm Settings screen.
- Select the Configuration tab; the Configuration screen will be displayed.
- The changed parameters will be highlighted yellow in the parameter selection list on the Configuration screen.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. On completion a dialog will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white background.



**Figure 29 - Alarm Settings Configuration**

**Table 8 – Alarm Parameter/Alarm Limits Reference Table**

Alarm Parameter	Alarm Limit
High Pressure	1.5 x maximum pressure of transducer
Low Pressure	0.5 bar Absolute
High Temperature	70°C
Low Temperature	-50°C
High Flow Rate	+ 1.5 x Qmax
Low Flow Rate	- 1.5 x Qmax

**To specify the parameters to be displayed on the LCD in alarm conditions:**

- From the Faults & Alarms screen select Alarm Settings; the Alarm Settings dialog will be displayed.
- From the Display section, select the parameter(s) that is/are required to be displayed on the LCD; ensure that a check is displayed in the appropriate check box. (The new parameters will need to be uploaded to the MC via the Configuration screen). If a parameter is disabled it may be because it is not available on the MC2 that you have. Consult your Dresser Natural Gas Solutions representative for further details.

- NOTE: If the MC2 is set to read a fixed pressure or temperature, the respective parameters will be disabled. To enable these parameters the measurement mode must be switched to Live Measurement.
- Select OK in the Alarm Settings dialog box.
- Select the Configuration tab; the Configuration screen will be displayed.
- Select Upload to MC2.
- The new details will be uploaded to the MC. A dialog box will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.
- NOTE: To switch an LCD displayed parameter off (so that it is not displayed in an alarm condition), select the appropriate parameter; ensure that the check is removed from the check box. Select OK, in the Alarm Settings dialog box. On the Configuration screen, select Upload to MC2. Upon display of the Sent OK message, select OK.

### **To specify output pulses for alarm conditions:**

- From the Faults & Alarms screen select Alarm Settings; the Alarm Settings screen will be displayed.
- From the Output Pulses section, select the parameter(s) that is / are required to invoke output pulses during an alarm condition, and ensure that a check is displayed in the appropriate check box. (The new parameters will need to be uploaded to the MC2 via the Configuration screen). If a parameter is disabled it may be because it is not available on the MC2 that you have. For further details contact your Dresser Representative.
- NOTE: If the MC2 is set to read a fixed pressure or temperature, the respective parameters will be disabled. To enable these parameters the measurement mode must be switched to Live Measurement.
- Select OK within the Alarm Settings dialog.
- Select the Configuration tab; the Configuration screen will be displayed.
- Select Upload to MC2.
- The new details will be uploaded to the MC2. A dialog box will be displayed stating Sent OK. Select OK, and the uploaded parameters will be displayed with the default white back ground.
- NOTE: To disable output pulse in an alarm condition, select the appropriate parameter; ensure that the check is removed from the check box. Select OK, within the Alarm Settings dialog. On the Configuration screen select Upload to MC2. On display of the Sent OK message, select OK.

## 10 Advanced Screen

The Advanced screen contains up to 6 options (model dependant); these are used less frequently than those shown on other screens. NOTE: If using the modem to connect, the Prover Mode option will be disabled.

It is possible to change the password and advanced password from this screen, test the pulse outputs, configure the trim table settings, test the accuracy of the meter via the Prover Mode option and set unit for External Power or Digital Input/Tamper or Digital Output/Volume Consumption.

Default password "0" <zero>.

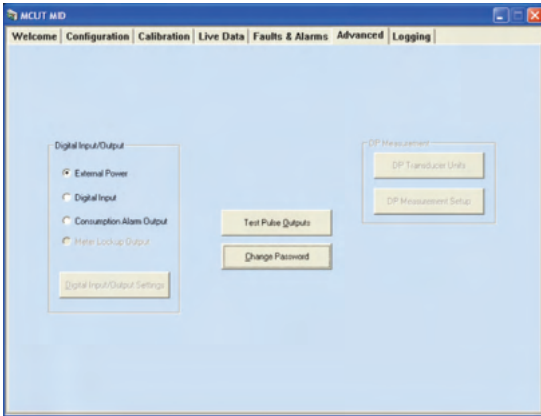


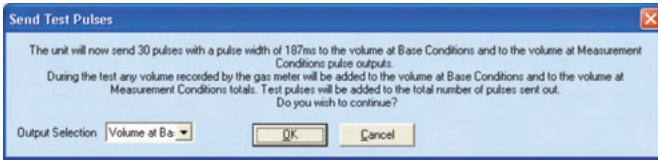
Figure 30 - Advanced Screen

### To display the advanced screen:

- From the MCUT select the Advanced tab. The Advanced screen will be displayed.
- NOTE: The options available on this screen depend on the model and configuration of the MC. If a required option is not available please contact your Dresser Representative for further details.

### 10.1 Test Pulse Outputs

The MCUT provides a Test Pulse Outputs facility. This allows a verification of the volume at base conditions and the volume at measurement conditions pulse output connections that are used for either telemetry and/or proving purposes. A total of 30 pulses are generated at the pulse width specified within the Volume Configuration dialog (accessed via the Configuration screen). The activation of the test pulse outputs facility will not cause any disruption to the metered gas. Volumes recorded by the meter will continue to be added to the volume at base conditions and the volume at measurement conditions totals. Additionally, the test pulses produced will be added to the total number of pulses generated. The operator is informed of the test pulse output conditions on selection of the Test Pulse Outputs option.



**Figure 31 - Send Test Pulses Screen**

NOTE: Firmware versions 1.93 and newer allow the user to choose between volume at base conditions and volume at measurement conditions pulse outputs.

