

# Dresser<sup>™</sup> Measurement Micro Corrector Model IMCW2 User Terminal Software (MCUT) Manual



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## **1** Information

This manual details the installation and operation of all varieties of the Dresser<sup>™</sup> Micro Corrector, Model IMCW2. The Micro Series Corrector and Micro Series Corrector User Terminal are manufactured by Natural Gas Solutions North America, LLC (Dresser)

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 **1.83 and higher** and up to Micro Corrector User Terminal software version **6.0.0.0**. or higher.

This manual uses the words corrector, corrected and uncorrected throughout. The words corrector, corrected and uncorrected should be read as meaning converter, converted and unconverted as defined by the most recent standards on volume conversion.

In addition, the term *telemetry output pulse* should be read as meaning *pulse output*.

In the case of the IMCW2 T-Only and when a fixed line pressure is applied, the corrected and uncorrected volumes should be read as meaning compensated and uncompensated.

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

## 2 General Overview

The Dresser<sup>™</sup> Micro Corrector, Model IMCW2 is designed to measure live pressure and temperature, and to utilize gas composition to calculate corrected volume.

The IMCW2 is designed to install directly on to all Dresser rotary meters as well as rotary meters of other manufacturers (contact your Dresser Representative for further details). Volume is sensed from the rotation of the impellers via a magnetic pickup, therefore the input signal to the electronic counter and volume corrector is of high resolution. This translates into an extremely high level of accuracy of volume measurement and correction. Furthermore, the lack of a mechanical counter increases the rangeability of the gas meter by reducing the flow required to start the meter rotating.

Model	Live Temperature	Live Pressure	Differential Pressure
IMCW2 T-Only	Yes		
IMCW2 PTZ	Yes	Yes	
Pressure Only		Yes	
T-dp	Yes		Yes
Ptz-dp	Yes	Yes	Yes

**Note:** A temperature only version of the IMCW2, the IMCW2 T-Only is available. The IMCW2 T-Only measures live temperature and calculates supercompressibility. The operator is required to configure a fixed line pressure value. All functionality, with exception of the live pressure measurement is identical to that of the IMCW2-PTZ, and this manual is applicable to both.

A monitor pressure version is also available. An external pressure transducer mounted on a length of armoured cable allows for additional upstream pressure monitoring. Configurable monitoring features are available for this Micro Corrector version.

A differential pressure version is also available, the IMCW2-dp. A differential pressure (DP) transducer module is mounted onto the back of the Micro Corrector unit. This module houses a DP transducer with inlet and outlet connections. Meter diagnostic capabilities are available for this Micro Corrector version.

The Micro Series Corrector User Terminal Software (MCUT) enables the operator to configure, calibrate, download data, and audit logs and monitor alarms. The operator can specify which parameters are logged in the data log as well as the logging interval. The audit log provides a tracking facility detailing any parameter changes; only the parameter changes that will affect the billing are included within the audit log. To ensure the integrity of the billing period, the audit log cannot be deleted.

## 3 Safety

The serial port may only be connected to an intrinsically safe modem as shown by the safety system approval drawing (062308-000 in the Dresser IMCW2 Hardware Manual). 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).1



## WARNING

All IMCW2 installations must meet Intrinsic Safety requirements.

Ensure that the installation is carried out in an appropriate manner in accordance with any National Codes of Practice dealing with Intrinsically Safe (I.S.) installations

Connection to intrinsically safe equipment must be properly assessed by the user; the manufacturer (Dresser) will not take responsibility for the overall safety of the system.

See drawing 062308-000 in the Dresser IMCW2 Hardware Manual

## 4 Installation and Getting Started

### 4.1 System Requirements

The MCUT is designed to run on Microsoft Windows® based PCs.

### 4.2 Required Equipment

The following equipment is needed to connect your computer to the Micro Corrector.

- Dresser Micro Corrector User Terminal Software files
- Dresser<sup>™</sup> Serial Communications Cable
- USB to Serial Port converter (if your laptop is not equipped with a serial port)

Item	Part	Purpose
1	Serial Communications cable	Connect from your computer's serial port to the Micro Corrector Serial port
2	USB to Serial Port converter (Example shown below)	Converts the above serial cable to a USB-A connector



**Communication Cable and Serial Converter** 

Note: The appearance of the items may differ from the ones shown here.

### 4.3 Installation

The MCUT software is supplied by your Dresser Representative either as a downloadable link or through physical media.

Insert/download the MCUT software installation onto your PC or laptop. If the auto run facility is enabled on the PC, the set-up program will start automatically.

If the installation program does not start automatically then double-click SETUP.EXE from the contents list.

Follow in installation prompts to complete the software installation.

Setup - MCUT6000 version 6.0.0.0	_		×
License Agreement Please read the following important information before continuing.		¢	
Please read the following License Agreement. You must accept the te agreement before continuing with the installation.	erms of th	iis	
Dresser UK Ltd., Yeoman Industrial Estate, Test Lane, Nursling, Sou SO 16 9JX (the "Licensor" which expression shall include its subsidiari successors and assigns) is authorised to license the software (the "S contained in this package and upon opening the sealed package the accepts a non-exclusive, non-transferable Licence to "Use" (as here defined) the Software on an IBM compatible PC computer) for single terms and subject to the conditions contained herein.	thampton es, agent Software", Licensee inafter use upor	n, ^ s, ) n the	
This Licence entitles the Licensee to: (a) load, install and Use the Software contained in this package on a	a single IE	зм 🗸	,
● <u>I accept the agreement</u> ○ I <u>d</u> o not accept the agreement			
Next	t>	Car	ncel

#### Dresser Measurement IMCW2 User Terminal Software Manual

iii) Setup - MCUT6000 version 6.0.0.0 − □ ×	Setup - MCUT6000 version 6.0.0.0 — — X
Select Destination Location Where should MCUT6000 be installed?	Select Start Menu Folder Where should Setup place the program's shortcuts?
Setup will install MCUT6000 into the following folder.	Setup will create the program's shortcuts in the following Start Menu folder.
To continue, click Next. If you would like to select a different folder, click Browse.	To continue, click Next. If you would like to select a different folder, click Browse.
C: \Program Files (x86)\dresser\MCUT6000 Browse	MCUT6000 Browse
At least 21.5 MB of free disk space is required.	< Back Next > Cancel
ⓐ Setup - MCUT6000 version 6.0.0.0 − □ ×	🗑 Setup - MCUT6000 version 6.0.0.0 — 🗆 🗙
Select Additional Tasks Which additional tasks should be performed?	Ready to Install Setup is now ready to begin installing MCUT6000 on your computer.
Select the additional tasks you would like Setup to perform while installing MCUT6000, then click Next.	Click Install to continue with the installation, or click Back if you want to review or change any settings.
Additional shortcuts:	Destination location:
Create a desktop shortcut	C:\Program Files (x86)\dresser\MCUT6000
	Additional tasks: Additional shortcuts: Create a desktop shortcut
< <u>B</u> ack <u>N</u> ext > Cancel	< Back Install Cancel
🗃 Setup - MCUT6000 version 6.0.0.0 — □ ×	🗃 Setup - MCUT6000 version 6.0.0.0 — □ ×
Installing Please wait while Setup installs MCUT6000 on your computer.	Completing the MCUT6000 Setup Wizard
Creating shortcuts C:\Users\steve.chiu\Desktop\IMCW USER HARDWARE HANDBOOK.lnk	Setup has finished installing MCUT6000 on your computer. The application may be launched by selecting the installed shortcuts.
	Click Finish to exit Setup.
Cancel	Einish

### 4.4 Operating the MCUT

Communications to the IMCW2 can be carried out either directly or remotely. An intrinsically safe barrier must be installed between a PC in a non-hazardous area and the IMCW2 in the hazardous area. The procedures contained in this manual are identical regardless of whether communications to the IMCW2 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.

Note: For details on setting-up and communicating via a modem contact your Dresser representative.

All the procedures outlined below are described using the direct method of communication and therefore assume that the Dresser supplied communications cable is connected between the PC and IMCW2.

### 4.5 Starting MCUT (Micro Corrector User Terminal)

To start the MCUT:



Note: Completion of the installation process will have placed an icon onto your Windows® desktop.

1. Locate and double-click the icon created on the desktop. Alternatively select the *MC UT* icon from the *Micro Series User Terminal* folder in the *Start, Programs* menu.



2. A window will pop-up showing the Welcome tab



## 5 Welcome Tab

The software version and release date of the user terminal is displayed on the Welcome tab.



Welcome Screen



Note: The Software Revision is required if customer support is requested.

The View Release Notes button will bring up a window which states a summary of changes in the current revision.

Report Viewer			×
Vers	sion History		^
Chan	ges from 5.1.0.2 to 6.0.0.0		
1. 2. 3. 4. 5.	Digital Temperature transducer capability is added AGA Detailed method of compressibility calculation is added For Canadian customers, password protection added to gas composition used in compressibility calculation for AGA Detailed method Possible presentation of corrected and uncorrected volumes on display with 8 digits and multiplication up to x1000 for imperial meters and up to x100 for metric meters in added Possible presentation of corrected and uncorrected volumes on display with 4 digits added	s s is	
Chan	ges from 5.1.0.1 to 5.1.0.2		
1.	Corrected and Uncorrected volume can be presented on display by 8 digits and x10 multiplier.	00	
Chan	ges from 5.1.0.0 to 5.1.0.1		~
<< <u>B</u> ack	Eorward >> Qpen Report Print		ose )

To connect to the IMCW2 it is necessary to select the *Configuration* tab to display the *Configuration Screen*.

## 6 Configuration Tab

#### To display the configuration tab:

- In the MCUT select the *Configuration* tab. The *Configuration* screen will be displayed.
- The options available on this screen depend on the model and configuration of the IMCW2.
- Upon initial call up of this screen (which must be done every time the MCUT is run) it is necessary to **establish communication** with the IMCW2 so that the current settings stored within the IMCW2 are displayed in the MCUT.

The *Configuration* tab is divided into 3 main sections; the left-hand parameter summary/selection list, 9 options which allow the operator to connect and configure the IMCW2, and the report generation section.

🗑 MCUT 6.0.0.0							_		×
Welcome Configuration	Calibration	Live Data	Faults	& Alarms	Advanced	Logging	System	]	
Volume Contiguration Mater Type Meter Size Rev/Unit Volume Meter/Site ID Flow Sense		,	`			<b>DRE</b> UTILITY	SOLUT	TONS	
Corrected Volume Uncorrected Volume		- 1		⊻ol	ume	Co	onnect with N	ИC	
Corrected Multiplier Uncorrected Multiplier Corrected No. digits				<u>C</u> orre	ctions	<u>.</u>	Upload to M(		
Uncorrected No. digits Enable U / C on LCD Corrected Pulse Output				Set Date	e & <u>T</u> ime	— <u>U</u> se N	vlodem To C	onnect	
Uncorrected Pulse Output Pulse Width				Custom	ize <u>L</u> CD		Battery Type	9	
Pulse Output 1 Pulse Output 2 Pulse Output 3				MC Comm	is Settings	UT	Comms Sett	ings	
Fault Output Mode Fault Output Polarity				<u>O</u> pen Confi	guration File	Save	Configuratio	n File	
Temperature Units Base Temperature			- Repo	ort		Customer			[
Temperature Mode Fixed Temperature Pressure Units			Rep	oort Heading					_
				Include Data Old Report Fo	Snapshot In Rep ormat	oort	Create <u>R</u> e	eport	

### 6.1 Connect to the Micro Corrector



For direct communications connect the 9 way "D" type connector of the communications cable to COM port 1 on the PC; connect the round connector to the serial port connector located in the right-hand corner on the bottom of the IMCW2. If COM port 1 is not available, it is possible to specify which COM port is to be used within the MCUT for direct communication (COM 1 to COM 255). A fixed baud rate may be selected for modem communications.

To connect to the IMCW2 directly select the *Connect with MC* option (if no com port is otherwise specified COM1 will be used by default).

Note: For details on setting-up and communicating via a modem contact your Dresser representative.

Welcome	Configuration	Calibration	Live Data	Faults & Alarms	Advanced L	.ogging   \$	System	
Volume Con	figuration			·				
Meter Type	e					ワアギ	SSER	
Meter Size						TIL ITY	SOL LITION	s
Rev/Unit \	/olume					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		-
Meter/Site	ID					_		
Flow Sense	e 							_
Corrected '	Volume			Val	ume	Con	and with MC	
Concorrecte	ed volume Multielier				umo		ICCO WITTING	!
Upcorrected	Multiplier d Multiplier				1			
Corrected	No diaits			Corre	ctions	Up	load to MC	
Uncorrecte	ed No. diaits					E 11	dana T. Camarak	_
Enable U /	C on LCD			Set Dat	e & <u>T</u> ime	i <u>u</u> se mo	idem 1 o Connect	
Corrected I	Pulse Output							
Uncorrecte	ed Pulse Output			Custor	iza LCD	R	atteru Tune	
Pulse Widt	h			Guaton	1120 200		accia Labo	
Pulse Outp	out 1							
Pulse Outp	out 2			MC Com	ns Settings	UT C	omms Settings	
Pulse Outp	out 3							
Fault Uutpi	utMode			Open Confi	iguration File	Save C	onfiguration File	
Fault Outp	ut Polarity Conformation				Igaradorri ne	00100	oringeration in the	
Temperatu	configuration re Units					Customer 🗌		_
Base Tem	nerature			- Benort-		I.		
Temperatu	re Mode			Report Heading				
Fixed Tem	perature							_
Pressure U	nits			·				
,				🗌 🗖 Include Data	Snapshot In Repo	rt		
				Old Benort Er	ormat		Create <u>R</u> eport	

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

elcome	Configuration	Calibration	Live Data	Faults	& Alarms	Advanced L	ogging	System	
/olume Con	ifiguration								
Meter Type	e						DRE	SSER	
Meter Size							ITH ITV	SOLUTION	-
Rev/Unit \	/olume							SOLUTIONS	2
Meter/Site	ID								
Flow Sense	e						_		
Corrected '	Volume				0.1			10	٦
Uncorrecte	ed Volume				<u>V</u> 01	ume	Lan	cel Lonnection	
Corrected I	Multiplier								
Uncorrecte	ed Multiplier				<u>C</u> orre	ctions	L	pload to MC	
Lorrected	INO. OIGIKS			_					_
Enable II (	ea No. aigits / Clan LCD				Set Dati	e & Time	🔲 <u>U</u> se M	odem To Connect	
Corrected I	Pulse Output				00.00.	5 G Timo			
Uncorrecte	ed Pulse Output								1
Pulse Widt	th				Custom	ize <u>L</u> CD	E	Battery Type	
Pulse Outp	out 1								
Pulse Outp	out 2				MC Comm	ns Settings	UTI	Comms Settings	
Pulse Outp	out 3								
Fault Outp	ut Mode								1
Fault Outp	ut Polarity				<u>O</u> pen Confi	guration File	<u>S</u> ave	Configuration File	
Corrections	Configuration			_			C		=
Temperatu	ire Units						Lustomer		
Base Temp	perature			Repo	ort				
Temperatu	ire Mode			Hep	port Heading				
Fixed Lem	perature								
		000001	Ň		Include Dista	Coopedat In Deee	e k		
ietting Mete	er Diagnostic Settings	@9600 baud			include Data	onapsnot in Repo	n.	County Document	

A status bar will display the connection progress.

The "Connect with MC" button will change to "Cancel Connection" during the connection time and you can abort the operation by pressing this button.

🛐 MCUT 6.0.0.0								×
Welcome Configuration	Calibration	Live Data	Fau	lts & Alarms	Advanced	Logging	System	
Volume Configuration			_			-		
Meter Type	Series B					DRE	CCEP	
Meter Size	5M							
Rev/Unit Volume	27.000 rev/ft3					UTILITY	SOLUTIONS	
Meter/Site ID	0							
Flow Sense	Forward							
Corrected Volume	0 ft <sup>9</sup>							1
Uncorrected Volume	0 ft <sup>3</sup>			<u>V</u> olu	me	Co	o <u>n</u> nect with MC	
Corrected Multiplier	x100			_				: 1
Uncorrected Multiplier	x100			Correc	tions		Upload to MC	
Corrected No. digits	8 MCUT			×	ono			
Uncorrected No. digits	8					🗌 🗖 Use N	vlodem To Connect	
Enable U / C on LCD	No				<u> ⊀ T</u> ime			
Corrected Pulse Output	1 ft <sup>3</sup>	opfiguration	Deur	planded OK				. I
Uncorrected Pulse Output	1 ft <sup>o</sup>	Johngulation	DOW	Initiaded OK	∋ LCD		Batterv Type	
Pulse Width	187							
Pulse Output 1	Und							1
Pulse Output 2	Corr			OK	Settings	UT	Comms Settings	
Pulse Uutput 3	Fau							. 1
Fault Output Mode	Single Latched Pu	ilse		Open Config	uration File	Save	Configuration File	
Fault Output Polarity	Normally UFF			openconig	aradorrinic	<u>0</u> 070	coningeration rule	
Lorrections Lonriguration	**					Customer		
Deve Terreture Units	150			7		Cultonio	I	
Lamperature	15.0 Liuc Messurement		- F'	Poport Hooding				
Fived Temperature	N/A	ι .		report reading				_
Pressure Units	live VPs							
T TESSORE OT IKS	NG	*		El Include Dista 9	Snanshot In Po	port		
			-		mapshorni ne	porc	Create Report	
				I UIG Report Fo	rmat			
			_					

If you receive a communication error, you are able to select another communication port...



### 6.2 UT Comms Settings

Communications to the IMCW2 may be conducted directly or remotely, via modem.

**Note:** For details on setting-up and communicating via a modem contact your Dresser representative.

1. Select the UT Comms Settings option. The UT Comms Settings dialog will be displayed.

🗑 MCUT 6.0.0.0							_		×
Welcome Configuration	Calibration	Live Data	Fault	s & Alarms	Advanced	Logging	System	]	
Volume Configuration Meter Type Meter Size Rev/Unit Volume Meter/Site ID Flow Sense	Series B 5M 27.000 rev/ft <sup>s</sup> 0 Forward	^	<u>`</u>			<b>DRE</b> UTILITY	SOLUT	TIONS	
Corrected Volume Uncorrected Volume	91 O 191 O			⊻ok	ıme	C	onnect with	мс	
Corrected Multiplier Uncorrected Multiplier Corrected No. digits	x100 x100 8		[	<u>C</u> orrec	ctions		Upload to M	с,	
Uncorrected No. digits Enable U / C on LCD	8 No 1 63			Set Date	e & <u>T</u> ime	🗖 <u>U</u> se i	Modem To C	Connect	
Uncorrected Pulse Output Pulse Width	1 ft <sup>g</sup> 1 87 ms			Custom	ize <u>L</u> CD		Battery Typ	e	
Pulse Output 1 Pulse Output 2 Pulse Output 3	Uncorrected Corrected Fault			MC Comm	s Settings	UT	Comms Set	tings	
Fault Output Mode Fault Output Polarity Corrections Configuration	Single Latched P Normally OFF	Pulse		<u>O</u> pen Confi	guration File	Save	: Configuratio	on File	
Temperature Units Base Temperature Temperature Mode Fixed Temperature Pressure Units	°C 15.0 Live Measuremer N/A kPa	nt	Re	port eport Heading		Customer			
				Include Data Old Report Fo	Snapshot In Re ormat	port	Create <u>R</u>	eport	

If there are no valid modem connections, then the following window will be displayed.