**To activate the test pulse output facility:**

- From the Advanced screen select Test Pulse Outputs. The Send Test Pulses screen will be displayed.
- The operator will be asked to confirm if it is OK to continue. If appropriate select OK, otherwise select Cancel.
- The LCD on the MC2 will display PULSES. The Advanced screen will be displayed.
- The output pulses will be generated. On completion of the test pulse outputs facility normal operation will resume.

**10.2 External Power or Digital Input/Output selection**

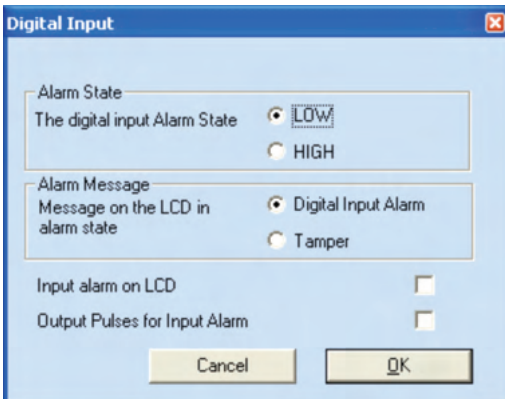
Two connectors in Terminal Block TB1 i.e. Not marked and GND could be configured as external power input or Digital Input/Tamper Alarm or Digital Output/Volume Consumption Alarm (Figure 30).

**10.2.1 External Power**

Two connectors in Terminal Block TB1 i.e. No marked and GND, are configured by default as external power input. It means that voltage from 5V to 6V could be supplied to power the unit. NOTE: Any external power supply being connected to the MC2 must be certified safe for use in a potentially explosive atmospheres, along with any other local legislation.

**10.2.2 Digital Input**

If Digital Input is selected on Advanced screen (Figure 30) from Digital Input/Output option then the window presented in Figure 32 appears.



**Figure 32 – Digital Input Screen**

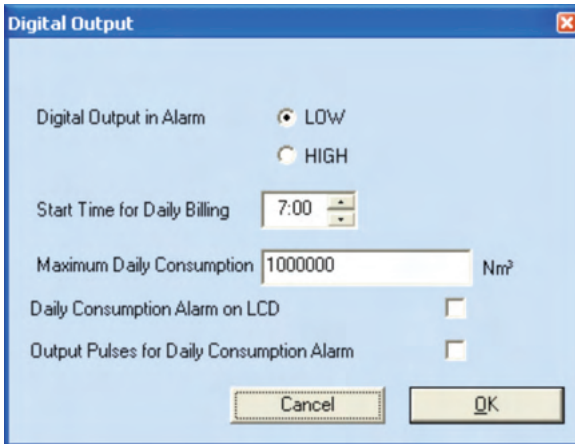
There are four selections:

- Voltage level for input alarm state, i.e. LOW or HIGH
- Alarm description that appears on Live Data screen, in Audit Log, Configuration Summary and Report. Depending on this selection, d\_In\_AL or tAnnPER can appear on LCD.
- Select whether or not alarm message will appear on LCD.
- Select whether or not an input alarm will generate fault pulses.

If a Digital Input/Tamper Alarm occurs, it is shown on the Live Data screen (Present and Occurred) and is registered in the Audit Log.

### 10.2.3 Consumption Alarm Output

The Consumption Alarm Output facility provides digital signal i.e. HIGH or LOW signal level on digital output terminal. If Maximum Daily Consumption of gas is reached than Alarm State is set for digital output. Refer to Figure 33. The operator can set the value of Maximum Daily Consumption, Start Time for Daily Billing and the signal level in Alarm State. Operator can also enable or disable Consumption Alarm Output facility.



**Figure 33 – Consumption Alarm Output Screen**

If Maximum Daily Consumption is reached then:

- Alarm State is set on digital output terminal.
- Daily Consumption Alarm is set in Live Data screen,
- vol\_AL is indicated on LCD if selected,
- Fault Pulse is generated on Output Pulse if selected.

Daily Consumption Register is always reset for Start Time for Daily Billing.

Depending from selection in Customize LCD screen the following parameters could be presented with abbreviated description on LCD:

- Accumulated Volume at Base Conditions current day (Cd),
- Accumulated Volume at Base Conditions previous day (Pd),
- Accumulated Volume at Base Conditions current month (Co),
- Accumulated Volume at Base Conditions previous month (Po),
- Highest daily volume in the current month (Ch),
- Highest daily volume in the previous month (Ph),
- Date of last consumption alarm (mm\_dd\_yy).

## 11 Logging Screen

The MCUT provides audit and data logging facilities. The audit log provides a record of 32 (maximum) changes to parameters that will affect the billing. The data log provides approximately 6000 data log records for 1.89 or newer firmware versions, if logging of 10 parameters is selected. The exact number is shown on Logging Setup screen.

Both the audit and data logs are saved as CSV files (comma-delimited). This enables easy import into spreadsheets such as MS<sup>®</sup> Excel. Once imported into the spreadsheet, the data can be manipulated as required.

The Logging screen contains 3 options which enable the operator to configure the logging setup of the data log, download the data log and download the audit log.