The operator can specify which communications port is to be used for direct communications **(COM1 to COM255)**, and the modem configuration for remote communications. Additionally, the user may select a fixed baud rate for direct communications.



Note: For details on setting-up and communicating via a modem contact your Dresser representative.

UT Comms S	ettings	X
⊢ Modem —		
Modem	Conexant SoftK56 Modem(M)	]
	Configure Modern	
Direct Com Port	COM1 Fixed Baud 9600	-
	<u> </u>	

#### **UT communication settings Screen**

#### To specify the communications port for in the MCUT:

- On the *Configuration* screen select the *UT Comms Settings* option and the *UT Comms Settings* screen will be displayed.
- From the *Direct* section, select the *Com Port* drop down selection box.
- Select the appropriate com port.
- Select OK on the UT Comms Settings screen.

**Note:** If the PC is not equipped with a serial communication port, then a USB to serial port adaptor can be used. Follow the following procedure to find out Com Port assignment.

- 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 specify the communications port for use in the MCUT:

In the *Direct* section select the *Com Port* drop down selection box.
 Select the appropriate COM port (*that which the communications cable is connected to*), default is COM 1.

JT Comms Se	tings
Modem Modem	Con <u>fig</u> ure Modem
Direct	
Com Port	[COM1]
WARNIN	COM1
Bluetooth	COM4 cr standard serial a COM5 cr standard serial a COM6 MC2/IMCW2, the Fixed box
should re	π COM7 x d. COM8 COM9
	COM10 COM11 OK Cancel

**UT** communication settings Screen

3. Select OK in the UT Comms Settings dialog.



**Note:** If the PC is not equipped with a serial communication port, then a USB to serial port adaptor can be used

#### Follow the following 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.

#### Select the Connect with MC option.



4. Communication will be established. A *progress bar* will begin to move from left to right across the screen as the data is downloaded.

Velcome	Configuration	Calibration	Live Data	Faults &	Alarms	Advanced	Logging	System		
Volume Con	figuration								-	
Meter Type	-						DRE	SSE	B	
Meter Size								COLUT	IONIC	
Rev/Unit V	/olume						UTILITY	SOLUI	10113	2
Meter/Site	ID									
Flow Sense	e									
Corrected \	/olume									1
Uncorrecte	ed Volume				⊻olu	ume	Car	ncel Connec	tion	
Corrected M	Multiplier			_						
Uncorrecte	d Multiplier				Corre	ctions	L. L.	Joload to M(	2	I
Corrected N	No. digits							_		
Uncorrecte	d No. digits					A.T.	🔲 🛛 🗠	lodem To C	onnect	
Enable U /	'C on LCD				Set Date	e « <u>i</u> me				
Corrected H	Julse Uutput									1
Uncorrecte	d Pulse Uutput				Customi	ize <u>L</u> CD		Battery Type		I
Pulse Widt	h 									
Pulse Outp	ut I				NC C					1
Pulse Outp	ut 2				MCLOMM	is Settings	01	Lomms Sett	ings	I
Fuise Outp	uto #Mada			_						1
Fault Outpu	ut Polaritu				Open Confi	guration File	Save	Configuratio	n File	I
Forrections I	Configuration			_						
Temperatu	re Units						Customer			"
Base Temp	perature			Report	t			,		1
Temperatu	re Mode			Repo	ort Heading					
Fixed Temp	perature									_
Pressure U	nits		· · · · · · · · · · · · · · · · · · ·							
Getting Trim	Table Setup @960	0 baud		🗌 🗆 Ir	nclude Data	Snapshot In Rej	port			
								Create Re	enort	

Once *OK* is selected, a summary of the current configuration is displayed on the left and all options within the *Configuration* screen will become available; it is now possible to setup and configure the unit.

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MCUT 6.0	0.0							_	~
NICOT 0.0.	.0.0								
Welcome	Configuration	Calibration	Live Data	Fault	s & Alarms	Advanced	Logging	System	
Mahara Care				_					
Motor Turo	guration	Carica D					DDD	COLD	
Meter Type		Selles D					DRE	SSEK.	
Dev/UnitVa	-lum-	27.000 min /68					UTILITY	SOLUTION	S
Hewonic vo	Diume	27.000 rev/re							
Meter/Site II	U	0							
Flow Sense		Forward							_
Lorrected Vi	olume A Values a	016			Volu	me	C	onnect with MC	
Concorrected	J VOIUME	U100			<u>+</u> 00	ame			
Uncerted M	i ulupilei i Mudielier	x100							- 1
Corrected N	a diaita	x100			Correc	ctions	Ī	Upload to MC	
Uncerted N	U. UIYIIS I Maraliaita	° MCUT			×				-
Enable 11.7	unio, algits Clam LCD	o No				t Time	🗖 <u>U</u> se M	vlodem To Connect	
Corrected Pr	ulan Quinuit	1.63				x <u>-</u> ime			
Uncerted Fi	dise Output I Bulaa Quteut	1.63	Configuration	Down	loaded OK				- I
Dulas ) (idth	s Fuise Output	107				∋ <u>L</u> CD		Battery Type	
Pulse Witten	4.1	107							_
Pulse Outpu	4 T	Corr			1	Callings		Course Collinso	
Pulse Outpu	42 40	Env			OK	Settings	01	Comms Settings	
Fuise Output	u o I blanda	Fau Cinale Latebard F	)			_			- 1
Fault Output	t Mode t Poloritu	Normally OFF	uise		Open Confi	guration File	Save	Configuration File	
Corrections C	onfiguration	Nonnally OFF							
Tomporature	oringuration Libita	°C					Customer		_
Page Tempe	e onito ereturo	15.0		_ D/	port			1	
Temperature	siature Mode	Live Measuromo	nt		sport Heading				
Fixed Terror	ereture	N/A	i R		report neaulity				
Pressure Un	oracure site	live VPs							
I nessure on	iito				Include Dista	Snapshot In Po	nort		
				_   ;			port	Create Report	
					Uld Report Fo	ormat			

### 6.3 Volume Configuration

🟹 MCUT 6.0.0.0				– 🗆 X
Welcome Configuration	Calibration Live	Data F	aults & Alarms   Advanced   L	.ogging System
Volume Configuration Meter Type Meter Size Rev/Unit Volume Meter/Site ID	Series B 5M 27.000 rev/ft <sup>s</sup> 0	^	l	DRESSER, JTILITY SOLUTIONS
Flow Sense Corrected Volume Uncorrected Volume	o Forward O ณี O ณี V100		⊻olume	Connect with MC
Uncorrected Multiplier	x100		<u>C</u> orrections	Upload to MC
Uncorrected No. digits Enable U / C on LCD	8 No 1 68		Set Date & <u>T</u> ime	🔲 Use Modem To Connect
Uncorrected Pulse Output Pulse Width	1 ft <sup>s</sup> 187 ms		Customize <u>L</u> CD	Battery Type
Pulse Output 1 Pulse Output 2 Pulse Output 3	Uncorrected Corrected Fault		MC Comms Settings	UT Comms Settings
Fault Output Mode Fault Output Polarity Corrections Configuration	Single Latched Pulse Normally OFF		Open Configuration File	Save Configuration File
Temperature Units Base Temperature Temperature Mode Fixed Temperature Pressure Units	°C 15.0 Live Measurement N/A kPa	Ŷ	Report Report Heading	Customer
			<ul> <li>Include Data Snapshot In Repo</li> <li>Old Report Format</li> </ul>	rt Create <u>R</u> eport

The Volume Configuration dialog is divided into 6 sections and the parameters that can be changed within this dialog:

- Volumes enables the operator to specify corrected and uncorrected volume totals.
- Flow enables the operator to specify which direction(s) of flow should be used to measure the volumes.
- **Pulse Outputs** enables the operator to specify the value for corrected and uncorrected volume per pulse, and the pulse width of these output pulses.
- Meter Data enables the operator to specify the type and size of meter that the IMCW2 is assembled to. Additionally, the operator is able to allocate a *Meter/Site ID* to each specific IMCW2. This field can be a combination of 16 alpha-numeric characters however, special characters not recognized in Microsoft<sup>™</sup> file names, cannot be entered in this field.
- **Display** enables the operator to specify how the corrected and uncorrected volumes are displayed.
- **Pulse Output Allocation** enables the operator to select uncorrected, corrected or fault pulses separately for each Pulse Output i.e., 1, 2 and 3.

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Volume Configuration				x
Volumes Corrected Volume Uncorrected Volume	0	ft <sup>2</sup> ft <sup>2</sup>	Meter Data Type Size	Series B 🔹
Flow Flow Sense	Forward	·	Meter/Site ID	27 rev/fl <sup>o</sup>
Pulse Outputs Corrected	1	• ft	otspiay	Multiplier Digits
Uncorrected	1	sh ▲	Corrected Volume Uncorrected Volume	00000000 x100 • ft <sup>8</sup> 8 • 00000000 x100 • ft <sup>8</sup> 8 •
Pulse Width	187	<b>▼</b> ms	🔲 Display U / C on LCI	) )
- Pulse Output Allocation-			– Fault Pulse Output Confid	nuration
Pulse Output 1	Uncorrected	-	Fault Mode	Single Latched Pulse
Pulse Output 2	Corrected	-	Polarity	Normally OFF 🛛 👻
Pulse Output 3	Fault	J		·
				<u>C</u> ancel <u>D</u> K

Volume	Configu	ration	Screen
--------	---------	--------	--------

#### 6.3.1 Meter Data

Volume Configuration				x
Volumes		-/	Meter Data	
Corrected Volume	0	fP	Туре	Series B 🔹
Uncorrected Volume	0	fP	Size	5M 🔹
Flow				27 rev/ft <sup>s</sup>
Flow Sense	Forward	l	Meter/Site ID	0
Pulse Outputs			Display-	
Corrected	1	ft³		Multiplier Digits
Uncorrected	1	ft <sup>a</sup>	Corrected Volume	00000000 x100 🔻 f <sup>e</sup> 8 💌
			Uncorrected Volume	00000000 x100 🔻 ft <sup>e</sup> 8 💌
Pulse Width	187 💌	ms	🔲 Display U / C on LCI	D
-Pulse Output Allocation			– Fault Pulse Output Confid	Juration
Pulse Output 1			Fault Mode	Single Latched Pulse
Pulse Output 2			Polarity	Normally OFF
Pulse Output 3	Fault 💌			,
			r	
				Lancel <u>D</u> K

The *Meter Data* section on the *Volume Configuration* screen contains 3 editable fields; 2 drop down selection boxes labelled *Type* and *Size*, and a text box labelled *Meter/Site ID*.

The number of revolutions per ft<sup>3</sup> (rev/ft<sup>3</sup>) / m<sup>3</sup> (rev/m<sup>3</sup>) (dependent on meter type selected) is automatically displayed when the appropriate meter *Type* and *Size* are selected from the appropriate drop-down selection boxes, these details should reflect the meter type and size that the IMCW2 is fitted to.

If the meter configuration required is not shown in the drop-down selection boxes, the *Manual* option from within the *Size* drop down selection box should be selected.

**Note:** If cubic feet (cu ft) are required, ensure that an imperial meter type is selected within the *Type* drop down selection box (e.g. *Series B*); if m<sup>3</sup> is required a metric meter type should be selected (e.g. *Series B Metric*).

If the *Manual* option is selected within the *Size* drop down selection box the text below will be enabled, this will allow the operator to enter the desired number of revolutions per (ft<sup>3</sup>) or (m<sup>3</sup>).

#### To set the meter type:

• In the *Meter Data* section select the *Type* drop down selection box and select the desired option. The new value will be highlighted yellow.

Volume Configuration			2
_ Volumes		Meter Data	
Corrected Volume	0 ft <sup>3</sup>	Туре	Series B
Uncorrected Volume	0 ft <sup>a</sup>	Size	Series B
- Flow			Series A (LMMA) Metric
Flow Sense	Forward	Meter/Site ID	Series G Romet Imperial Romet Metric
Pulse Outputs		Display	HP Imperial
Corrected	1 tt <sup>3</sup>		Multiplier Digits
Uncorrected	1 <b>•</b> ft <sup>3</sup>	Corrected Volume	00000000 ×100 • ft <sup>3</sup> 8 •
		Uncorrected Volume	00000000 x100 🕶 ft <sup>2</sup> 8 💌
Pulse Width	187 <b>•</b> ms	🗖 Display U / C on	LCD
- Pulse Output Allocation -		Eault Pulse Output Co	nfiguration
Pulse Output 1	Uncorrected 💌	Fault Mode	Single Latched Pulse
Pulse Output 2	Corrected	Polarity	Normally OFF
Pulse Output 3	Fault 🗨		
			<u>Cancel</u>

• Select the OK option on the Volume Configuration screen.

Volumes Corrected Volume	0	m <sup>3</sup>	Meter Data	Series B Metric
Uncorrected Volume	0	m³	Size	2М
Flow				1765.73 rev/m <sup>3</sup>
Flow Sense	Forward	•	Meter/Site ID	0
Pulse Outputs			Display	
Corrected	100	<b>▼</b> m <sup>3</sup>		Multiplier Digits
Uncorrected	100	✓ m <sup>3</sup>	Corrected Volume	00000000 x100 🕶 m <sup>3</sup> 8 💌
			Uncorrected Volume	00000000 x100 🕶 m³ 8 💌
Pulse Width	125	▼ ms	🔲 Display U / C on LC	D
Pulse Output Allocation			– Fault Pulse Output Confi	quration
Pulse Output 1	Uncorrected	-	Fault Mode	Single Latched Pulse
Pulse Output 2	Corrected	•	Polarity	Normally OFF 🔹
Pulse Output 3	Fault	-		,
				<u>C</u> ancel <u>O</u> K

• The *Configuration* screen will be displayed, and any changed parameters will be highlighted in yellow in the parameters selection list.

🗑 MCUT 6.0.0.0							_		×
Welcome Configuration	Calibration Live Da	ta   F	Faults	& Alarms	Advanced	Logging	System		
Volume Configuration		^							
Meter Type	Series B Metric					DRE	SSE	TR.	
Meter Size	2M								
Rev/Unit Volume	1765.730 rev/m³					UTILITY	SOLU	TIONS	
Meter/Site ID	0								
Flow Sense	Forward								
Corrected Volume	0 m <sup>3</sup>					(**********			1
Uncorrected Volume	0 m <sup>3</sup>			⊻ok	ume	Co	o <u>n</u> nect with	MC	
Corrected Multiplier	x100		_			<u></u>			비
Uncorrected Multiplier	x100			Corre	ctions		Lipload to M	C	
Corrected No. digits	8			<u></u>			<u></u>	<u> </u>	
Uncorrected No. digits	8					🗖 Use i	Modem To C	Connect	
Enable U / C on LCD	No			Set Date	e & <u>T</u> ime				
Corrected Pulse Output	100 m <sup>3</sup>								1
Uncorrected Pulse Output	100 m <sup>3</sup>			Custom	ize LCD		Battery Typ	е	
Pulse Width	125 ms				-				
Pulse Output 1	Uncorrected								1
Pulse Output 2	Corrected			<u>M</u> C Comm	ns Settings	UT	Comms Set	tings	
Pulse Uutput 3	Fault								
Fault Uutput Mode	Single Latched Pulse			Open Confi	guration File	Save	Configurati	on File	
Fault Output Polarity	Normally UFF				garadonnia		, conngarad	0111110	
Lonections Configuration	۰۲					Customer			
Rase Temperature	r 60.0		- Res	ort			I		
Temperature Mode	Live Messurement		Bei	on Dort Heading					
Fixed Temperature	N/A			port neautify					
Pressure Units	PSI	0							
Thessare enits	1.01	*		Include Data	Snapshot In Be	nort			
				Old Depart Cr	onapsnot ni ne	porc	Create R	eport	
				UIA Réport Fo	ormat				

#### To set the meter size:

• In the *Meter Data* section select the *Size* drop down selection box and select the desired option. The new value will be highlighted yellow.

Volume Configuration			x
- ) (elumes		- Motor Data	
Corrected Volume	0 68	Meter Data	
Conected Volume		Туре	Series B
Uncorrected Volume	69 O	Size	ЗМ
- Flow			ЗМ
Flow Sense	Forward		5M 7M
		Meter/Site ID	8.8M
- Pulse Outputs		Display	11M
Corrected	1 <b>f</b> l <sup>3</sup>		23M4 V.
			munpiler engly
Uncorrected	1 <b>v</b> ft <sup>3</sup>	Corrected Volume	00000000 x100 🕶 ft <sup>8</sup> 8 💌
	·	Uncorrected Volume	00000000 x100 🔻 ft 8 🕶
Pulse Width	187 <b>v</b> ms	Display 117 C on 1	
Pulse Output Allocation-		– Fault Pulse Output Conf	figuration
Pulse Output 1	Uncorrected 🔹	Fault Mode	Single Latched Pulse
Pulse Output 2		Polarity	Normallu OEE
Pulsa Output 2			
Paise Dalpal 3			
			<u>C</u> ancel <u>O</u> K

- Select the OK option on the Volume Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted in yellow in the parameters selection list.

#### To set the Meter/Site ID:

- In the *Meter Data* section select the *Meter/Site ID* text box and enter the desired Meter/Site ID reference.
- Maximum of 16 alphanumeric characters including spaces.
- The new value will be highlighted yellow.

Volume Configuration			×
Volumes		Meter Data	
Corrected Volume	9h 0	Туре	Series B 🔹
Uncorrected Volume	0 ft <sup>e</sup>	Size	5M 🔹
Flow			27 rev/ft <sup>e</sup>
Flow Sense	Forward	Meter/Site ID	0
Pulse Outputs		Display	
Corrected	1 ▼ ft <sup>2</sup>		Multiplier Digits
Uncorrected	1 <b>•</b> ft <sup>3</sup>	Corrected Volume	00000000 x100 v ft <sup>3</sup> 8 v
		Uncorrected Volume	00000000 x100 🔻 ft <sup>8</sup> 8 💌
Pulse Width	187 <b>•</b> ms	🗖 Display U / C on LC	CD
- Pulse Output Allocation-		Eault Pulse Output Confi	iguration
Pulse Output 1	Uncorrected 🔹	Fault Mode	Single Latched Pulse
Pulse Output 2	Corrected 🔹	Polarity	Normally OFF 🔹
Pulse Output 3	Fault		,
		(m)	Causal OK

- Select the OK option on the Volume Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted in yellow in the parameters selection list.



#### 6.3.2 Volumes

It is possible to change the corrected and uncorrected volumes once the data in the IMCW2 has been downloaded to the MCUT.

The *Volumes* section on the *Volume Configuration* screen contains 2 text boxes labelled *Corrected Volume* and *Uncorrected Volume* that enable the operator to change the values of the corrected and uncorrected volumes.