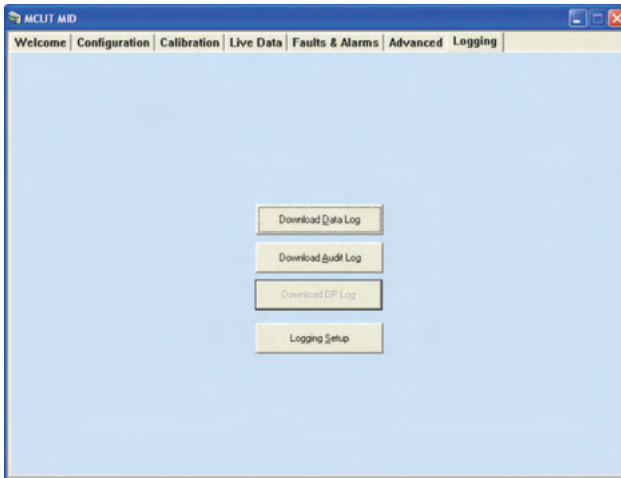


Figure 34 - Logging Screen

## To display the logging screen:

- From within the user terminal select the Logging tab. The Logging screen will be displayed.
- NOTE: The options available on this screen depend on the model and configuration of the MC. If a required option is not available please contact your Dresser Representative for further details.

### 11.1 Logging Setup

The Logging Setup dialog is divided into 4 sections; the Logged Parameters, Log1, Log2, and Log3. Within these sections the operator is able to configure what data is logged and the frequency of these logs.

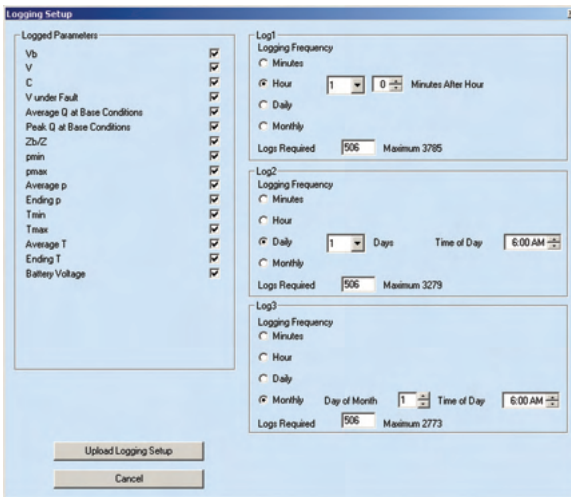


Figure 35 - Logging Setup Screen

The logged parameters available for selection include:

- Volume at Base Conditions ( $V_b$ )
- Volume at Measurement Conditions ( $V$ )
- V under Fault
- Conversion Factor ( $C$ )
- Average Flow Rate ( $Q$ ) at Base Conditions
- Peak Flow Rate ( $Q$ ) at Base Conditions
- Supercompressibility ( $Z_b/Z$ )
- Minimum Pressure ( $p_{min}$ )
- Maximum Pressure ( $p_{max}$ )
- Average Pressure (Average  $p$ )
- Ending Pressure (Ending  $p$ )
- Minimum Temperature ( $T_{min}$ )
- Maximum Temperature ( $T_{max}$ )
- Average Temperature (Average  $T$ )
- Ending Temperature (Ending  $T$ )
- Battery Voltage

The logging frequency is distributed over a maximum of 3 different logging intervals; these are described as Log1, Log2 and Log3 within the Logging Setup dialog. By default, the MC will log 523 hourly logs (Log1), 523 daily logs (Log2) at 06:00 hours, and 523 monthly logs (Log3) taken on the first day of every month at 06:00 hours. For the purpose of the monthly data log all months are assumed to have a maximum of 28 days. The default logged parameters are: volume at base conditions, volume at measurement conditions, conversion factor, volume at measurement conditions under fault, line pressure, temperature, average flow rate at base conditions, peak low rate at base conditions, and supercompressibility.

If the configuration of Logged Parameters is changed, the number of logs available will also change; by reducing the number of parameters to be logged the number of available logs recorded will increase. Any change to the maximum number of logs available is displayed within the relevant section(s) on the Logging Setup screen e.g. Maximum 523.

### **To display the logging setup screen:**

- From within the user terminal select the Logging tab.  
The Logging screen will be displayed.
- From within the Logging screen select Logging Setup.  
The Logging Setup dialog will be displayed.

#### **11.1.1 Logged Parameters**

The Logged Parameters are operator configurable; by default all available parameters are switched on, if the details of a parameter are not required within the data log, it is possible to switch it off.

### **To switch off unwanted logged parameters:**

- From the Logging screen select Logging Setup.  
The Logging Setup screen will be displayed.
- From the Logged Parameters section, select the appropriate parameter(s) whose details are not required within the data log. Ensure that the check is removed from the appropriate check box.
- Select Upload Logging Setup.
- **NOTE: By changing the configuration of the logged parameters any existing log entries will be cleared from the data log. Therefore it is recommended that any existing data log is downloaded prior to any changes to the data log configuration.**
- If it is not required to download the existing data log select the Upload Logging Setup, otherwise select Go To Data Log Download Screen or Cancel.
- On completion a dialog box will be displayed stating New Logging Settings Successfully Uploaded. Select OK. The Logging screen will be displayed.

### To switch on required logged parameters:

- From the Logging screen select Logging Setup. The Logging Setup screen will be displayed.
- From the Logged Parameters section select the appropriate parameter(s) whose details are required within the data log. Ensure that a check is displayed in the appropriate check box.
- Select Upload Logging Setup.
- **NOTE: By changing the configuration of the logged parameters any existing log entries will be cleared from the data log. Therefore it is recommended that any existing data log is downloaded prior to any changes to the data log configuration.**
- If it is not required to download the existing data log select the Upload Logging Setup, otherwise select Go To Data Log Download Screen (to download the data log) or Cancel.
- On completion a dialog will be displayed stating New Logging Settings Successfully Uploaded. Select OK. The Logging screen will be displayed.