#### To set the Corrected and Uncorrected volumes:

• In the *Volumes* section enter the desired value in the appropriate text box. The new value will be highlighted in yellow. A maximum of 9 digits can be entered in the MCUT for the corrected and uncorrected volumes for firmware versions up to 6.0.0.0. A maximum of 11 digits can be entered for firmware version 6.0.0.0 and higher.



**Note:** The LCD of the IMCW2 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 the OK option in the Volume Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted yellow in the parameters selection list.

Volume Configuration				x
Volumes			Meter Data	
Corrected Volume	2079 f	9	Туре	Series B
Uncorrected Volume	1873 <mark> </mark>	ej:	Size	5M 🔹
Flow-			·	27 rev/ft <sup>s</sup>
Flow Sense	Forward		Meter/Site ID	0
Pulse Outputs			Display	
Corrected	1 <b>•</b> ft	3		Multiplier Digits
Uncorrected	1 <b>•</b> ft	3	Corrected Volume	00000020 x100 v f <sup>8</sup> 8 v
DI SZM			Uncorrected Volume	00000018 x100 🖵 ft <sup>e</sup> 8 💌
Puise Width	18/ <b>•</b> "	าร	🔲 Display U / C on LCE	)
Pulse Output Allocation-			- Fault Pulse Output Config	guration
Pulse Output 1	Uncorrected		Fault Mode	Single Latched Pulse 🔻
Pulse Output 2	Corrected -		Polarity	Normally OFF
Pulse Output 3	Fault 💌			
				Cancel

#### 6.3.3 Flow Sense

The IMCW2 measures the flow from the meter via a magnetic pickup which is installed inside the mag well of the meter. The *Flow* section on the *Volume Configuration* screen contains a drop-down selection labeled *Flow Sense*. In this drop-down selection box, the user can specify which flow sense is identified as the positive and negative flow, along with how the flow should be calculated.

olume Configuration					
Volumes Corrected Volume	2079	ft <sup>3</sup>	Meter Data	Series B	•
Uncorrected Volume	1873	ft <sup>a</sup>	Size	5M	•
- Flow - Flow Sense	Forward - Reverse	-	Meter/Site ID	27 rev/ft <sup>e</sup>	
Pulse Outputs			Display		
Corrected	1			Multiplier [	Digits
Uncorrected	1		Corrected Volume	00000020 x100 🕶 ft	³8 <b>▼</b>
Pulse Width	187	▼ ms	Uncorrected Volume	00000018 x100 _ ff	<sup>3</sup>  8 💌
- Pulse Output Allocation			- Epult Pulso Output Confi	a vision	
Pulse Output 1	Uncorrected	•	Fault Mode	Single Latched Pulse	•
Pulse Output 2	Corrected	•	Polarity	Normally OFF	-
Pulse Output 3	Fault	-		, .	_
				<u>C</u> ancel	<u>-</u> K

The various flow sense configurations are described in below (Flow Sense Configurations Reference Table).

#### Flow Sense Configurations Reference Table

	Measured Flow Source				
Flow Sense	Forward Reverse		Calculated Flow		
Forward – Reverse	$\checkmark$	$\checkmark$	Volume in Reverse flow is subtracted from the volume calculated in Forward flow. Reverse flow will be indicated with a "-" symbol.		
Reverse – Forward	$\checkmark$	$\checkmark$	Volume in Forward flow is subtracted from the volume calculated in Reverse flow. Forward flow will be indicated with a "-" symbol.		
Reverse	×	$\checkmark$	Volume in Reverse flow only is calculated. All flow in the Forward direction is ignored.		
Forward	$\checkmark$	×	Volume in Forward flow only is calculated. All flow in the Reverse direction is ignored.		
Forward + Reverse	$\checkmark$	$\checkmark$	Volume in Reverse and Forward flow are calculated. Calculated volume is the total of all flow in both directions.		



**Note:** For units sealed for Measurement Canada custody transfer the flow sense must be set for "Forward" only.

#### To set the required flow sense:

• In the *Flow* section select the desired option from the drop-down selection box labelled *Flow Sense*. Details of the options are described in table above (*Flow Sense Configuration Reference Table*). The new option selected will be highlighted yellow.

Corrected Volume 0 ft <sup>3</sup> Uncorrected Volume 0 ft <sup>3</sup> Flow 40   Flow 40   Flow Sense Forward - Reverse   Forward - Reverse Image: Series B   Pulse Outputs Forward - Reverse   Forward + Reverse Forward + Reverse   Pulse Output Allocation Forward + Reverse   Pulse Output 2 Corrected   Pulse Output 3 Fault   Forward + Reverse Forward + Reverse   Forward + Reverse Forward + Reverse </th <th></th> <th></th> <th>Meter Data</th> <th></th> <th>Volumes</th>			Meter Data		Volumes
Uncorrected Volume       0       ft <sup>a</sup> Flow       Forward - Reverse       Image: Corrected forward - Reverse         Pulse Outputs       Forward - Reverse       Image: Corrected forward + Reverse         Uncorrected       Forward + Reverse       Image: Corrected forward + Reverse         Uncorrected       Forward + Reverse       Image: Corrected Volume forward + Reverse         Pulse Width       125       Image: Corrected Volume for the forward + Reverse         Pulse Output Allocation       Image: Corrected forward + Reverse         Pulse Output 1       Uncorrected forward + Reverse         Pulse Output 2       Corrected forward + Reverse         Pulse Output 3       Fault	-	Series B	Туре	0 ft <sup>3</sup>	Corrected Volume
Flow       Forward - Reverse         Flow Sense       Forward - Reverse         Pulse Outputs       Reverse         Reverse       Forward - Reverse         Corrected       Forward - Reverse         Uncorrected       Forward + Reverse         Pulse Output Allocation       Top         Pulse Output Allocation       Pulse Output 1         Pulse Output 2       Corrected         Pulse Output 3       Fault	-	ЗМ	Size	0 fts	Uncorrected Volume
Flow Sense       Forward - Reverse         Pulse Outputs       Reverse - Forward         Reverse       Forward + Reverse         Forward + Reverse       Forward + Reverse         Uncorrected       Forward + Reverse         Pulse Vidth       125         Pulse Output Allocation       Image: Corrected in the pulse Output 1         Pulse Output 2       Corrected in the pulse Output 3	v∕ft <sup>e</sup>	40 rev/ft <sup>e</sup>			Flow
Pulse Outputs       Reverse - Forward         Reverse       Forward         Pulse Output       Forward + Reverse         Uncorrected       roo         Pulse Width       125         Pulse Output Allocation       ms         Pulse Output 1       Uncorrected         Pulse Output 2       Corrected         Pulse Output 3       Fault		123456789 3456	Meter/Site ID	Forward - Reverse	Flow Sense
Corrected     Newsee Forward Forward + Reverse     Multipler       Uncorrected     125     ms       Pulse Width     125     ms       Pulse Output Allocation     Display U / C on LCD       Pulse Output 1     Uncorrected       Pulse Output 2     Corrected       Pulse Output 3     Fault			Display	Reverse - Forward	Pulse Outputs
Forward + Reverse       Corrected Volume       00000000       100         Pulse Width       125       ms       Uncorrected Volume       00000000       100         Pulse Width       125       ms       Display U / C on LCD       Image: Corrected Volume       00000000       100         Pulse Output Allocation       Image: Corrected Volume       00000000       100       Image: Corrected Volume       00000000       100         Pulse Output 1       Uncorrected       Image: Corrected Volume	er Digits	Multiplier		Forward	Corrected
Pulse Width     125     ms     Uncorrected Volume     00000000     x100       Pulse Output Allocation     Image: Corrected Volume     Display U / C on LCD     Image: Corrected Volume     Single Latched Pulse       Pulse Output 1     Uncorrected Image: Corrected Volume     Single Latched Pulse     Polarity     Normally OFF       Pulse Output 3     Fault     Image: Corrected Volume     Image: Corrected Volume <td></td> <td>00000000 x100 💌</td> <td>Corrected Volume</td> <td>Forward + Reverse</td> <td>Uncorrected</td>		00000000 x100 💌	Corrected Volume	Forward + Reverse	Uncorrected
Pulse Width     125     ms     Display U / C on LCD       Pulse Output Allocation     Fault Pulse Output Configuration     Fault Pulse Output Configuration       Pulse Output 1     Uncorrected     Fault Mode       Pulse Output 2     Corrected     Polarity       Pulse Output 3     Fault     Image: Contract of the second se		00000000 x100 💌	Uncorrected Volume		
Pulse Output Allocation     Fault Pulse Output Configuration       Pulse Output 1     Uncorrected       Pulse Output 2     Corrected       Pulse Output 3     Fault		I	🔲 Display U / C on LCD	125 <b>v</b> ms	Pulse Width
Pulse Output 1     Uncorrected     Image: Fault Pulse Output 2     Single Latched Pulse       Pulse Output 2     Corrected     Image: Fault Pulse Output 3     Fault       Pulse Output 3     Fault     Image: Fault Pulse Output 3     Fault Pulse Output 3		uration	– Esult Pulse Outsut Config		Pulse Output Allocation
Pulse Output 2     Corrected     Image: Construction of the constructio	<b>_</b>	Single Latched Pulse	Fault Mode	Uncorrected 🔹	Pulse Output 1
Pulse Output 3 Fault		Normally OFF	Polarity	Corrected	Pulse Output 2
		[		Fault 💌	Pulse Output 3

• Select the OK option on the Volume Configuration screen.

olume Configuration				×
Volumes		7 6	Meter Data	
Corrected Volume	2079 ft <sup>a</sup>		Туре	Series B 👻
Uncorrected Volume	<mark>1873 ft<sup>9</sup></mark>		Size	5M 🔹
Flow				27 rev/ft <sup>a</sup>
Flow Sense	Forward - Reverse		Meter/Site ID	0
Pulse Outputs		1 г	Display	
Corrected	1 <b>•</b> ft <sup>8</sup>			Multiplier Digits
Uncorrected	1 <b>▼</b> f <sup>®</sup>		Corrected Volume	00000020 x100 💌 ft <sup>e</sup> 8 💌
			Uncorrected Volume	00000018 x100 💌 ft <sup>e</sup> 8 💌
Pulse Width	187 <b>•</b> ms		🔲 Display U / C on LCD	1
Pulse Output Allocation-		- L ] _	Fault Pulse Output Config	uration
Pulse Output 1	Uncorrected 🔹		Fault Mode	Single Latched Pulse 🔻
Pulse Output 2	Corrected		Polarity	Normally OFF 🔹
Pulse Output 3	Fault 💌			
			<u></u>	

• The *Configuration* screen will be displayed, and any changed parameters will be highlighted in yellow in the parameters selection list.

Gas flow related values available in IMCW2:

- Instantaneous actual (uncorrected) flow rate
- Overspeed fault
- High flow alarm
- Low flow alarm
- Average corrected flow rate
- Peak corrected flow rate
- Peak uncorrected flow rate

Uncorrected or actual flow rate is available on the display screen. The value of this parameter should not exceed the total connected load at the metering site. The uncorrected flow rate is determined every second, and the four second average value is shown on the display screen.

A snapshot of uncorrected flow rate is available on the Live Data screen in the User Terminal (MCUT).

The operator can set the preferred minimum and maximum uncorrected flow values in the MCUT, and a *High or Low Flow Alarm* will be set if the actual flow rate is outside of the limits. Refer to the section entitled **Faults and Alarms**.

The IMCW2 will set an *Overspeed Fault* if the measured uncorrected flow rate exceeds 125% of the meter Qmax. The operator is not required to set up this fault.

6.3.4 In Firmware Version 3.01 or higher, the operator can choose to log *Peak Uncorrected Flow Rate.* The operator can also choose to log *Average Corrected Flow Rate* and *Peak Corrected Flow Rate*. Refer to the section entitled Logging Screen.

#### 6.3.4 Pulse Outputs

The pulse outputs can be configured as 0.1, 1, 10, 100 and 1000, and describe the volume per output pulse. These values can be either metric or Imperial. For example, if the corrected pulse output is set to 100 ft<sup>3</sup>, 1 output pulse will be generated for every 100 ft<sup>3</sup> received, see table below (*Pulse Output Reference Table*) for further details.

Corrected & Uncorrected Pulse Output (ft <sup>3</sup> )	Condition for Output Pulse Generation	
1 ft <sup>3</sup>	For every 1 ft <sup>3</sup> received	
10 ft <sup>3</sup>	or every 10 ft <sup>3</sup> received	
100 ft <sup>3</sup>	For every 100 ft <sup>3</sup> received	
1000 ft <sup>3</sup>	For every 1000 ft <sup>3</sup> received	
Corrected & Uncorrected Pulse Output (m <sup>3</sup> )	Condition for Output Pulse Generation	
0.1 m <sup>3</sup>	For every 0.1 m <sup>3</sup> received	
0.1 m <sup>3</sup> 1 m <sup>3</sup>	For every 0.1 m <sup>3</sup> received For every 1 m <sup>3</sup> received	
0.1 m <sup>3</sup> 1 m <sup>3</sup> 10 m <sup>3</sup>	For every 0.1 m <sup>3</sup> received For every 1 m <sup>3</sup> received For every 10 m <sup>3</sup> received	

#### Pulse Output Reference Table



**Note:** The *Corrected Pulse Outputs* and *Uncorrected Pulse Outputs* are independent of one another; therefore, the corrected and uncorrected pulse outputs may be set as different values. This is particularly useful when working with high correction factors.

The *Pulse Outputs* section on the *Volume Configuration* screen contains 3 drop-down selection boxes labeled *Corrected*, *Uncorrected* and *Pulse Width*.

#### To set the pulse outputs:

• In the *Pulse Outputs* section select the appropriate (*Corrected* or *Uncorrected*) drop down selection box and select the desired option. The new value will be highlighted yellow.

Volume Configuration				2
Volumes			Meter Data	
Corrected Volume	0	ft <sup>3</sup>	Туре	Series B
Uncorrected Volume	0	ft <sup>a</sup>	Size	5M 🔻
Flow				27 rev/ft <sup>3</sup>
Flow Sense	Forward		Meter/Site ID	0
Bulas Outputs			Display	
Corrected	1	ft <sup>3</sup>		Multiplier Digits
Uncorrected	10	fi <sup>8</sup>	Corrected Volume	00000000 x100 💌 ft <sup>a</sup> 8 💌
	100		Uncorrected Volume	00000000 x100 🔻 f <sup>e</sup> 8 💌
Pulse Width	187 💌	ms	🔲 Display U / C on LC	D
Pulse Output Allocation			⊢ ⊢Fault Pulse Output Confi	auration
Pulse Output 1	Uncorrected 🔹		Fault Mode	Single Latched Pulse
Pulse Output 2	Corrected		Polarity	Normally OFF 🔹
Pulse Output 3	Fault 💌			

- Select the OK option on the Volume Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted in yellow in the parameters selection list.

#### To set the pulse width:

- In the *Pulse Outputs* section select the *Pulse Width* drop down selection box and select the desired option. The pulse width of the output pulses can be set to
  - 62.5 ms (not suggested for an Itron<sup>™</sup> ERT)
  - o 125 ms
  - o **187 ms**
  - o 315 ms

Note: If connecting an Itron<sup>™</sup> ERT the pulse width must be set to 125 ms or greater.

Volumes			Meter Data		
Corrected Volume	0	ft³	Туре	Series B	-
Uncorrected Volume	0	ft <sup>3</sup>	Size	ЗМ	1
Flow				40 rev/ft	3
Flow Sense	Forward - Reverse	•	Meter/Site ID	123456789 3456	
Pulse Outputs			Display		
Corrected	100			Multiplier	Digits
Uncorrected	100		Corrected Volume	00000000 ×100 -	ft <sup>8</sup> 8 ▼
			Uncorrected Volume	00000000 x100 -	ft <sup>3</sup> 8 🔻
Pulse Width	125 62.5	<u></u> ms	🔲 Display U / C on LCD	)	
Pulse Output Allocation	125		- Fault Pulse Output Config	uration	
Pulse Output 1	187 315		Fault Mode	Single Latched Pulse	•
Pulse Output 2	- [C		Polarity	Normally OFF	1
Pulse Output 3	Fault	•		,	_
	,	_			
				Cancel	ОК

- The new value will be highlighted yellow.
- Select the OK option on the Volume Configuration screen.
# 6.3.5 Pulse Output Allocation

- In the *Configuration* screen select the *Pulse Output 1, 2 or 3* option. The *Pulse Output Allocation Configuration* section will be displayed.
- In the *Pulse Output Allocation* section, select the required *Pulse Output* drop down selection box and select the desired option i.e.
  - o Uncorrected,
  - Corrected
  - o Fault

### Note: refer to the Dresser IMCW2 Hardware Manual to match physical connection Volume Configuration

Volumes			Meter Data	
Corrected Volume	2079	ft <sup>a</sup>	Туре	Series B 🗸
Uncorrected Volume	1873	ft <sup>3</sup>	Size	5M 🔽
Flow				27 rev/ft <sup>8</sup>
Flow Sense	Forward - Reverse 🗾 💌		Meter/Site ID	0
Pulse Outputs			Display	
Corrected	1 <b>•</b> f	9		Multiplier Digits
Uncorrected	1 <b>•</b> f	9	Corrected Volume	00000020 x100 ▼ f <sup>®</sup> 8 ▼
	,		Uncorrected Volume	00000018 x100 🔻 ft <sup>e</sup> 8 💌
Pulse Width	187 <b>•</b> r	ns	🗖 Display U / C on LC	D
Pulse Output Allocation -			Fault Pulse Output Confi	guration
Pulse Output 1	Corrected 🔹		Fault Mode	Single Latched Pulse
Pulse Output 2	Uncorrected 🗸		Polarity	Normally OFF
Pulse Output 3	Fault 💌			
				<u>Cancel</u>

- The new value will be highlighted yellow.
- Select the OK option on the Volume Configuration screen.

x

# 6.3.6 Display

The Display section on the Volume Configuration screen contains 4 drop down selection boxes:

- Corrected Volume Multiplier
- Corrected Volume Digits
- Uncorrected Volume Multiplier
- Uncorrected Volume Digits

The LCD can display up to 8 digits for the various volumes.

# For firmware versions earlier than version 6.00:

The maximum volume value registered and stored in the volume register is 999,999,999 plus 0.99 [ft<sup>3</sup>] or [m<sup>3</sup>]. This means 9 digits volume value plus 2 digits residual volume. If the volume is increased by 0.01 in set volume units, then the volume stored in register becomes zero and the counting will continue.

Volume	Multiplier	Digits	Volume
Reading	Option	Option	Displayed on LCD
	x0.1		34567890
	x1		23456789
123456789	x10	8	12345678
	x100		01234567
	x1000		00123456
	x0.1		4567890
	x1		3456789
123456789	x10	7*	2345678
	x100		1234567
	x1000		0123456
	x0.1		567890
	x1		456789
123456789	x10	6*	345678
	x100		234567
	x1000		123456
	x0.1		67890
	x1		56789
123456789	x10	5*	45678
	x100		34567
	x1000		23456

\* When selected the *Display U / C on LCD* check box is displayed, by selecting this option a *U* will be displayed on the uncorrected volume and a *C* on the corrected volume on the LCD.