#### 11.1.2 Log1, Log2 and Log3

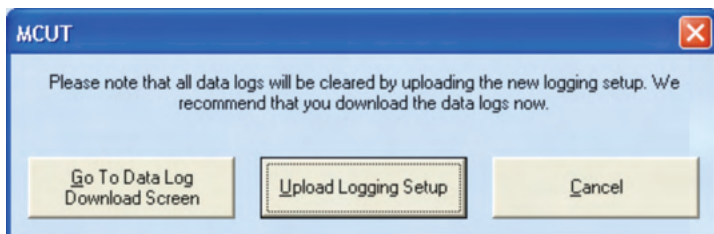
The method for changing the Logging Frequency is the same for Log1, Log2 and Log3; therefore the methods described below apply to all 3 logging frequencies (NOTE: to change Log1 the settings must be changed within the Log1 section, Log2, the Log2 section and Log3, the Log 3 section).

To specify the logging frequency:

- From the Logging screen select Logging Setup. The Logging Setup screen will be displayed.
- From the appropriate section (Log1, Log2 or Log3) select the desired frequency (Minutes, Hour, Daily or Monthly).
- Once selected, a more specific selection is required;
  - Minutes – specify how frequent the logs should be taken, acceptable range 1 – 59 (if 2 is selected a log will be taken every 2 minutes).
  - Hour – specify how frequent the logs should be taken, acceptable range 1 – 4, 6, 8, 12. In addition the operator should also specify how many minutes after the hour the log should be taken, accepted range 0 – 59 (if 4 is selected in the first drop down selection box and 53 in the second, the logs will be taken every 4 hours at 53 minutes past the hour).
  - Daily – specify the Time of Day that the logs should be taken, acceptable range 0:00 – 23:00.
  - Monthly – specify the Day of Month, accepted range 1 – 28. In addition, the operator should specify the Time of Day, acceptable range 0:00 – 23:00 (if 28 is selected in the first selection box and 23:30 in the second, a log will be taken on the 28 day of every month at 23:30).
- Repeat for each Log as required.
- Select Upload Logging Setup.

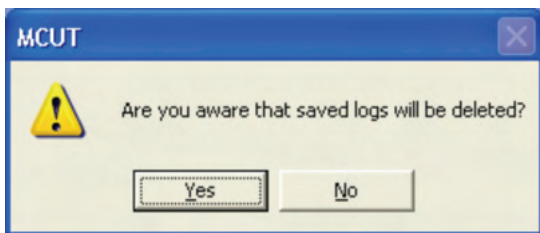
- NOTE: By changing the configuration of the logged parameters any existing log entries will be cleared from the data log. Therefore it is recommended that any existing data log is downloaded prior to any changes to the data log configuration.
- If it is not required to download the existing data log select the Upload Logging Setup, otherwise select Go To Data Log Download Screen (to download the data log) or Cancel.
- On completion a dialog will be displayed stating New Logging Settings Successfully Uploaded. Select OK. The Logging screen will be displayed.

NOTE: If any parameters or logging frequencies are changed, the user will be prompted with the following warning screen.



**Figure 36 – 1st Warning Screen**

If “Upload Logging Setup” is chosen, the user will again be prompted with the following 2nd warning screen.



**Figure 37 – 2nd Warning Screen**

## 11.2 Download Data Log

When downloading the data log it is possible to select the specific data that is to be retrieved; which log to be downloaded, the range of data for that log, and the manner in which the logged data should be displayed within the log file. The Download Data Log dialog is divided into 5 sections; Log1, Log2, Log3, Options and Download Volume Units section.

Log1		Time	Date
Logging Frequency	Every 1 Hours at 0 min past	Download Logs From	2:00 PM 15/02/11
Logs Acquired	50	Download Logs To	3:00 PM 17/02/11
Logs Available	50		
Time/Date of First Log Available	2:00:00 PM 15/02/2011		
Time/Date of Last Log Available	3:00:00 PM 17/02/2011		
Download Log 1			

Log2		Time	Date
Logging Frequency	Daily at 6:00 AM	Download Logs From	6:00 AM 16/02/11
Logs Acquired	2	Download Logs To	6:00 AM 16/02/11
Logs Available	2		
Time/Date of First Log Available	6:00:00 AM 16/02/2011		
Time/Date of Last Log Available	6:00:00 AM 17/02/2011		
Download Log 2			

Log3		Time	Date
Logging Frequency	Monthly on the 1 at 6:00 AM		
Logs Acquired	0		
Logs Available	0		
Time/Date of First Log Available			
Time/Date of Last Log Available			

Options:

Cumulative/Index Read Log     Consumption Per Log     Both     Download From Last Log

Reverse Chronological     Chronological

View Last Log

Refresh Data    Close

Figure 38 - Download Data Log Screen

### 11.2.1 Download Log1, Log2 and Log3

The method for downloading the data logs is the same for Log1, Log2 and Log3; therefore the methods described below apply to all 3 logging frequencies (NOTE: to download Log1 the download options must be changed within the Log1 section, Log2, the Log2 section and Log3, the Log 3 section). A Refresh Data option is provided to ensure that the latest time and date of logged entries available for download are displayed to the operator. Once a data log has been downloaded the View Last Log option will become available.

#### To download all available data log entries:

- From within the Logging screen select Download Data Log. The Download Data Log screen will be displayed.
- The time and date of the first available log are displayed in the relevant section, along with the time and date of the last available log. By default, all available data logs will be downloaded.
- Select Refresh Data to ensure that the very latest available log time and date are displayed. If appropriate the read only details associated with each log period will be updated.