# For firmware versions 6.00 and higher:

The maximum value stored in the volume register is 99,999,999,999 plus 0.99 [ft<sup>3</sup>] or  $[m^3]$ . This means 11 volume digits plus 2 digits residual volume. The registered volume is shown on the Live Data screen. If the volume is increased by 0.01 in set volume units, then the volume stored in register becomes zero and the counting will continue. Refer to the following chart.

Volume	Multiplier	Digits	Volume
Reading	Option	Option	Displayed on LCD
	x0.1		34567890
	x1		23456789
98123456789	x10	8	12345678
	x100		81234567
	x1000		98123456
	x0.1		4567890
	x1		3456789
98123456789	x10	7	2345678
	x100		1234567
	x1000		8123456
	x0.1		567890
	x1		456789
98123456789	x10	6	345678
	x100		234567
	x1000		123456
	x0.1		67890
	x1		56789
98123456789	x10	5	45678
	x100		34567
	x1000		23456

Dresser Measurement	IMCW2 User	Terminal	Software	Manual
---------------------	------------	----------	----------	--------

			– Meter Data	
Corrected Volume	0	ft <sup>a</sup>	Tune	
Uncorrected Volume	0	fl3	i ype	Series B
	J°	К	Size	2M 🔽
Flow				50 rev/ft <sup>e</sup>
Flow Sense	Forward	•	Meter/Site ID	0
Pulse Outputs			Display	
Corrected	100			Multiplier Digits
Uncorrected	100		Corrected Volume	00000000 x100 V ft <sup>2</sup> 8 V
			Uncorrected Volume	00000000 x100 🔻 ft 8 💌
Pulse Width	125	▼ ms	🗖 Display U / C on I	LCD
- Pulse Output Allocation	1		– Fault Pulse Output Cor	nfiguration
Pulse Output 1	Uncorrected	-	Fault Mode	Single Latched Pulse
Pulse Output 2	Corrected	-	Polarity	Normally OFF 🚽
Pulse Output 3	Fault	•		,
			<i>י</i> ייי	
				<u>Cancel</u>

Number of volume digits to display on LCD can be selected

## To set the corrected and uncorrected volume digits:

• In the *Display* section select the appropriate *Digits* drop down menu and select the desired option.

olume Configuration				
Volumes			Meter Data	
Corrected Volume	0	ft <sup>a</sup>	Туре	Series B
Uncorrected Volume	0	ft <sup>a</sup>	Size	5м 🗸
Flow				27 rev/ft <sup>o</sup>
Flow Sense	Forward	•	Meter/Site ID	0
Pulse Outputs			Display	
Corrected	1	▼ ft <sup>9</sup>		Multiplier
Uncorrected	1		Corrected Volume	00000000 x100 🔻 ft <sup>e</sup> 8 💌
	1.	_	Uncorrected Volume	00000000 x100 🖵 ft <sup>e</sup> 4
Pulse Width	187	▼ ms	🔲 Display U / C on LCI	D 6
Pulse Output Allocation			- Fault Pulse Output Confid	a uration
Pulse Output 1	Uncorrected	-	Fault Mode	Single Latched Pulse
Pulse Output 2	Corrected	•	Polarity	Normally OFF
Pulse Output 3	Fault	•		
				<u>C</u> ancel <u>D</u> K

It is possible to independently configure the corrected and uncorrected volumes on the LCD; both the multipliers and number of digits displayed on the LCD:

- Between 5 and 8 up to firmware revision 6.00
- Between 4 and 8 for firmware revision 6.00 and higher



**Note:** For units sealed for Measurement Canada custody transfer the number of digits must be 5-8 digits

- The new value will be highlighted yellow.
- Select the OK option on the Volume Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted in yellow in the parameters selection list.

••7	
	Note: To upload changes to the Micro Corrector refer to the section entitled Upload to MC

## **Display Multiplier**

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 "*O*" is placed in front of the value. A decrease to the *Digits* will effectively 'remove' the most significant figure of the volumes value. The effect of the various *Multiplier* and *Digits* options is detailed in Table 3 (*Volume Multiplier and Digits Reference Table*). Additionally, a sample of a corrected and uncorrected volume value is displayed in the *Display* section on the *Volume Configuration* screen.

It is possible to independently configure the corrected and uncorrected volumes on the LCD; both the multipliers and number of digits displayed on the LCD:

- Between 5 and 8 up to firmware revision 6.0.0
- Between 4 and 8 for firmware revision 6.0.0 and later.

Display multipliers are selectable:

- x1, x10, x100, x1000 if imperial units are selected [ft<sup>3</sup>]
- x0.1, x1, x10, x100 if metric units are selected [m<sup>3</sup>]

Volume Configuration			x
-			
└ Volumes		Meter Data	
Corrected Volume	ft <sup>9</sup>	Туре	Series B 🗸
Uncorrected Volume	0 ft <sup>3</sup>	Size	2M 🔽
Flow			50 rev/ft <sup>3</sup>
Flow Sense	Forward 💌	Meter/Site ID	0
Pulse Outputs		Display	
Corrected	100 <b>•</b> ft <sup>3</sup>		Multiplier Digits
Uncorrected	100 <b>•</b> ft <sup>9</sup>	Corrected Volume	00000000 x100 🗸 ft <sup>8</sup> 8 🗸
Pulse Width	125 <b>•</b> ms	Uncorrected Volume	
Pulse Output Allocation-		– Foult Pulso Output Confid	u ration
Pulse Output 1		Fault Mode	Single Latched Pulse
Pulse Output 2	Corrected	Polarity	Normally OFF
Pulse Output 3	Fault 💌		
			<u>Cancel</u>

Volume multiplier is selectable in "Display" section

### To set the corrected and uncorrected volume multiplier:

- In the *Display* section, select the appropriate *Multiplier* drop down selection box and select the desired option. The new value will be highlighted in yellow.
- Select the OK option in the Volume Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted in yellow in the parameters selection list.

Note: To upload changes to the Micro Correc	tor see the section entitled <b>Upload to MC</b>
Volume Configuration         Volumes         Corrected Volume         Uncorrected Volume         Image: Second S	× Meter Data Type Series B ▼ Size 5M ▼ 27 rev/t <sup>g</sup> Meter/Site ID 0

oume configuration				
-Volumes		_	Meter Data	
Corrected Volume	0 ft	3	Тире	Series B
Uncorrected Volume	0 ft	3	Size	5M
Flow				27 rev/fB
Flow Sense	Ferrurad			I. IOMIC
TIOW SCHOOL			Meter/Site ID	0
Pulse Outputs			Display	
Corrected	1 ft <sup>a</sup>			Multiplier
			Corrected Volume	
Uncorrected	1 ft <sup>0</sup>			
Pulse Width	197 <b>m</b>			x10
		<u> </u>	Display U / C on LCD	x100
Pulse Output Allocation		٦.	- Fault Pulse Output Config	uration
Pulse Output 1	Uncorrected 🔹		Fault Mode	Single Latched Pulse 🔹
Pulse Output 2	Corrected 🔹		Polarity	Normally OFF 🔹
Pulse Output 3	Fault			,
	,			
				<u>C</u> ancel <u>O</u> K

# Display U/C on LCD



# 6.3.7 Fault Pulse Output Configuration

Corrected Volume	0	fl <sup>e</sup> Tupo	c : p	
Uncorrected Volume	0	H <sup>3</sup> o:	Series B	
Unconected volume	10	Size	5M	-
Flow			27 rev/ft	
Flow Sense	Forward 💌	Meter/Site ID	0	
Pulse Outputs		Display		
Corrected	1	ftP	Multiplier	Digits
Uncorrected	1 💌	ft <sup>3</sup> Corrected Volume	00000000 x100 💌	ft <sup>8</sup> 8 💌
	,	Uncorrected Volume	e 00000000 x100 🗸	ft <sup>9</sup> 8 🔻
Pulse Width	187 💌	ms 🗌 Display U / C or	LCD	
Pulse Output Allocation-		Fault Pulse Output C	onfiguration	
Pulse Output 1	Uncorrected -	Fault Mode	Single Latched Pulse	-
Pulse Output 2	Corrected -	Polarity	Single Latched Pulse	
Pulse Output 3	Fault	j	Continous Pulse	
	,			

Refer to the Volume Configuration screen for Fault Pulse Output Configuration.

Fault Output Pulse forms:

- Continuous pulses
- Single Latch pulse (level)
  - Normally off
  - o Normally on





Note: To upload changes to the Micro Corrector refer to the section entitled Upload to MC

# 6.4 Corrections Configuration

To access the *Corrections Configuration* screen, select the *Corrections* option in the *Configuration* screen. The Correction Configuration Parameter Reference Table is provided as a quick reference indicating the accepted ranges for the correction configuration parameters.

MCUT 6.0.0.0	- 🗆 X
Welcome Configuration Calibration	Live Data   Faults & Alarms   Advanced   Logging   System
Volume Configuration Meter Type Series B Meter Size 5M	
Rev/Unit Volume         27.000 rev/ft <sup>9</sup> Meter/Site ID         0           Flow Sense         Forward           Corrected Volume         0.09	
Uncorrected Volume 0 ft <sup>o</sup> Corrected Multiplier x100	Yokame Connect with MC
Uncorrected Multiplier x100 Corrected No. digits 8	Corrections
Uncorrected No. digits 8 Enable U / C on LCD No	Set Date & <u>I</u> me
Uncorrected Pulse Output 1 ft <sup>®</sup> Pulse Width 187 ms	Customize LCD Battery Type
Pulse Output 1 Oncorrected Pulse Output 2 Corrected Pulse Output 3 Fault	MC Comms Settings UT Comms Settings
Fault Output Mode Single Latched Pr Fault Output Polarity Normally OFF Corrections Configuration	ulse Open Configuration File Save Configuration File
Temperature Units °C Base Temperature 15.0	Customer Customer
Temperature Mode Live Measuremen Fixed Temperature N/A	Report Heading
Pressure Units kPa	I Include Data Snapshot In Report  Old Report Format  Create <u>Report</u>
Corrections Configuration	
- Temperature	
Units • F C	°C
Base Temperature 60	*F Fixed Temperature *F
Pressure	C Live Messurement C Fixed (T Only)
● PSI O bar O kPa O	kgf/cm <sup>2</sup>
Base Pressure 14.73	PSI Fixed Line Pressure PSI
Atmospheric Pressure	PSI Fixed Pressure Factor
Supercompressibility	
• Live Measurement O Fixe	d Supercompressibility (Fpv²)
Compressibility - Natural Gas	
Method of Calculation	Heating Value   1050   BTU/f <sup>®</sup>
NX 19 Low Heating Value 🔻	Specific Gravity  0.58
	CO2  U.5 %mol
Gas composition	N2 U.5 %mol
	H2 0 %mol
	<u>Cancel</u>

### **Corrections Configuration Screen**

The *Corrections Configuration* screen is divided 3 sections and the parameters that can be changed on this screen are those associated with volume correction:

- <u>**Temperature**</u> the operator can specify the temperature units, base temperature value, and whether to utilize either live temperature measurement via the temperature probe or a specified fixed temperature value.
- <u>Pressure</u> the operator can specify the pressure units, base pressure value, and whether to utilize either live pressure measurement via the pressure transducer or values for specified fixed line pressure and fixed pressure factor values. If the fixed line pressure value option is selected, it is also necessary to specify whether the value is absolute or gauge (in the case of gauge, an atmospheric pressure value will need to be entered).
- <u>Supercompressibility</u> the operator can specify whether a fixed Supercompressibility value is to be utilized or calculated using gas composition values supplied by the operator. Previously, if fixed factor supercompressibility was selected, the specific gravity value was not accessible. This is now configurable for DP-versions.

Parameter	Minimum	Maximum	Minimum	Maximum
Base Temperature	32 °F	86 °F	0 °C	30 °C
Fixed Temperature	-40 °F	140 °F	40 °C	60 °C
Base Pressure	9 PSI	15 PSI	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	8 PSI	15 PSI	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	The acceptab	le ranges for <i>Fixed Line</i> t	<i>Pressure</i> are variable and d ransducer type.	epend on the pressure
Fixed Pressure Factor			1-148	
Supercompressibility (Fpv <sup>2</sup> )			0.9-1.2	

# **Correction Configuration Parameter Reference Table**

### 6.4.1 Temperature Measurement

• Alternatively, if live temperature readings cannot be taken, the operator is able to specify a fixed temperature; this constant value is then used for calculating supercompressibility.

It is possible to set the temperature units to enable the display of temperature readings in either °C or °F

### To set the temperature units:

- In the *Temperature* section select the desired *Units* option (°C or °F). The option described as the *Base Temperature* value will be highlighted yellow, and the new temperature units will be displayed to the right of the *Base Temperature* text box.
- Select the OK option on the Corrections Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted in yellow in the parameters selection list.

Note: To upload changes to the Micro Corrector refer to the section entitled Upload to MC
Corrections Configuration

- Temperature	
Units C °F 🔍 °C	Live Measurement     C Fixed
Base Temperature 15 °C	Fixed Temperature C
Fressure Units	<ul> <li>Live Measurement</li> <li>Fixed (T Only)</li> </ul>
⊂ PSI ⊂ bar ⊙ kPa ⊂ kgf/cm²	
Base Pressure 101.325 kPa	Fixed Line Pressure kPa
Atmospheric Pressure kPa	Fixed Pressure Factor
Supercompressibility © Live Measurement O Fixed	Supercompressibility (Fpv²)
Compressibility - Natural Gas Method of Calculation	Heating Value 0 BTU/ft® 🚽
SGEBG Method 3	Specific Gravity 0.6
	CO2 0 %mol
Gas composition	N2 0 %mol
	H2 0 %mol
	Cancel OK

### To set the base temperature:

- In the *Temperature* section select the *Base Temperature* text box and enter the desired value. The new value will be highlighted yellow.
- **Note:** See Correction Configuration Parameter Reference Table for acceptable range.
- Select the OK option on the Corrections Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted in yellow in the parameters selection list.



Note: To upload changes to the Micro Corrector see refer to the section entitled Upload to MC

### To set a fixed temperature value:

- In the *Temperature* section select the *Fixed* option. The new option described 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 Correction Configuration Parameter Reference Table for acceptable range.
- Select the OK option on the Corrections Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted in yellow in the parameters selection list.



Note: To upload changes to the Micro Corrector see refer to the section entitled Upload to MC



### To use live temperature measurement:

- In the *Temperature* section select the *Live Measurement* option. The option displayed as the *Fixed Temperature* text box will be disabled.
- Select the OK option on the Corrections Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted in yellow in the parameters selection list.



Note: To upload changes to the Micro Corrector see refer to the section entitled Upload to MC

### 6.4.2 Pressure Measurement

Live pressure measurement is enabled via a factory installed pressure transducer (pressure transducer range is order specific). If a gauge transducer is fitted, an additional text box is enabled to allow the operator to specify the appropriate value for *Atmospheric Pressure*. Alternatively, if live pressure readings cannot be taken, the operator is able to specify a fixed line pressure value; this constant value is then used for calculating supercompressibility.

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

Corrections Configuration	
Temperature Units C °F ⊙ °C	• Live Measurement
Base Temperature 15 °C	Fixed Temperature C
Pressure Units OPSIObar ©kPaOkgf/cm²	• Live Measurement C Fixed (T Only)
Base Pressure 101.325 kPa	Fixed Line Pressure kPa
Atmospheric Pressure kPa	Fixed Pressure Factor
Supercompressibility © Live Measurement O Fixed	Supercompressibility (Fpv²)
Compressibility - Natural Gas Method of Calculation	Heating Value 0 BTU/ft <sup>®</sup>
SGERG Method 3	CO2 0 %mol
Gas composition	N2 0 %mol
	<u>Cancel</u> <u>D</u> K

### To set the pressure units:

- In the *Pressure* section select the desired *Units* option (bar, kgf/cm<sup>2</sup>, kPa or PSI). The new option described as the *Base Pressure* value will be highlighted yellow, and the new pressure units will be displayed to the right of the *Base Pressure* text box.
- Select the OK option on the Corrections Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted in yellow in the parameters selection list.



Note: To upload changes to the Micro Corrector see refer to the section entitled Upload to MC

### To set the base pressure:

- In the *Pressure* section select the *Base Pressure* text box and enter the desired value. The new value will be highlighted yellow.
  - *Note:* See Correction Configuration Parameter Reference Table for acceptable range.
- Select the OK option on the Corrections Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted yellow in the parameters selection list.



Note: To upload changes to the Micro Corrector see refer to the section entitled Upload to MC

### 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.
- In the *Pressure* section select the *Fixed (T Only)* option. The new option described as the pressure reference (*Absolute* and *Gauge*) options will be enabled.
- Select the appropriate pressure reference option. **Note:** If the Gauge option is selected an additional text box labelled Atmospheric Pressure will be enabled, and the appropriate value should be entered. See Correction Configuration Parameter Reference Table for acceptable range.
- Select the *Fixed Line Pressure* text box and enter the desired value. The new value will be highlighted yellow.
- Note: The acceptable *Fixed Line Pressure* range will depend on other parameter settings; if an invalid value is entered the operator will be advised of the acceptable range.
- Select the OK option on the Corrections Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted yellow in the parameters selection list.



Note: To upload changes to the Micro Corrector see refer to the section entitled Upload to MC



**Note:** When a fixed pressure value is used the pressure 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.
- In the *Pressure* section select the *Fixed (T-Only)* option. The new option described as the pressure reference (*Absolute* and *Gauge*) options will be enabled.
- Select the appropriate pressure reference option. **Note:** If the Gauge option is selected an addition text box labelled Atmospheric Pressure will be enabled the appropriate value should be entered. See Correction Configuration Parameter Reference Table for acceptable range.
- 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 the OK option on the Corrections Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted yellow in the parameters selection list.

m

Note: To upload changes to the Micro Corrector see refer to the section entitled Upload to MC



### To utilize live pressure measurement:

- In the *Pressure* section select the *Live Measurement* option. The options described as the *Fixed Line Pressure* and *Fixed Pressure Factor* text boxes will be disabled.
- Select the OK option in the Corrections Configuration screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted yellow in the parameters selection list.



Note: To upload changes to the Micro Corrector see refer to the section entitled Upload to MC

# 6.4.3 Supercompressibility

Volume correction is calculated based on live pressure and temperature measurement, fixed pressure and temperature measurement or any combination of fixed and/or live pressure and/or temperature measurement.

orrections Configuration		
-Temperature Units C °F • °C	C Live Measurement	C Fixed
Base Temperature 15 °C	Fixed Temperature	°C
Pressure Units	• Live Measurement	C Fixed (T Only)
Base Pressure 101.325 kPa	Fixed Line Pressure	kPa
Atmospheric Pressure kPa	Fixed Pressure Factor	
Supercompressibility C Live Measurement • Fixed	Supercompressibilit	ty (Fpv²) 1
Compressibility - Natural Gas		
Method of Calculation	Heating Value	
	Specific Gravity	
IVerailed Method		
	CO2	%mol
	CO2 N2	%mol %mol
Gas composition	CO2 N2 H2	%mol %mol %mol

The operator can specify whether supercompressibility is to be calculated by selecting the Supercompressibility method and using gas composition inputs selected by the operator and from the live pressure and temperature readings, or if a fixed "Z" value is to be used with the pressure and temperature. The gas compressibility calculations depend on the composition of the gas; this information is entered when utilizing the *Live Measurement* method.

NOTE: Calculation of the Supercompressibility factor has an error typically better than 0.01%.

## To set a fixed supercompressibility value:

- In the *Configuration* screen, select the *Corrections* option and the *Corrections Configuration* screen will be displayed.
- In the *Supercompressibility* section, select the *Fixed* option. The new option described as the *Supercompressibility* (*Fpv*<sup>2</sup>) text boxed will be enabled.
- Select the *Supercompressibility (Fpv<sup>2</sup>)* text box and enter the desired value. The new value will be highlighted yellow.

*Note:* See *Correction Configuration Parameter Reference Table* below for acceptable range.

rrections Configuration		
Temperature		
Units O °F 👁 °C	Eive Measurement	O Fixed
Base Temperature 15 °C	Fixed Temperature	°C
Pressure Units	C Live Measurement	C Fixed (T Only)
C PSI C bar	Fixed Line Pressure	kPa
Atmospheric Pressure kPa	Fixed Pressure Factor	
Supercompressibility C Live Measurement	Supercompressibili	ty (Fpv²) ]1
Compressibility - Natural Gas	Handler Maker	
Method of Calculation	Heating value	
Detailed Method	Specific Gravity	%mol
	N2	%mol
Gas composition	H2	%mol
	Consel	OK

# To select a Method of Calculation for Live Supercompressibility Measurement:

• From within the *Supercompressibility* section select the *Live Measurement* option. The new option will be implied various compressibility calculation methods and radio button options will be enabled.

Corrections Configuration			
Temperature			
Units • F C *C	Eive Measurement	C Fixed	
Base Temperature 60 °F	Fixed Temperature	۴	
Pressure	<u></u>		
Units	<ul> <li>Live Measurement</li> </ul>	Fixed (T Unly)	
● PSI Obar OkPa Okgf/cm²			
Base Pressure 14.73 PSI	Fixed Line Pressure	PSI	
Atmospheric Pressure PSI	Fixed Pressure Factor		
Supercompressibility			
• Live Measurement O Fixed	Supercompressibility (Fpv²)		
Compressibility - Natural Gas			
Method of Calculation	Heating Value 1050	BTU/ft <sup>a</sup> 👻	
NY 10 Law Hasting Yalus	Specific Gravity 0.58		
	CO2 0.5	%mol	
G as composition	N2 0.5	%mol	
clas composition	H2 0	%mol	
	Cancel	<u>о</u> к	
	L	_	

- In the Corrections Configuration screen select the radio button to view the available methods
- Select one of the following methods:
  - 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
  - 9. AGA 8 Detailed Method available for firmware version 6.00 and higher

Note: For units sealed for Measurement Canada custody transfer the only approved methods of compressibility are AGA Gross Method 1, AGA Gross Method 2, NX-19 Low Heating Value and AGA 8 Detailed Method.

Temperature	
Units C °F 📀 °C	
Base Temperature 15 °C	Fixed Temperature C
Pressure Units	C Live Measurement C Fixed (T Only)
⊂ PSI ⊂ bar ∙ kPa ⊂ kgf/cm²	
Base Pressure 101.325 kPa	Fixed Line Pressure KPa
Atmospheric Pressure kPa	Fixed Pressure Factor
Live Measurement     C Fixed	Supercompressibility (Fpv²)
Compressibility - Natural Gas	
Method of Calculation	Heating Value 1050 BTU/ft <sup>®</sup>
Method of Calculation	Heating Value 1050 BTU/ft <sup>®</sup> -
Method of Calculation AGA 8 Gross Method 1	Heating Value 1050 BTU/ft <sup>®</sup> Specific Gravity 0.6 CO2 0 %mol
Method of Calculation AGA 8 Gross Method 1 AGA 8 Gross Method 1 AGA 8 Gross Method 2 SGEBG Method 1	Heating Value 1050 BTU/ft <sup>®</sup> Specific Gravity 0.6 CO2 0 %mol N2 0 %mol
Method of Calculation AGA 8 Gross Method 1 AGA 8 Gross Method 1 AGA 8 Gross Method 2 SGERG Method 1 SGERG Method 2 SGERG Method 2 SGERG Method 3	Heating Value     1050     BTU/ft <sup>®</sup> ▼       Specific Gravity     0.6        CD2     0     %mol       N2     0     %mol       H2     0     %mol
Method of Calculation AGA 8 Gross Method 1 AGA 8 Gross Method 1 AGA 8 Gross Method 2 SGERG Method 1 SGERG Method 2 SGERG Method 3 SGERG Method 4	Heating Value 1050 BTU/ft <sup>®</sup> Specific Gravity 0.6 CO2 0 %mol N2 0 %mol H2 0 %mol

### Compressibility calculation method selection screen

# • See the Supercompressibility Configuration Parameter Reference Table for appropriate input ranges and input your values into the white fields

Method	Parameter	Minimum	Maximum	
	Heating Value	18.7 MJ/m <sup>3</sup>	45.1 MJ/m <sup>3</sup>	
	Specific Gravity	0.554	0.87	
AGA 8 Methods	%CO2	0	30%	
1 & 2	%N2	0	50%	
	Note: Conversion calculations are c 0% to 10%. I	only valid if the following gas compo Propane: 0% to 4%. Hydrogen: 0% t	sition is maintained. Ethane: to 10%.	
	Heating Value	20 MJ/m <sup>3</sup>	48 MJ/m <sup>3</sup>	
Method AGA 8 Methods 1 & 2 SGERG88 Methods 1, 2, 3 & 4 NX19 Low Heating Value NX19 High Heating	Specific Gravity	0.55	0.9	
SGERG88 Methods	%CO2	0%	30%	
1, 2, 3 & 4	%N2	0%	50%	
_, _,	%H2	0%	10%	
	Note: Conversion calculations Methane: 50% to 2	are only valid if the following gas co 100%. Ethane: 0% to 20%. Propan	mposition is maintained. e: 0% to 5%.	
	ParameterMinimumMaximHeating Value18.7 MJ/m³45.1 M.Specific Gravity0.5540.8:%CO2030%%N2050%Note: Conversion calculations are only valid if the following gas composition is maintaine 0% to 10%. Propane: 0% to 4%. Hydrogen: 0% to 10%.Heating Value20 MJ/m³48 MJ/Specific Gravity0.550.9%CO20%30%%CO20%30%%N20%50%%H20%10%Note: Conversion calculations are only valid if the following gas composition is maintaine 0% CO20%%N20%10%%H20%10%Methane: 50% to 100%. Ethane: 0% to 20%. Propane: 0% to 5%.%N20%15%%N20%15%%N20%15%%N20%2.59%N20%2.59%N20%2.59%N20%2.59%N20%7%		1.0	
NX19 Low Heating Value	%CO2	0%	15%	
Value	%N2	0%	15%	
	Heating Value	39 MJ/m <sup>3</sup>	47 MJ/m <sup>3</sup>	
Method         AGA 8 Methods         1 & 2         N         SGERG88 Methods         1, 2, 3 & 4         NX19 Low Heating         Value	Specific Gravity	0.55	0.7	
NX19 High Heating	hodParameterHeating ValueSpecific GravitySpecific GravitySpecific GravityNote: Conversion calculations are only va 0% to 10%. ProparMethods8 & 4Methods8 & 4%CO2%N2Methods9 & 4%CO2%N2<	0%	2.5%	
Value	%N2	0%	7%	
	Note: Conversion calculations are o	only valid if the following gas compo to 4%.	osition is maintained. H2: 0%	

# Supercompressibility Configuration Parameter Reference Table

If the **Detailed Method** is selected, an additional window will appear:

	611 H				
Units UP 10 1	<ul> <li>Live Measurement</li> <li>Fixed</li> </ul>				
Base Temperature 15 °C	Fixed Temperature C				
Pressure	0.				
Units	(• Live Measurement C Fixed [I Unly				
C PSI (• bar C kPa C kgt/cm²					
Base Pressure 1.01325 bar	Fixed Line Pressure bar				
Atmospheric Pressure	Fixed Pressure Factor				
	Supercompressibility (Epy2)				
Live Measurement O Fixed	experient preserving () pv (				
Compressibility - Natural Gas					
Method of Calculation	Heating Value				
Detailed Method	Specific Gravity				
	CO2 %mol				
	N2 %mol				
Las composition	H2 %mol				
	112 201101				

Methane	94.7	[%]	Hydrogen	0.02	[%]	nHexane	0.01	
Nitrogen	0.5	[%]	Carbon Monoxide	0	[%]	nHeptane	0	
Carbon Dioxide	0.3	[%]	Oxygen	0.01	[%]	nOctane	0	— i
Ethane	4.2	[%]	iButane	0.02	[%]	nNonane	0	
Propane	0.2	[%]	nButane	0.02	[%]	nDecane	0	_
Water	0	[%]	iPentane	0.01	[%]	Helium	0	_
Hydrogen Sulfide	0	[%]	nPentane	0.01	[%]	Argon	0	
	1		1			, -		
Adjust Methane	Gu	lf Coast Defa	aults Defa	aults			OK	

## Gas Composition selection screen

- Input your values for the Detailed Method.
- There are additional buttons for adjusting methane and other regional default values.

If a value entered by user total greater than 100%, a warning message pops up seen below:

Methane	96.5222	[%]	Hydrogen	0	[%]	nHexane	0.0664	[2
Nitrogen	0.2595	[%]	Carbon Monoxide	0	[%]	nHeptane	99	p
Carbon Dioxide	0.5956	[%]	Oxygen	0	[%]	nOctane	0	
Ethane	1.8186	[%]	iButane	0.0977	[%]	nNonane	0	
Propane	0.4596	[%]	nButane	0.1007	[%]	nDecane	0	
Water	0	[%]	iPentane	0.0473	[%]	Helium	0	`
Hydrogen Sulfide	0	[%]	nPentane	0.0324	[%]	Argon	0	



• Once all the required parameter values are entered select the OK option on the Conversions Configuration screen



Name of Component	Abbreviation			
Methane	1			
Nitrogen	n			
Carbon Dioxide	С			
Ethane	2			
Propane	3			
Water	4			
Hydrogen Sulfide	5			
Hydrogen	Н			
Carbon Monoxide	6			
Oxygen	7			
iButane	8			
nButane	9			
iPentane	А			
nPentane	b			
nHexane	С			
nHeptane	d			
nOctane	E			
nNonane	F			
nDecane	h			
Helium	i			
Argon	L			
Specific Gravity	G			
Heat Value [MJ/m3]	J			
Heat Value [BTU/ft3]	U			

# Abbreviations for gas compositions and gas parameters available on LCD display

# Table 1a - Abbreviations for compressibility methods

Compressibility Method	Abbreviation
AGA8 Method 1	AGA1
AGA8 Method 2	AGA2
SGERG Method 1	SGErG1
SGERG Method 2	SGErG2
SGERG Method 3	SGErG3
SGERG Method 4	SGErG4
NX19 Low Heating Value	Lo
NX19 High Heating Value	Hi
AGA8 Detailed Method	dEtA

# 6.5 Differential Pressure Monitoring

Meter site differential pressure (DP) diagnostic functionality for rotary meters is possible if the meter is equipped with a Dresser IMCW2-dp volume corrector. Meter diagnostics are based on the DP value measured between the inlet and outlet differential pressure test connections (REF: ANSI B109.3 Appendix A). The differential pressure value is measured every 30 seconds and can be viewed on the IMCW2-dp LCD. This value is accessible through the MCUT Logging function and is also recorded on the Live Data screen.

The measured DP value is used to determine:

- Average DP and related values when stable conditions provide a valid test
- Rotary meter alarm conditions
- Rotary meter fault conditions

The following 3 conditions are monitored and reported by the IMCW2-dp:

- Meter DP Alarm
- Meter DP Fault
- Meter Lock-up Fault

# Meter DP Alarm

The meter DP alarm is activated if the number of measured high occurrences exceeds the meter DP alarm threshold (calculated by the learned model). The meter DP alarm is only enabled for flow rates higher than the required minimum flow rate for a valid DP sample. If this alarm occurs, **dP AL** is shown on the LCD and fault output pulses are generated if selected on the *Alarm Settings* screen.

## Meter DP Fault

The meter DP fault is activated if the number of measured high occurrences exceeds the meter DP fault threshold (calculated by learned model). The meter DP fault is only evaluated for flow rates higher than the required minimum flow rate for a valid DP sample. If this fault occurs, **dP FLt** is shown on the LCD and fault output pulses are generated.

# Meter Lock-up Fault

The meter lock-up fault is activated if the number of high occurrences measured exceeds the meter lock-up threshold. The lock-up threshold is defined as the theoretical DP value for particular conditions multiplied by the lock-up factor, provided there is a sufficient period of stable flow. If this fault occurs, then **dP LOC** is shown on the LCD and fault output pulses are generated.

The following parameters are required for DP measurement:

- Gas flow rate
- Line gas pressure
- Gas temperature
- Gas composition
- Gas meter size/type

Differential pressure is calculated using mathematical models, which are based on these parameters. The measured differential pressure is compared with the theoretical value calculated from the mathematical model. Flow rate, line pressure, and line temperature are all measured by the IMCW2-dp and reported into the analytical model. Gas composition and meter size/type must be entered by the operator using the MCUT software.

This is the reason that the health diagnostic of the gas meter must involve DP measurement accompanied with measurement of other parameters.

# 6.6 Set Date & Time

It is possible to set the date and time stored in the IMCW2 using the MCUT software. 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 the Date Format.

MCUT 6.0	).0.0							_		×
Welcome	Configuration	Calibration	Live Data	Faul	ts & Alarms	Advanced	Logging	System	]	
Volume Con	figuration			~						
Meter Type	- )	Series B					DRE	SSE	B	
Meter Size		5M								
Rev/Unit V	/olume	27.000 rev/ft <sup>8</sup>					UTILITY	SOLUI	IONS	
Meter/Site	ID	0		_						
Flow Sense		Forward								
Corrected	/olume	0 ស				- 1	ſ			1
Uncorrecte	d Volume	0 ស			⊻olu	ume	Co	nect with h	4C	
Corrected I	Aultiplier	x100					<u> </u>		)	1
Uncorrecte	d Multiplier	x100			Correc	ctions		Inload to Mi	-	
Corrected I	vo. digits	8				Stions	<u>`</u>			
Uncorrecte	d No. digits	8		1			🗖 Use N	Aodem To C	onnect	
Enable U /	C on LCD	No			Set Date	e & <u>T</u> ime				
Corrected F	Pulse Output	1 ស		- L			)			.
Uncorrecte	d Pulse Output	1 ft <sup>3</sup>			Custom	zelCD		Ratteru Tune		
Pulse Widt	h	187 ms			Custom	20 200			·	
Pulse Outp	ut 1	Uncorrected								1
Pulse Outp	ut 2	Corrected			<u>M</u> C Comm	is Settings	UT	Comms Sett	ings	
Pulse Outp	ut 3	Fault								1
Fault Outpu	ut Mode	Single Latched F	Pulse							
Fault Outpu	ut Polarity	Normally OFF			Upen Config	guration File	<u>S</u> ave	Configuratio	n File	
Corrections	Configuration									1
Temperatu	re Units	°C					Lustomer	ļ		
Base Temp	erature	15.0		R	eport					
Temperatu	re Mode	Live Measureme	nt	F	Report Heading					
Fixed Temp	perature	N/A								_
Pressure U	nits	kPa	•	v						
				1	Include Data	Snapshot In Rej	port			
				- I	Old Report Fo	ormat		Create <u>R</u>	eport	
,										

Set Date and Time Screen

### Dresser Measurement IMCW2 User Terminal Software Manual

### To set the date and time:

Set Date and Time		x
Date and Time		
Time in MC at Last Snap Shot	10/31/2022, 22:46:50	Update Now
New Date (mm/dd/yy):	11/01/22 - Dat	e Format mm/dd/yy 💿
New Time (hh:mm:ss):	12:41:11 PM 🔹	dd/mm/yy O
	<u>C</u> ancel	<u>S</u> end

- The date and time stored in the IMCW2 is displayed and is identified as *Time in MC at Last Snapshot*.
- Select the **Update Now** option; the *Time in MC at Last Snapshot* value, *New Date (mm/dd/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 will be displayed. Select the appropriate date. To change the month displayed select the appropriate arrow option located at the top of the calendar. Once a date has been selected the calendar will close and the new date will be displayed in the drop-down selection box.
- If an update to the time is required select the *New Time (hh:mm:ss)* 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 the *Send* option to upload the new date and time to the IMCW2.
- 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 IMCW2. It is therefore recommended that all data logs are downloaded from the IMCW2 before the new data and/or time settings are uploaded. For information regarding the downloading of data logs, refer to section *Download Data Log* 

\*The MCUT 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 MCUT will display the date format in DD/MM/YY.

Note: Time will not be automatically adjusted for Daylight Savings

# 6.7 Customize LCD

MCUT 6.0.0.0							_		×
Welcome Configuration	Calibration	Live Data	Faul	ts & Alarms	Advanced	Logging	System		
Volume Configuration Meter Type Meter Size Rev/Unit Volume Meter/Site ID Flow Sense	Series B 2M 50.000 rev/ft <sup>e</sup> 0 Forward	ŕ				<b>DRE</b> UTILITY	SOLU	TIONS	
Uncorrected Volume	0 fP			⊻olu	ime	Co	nect with	мс	
Corrected Multiplier Uncorrected Multiplier Corrected No. digits	x100 x100 8 8			Correc	ctions		Jpload to M	C	
Enable U / C on LCD	No			Set Date	e & <u>T</u> ime	L <u>U</u> se h	vlodem To (	Connect	
Corrected Pulse Output Uncorrected Pulse Output Pulse Width	100 fP 100 fP 125 ms		ſ	Customi	ze <u>L</u> CD		Battery Typ	e	
Pulse Output 1 Pulse Output 2 Pulse Output 3	Uncorrected Corrected Fault			MC Comm	s Settings	UT	Comms Set	tings	
Fault Output Mode Fault Output Polarity Corrections Configuration	Single Latched F Normally OFF	Pulse		Open Config	guration File	<u>S</u> ave	Configurati	on File	
Temperature Units Base Temperature Temperature Mode Fixed Temperature Pressure Units	°F 60.0 Live Measuremen N/A PSI	nt	,     ,	eport Report Heading	Snapshot In Rep	Customer	Corola 1		
			- 1	Old Report Fo	rmat		Ureate <u>H</u>	eport	

Depending on the IMCW2 model, the front panel selector button of the IMCW2 will enable the following parameters to be displayed on the LCD:

- Corrected Volume
- Uncorrected Volume
- Uncorrected Flow Rate (updated every 4 seconds on display)
- Correction Factor
- Meter Size\*\*
- Line Pressure
- Temperature
- Uncorrected Volume Under Fault
- Corrected Residual
- Uncorrected Residual
- Firmware version
- Atmospheric Pressure\*
- Base Pressure
- Pressure Factor
- Supercompressibility
- Battery Voltage
- Current Date
- Current Time

- *Configurable Screens* Three additional parameters connected with Daily Consumption can be selected from 12 options:
  - 1. Accumulated Corrected Volume previous day
  - 2. Accumulated Corrected Volume current day
  - 3. Accumulated Corrected Volume previous month
  - 4. Accumulated Corrected Volume current month
  - 5. *Highest daily volume in the previous month*
  - 6. *Highest daily volume in the current month*
  - 7. Date of last consumption alarm
  - 8. Maximum peak flow
  - 9. Differential pressure results\*\*\*
  - 10. Meter size
  - 11. Gas Composition\*\*\*\*
  - 12. EMC Screen (Test Screen)

\*Only where applicable, i.e., if transducer fitted is gauge (*Customize LCD Dialog*) below represents an IMCW2 with an absolute transducer.