- From the appropriate section (Log1, Log2 or Log3) select Download Log. The Save As screen will be displayed.
- Select the location where the data log file is to be saved.
- Enter the desired file name that the data log file is to be saved to. A default file name will be displayed which may also be used. Select Save.
- Once complete a dialog box will be displayed stating Log File Saved OK. Select OK.

#### **To view a downloaded data log:**

- Once downloaded from the MCUT select View Last Log. The default spreadsheet program used to open CSV files will be launched, and the data log file will open. The data can then be manipulated as required.
- To return to the Logging screen select Close.

#### **Alternatively:**

- Open the appropriate data log file (all data log files saved from within the MCUT are of the type .CSV) from within the spreadsheet in the usual manner.

### **11.2.2 Options**

Various options are available within the Download Data Log dialog in the Options section. An explanation of the functionality they offer is provided below. If any of these options are required, they should be selected prior to selection of the appropriate Download Log option.

#### **Cumulative / Index Read Log:**

- Selection of this option will display the volumes within the data log as per the volumes displayed on the LCD of the MC2.

#### **Consumption Per Log:**

- Selection of this option will display the volumes logged within each logging period (i.e. the difference between the new and last volume reading)

#### **Download From Last Log:**

- Selection of this option will include only the data log entries that have been logged since the last data log was retrieved.

#### **Chronological and Reverse Chronological:**

- Selection of the Chronological option will ensure that the data log entries within the data log file are displayed with the oldest entry first. If the Reverse Chronological option is selected the data log entries within the data log file will be displayed with the oldest entry last.

### 11.3 Download Audit Log

An audit log facility is provided to ensure that all changes to parameters that may affect the customer's billing are recorded. All audit log files saved in the MCUT are of the type .CSV. A Refresh Data option is provided to ensure that the latest log entry details available for download are included. Once an audit log has been downloaded the View Last Log option will become available.

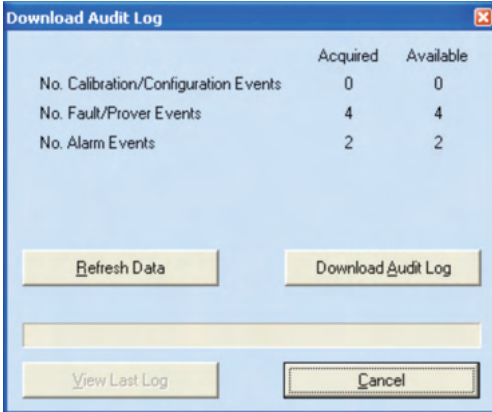


Figure 39 - Download Audit Log Screen

**Table 9 – Audit Log Parameters Reference Table**

Audit Log Parameter	
<b>Volume Configuration</b>	Pulse Value
	Volume at Base Conditions Multiplier
	Volume at Measurement Conditions Multiplier
	Volume at Base Conditions Pulse Output
	Volume at Measurement Conditions Pulse Output
	Pulse Output Allocation
	Pulse Width
	Volume at Base Conditions
	Volume at Measurement Conditions
	Volume at Measurement Conditions under Fault
<b>Conversion Configuration</b>	Temperature Units
	Base Temperature
	Temperature Mode (Fixed or Live)
	Fixed Temperature
	Pressure Units
	Base Pressure
	Atmospheric Pressure
	Fixed Pressure Factor
	Fixed Line Pressure
	Pressure Mode (Fixed or Live)
	Supercompressibility
	Fixed Pressure Type
<b>Calibration</b>	Temperature Calibration Offset
	Temperature Calibration Span
	Pressure Calibration Offset
	Pressure Calibration Span
<b>Alarm Settings</b>	High Pressure Alarm Limit
	Low Pressure Alarm Limit
	High Temperature Alarm Limit
	Low Temperature Alarm Limit
	High Flow Rate Alarm Limit
	Low Flow Rate Alarm Limit
<b>Advanced Options</b>	Digital Input/Tamper
	Test Pulses Output

NOTE: In addition to these configurable parameters, the audit log will also display faults and alarms that have either occurred or have occurred and been cleared, since the last logging download. The audit log also shows entries for proving activity.

### **To download the audit log:**

- From the Logging screen select Download Audit Log. The Download Audit Log screen will be displayed.
- The number of available log entries will be displayed on the screen under the Available heading. For operator informational purposes, the available logs are categorized under the following headings; audit log entries, fault/Prover log entries and alarm entries.
- Select Refresh Data to ensure that the very latest available log entry details are included. If appropriate the read only details associated with each audit log category will be updated.
- Select Download Audit Log. The Save As dialog will be displayed.
- Select the location where the audit log file is to be saved.
- Enter the desired file name that the audit log file is to be saved to. A default file name will be displayed which may also be used. Select Save.
- Once complete a dialog box will be displayed stating Log File Saved OK. Select OK.

### **To view a downloaded audit log:**

- Once downloaded from the MCUT select the View Last Log option. The default spreadsheet program used to open CSV files will be launched and the audit log file will open. The data can then be manipulated as required.
- To return to the Logging screen select Cancel.

## **12 Monitor Pressure**

Micro Converters with firmware version 1.91 or higher can be equipped with a second pressure transducer, called Monitor Pressure, in addition to a Line Pressure transducer. Pressure units selected on the Configuration screen must be the same for both the line and monitor transducers (See Chapter 6.4). Value of the monitor pressure is shown on Live Data screen; see Figure 21 on page 48. Values of monitor pressure can be logged in Data Logs. Logging setup (See Chapter 11.1) allows selection of:

- Average Monitor Pressure.
- Minimum Monitor Pressure.
- Maximum Monitor Pressure.
- End Monitor Pressure.