\*\*Monitor Pressure is available instead of Meter Size if corrector is equipped with second external pressure transducer and Differential pressure is available instead of Meter Size if corrector is equipped with a DP transducer.

\*\*\*Only available for IMCW2-dp.

\*\*\*\*Only available for firmware version 6.00 and higher

It is possible to *switch* the displayed parameters *on* and *off*. Additionally, the operator should specify which parameter should be displayed on the LCD as the Default Parameter. At least one of the first 7 (*Main Screen*) parameters must be *switched on*.

By default, all available parameters for the chosen IMCW2 model will be displayed. The *switched-on* parameter check boxes have a check placed in the associated box indicating that the parameter is to be displayed on the LCD.

# To set the default screen parameter on the LCD:

- Select the desired *Default Screen* 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 the OK option on the Customize LCD screen.
- The *Configuration* screen will be displayed, and any changed parameters will be highlighted yellow in the parameters selection list.
- Select *Upload to MC*. The new details will be uploaded to the IMCW2. A dialog box will be displayed stating *Sent OK*. Select *OK*.

CUSTOMIZE LCD					
Main Screens	Diselau	Defeult	Additional Screens	Disalau	Defeuilt
Corrected Volume	Display	(•	Uncorrected Volume Under Fault		C
Uncorrected Volume		С	Corrected Residual	$\checkmark$	0
Flow Rate		С	Uncorrected Residual	$\checkmark$	0
Correction Factor	$\checkmark$	С	Firmware version	<b>v</b>	0
Differential Pressure	$\checkmark$	С	Atmospheric Pressure		0
Line Pressure		С	Base Pressure	$\overline{\checkmark}$	0
Temperature		С	Pressure Factor		0
- Configurable Screens			Supercompressibility	•	0
	Display	Default	Battery Voltage	▼	0
Accumulated Corrected Volume previous day	•	0	Current Date	<b>V</b>	0
Accumulated Corrected Volume previous month	- -	C	Current Time	•	0
Highest daily volume in the previous month	• •	0			
<u>C</u> ancel	<u>(</u>	<u>ס</u> ג	]		

### **Customize LCD Screen**

# To switch parameters <u>on/off</u> on the LCD:

- Select the parameter(s) that are-required/not-required to be displayed on the LCD, ensure that the appropriate check box is checked/unchecked. If a parameter is disabled, it may be because it is not available on the model of IMCW2 that you have chosen.
- Select the OK option on the Customize LCD screen.



Note: For details on setting-up and communicating via a modem contact your Dresser representative.

# 6.8 MC Comms Settings



(only for units equipped with an external modem)

# 6.9 Upload to MC

After configuration data has been changed in the MCUT, you can upload the new parameter details to the IMCW2. Prior to the upload, any parameters that have been changed are highlighted yellow in the parameters selection list; after the parameters have been uploaded to the IMCW2 the yellow highlights will be removed.

Yelcome	Configuration	Calibration	Live Data	Faults & Alarms	Advanced	Logging	System	
Volume Confi	guration		~	_				
Meter Type	-	Series B Metric				DRE	SSEE	
Meter Size		8C				ITH ITY	COLUTIC	NIC
Rev/Unit Vo	olume	4767.480 rev/m <sup>2</sup>					SOLUTIC	JN25
Meter/Site II	D	Digital PCB22	_					
Flow Sense		Reverse						
Corrected V	olume	0 m²			1	ſ		
Uncorrected	Volume	0 m <sup>3</sup>		⊻o	lume	Co	nect with MC	
Corrected M	ultiplier	x10				<u> </u>		i
Uncorrected	Multiplier	x10		Corre	actions		Inload to MC	
Corrected N	o, digits	7		Cons	scuoris	3	2pload to Mic	
Uncorrected	INo. digits	7					Andem To Conn	ect
Enable U / (	C on LCD	N/A		Set Date & <u>T</u> ime		1 2001	10401110 0011	
Corrected Pr	ulse Output	10 m <sup>3</sup>						
Uncorrected	l Pulse Output	10 m <sup>3</sup>		Custor	aiza LCD		Rattery Tupe	
Pulse Width		315 ms		Custor	nize <u>L</u> CD		ballely Type	
Pulse Outpu	£1	Corrected						
Pulse Outpu	t2	Uncorrected		MC Com	ms Settings	UT	Comms Settings	.
Pulse Outpu	t 3	Fault						
Fault Output	Mode	Continous Pulse						.
Fault Output	Polarity	Normally OFF		<u>O</u> pen Coni	figuration File	<u>S</u> ave	Configuration F	ile
Corrections C	onfiguration							
Temperature	e Units	۴F				Customer		
Base Tempe	erature	60.0		Report				
Temperature	Mode	Live Measureme	nt	Report Heading				
Fixed Tempe	erature	N/A						_
Pressure Un	its	PSI	~	·   .				
				🗌 🗌 Include Data	a Snapshot In Repo	ort		
				Old Report P	ormat		Create <u>R</u> epo	rt

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

To upload any changes made within the MCUT, select Upload to MC.

📓 MCUT 6.	0.0.0							-		х
Welcon	Configuration	alibration	Live Data	Fault	ts & Alarms	Advanced	Logging	System		
Volume Con Meter Type Meter Size Rev/Unit V Meter/Site Flow Sens	figuration e /olume ID e	Series B 5M 27.000 rev/ft <sup>e</sup> 0 Forward	,				<b>DRE</b> Utility	SSI-	TIONS	
Corrected Uncorrecte	√olume ed Volume	0 ft <sup>e</sup> 0 ft <sup>e</sup>			⊻olu	ime	Co	onnect with	мс	
Uncorrected Corrected	Multiplier ed Multiplier No. digits	x100 x100 8			<u>C</u> orrec	ctions	ļ	Jpload to M	С	
Uncorrecte Enable U /	ed No. digits 'C on LCD Pulse Output	8 No 1 69			Set Date	e & <u>T</u> ime	🗖 Use N	/lodem To (	Connect	
Uncorrecte Pulse Wid	d Pulse Output h	1 ft <sup>9</sup> 187 ms			Customi	ze <u>L</u> CD		Battery Typ	e	
Pulse Outp Pulse Outp Pulse Outp	ut1 ut2 ut3	Uncorrected Corrected Fault			MC Comm	s Settings	UT	Comms Set	tings	
Fault Outp Fault Outp	ut Mode ut Polarity Configuration	Single Latched F Normally OFF	Pulse		Open Config	guration File	Save	Configurati	on File	
Temperatu Base Temp Temperatu Fixed Tem	re Units perature re Mode perature	°C 15.0 Live Measureme N/A	nt		eport Report Heading		Customer			
	nits	кга			Include Data Old Report Fo	Snapshot In Rep rmat	port	Create <u>R</u>	eport	

# 6.9.1 Protection of Metrological Parameters

There are two methods of metrological parameter protection in the IMCW2:

- Software seal (Password)
- Hardware seal (Link)
- Hardware and Software Protection (Beginning with firmware version 3.00)

The method of protection is set during the factory configuration process and cannot be changed.

# 6.9.2 Password Protection

Parameters that are password protected are detailed in the Password Protected Parameters Table. If the operator attempts to change a protected parameter, a password dialog will be displayed. The appropriate password should be entered; following a successful password entry the changed parameters will be uploaded to the IMCW2. All changes to metrological parameters are recorded in the Audit Log.

**Note:** If the IMCW2 is configured with password protection, it may be necessary to enter a password to upload the changes; the default password is the numerical value *0*.

🗑 мсит		×
Welcome Configuration	Calibration   Live Data   Faults & Alarms   Advanced   Logging	
Volume Configuration	<b>^</b>	
Meter Type Meter Size Rev/Unit Volume Meter/Site ID Flow Sense Corrected Volume Uncorrected Volume Corrected Multiplier Uncorrected Multiplier Corrected Multiplier Corrected Nultiplier Uncorrected No. digits Uncorrected No. digits Enable U / C on LCD	Series 8 Metric 2M 1765.730 rev/m <sup>2</sup> 0 Forward - Reverse 0 m <sup>2</sup> 100 20 20 20 20 20 20 20 20 20	
Corrected Pulse Output Uncorrected Pulse Output Pulse Width Corrections Configuration Temperature Units Base Temperature Temperature Mode	1 m <sup>2</sup> 1 m <sup>2</sup> 125 ms OK Cancel *F MC Comms Settings UT Comms Settings 60.0 Live Measurement Open Configuration File	
Fixed Temperature Pressure Units Base Pressure Atmospheric Pressure Pressure Mode Fixed Pressure Reference Eixed Pressure Reference	N/A PSI 14.700 Live Measurement N/A N/A	

### Password Protected Parameters Reference Table

Password Protected Parameter				
	Meter Type			
	Meter Size			
	Flow Sense			
	Corrected Multiplier			
	Uncorrected Multiplier			
Volume Configuration	Pulse Output Allocation			
	Corrected Pulse Output			
	Uncorrected Pulse Output			
	Corrected Volume			
	Uncorrected Volume			
	Clear Uncorrected Volume under Fault Register			
	Temperature Units			
	Base Temperature			
	Temperature Mode (Fixed or Live)			
	Fixed Temperature			
	Pressure Units			
	Base Pressure			
Corrections	Atmospheric Pressure			
comguration	Fixed Pressure Factor			
	Fixed Line Pressure			
	Pressure Mode (Fixed or Live)			
	Supercompressibility			
	Supercompressibility Mode			
	Fixed Pressure Type (Gauge or Absolute)			
Colibration	Temperature Calibration			
Calibration	Pressure Calibration			
	Trim Table Settings*			
	Test Pulse Outputs			
	External Power			
Other	Digital Input			
	Digital Output			
	Password Change			
	Advanced Password Change			



**Note:** \*Trim Table Settings is protected by the *Advanced Password*.

### 6.9.3 Hardware Protection

The hardware link protection is provided to meet various country legislative requirements.

**Note:** Canadian Micro Correctors are protected by hardware protection and a physical read/write jumper which must be in the Read/Write position on the PCB to upload any changes.

Refer to the *Dresser Measurement IMCW2 Hardware Manual*. There are two positions for the hardware link on the main PCB board as follows:

- R/W Read/Write
- RO Read only

If the link is set in the RO position, the metrological parameters are protected and cannot be changed.

**Note:** If the hardware link is removed, the metrological parameters are protected.

If the operator attempts to change a parameter protected by hardware protection, then a dialog box will be displayed once the *Upload to MC* option is selected.

🗑 мсит								X
Welcome	Configuration	Calibration	Live Data	Fault	ts & Alarms	Advanced Lo	gging	
Volume Con Meter Type Meter Size Rev/Uni \ Meter/Site Flow Senss Corrected 1 Uncorrecte Corrected 1 Uncorrecte Enable U / Corrected 1 Uncorrecte Enable U / Corrections Temperatu Fixed Temp Pressure U Base Press Atmospheri Prised Inno Pressure U Base Press	riguration volume ID volume d Volume d Volume d Multiplier vo. digits d No. digits Con LCD Pulse Output d Pulse Output d Pulse Output h Configuration re Units verature re Mode verature ret Mode verature ret Mode verature ret Mode verature ret Mode verature ret Mode verature ret Mode verature ret Mode verature ret Mode verature ret Mode verature ve	Series B Metric 3M 1412.590 rev/m <sup>2</sup> 0 Forward - Reverse 12.m <sup>2</sup> 0 m <sup>2</sup> ×100 8 8 N/A 1 m <sup>2</sup> 125 ms <sup>*</sup> C 0.0 Live Measuremen N/A 1.01325 1.01325 Live Measuremen N/A N/A N/A	A MCUT	Unit Oper	Volu write protected ration Failed K Qpen Config eport Report Heading	ions [ LCD Settings ] uration File	Cognect with MC Upload to MC Use Modern To Connect UT Comms Settings Save Configuration File	-
Checking Ur	nit Security @9600	baud	COM		Include Data 9	Snapshot In Report	Ureate <u>H</u> eport	

Hardware Link Protection Screen

	Password Protected Parameter
	Meter Type
	Meter Size
	Flow Sense
	Corrected Multiplier
	Uncorrected Multiplier
volume configuration	Corrected Pulse Output
	Uncorrected Pulse Output
	Corrected Volume
	Uncorrected Volume
	Clear Uncorrected Volume under Fault Register
	Temperature Units
	Base Temperature
	Temperature Mode (Fixed or Live)
	Fixed Temperature
	Pressure Units
	Base Pressure
Corrections	Atmospheric Pressure
eeguruuren	Fixed Pressure Factor
	Fixed Line Pressure
	Pressure Mode (Fixed or Live)
	Supercompressibility
	Supercompressibility Mode
	Fixed Pressure Type (Gauge or Absolute)
Calibration	Temperature Calibration
Calibration	Pressure Calibration
	Trim Table Settings*
	Test Pulse Outputs
	External Power
Advanced Options	Digital Input
	Digital Output
	Password Change
	Advanced Password Change

### Hardware Link Protected Parameters Reference Table
### 6.9.4 Hardware and Software Protection

The IMCW2 can be configured so that the majority of the metrological parameters are hardware protected, but some selected metrological parameters are protected by a software password.

Firmware version 3.00 and higher allows the user to change the following supercompressibility parameters:

- a. Method of calculation:
  - AGA 8 Gross Method 1
  - AGA 8 Gross Method 2
  - NX19 Low Heating value
- **b.** Gross method gas composition parameters:
  - Heating Value from 501.9 to 1210.44 [BTU/ft3] or from 18.7 to 45.1 [MJ/m3]
  - Specific Gravity from 0.56 to 0.87
  - CO2 from 0 to 30 [%mol]
  - Specific Gravity from 0.56 to 0.87
  - CO2 from 0 to 30 [%mol]
  - N2 from 0 to 50 [%mol]

Firmware version 6.00 and higher allows the user to select and change the following:

- AGA Detailed Method
- 21 gas composition values

An IMCW2 configured with both methods of metrological protection activates a *Self-Contained Event Log*. The Self-Contained Event Log that records changes made to supercompressibility parameters has a 200-event limit. Each parameter change is recorded as a separate event. When the 200 events limit is reached, no further supercompressibility parameter changes can be made or recorded and the Self-Contained Event Log must be "Reverified" to allow for more supercompressibility parameter changes. The reverification process is described in a separate section.

The Self-Contained Event Log contains the following information.

- **1.** Information related to the meter:
  - Unit serial number
  - Meter/Site ID (location)
  - Meter Type
  - Meter size.
  - Total number of events
- **2.** Information related to changes to supercompressibility parameters:
  - Auto-generated successive event number
  - Date
  - Time
  - Description of the parameter changed
    - Old value of the parameter
    - New value of the parameter
  - Operator I.D. (name)



**Note:** Parameter values entered during the initial factory programming are not counted as a parameter change event.

- **3.** Information related to reverification events:
  - Auto-generated successive event number
  - Date
  - Time
  - Event Description: e.g. "Self-contained log was reverified"

**Note:** The operator is not named as this procedure as must be performed by an authorized metrology authority person.

If the hardware link is set to the "Read/Write" position, all metrological parameters can be changed using a password. These changes are recorded in the Audit Log and the supercompressibility parameter changes are also recorded in the Self-Contained Event Log.

To access these event logs, select the Logging Tab on the Welcome Screen. From this screen, select Download Audit Log.

MCUT 6.0.0	x
Welcome Configuration Calibration Live Data Faults & Alarms A	dvanced Logging ystem
	DRESSER. UTILITY SOLUTIONS
Download <u>D</u> ata Log	
Download <u>A</u> udit Log	
Download DP Log	
Logging <u>S</u> etup	



The following screen which allows downloading both the Audit Log and the Self-Contained Event Log will appear:

Download Audit Log		×
	Acquired	Available
No. Calibration/Configuration Events	189	32
No. Fault/Prover Events	8	8
No. Alarm Events	2	2
Self-Contained Event Logs	184	184
Refresh Data	Download <u>/</u>	<u>A</u> udit Log
Reverification	ad Self-containe	d event log
⊻iew Last Log	Cano	el

Audit Log download screen

**Note:** The "Reverification" button is grayed out. This button only becomes available when the Self-Contained Event Log reaches more than 185 recorded entries.

Download Audit Log		×			
	Acquired	Available			
No. Calibration/Configuration Events	192	32			
No. Fault/Prover Events	8	8			
No. Alarm Events	2	2			
Self-Contained Event Logs	187	187			
<u>R</u> efresh Data	Download ¿	Audit Log			
Reverification	Self-containe	d event log			
Saving Logs To file					
View Last Log					

Audit Log download screen with "Reverification" option activated

If the hard link protection switch is set to the "Read Only" position, and the operator attempts to change parameters other than selected supercompressibility parameters, the following message will appear:



Indicates failed attempt to change a parameter not available for software password protection when the hardware link is set in Read-only position

The operator must enter the password and his/her name (max seven characters).

Password	x
	Enter Password
	Operator name
<u>0</u> K	Cancel

Input Screen: Password and Operator Name

Example of the Self-Contained Event Log:

Audit Log							
Unit Serial Number	12/18/151417						
Meter/Site ID							
Meter Type	Series B Metric						
Meter Size	7M						
Number of Logs Stored	15 out of 15						
Log Number	Date	Time	Parameter changed	Old value	New value	User	
1	27/03/2020	4:01:01 PM	Supercompressibility Method	SGERG Method 3	AGA 8 Gross		
2	27/03/2020	4:05:26 PM	%CO2	0	0.1	ROMA	
3	27/03/2020	4:05:26 PM	Specific Gravity	0.6	0.61	ROMA	
4	27/03/2020	4:05:26 PM	Supercompressibility Method	AGA 8 Gross Method 2	AGA 8 Gross	ROMA	
5	27/03/2020	4:05:26 PM	Heating Value	0	1000	ROMA	
6	27/03/2020	4:08:01 PM	%CO2	0.1	0.9	NICU	
7	27/03/2020	4:08:01 PM	Specific Gravity	0.61	0.6	NICU	
8	27/03/2020	4:08:01 PM	Heating Value	1000	1001	NICU	
9	27/03/2020	4:10:46 PM	%CO2	0.9	0.93	PAUL	
10	27/03/2020	4:10:46 PM	Specific Gravity	0.6	0.61	PAUL	
11	27/03/2020	4:10:46 PM	Supercompressibility Method	AGA 8 Gross Method 1	AGA 8 Gross	PAUL	
12	27/03/2020	4:10:46 PM	%N2	0	0.6	PAUL	
13	27/03/2020	4:13:41 PM	%CO2	0.93	0.933	ANAN	
14	27/03/2020	4:13:41 PM	Specific Gravity	0.61	0.614	ANAN	
15	27/03/2020	4:13:41 PM	%N2	0.6	0.622	ANAN	
1				I			

### 6.9.5 Reverification process

If the number of events registered in the Self-Contained Event Log reaches more than 185 events, the following message appears. This indicates the log is full and reverification is now required:

MCUT	×
<u></u>	CAUTION: The Self-Contained Event Log is full. Execute the Reverification Process which is accessible from the Logging Tab
	OK

This message directs the operator to the Logging tab:

🗃 MCUT							_		$\times$
Welcome	Configuration	Calibration	Live Data	Faults & Alarms	Advanced	Logging	<b>ES</b> AL GA	SE S SOL	UTIO
				ownload <u>D</u> ata Log ownload <u>A</u> udit Log					
				Logging <u>S</u> etup					

Logging screen

Select the tab named Download Audit Log:

Download Audit Log			×
		Acquired	Available
No. Calibration/Configuratio	n Events	192	32
No. Fault/Prover Events		8	8
No. Alarm Events		2	2
Self-Contained Event Logs		187	187
<u>R</u> efresh Data		Download <u>A</u>	Judit Log
Reverification	Downlo	ad Self-containe	d event log
Saving Logs To file			
View Last Log		<u>C</u> anc	el

Audit Log download screen with "Reverification" option activated

Select the "Reverification" button. The following message will appear:





**Note:** To perform the reverification, the operator must break the hardware metrological seal by changing the position of the hardware link to the "Read/Write" position.

After the reverification process has been successfully completed, the following message will appear:



After this operation is executed, the following message appears:



The hardware metrological seal must now be replaced on the corrector. The reverification operation has now been recorded in the Self-Contained Event Log. This allows 200 new events to be recorded in this Log. The newest recorded event will overwrite the oldest recorded event. The reverification process must be repeated every time 200 supercompressibility event changes are recorded.

# 6.10 Battery Type

MCUT 6.0.0.0						_		×
Welcome Configuration	Calibration   Live Data	Fault	ts & Alarms	Advanced	Logging	System		
Volume Configuration Meter Type Meter Size Rev/Unit Volume Meter/Site ID Flow Sense	Series B 5M 27.000 rev/ft <sup>s</sup> 0 Ecriward	^			<b>DRE</b> UTILITY	SSI SOLUT	TONS	
Corrected Volume Uncorrected Volume	910 910 910		⊻olu	ıme	Co	nnect with N	ИC	
Corrected Multiplier Uncorrected Multiplier Corrected No. digits	x100 x100 8		<u>C</u> orrec	ctions	L	Įpload to M(	2	
Uncorrected No. digits Enable U / C on LCD	8 No 1.68		Set Date	e & <u>T</u> ime	☐ <u>U</u> se M	lodem To C	onnect	
Uncorrected Pulse Output Pulse Width	1 ft² 187 ms		Customi	ze <u>L</u> CD		Battery Type	,	
Pulse Output 1 Pulse Output 2 Pulse Output 3	Uncorrected Corrected Fault		MC Comm	s Settings	UT	Comms Sett	ings	
Fault Output Mode Fault Output Polarity	Single Latched Pulse Normally OFF		<u>O</u> pen Config	guration File	<u>S</u> ave	Configuratio	n File	
Temperature Units Base Temperature Temperature Mode Fixed Temperature Pressure Units	°C 15.0 Live Measurement N/A kPa	► Brite	eport Report Heading		Customer			_
			Include Data Old Report Fo	Snapshot In Rep ormat	oort	Create <u>R</u> e	eport	

Once you select the Battery Type from the Configuration Tab a window will pop up allowing you to choose between Alkaline or Lithium

Battery type ×
Battery Selection
• Alkaline
C Lithium
Lithium Battery Details
Battery Warning Date 06-09-2032
Battery End Life Date 06-09-2034
New Lithium battery is installed
Cancel

Selecting Lithium will activate the New Lithium battery installed button which is explained in the section entitled **Battery Replacement.** 

## 6.11 Save Configuration File

The MCUT provides the facility to save configuration files. This is beneficial when it is necessary to configure several IMCW2's with the same configuration data, as the file can be opened by the MCUT, and then uploaded to the IMCW2. It is possible to save both uploaded parameters (displayed with white background) and changed parameters (highlighted yellow).

### To save a configuration to a file:

- On the *Configuration* screen select the *Save Configuration File* option and the *Save As* dialog box will be displayed.
- Determine the location on your PC where 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.
- Select the *Save* option.
- A dialog box will be displayed stating *Configuration Saved*, select *OK*.
- The configuration data is now saved to the file. All configuration files have an ".mc" file extension.

						-		×
Welcome Configuration	Caibration Live Data	Faults	s & Alarms	Advanced	Logging	System	]	
Volume Conformation Meter Type Meter Size Rev/Unit Volume Meter/Site ID	Series B 5M 27.000 rev/ft <sup>a</sup> 0				<b>DRE</b> UTILITY	SSL	TIONS	
Flow Sense Corrected Volume Uncorrected Volume Corrected Multiplier	Forward 0 ft <sup>e</sup> 0 ft <sup>e</sup> x100		⊻ok	ume	Co	onnect with I	мс	
Uncorrected Multiplier Corrected No. digits Uncorrected No. digits Enable U / C on LCD	x100 8 8 No		<u>C</u> orre Set Date	ctions e & Iime	<u> </u>    Use	<b>Jpload to M</b> Nodem To C	<b>C</b> Connect	
Corrected Pulse Output Uncorrected Pulse Output Pulse Width	1 ft <sup>e</sup> 1 ft <sup>e</sup> 187 ms		Custom	ize <u>L</u> CD		Battery Typ	e	
Pulse Dutput 1 Pulse Output 2 Pulse Output 3	Uncorrected Corrected Fault		MC Comm	ns Settings	UT	Comms Set	tinas	
Fault Output Mode Fault Output Polarity Corrections Configuration	Single Latched Pulse Normally OFF		<u>O</u> pen Confi	guration File	Save	Configuratio	on File	
Temperature Units Base Temperature Temperature Mode Fixed Temperature Breesure Units	°C 15.0 Live Measurement N/A ⊬P∋	Rep	oort eport Heading		Customer	,		_
			Include Data Old Report Fo	Snapshot In Re prmat	port	Create <u>R</u>	eport	

📓 Save As			×
Save in:	my company configuration files	🗢 🗈 💣	# <b>*</b>
Name	^	Status	Date mod
	No items match your search	h.	
<			>
File <u>n</u> ame:	config_0d40_0_07-07-2022.mc		<u>S</u> ave
Save as type:	Configuration Files (*.mc)	<b>•</b> (	Cancel

## 6.12 Open Configuration File

The MCUT provides the facility to open a previously saved configuration file to an IMCW2. This may be beneficial when it is necessary to configure several IMCW2's with the same configuration data.

### To open a previously saved configuration file:

- On the *Configuration* screen select the *Open Configuration File* option and the *Open* dialog box will be displayed.
- Locate and select the configuration file required to be uploaded to the IMCW2. The configuration file will have the ".mc" file extension.
- Select Open.
- A dialog will be displayed stating Configuration Restored, select OK.
- The configuration details will now be restored to the MCUT. Any changed parameters will be highlighted yellow on the parameters selection list.
- To ensure that the configuration details are uploaded to the IMCW2 select the *Upload to MC* option. (Enter the password if appropriate, and select *OK*, otherwise select *Cancel*).
- The new details will be uploaded to the IMCW2. A dialog will be displayed stating *Sent OK*. Select *OK*, and the uploaded parameters will be displayed with the default white background.

MCUT 6.0.0.0				-		×	
Welcome Configuration	Calibration Live Data	Faults & Alarms   Ad	vanced   Log	jging   System	]		
Volume Configuration Meter Type Meter Size Rev/Unit Volume Meter/Site ID	Series B 5M 27.000 rev/ft <sup>o</sup> 0			ILITY SOLU	R		
Flow Sense Corrected Volume Uncorrected Volume	Forward 0 ft <sup>9</sup> 0 ft <sup>9</sup>	⊻olume		Connect with	мс		
Uncorrected Multiplier Corrected No. digits	x100 x100 8		\$	Upload to M	с		
Uncorrected No. digits Enable U / C on LCD Corrected Pulse Output	8 No 1 ft <sup>9</sup>	Set Date & <u>T</u> i	ime r	Use Modem To C	Connect		
Uncorrected Pulse Output Pulse Width	1 ft <sup>e</sup> 187 ms	Customize L	CD	Battery Typ	e		
Pulse Output 1 Pulse Output 2 Pulse Output 3	Uncorrected Corrected Fault	MC Comms Se	ttings	UT Comms Set	tings		
Fault Output Mode Fault Output Polarity	Single Latched Pulse Normally OFF	Open Configurat	ion File	<u>S</u> ave Configuration	on File		
Temperature Units Base Temperature Temperature Mode Fixed Temperature Pressure Units	*C 15.0 Live Measurement N/A kPa	Report Report Heading I Include Data Snap	cut oshot In Report	tomer Create <u>R</u>	eport	_	
Dopen	Open X						
Name	^		Status	Dat	e mod		
bijconfig_2M	sample IMC file.mc		g	201	3-03-0		

config\_2M sample IMC file.mc

Configuration Files (\*.mc)

Open

Ŧ

<

File name:

Files of type:

## 6.13 Report

The MCUT provides a *Create Report* facility. A read only report is generated which details the configuration of the IMCW2. The operator can enter a report heading via the keyboard; this could reflect the configuration type (e.g. B Series 3M meter) or meter location reference (e.g. south 1). The report can include a *data snapshot* of the data stored in the corrector. The additional information displayed in this report is listed below and includes data specific to the IMCW2 that the MCUT is communicating with.

🗑 MCUT 6.0	.0.0							_		×
Welcome	Configuration	Calibration	Live Data	Faults	s & Alarms	Advanced	Logging	System	ı	
Volume Confi Meter Type Meter Size Rev/Unit Vo Meter/Site I Flow Sense Corrected V	guration olume D	Series B 5M 27.000 rev/ft <sup>®</sup> 0 Forward 0 ft <sup>®</sup>	^				<b>DRE</b> UTILITY	SSE SOLU	TIONS	
Uncorrected	d Volume	0 មេ			⊻ok	ume	Co	nect with	мс	
Corrected M Uncorrected Corrected N	lultiplier 1 Multiplier o. digits	x100 x100 8			<u>C</u> orre	ctions	L	Įpload to M	1C	
Uncorrected Enable U /	d No. digits Con LCD when Output	8 No 1 63			Set Date	e & <u>T</u> ime	🔲 <u>U</u> se M	lodem To (	Connect	
Uncorrected Pulse Width	dise Output Pulse Output	1 ft <sup>8</sup> 187 ms			Custom	ize <u>L</u> CD	E	Battery Typ	be	
Pulse Outpu Pulse Outpu Pulse Outpu	ιt1 ιt2 ιt3	Uncorrected Corrected Fault			MC Comm	ns Settings	UT	Comms Se	ttijngs	
Fault Outpu Fault Outpu	t Mode t Polarity configuration	Single Latched F Normally OFF	Pulse		<u>O</u> pen Confi	guration File	<u>S</u> ave	Configurati	ion File	
Temperature Base Temp Temperature Fixed Temp Pressure Ur	e Units erature e Mode erature nits	°C 15.0 Live Measureme N/A kPa	nt	Rep Re	port eport Heading Include Data	Snapshot In Rej	Customer			
					Old Report Fo	ormat		Create <u>F</u>	}eport	

**Configuration Report** 

Dresser Measurement IMCW2 User Terminal Software Manual

🖏 Save As		×
Save in: 2022 🗨	+ 🗈 💣 🗉	<b>≣</b> ▼
Name	Status	Date mod
O report_Enb Sample 2M Series A PTZ imp NX	$\bigcirc$	2022-07-0
💿 report_Enb Sample 2M Series B PTZ imp NX	$\bigcirc$	2022-07-0
💿 report_Enb Sample 16M Series A PTZ imp N	$\bigcirc$	2022-07-0
💿 report_Enb Sample 16M Series B PTZ imp N	$\bigcirc$	2022-07-0
💿 report_Enb Sample RM2000 PTZ imp NX-19	$\bigcirc$	2022-07-0
💿 report_Enb Sample RM16000 PTZ imp NX-19	$\bigcirc$	2022-07-0
<		>
File name: Report_Digital PCB22_11-02-2022 .html		<u>S</u> ave
Save as type: HTML Files (*.html;htm)	- (	Cancel

File format can be saved as either .HTML or .CSV

The information provided in the report includes (dependent on model and configuration of the IMCW2):

- Volume configuration screen parameters.
- Corrections configuration screen parameters.
- Display Configuration.
- Alarm limits.
- Fault Dial out settings.
- Alarm Dial out settings.
- Logged parameters (including details of Log 1, Log 2 and Log 3).
- DP test parameters (only for DP-versions).

When a *data snapshot* is included within the report the following additional information is displayed (dependent on model and configuration of the IMCW2):

- Unit serial number.
- Firmware revision.
- Battery voltage.
- Volumes data (including temperature, pressure, and correction factor).
- Present fault(s) details (including differential & line pressures, temperature, volume, internal operation, and low battery).
- Occurred fault(s) details (including differential & line pressures, temperature, volume, internal operation, and low battery).
- Present alarm(s) details (including meter DP, high and low pressure, temperature, and flow).
- Occurred alarm(s) details (including meter DP, high and low pressure, temperature, and flow).

### To create a configuration report:

• From the Report section of the *Configuration* screen, select the *Report Heading* text box. Enter the desired heading of the report.

Dresser Measurement IMCW2 User Terminal Software Manual

MCUT 6.0	0.0.0							_		×
Welcome	Configuration	Calibration	Live Data	Fa	ults & Alarms	Advanced	Logging	System	1	
Volume Con Meter Type Meter Size Rev/Unit V Meter/Site Flow Sense	iguration olume ID	Series B 3M 40.000 rev/ft <sup>e</sup> Forward	ŕ	~			<b>DRE</b> UTILITY	SOLU	TIONS	
Corrected \ Uncorrecte	/olume d Volume	0 សេ ០ សេ			⊻o	ume	Co	o <u>n</u> nect with	MC	
Corrected M Uncorrecte Corrected M	Aultiplier d Multiplier No. digits	×100 ×100 8			<u>C</u> orre	ctions		Jpload to N	1C	
Uncorrecte Enable U /	d No. digits C on LCD	8 No			Set Dat	e & <u>T</u> ime	🔲 <u>U</u> se N	dodem To	Connect	
Corrected F Uncorrecte Pulse Widt	Pulse Output d Pulse Output n	100 fP 100 fP 125 ms			Custon	ize <u>L</u> CD		Battery Typ	be	
Pulse Outp Pulse Outp Pulse Outp	ut1 ut2 ut3	Uncorrected Corrected Fault			MC Com	ns Settings	UT	Comms Se	ttings	
Fault Outpu Fault Outpu	it Mode it Polarity	Single Latched F Normally OFF	Pulse		Open Conf	guration File	<u>S</u> ave	Configurat	ion File	
Temperatu	configuration e Units	۴F					Customer			
Base Temp Temperatu Fixed Temp Pressure U	erature e Mode perature nits	60.0 Live Measureme N/A PSI	nt		Report Report Heading					_
,				L	☐ Include Data	Snapshot In Rej	port	Create P	Benort	

- 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 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.

Report Viewer			Report Newer		
Corrected Multipler     C	Meter Configuration Report Series B 3M 40:000rev#* 0 Forward - Reverse x100 8 8 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	*	Data Snapshot (12/11/2003 , 1 Internal Hardware Unit Setial Number Firmwere Revision Battery Votage Volumes & Other Data Corrected Volume Uncorrected Residual Uncorrected Residual	15:51:17) 11/09/12301 186F 5:30V 0.x100 ft <sup>e</sup> 0.00 ft <sup>b</sup> 0.00 ft <sup>b</sup> 0.0	
Corrected Pulse Output	1 K <sup>2</sup>		Correction Factor	0.88817	
or Sudi. Powerd to	Sove Report Open Report Print	Close	or Sud. Powerfile Save Repot.	Open Report Print	Con

**Configuration Report** 

### 6.13.1 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 can 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.

Report Viewer	-		×
DRESSER, UTILITY SOLUTIONS	Meter Configuration Report		^
Time & Date	01:28:43 PM , 11/02/2022		
Volume Configuration			
Meter Type	Series B		
Meter Size	3M		
Rev / Unit Vol	40.000 rev/ft <sup>3</sup>		
Meter/Site ID			
Flow Sense	Forward		
Corrected Volume	0 ft <sup>3</sup>		
Uncorrected Volume	0 ft <sup>3</sup>		
Corrected Multiplier	x100		
Uncorrected Multiplier	x100		
Corrected No. Digits	8		
Uncorrected No. Digits	8		
Enable U / C on LCD	No		$\sim$
<< <u>Back</u> Eorward >>	Save Report Open Report Print	<u>C</u> los	e

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*.

Report Viewer	_		×
Version History			^
Changes from 5.1.0.2 to 6.0.0.0			
<ol> <li>Digital Temperature transducer capability is added</li> <li>AGA Detailed method of compressibility calculation is added</li> <li>For Canadian customers, password protection added to gas composition use compressibility calculation for AGA Detailed method</li> <li>Possible presentation of corrected and uncorrected volumes on display with 8 and multiplication up to x1000 for imperial meters and up to x100 for metric me added</li> <li>Possible presentation of corrected and uncorrected volumes on display with 4 added</li> <li>Possible presentation of corrected and uncorrected volumes on display with 4</li> </ol>	d in digits eters is digits i	S	
<ol> <li>Corrected and Uncorrected volume can be presented on display by 8 digits an multiplier.</li> </ol>	nd x100		
Changes from 5.1.0.0 to 5.1.0.1			~
< <p>Kerker Kerker Kerke</p>		<u>[</u> ]	se

# 7 Calibration Tab

Temperature and pressure recalibration should not be required, however the IMCW2 may be temperature and pressure calibrated by the operator, using direct communications between the PC and IMCW2. 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/regulatory requires periodic checks on the transducers.



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

1. Use temperature-controlled baths with the IMCW2 temperature probe and a calibrated thermometer for determining the bath temperatures. The thermometer's stated accuracy should be ±0.1 degree.

### OR

2. A reference thermometer can be inserted into the differential pressure tap on the inlet of the Meter. This calibration can be performed in the field.