Converter's firmware senses if Monitor Pressure transducer fails, then a fault is set. This set fault, occurred and present, can be seen on Live Data screen. Pressure Monitor fault is registered in the Audit Log with date & time of this event, and also "Pm FLt" is shown on LCD. Monitor Pressure fault can be selected so that converter will dialout to specific telephone number in case of this event, look at chapter 9.3.

Monitor Pressure transducer can be recalibrated in one or two points, Refer to Chapter 7.

## 13 Modem Communications

NOTE: An intrinsically safe barrier must be installed between a PC in a non-hazardous area and the MC2 in the hazardous area. Please refer to section 3 (Safety) for more details. Two types of Dresser modems are recommended: line type Micro Modem and GSM/GPRS type Micro Modem.

### To initialize communications via modem:

- Start the MCUT software.
- Select the Configuration tab, the Configuration screen will be displayed.
- From the Configuration screen, select the Use Modem To Connect option. Ensure a check is displayed within the check box.
- Select UT Comms Settings. The UT Comms Settings screen will be displayed.
- From the Modem section, select the Modem drop down box, and select the appropriate modem (ensure that the PC modem that will be used by the PC to dial out is selected).
- Ensure the modem is configured as specified. Please refer to section 6.10 (UT Comms Settings) for further details.
- NOTE: It is important to specify the correct modem baud rate in the MC2 Comms Settings option while in direct communications (accessed via the Configuration screen). This will ensure that the MC2 and modem communicate at the speed specified by the modem. If the incorrect modem baud rate is specified, modem communications will not be possible.
- From the UT Comms Settings dialog select OK.
- From the Configuration screen select Connect with MC2. The Telephone Number screen will be displayed.
- Enter the telephone number of the Modem that the MC2 is connected to. Select OK.
- Once communications have been established, a dialog will be displayed stating Configuration Downloaded OK. Select OK.
- Continue to configure the MC2 as required. Please refer to the relevant sections above as required.

## 14. Protection of Volume Registers, Legally Relevant Parameters and Calibration

### 14.1 Hardware Link Protection

The Weights and Measures link protection is provided to meet various legislative requirements. When the Weights and Measures link is in place, the parameters that it protects (see Table 10 - Weights and Measure Link Protection) are not operator configurable. For further details regarding the setting of the weights and measures link refer to the Micro Series Volume Converter Type MC2 Hardware Manual as shipped with the MC. **NOTE: The configuration set up of the MC will need to be carried out prior to setting the Weights and Measures link.**

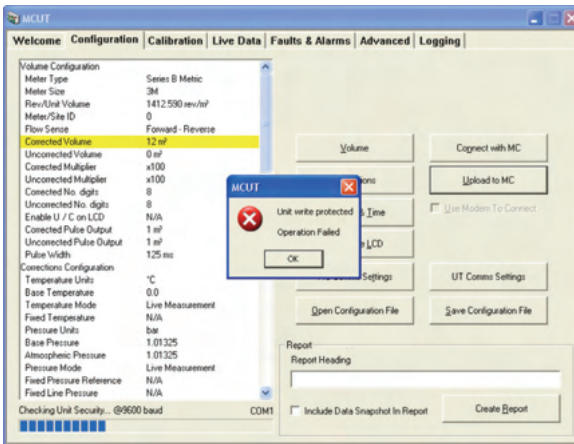


Figure 40 - Weights and Measures Link Protection Screen

If the operator attempts to change a parameter protected by the Weights and Measures link, a screen will be displayed (see Figure 40 (Weights and Measure Link Protection Screen) once the Upload to MC2 option is selected.)

In addition, all changes to either legally relevant parameters or to the calibration of the Converter are stored in the Audit Log in non-volatile memory, as follows:

- Name of Parameter
- Initial Parameter Value
- New Parameter Value
- Date/Time Stamp of the Change

## 14.2 Password Protection with Audit Log

If the operator wants to change any of the legally relevant parameters or wants to calibrate the pressure and temperature readings in the Converter, then the operator must know the password. The password will be requested by the User Terminal when the operator attempts to upload any of these changes, as follows:

- Name of Parameter
- Initial Parameter Value
- New Parameter Value
- Date/Time Stamp of the Change

Default password "0" <zero>.

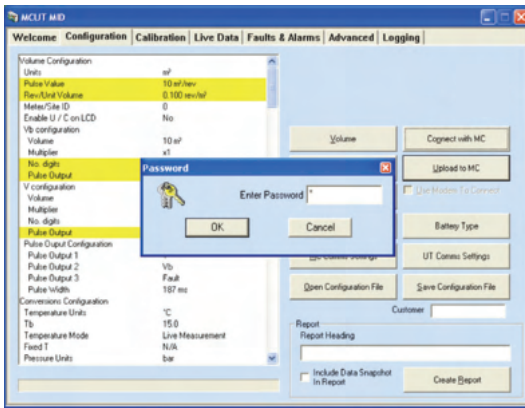


Figure 41 - Software Prompt to Enter Password

## Section 14.3 Changes to the Volume Registers

Volume Registers are always protected by Hardware Link Protection. In order to change the volume registers, you must first change the hardware link from Read Only, to the Read/Write position. If you attempt to change the volume in the volume registers without changing the hardware link, the following message will appear:

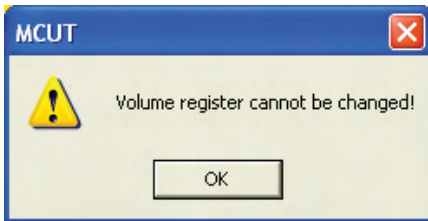


Figure 42 - Volume Register Warning Screen

Once the hardware link has been moved, you can then input new volumes into the two volume registers. After the change has been made, go to the Configuration Screen and choose Upload to MC. The User Terminal software will then ask you to enter the password. Enter the password and the software will make the change. These volume changes will be registered in the Audit Log. After you have completed the volume register changes, be sure to put the Hardware Link back into the Read Only position.

**Table 10 – Weights and Measures Link Protected Parameters Reference Table**

<b>Password Protected Parameters</b>	
<b>Volume Configuration</b>	Pulse Value
	Volume at Base Conditions Multiplier
	Volume at Measurement Conditions Multiplier
	Pulse Output Allocation
	Volume at Base Conditions Pulse Output
	Volume at Measurement Conditions Pulse Output
	Volume at Base Conditions
	Volume at Measurement Conditions
<b>Conversion Configuration</b>	Clear Volume at Measurement Conditions under Fault Register
	Temperature Units
	Base Temperature
	Temperature Mode (Fixed or Live)
	Fixed Temperature
	Pressure Units
	Base Pressure
	Atmospheric Pressure
	Fixed Pressure Factor
	Fixed Line Pressure
	Pressure Mode (Fixed or Live)
	Supercompressibility
	Supercompressibility Mode
	Fixed Pressure Type
<b>Calibration</b>	Temperature Calibration
	Pressure Calibration
<b>Advanced Options</b>	Test Pulse Outputs
	Digital Input / Tamper
	Digital Output

## 15 The MC2 LCD Displayed Messages

The parameters displayed on the LCD of the MC2 can be accessed via the selector push button on the front panel of the MC2. In addition to the parameters listed in section 6.6 (Customize LCD) further messages are displayed for informational purposes (see Table 11 - CD Displayed Messages). NOTE: Some of these messages are dependent on the configuration of the unit.

**Table 11 – LCD Displayed Messages Reference Table**

<b>LCD Parameter</b>	<b>Additional Information</b>	<b>Example</b>
Volume at Base Conditions	Maximum 9 digits. The display multiplier and volume units are also displayed.	999999999 <sub>x1</sub> m <sup>3</sup>
Volume at Measurement Conditions	Maximum 9 digits. The display multiplier and volume units are also displayed	999999999 x m <sup>3</sup>
Flow Rate	In addition to the flow rate value the volume units will be displayed.	0.0 m <sup>3</sup>
Conversion Factor	Value only.	
Pulse Value	Dirve rate reference and pulse value	Dr 1
Line Pressure	Pressure reading and pressure units displayed.	1.001b
Temperature	Temperature reading and temperature units displayed.	50.1C
Volume at Measurement Conditions Under Fault	Maximum 5 digits. The letters UF are displayed to signify volume at measurement conditions under Fault. The display multiplier and volume units are also displayed.	99999UF <sub>x1</sub> m <sup>3</sup>
Volume at Base Conditions Residual	Maximum 3 digits (and 2 decimal places). The letters Cr are displayed to signify Volume at Base Conditions Residual. The display multiplier and volume units are also displayed.	199.99Cr <sub>x1</sub> m <sup>3</sup>
Volume at Measurement at Conditions Residual	Maximum 3 digits (and 2 decimal places). The letters Ur are displayed to signify Volume at Measuring Conditions Residual. The display multiplier and volume units are also displayed.	199.99Ur <sub>x1</sub> m <sup>3</sup>
Firmware Version/CRC	Firmware version followed by r.	2.17A / 1bd9 CrC
Base Pressure	Base pressure reading followed by p <sub>b</sub> .	1.01 p <sub>b</sub>
Pressure Factor	Pressure factor value followed by PF.	1.00 PF
Supercompressibility	Supercompressibility value followed by F	1.000 F
Battery Voltage	Indication of battery voltage followed by Ub	5.39 Ub
Current Date	Date is displayed with an underscore separator. MM/DD/YY format.	05_01_03
Current Time	Time is displayed with a dash separator. HH/MM/SS	10-30-59
Test Screen	LCD will display each section (as an 8) individually and all symbols (battery icon, display multiplier and volume units)	

**Table 11 – LCD Displayed Messages Reference Table (continued)**

<b>Units</b>	<b>Explanation</b>
x0.1	0.1 Display multiplier
x1	1 Display multiplier
x10	10 Display multiplier
x100	100 Display multiplier
x1000	1000 Display multiplier
m <sup>3</sup>	Cubic meters
b	bar
-PA	kPa/cm2
-9F	kgf/cm2
P FLt	MC has entered the Pressure Fault condition.
Pm FLt	Monitor Pressure Fault (second pressure transducer)
t FLt	MC has entered the Temperature Fault condition.
Int FLt	MC has entered the Internal Operation fault condition.
Lo bAtt	MC has entered low battery condition.
HP AL	High Pressure alarm present.
LP AL	Low Pressure alarm present.
Ht AL	High Temperature alarm present.
Lt AL	Low Temperature alarm present.
HF AL	High Flow alarm present.
LF AL	Low Flow alarm present.
D_In_AL	Digital Input alarm present.
tAnnPEr	Tamper alarm present.
Vol AL	Volume consumption alarm present.
dIAL Out	MC has entered dial out mode.
CLr FLt	Clear fault, a further press of the MC selector button will clear any occurred faults.
PULSES	MC is in test pulse output mode.
CHEcSunn	CRC Fault

## Appendix A – Terminology Used

The terminology used in this manual is listed, for quick reference, in Table 12 (Terminology and Abbreviation Quick Reference Table); in addition the abbreviations used are described within the body of this manual on the first use in the relevant section. Subsequent instances will be abbreviated.

**Table 12 – Terminology and Abbreviation Quick Reference Table**

Terminology / Abbreviation	Explanation
MCUT	Micro Converter User Terminal software
MC2 / Unit	Micro Series Volume Converter with Magnetic Pickup Volume Input
Select / Selecting	Place the mouse cursor over an item and press the left mouse button.
Title Bar	The title bar displays the name of the main screen/dialog box. These names are used to cross refer throughout this manual.
Tab	The following tab options are available; Welcome, Configuration Calibration, Live Data, Faults & Alarms, Advanced, Logging.
Button / Option	A selectable icon that the operator is required to select. Selection of a button/option will either signify the operator's response (e.g. selecting OK to acknowledge a message) or an operator request (e.g. selecting the Configuration tab to display the Configuration screen). See Figure 38 (Identification Guide).
Screen	When a Tab is selected the associated Screen is displayed. Figure 38 shows the Configuration screen.
Dialog	There are numerous dialogs that may be displayed within the MCUT. These are displayed when selecting a button / option from within a screen. See Figure 38 (Identification Guide); the dialog requires a response from the operator to acknowledge a successful configuration download. In this instance the operator should select the OK option to continue.
Check Box	When a check box is enabled a 'tick' or 'check' is placed in the box. See Figure 37 (Identification Guide); the check box should be enabled if communication to the MC2 is to be carried out via a modem.
Parameter Selection List	The parameter selection list is located on the left hand side of the Configuration screen and contains the list of parameters that are changeable within a dialog (e.g. Volume Configuration dialog). By double clicking an item within the parameter selection list the appropriate dialog (including those from other screens) will be displayed, and where applicable the specific parameter will be highlighted within that dialog. If any parameter is changed it will be highlighted yellow within the parameter selection list until it is Uploaded to MC2.
Text Box	A text box is an operator editable field which enables the operator to enter a new value. Figure 37 (Identification Guide) contains a text box which allows the operator to specify a name for a given MC2.
Drop Down Selection Box	The drop down selection box provides the operator with a pre-determined selection of options. To view the options available select the arrow located on the right hand side of the selection box. The available options are then displayed; if required a scroll bar is displayed to enable viewing of all options. Figure 37 (Identification Guide) contains the Flow Sense drop down selection box.

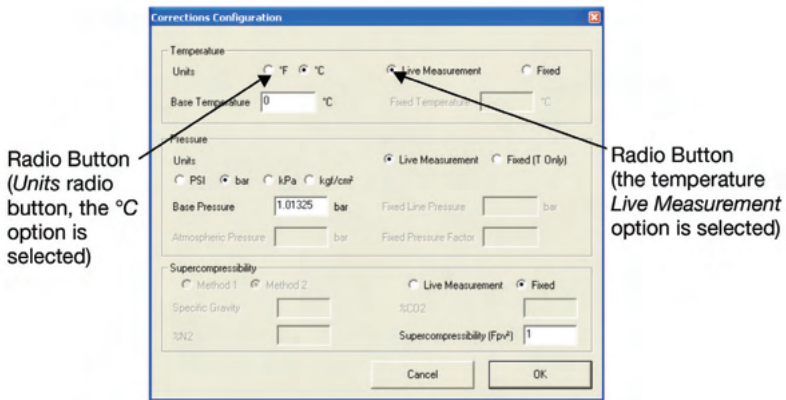
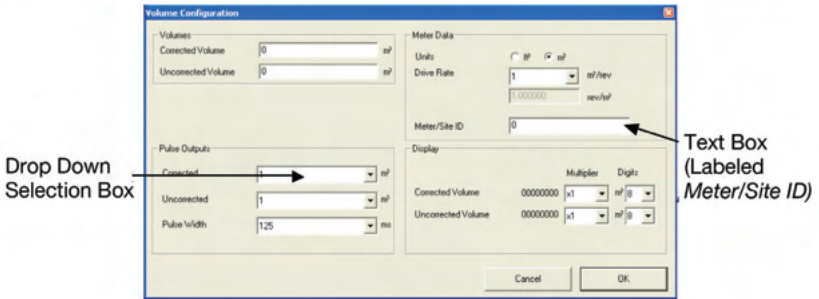
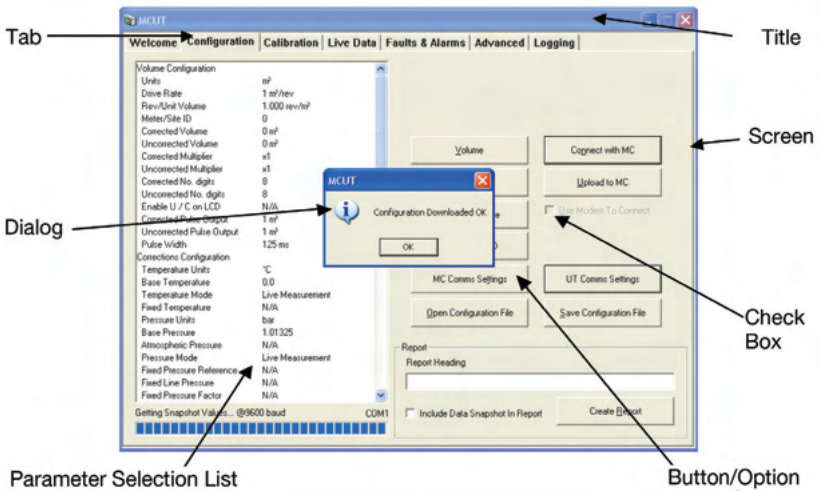


Figure 43 - Identification Guide A

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