**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 a recognized pressure calibrator may be used to as a pressure reference.

**Note:** It is generally a requirement that there should be a certificate of calibration traceable to national standards, for all devices used in the calibration process.

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 IMCW2 has already been established, then it is possible to calibrate both the temperature and pressure.

🗃 MCUT 6.0.0.0							_		×
Welcome Configuration	Calibration L	_ive Data	Faults &	Alarms	Advanced	Logging	System		
						<b>DRE</b> UTILITY	SSI SOLU	TIONS	
- Temperature		Pressure			- Monitor				
<u>S</u> ingle Poir	t Calibration	Single <u>F</u>	Point Calibra	ition	Single P <u>o</u>	int Calibration			
Zero and Sp	an Calibration	Z <u>e</u> ro and	l Span Calib	ration	Zero and 9	6 pan Calibratio	on		

### **Calibration Screen**

### To display the Calibration screen:

- Select the *Calibration* tab. The *Calibration* screen will be displayed.
- The options available on this screen depend on the model and configuration of the IMCW2.
- Note: Pressure calibration of an IMCW2 T-Only unit is not possible as no pressure transducer is fitted. If the IMCW2
  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 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 IMCW2.

## 7.1 Temperature Single Point Calibration

### To calibrate a single point temperature:

- Insert temperature probe into a temperature bath with a <u>reference</u> thermometer or expose temperature probe and a <u>reference</u> thermometer to the same, stable conditions.
- From within the *Calibration* screen select the temperature *Single Point Calibration* option. The *Temperature Calibration* dialog will be displayed.
- Select the *Update Live Temperature* option. The IMCW2 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 <u>reference</u> temperature value.
- Select the Upload Temperature Changes option. Enter the password if appropriate and select OK, otherwise select Cancel.
- 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 ± 9°F / < ± 5°C.</li>
- From the *Temperature Calibration* screen, select the *Return to Calibration Screen* option. The *Calibration* screen will be displayed

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

- On the *Calibration* screen select the temperature *Single Point Calibration* option. The *Temperature Calibration* dialog will be displayed.
- Select the *Restore Factory Defaults* option. Enter the password if appropriate and select *OK*, otherwise select *Cancel*.
- Once complete a message will be displayed stating *Factory temperature calibration restored*. Select *OK*.
- The *Temperature Calibration* dialog will be displayed. Select the *Return to Calibration Screen* option; the *Calibration* screen will be displayed.

Temperature Calibration		x
Live Temperature Temperature Offset Value	<b>76.7 °F</b> 0.0 °F	Update Live Temperature
Offset Reference Temperature	76.7 °F	Upload Temperature <u>C</u> hanges
		Restore Factory <u>D</u> efaults
<u>B</u> e	eturn to Calibration Screen	

# 7.2 Temperature Zero and Span Calibration

### To calibrate the temperature zero and span:

- Insert temperature probe into a temperature bath with a <u>reference</u> thermometer.
- Set the zero-point temperature in the bath as close as possible to -40°F/°C
- On the *Calibration* screen select the temperature *Zero and Span Calibration* option. The *Temperature Calibration* screen will be displayed.
- Select the *Update Live Temperature* option. The IMCW2 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 zero-point <u>reference</u> temperature value. If the temperature you select is not feasible (above 50°F), a message to this effect will be displayed.



Note: The range between zero and span must be at least 90 degrees F

- Select the Send Zero Calibration option. Enter the password if appropriate and select OK, otherwise select Cancel.
- Once complete, a dialog box will be displayed stating Zero Calibration Successful, select OK.
- Set the span-point temperature in the bath as close as possible to 140°F/60°C
- The Send Span Calibration option will now be available.
- Select the *Span Reference Temperature* text box and enter the span-point **reference** temperature. If necessary, the operator will be informed of the accepted range.

Note: The range between zero and span must be at least 90 degrees F

- Select the Send Span Calibration Option. Enter the password if appropriate and select OK, otherwise select Cancel.
- 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 the *Return to Calibration Screen* option. 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 the *Restore Factory Defaults* option. Enter the password if appropriate and select *OK*, otherwise select *Cancel*.
- Once complete, a dialog box will be displayed stating *Factory temperature calibration restored*. Select *OK*.
- The *Temperature Calibration* screen will be displayed. Select the *Return to Calibration Screen* option; the *Calibration* screen will be displayed.

Temperature Calibration				x
<b>Live Temperature</b> Temperature Offset Value	,	<b>76.7 °F</b> 0.0 °F	ļ	<u>U</u> pdate Live Temperature
Zero Reference Tempera	iture	40	۴F	Send <u>Z</u> ero Calibration
Span Reference Temper	ature	140	۴F	Send <u>S</u> pan Calibration
				Restore Factory <u>D</u> efaults
	<u>R</u> e	turn to Calibration	Screen	

## 7.3 Pressure Single Point Calibration

### To calibrate a single point pressure:

- Ensure the pressure transducer of the IMCW2 is connected to the pressure calibrator.
- Set a <u>reference</u> pressure point on the reference calibrator that is within the range of the IMCW2 pressure transducer.
- On the *Calibration* screen, select the pressure *Single Point Calibration* option. The *Pressure Calibration* screen will be displayed.
- Select the *Update Live Pressure* option. The IMCW2 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 <u>reference</u> pressure value.
- Select the Upload Pressure Changes option. Enter the password if appropriate and select OK, otherwise select Cancel.
- Once complete a dialog will be displayed stating *Offset Calibration Successful*, select *OK*. The *Pressure Calibration* dialog will be displayed.



• On *Pressure Calibration* screen select the *Return to Calibration Screen* option. The *Calibration* screen will be displayed.

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

- On the *Calibration* screen, select the pressure *Single Point Calibration* option. The *Pressure Calibration* screen will be displayed.
- Select the *Restore Factory Defaults* option. Enter the password if appropriate and select *OK*, otherwise select *Cancel*.
- Once complete, a dialog box will be displayed stating *Factory temperature calibration restored*. Select *OK*.
- From The *Pressure Calibration* dialog will be displayed. Select the *Return to Calibration Screen* option; the *Calibration* screen will be displayed.

Line Pressure Calibration		×
<b>Live Pressure</b> Pressure Offset Value	14.34 PSI 0.000 PSI	Update Live Pressure
Reference Pressure	t4.3 PSI	Upload Pressure <u>C</u> hanges
		Restore Factory <u>D</u> efaults
	<u>R</u> eturn to Calibration Screen	

## 7.4 Pressure Zero and Span Calibration

### To calibrate the pressure zero and span:

- Ensure the pressure transducer of the IMCW2 is connected to the pressure calibrator.
- Set a zero-<u>reference</u> pressure point on the reference calibrator as close as possible to the lower pressure range of the IMCW2 pressure transducer.
- On the *Calibration* screen select the pressure *Zero and Span Calibration* option. The *Pressure Calibration* screen will be displayed.
- Select the *Update Live Pressure* option. The IMCW2 pressure will be updated, displayed as read only text and labeled as *Live Pressure*.
- Select the *Zero Reference Pressure* text box and enter the 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 IMCW2.

- Select the Send Zero Calibration option. Enter the password if appropriate and select OK, otherwise select Cancel.
- Once complete, a dialog box will be displayed stating Zero Calibration Successful, select OK.
- Set a span-<u>reference</u> pressure point on the reference calibrator as close as possible to the higher-pressure range of the IMCW2 pressure transducer.
- The Send Span Calibration option will now be available.
- Select the *Span Reference Pressure* text box and enter the span-<u>reference</u> pressure. If necessary, the operator will be informed of the acceptable range.



- Select the Send Span Calibration Option. Enter the password if appropriate and select OK, otherwise select Cancel.
- 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 the *Return to Calibration Screen* option. The *Calibration* screen will be displayed.

### To restore temperature 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 the *Restore Factory Defaults* option. Enter the password if appropriate and select *OK*, otherwise select *Cancel*.
- Once complete, a dialog box will be displayed stating Factory temperature calibration restored. Select OK.

• The *Pressure Calibration* dialog will be displayed. Select the *Return to Calibration Screen* option; the *Calibration* screen will be displayed.

Line Pressure Calibration		2
<b>Live Pressure</b> Pressure Offset Value	14.53 PSI 0.000 PSI	Update Live Pressure
Zero Reference Pressure	14.504 PSI	Send Zero Calibration
Span Reference Pressure	1450 PSI	Send <u>S</u> pan Calibration
		Restore Factory <u>D</u> efaults
	Return to Calibration Screen	
_		

## 7.5 Monitor Pressure Calibration

If IMCW2 is equipped with a secondary line-pressure transducer (Monitor) the Monitor Pressure Calibration is the same as the primary line-pressure transducer (section 7.3 and 7.4)

# 8 Live Data Tab

Select the *Live Data* screen. 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.
- Monitor Pressure.
- Corrected and uncorrected volumes.
- Corrected and uncorrected residual.
- Uncorrected flow rate volume.
- Uncorrected under fault volume.
- Temperature reading.
- Line pressure reading.
- Supercompressibility.
- Correction factor.
- Details of all present faults and alarms.
- Details of all occurred faults and alarms.
- Monitor pressure results (only for external monitor pressure versions).
- Differential pressure results (only for DP-versions).

In a fault condition, the appropriate *Present Fault* indicator is displayed as a red square with a 1. The following *Live Data Screen* shows 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 entitled *Faults and Alarms* for further details.

🗑 MCUT 6.0.0.0			– 🗆 X
Welcome     Configuration     Calibra       Last Snapshot T     06/24/2022 , 12:	ime: 24:58 AM	Alarms Advanced L Present Alarms High Pressure Low Pressure High Temperature	ogging System
Internal Hardware Unit Serial Number 21/47/483647 Meter/Site ID 0 Firmware Revision 0d40 PCB Revision 22 Battery Voltage 5.83V Battery remaining Life 143 months Temperature Digital SN 122000001	Line Pressure Fault DP Transducer Fault Temperature Fault Volume (Wiegand) Fault Internal Operations Fault Low Battery Overspeed Meter DP Fault Meter DP Fault Meter DP Zero Fault Table Limit Fault	Low Temperature I High Flow Rate I Low Flow Rate I Daily Consumption Digital input Meter DP Alarm	Differential Pressure Results Avg DP value N/A Avg Flow Rate N/A Avg Line Pressure N/A Avg Temperature N/A Date of Occurrence N/A Current DP value 0.014 inWC
DP Digital SN 620115929 DP Digital SN 520189946 Corrected Volume 0 x100 ft <sup>9</sup> Uncorrected Volume 0 x100 ft <sup>9</sup> Corrected Residual 0.00 ft <sup>9</sup> Uncorrected Residual 0.00 ft <sup>9</sup> Uncorrected Flow Rate 0 ft <sup>9</sup> /h Uncorrected Under Fault 0 ft <sup>9</sup>	Digital Port 1 Digital Port 2 Digital Sensor CRC Fault Occurred Faults Line Pressure Fault DP Transducer Fault DP Transducer Fault Temperature Fault Volume (Wiegand) Fault Internal Operations Fault Low Battery Overspeed Meter DP Fault	Digital Temp SN Digital Press SN Digital Press SN Digital DP/Mon SN Docurred Alarms High Pressure Digital DP/Mon SN Digital DP/Mon SN Digital Consumeration High Temperature Digital Temperature Digital Provement Digital Consumption Digital Input Mate Digital Input	Method       Learn method 1         Method Status       Learning         Daily DP Logging       Valid samples         First flow band       0         Second flow band       0         Third flow band       0         Forth flow band       0         Total rejected       1         Low flow       1850         Unstable flow       0
Corrections Used Temperature 25.6 °C Line Pressure 99.25 kPa Supercompressibility 0.9997 Correction Factor 0.94439	Meter Dir Fault U Meter Lockup U Meter DP Zero Fault U Table Limit Fault U Digital Port 1 U Digital Port 2 U Digital Sensor CRC Fault U	Digital Temp SN 0 Digital Press SN 0 Digital DP/Mon SN 0	

### Live Data Screen (DP-version shown)

### To display the live data screen:

- In the MCUT, 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 IMCW2.

### To update values:

- On the *Live Data* screen, select the *Update Values* option.
- The values on the screen will be updated.

# 9 Faults & Alarms Tab

A Fault in the IMCW2 occurs if metrology functionality is obstructed. Fault conditions are defined by design; no setup is required.

An Alarm in the IMCW2 occurs if conditions defined by user are not met.

## 9.1 Faults Functionality

### To display the faults and alarms screen:

• In the MCUT select the Faults & Alarms tab. The Faults & Alarms screen will be displayed.

а мсит	
Welcome Configuration Calibration L	Live Data Faults & Alarms I dvanced Logging
	DRESSER
Faults	Alams
<u>C</u> lear Occurred	ed Faults Clear Occurred Alarms
Clear <u>U</u> ncorrecter Under Fau	ed Volume Alarm Settings
Eault Dialout S	Settings Alarm Dialout Settings
	<u>M</u> onitor Calls

If a fault occurs, then it is indicated:

- On the display
- Fault output pulses if assigned to any output pulse terminal, refer to the section entitled Fault Pulse Allocation
- On the Live Data screen

The form of output pulses is configured on the Volume Configuration screen in the Fault Pulse Output Configuration section

Fault Output Pulse forms:

- Continuous pulses
- Single Latched pulse (level)
  - Normally off

Normally on

Volumes			Meter Data	
Corrected Volume	0	ft³	Туре	Series B 🔹
Uncorrected Volume	0	ft <sup>3</sup>	Size	3М 🔹
Flow				40 rev/ft <sup>3</sup>
Flow Sense	Forward - Reverse	•	Meter/Site ID	0
Pulse Outputs			- Display	
Corrected	1	▼ ft <sup>3</sup>		Multiplier Digits
Uncorrected	1	<b>▼</b> ft <sup>8</sup>	Corrected Volume	00000000 x1 🕶 f <sup>e</sup> 8 💌
Pulse Width	187	▼ ms	Uncorrected Volume	00000000 x1 • ft 8 •
Pulse Output Allocation			– Fault Pulse Output Confi	iguration
Pulse Output 1	Uncorrected	•	Fault Mode	Single Latched Pulse
Pulse Output 2	Corrected	•	Polarity	Single Latched Pulse
Pulse Output 3	Fault	•		Continous Pulse
				Cancel OK

Configuration of Fault Pulse Output form

## 9.2 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 (refer to the <u>(Fault Code Reference Table)</u>. A download from the unit via the MCUT will show that the appropriate icon(s) in the *Present Faults* and *Occurred Faults* section of the *Live Data* screen are displayed with a "1" in a red square. When the nature of the problem is determined and resolved, the icon on the *Present Faults* section of the *Live Data* screen will return to green with a "0" and the fault code on the LCD will no longer be displayed. The appropriate icon on the *Occurred Faults* screen 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 (refer to <u>(Clear Occurred Faults</u>), or locally by scrolling through the LCD parameters until the test screen is displayed (*scrolling 8's*). Remain on the test screen until **CLr FLt** is displayed. Press the IMCW2 selector button and this will clear the occurred faults register. Following the selection of the *Update Values* options on the *Live Data* screen, the icon on the *Occurred Faults* section will return to green with a "0".

🗃 мсит	
Welcome Configuration Calibration Li	ive Data Faults & Alarms Advanced Logging
Faults Liear Occurred Clear <u>Unconscrea</u> Under Fault <u>F</u> ault Dialout Se	Faults  Faults  Clear Occurred Alarms  Alarm Settings  Alarm Dialout Settings
	Monitor Calls

FAULT	DESCRIPTION/REASON	LCD	LIVE DATA	Volume	NOTES
			for	Accumulation	
			Fault Names		
Volume Fault	Caused by open wire(s) in volume sensor. When there are one or more open wires on one of the 4 pulse input wires, this fault is set.	Vol FLt and alarm bell icon	Volume fault	Volume counting stops	Internal MC2 problem. Consult factory.
Line Pressure Fault	Pressure sensor fault occurs when the pressure sensor wire is crimped or cut/open, always connected to main board, or when the pressure is higher or lower than the calibration range for the pressure.	P FLt and alarm bell icon	Line Pressure fault	Accumulated in Volume under fault register	_
Line Temperature Fault	Temperature sensor fault occurs when the temperature sensor is removed from unit or there is an open wire, then this fault is set, or when temperature is outside of the -40 °F to 140 °F range.	t FLt and alarm bell icon	Line Temperature fault	Accumulated in Volume under fault register.	-
Supercompressibility Table Limit Fault	The Supercompressibility table temperature has exceeded a threshold that depends on gas method.	tbl FLt and alarm bell icon	Z Table Limit fault	Accumulates active volume, but with Z Supercompressibility factor set to 1.	When the AGA, SGERG Methods have a temp - 35C and 60C, NX 19 - 12C to 32C.
Low Battery Fault	Low battery voltage below 5.3 V.	Blinking bell icon	Low Battery Alarm warning (not on live data)	Accumulates active volume.	-
_	When the battery voltage dips below 4.9V, the low battery fault is set.	Lo bAtt and battery icon	Low Battery fault	Accumulates active volume.	_
_	When the battery voltage dips below 3.9V, the replace battery fault is set.	rEP BAtt	Replace Battery (not in live data)	Volume on LCD and ERT is locked.	Controlled shutdown volume & ERT synchronization state.
-	When the battery voltage dips below 3.4V, MC2 enters shutdown.	Might be BLANK	Battery Dying (not in live data)	MC2 functionality is not guaranteed.	_
Internal Operations Fault	Memory fault and watchdog reset happens or the battery power went below 3.4V and reset the device.	Int FLt and blinking bell icon	Internal Operations fault	Continues accumulation where it left off since the battery power was intact up until 3.9V.	This fault has occurred in the past. When the processor comes up this is a present fault.
Overspeed Fault	When a meter for a rated QMAX is over sped by 25% or more.	OS Flt and alarm bell icon	Overspeed fault	-	The meter is running too fast or being oversped.
Digital Port 1 Fault	When the digital sensor communication fails on port 1 of board.	d1 Flt	Digital Port 1	Volume accumulation stops.	_
Digital port 2 fault	When the digital sensor communication fails on port 2 of board.	d2 Flt	Digital Port 2	Volume accumulation stops.	-
Digital Sensor CRC Fault	When there is a CRC mismatch for digital sensor on port1 and/or port 2.	CrC Flt	Digital sensor CRC fault	Volume accumulation continues.	Mismatch for sensor serial number and/or calibration.
Differential Pressure Fault	defined number of DP values measured in sequence have exceeded the meter fault threshold	DP Flt	Meter DP Fault	Volume accumulation continues.	-
Meter Lock-up Fault	defined number of DP values measured in sequence have exceeded the meter lock-up threshold.	DP LOC	Meter lockup	Volume accumulation continues	-



**Note:** When P Fault occurs outside of calibration range or T Fault occurs outside of operating range, accuracy of volume is not guaranteed even if you set extreme alarm limits for P and T.

### To clear occurred faults registry:

- From the Faults & Alarms screen, select the Clear Occurred Faults option.
- The faults will be cleared. A dialog box will be displayed stating Faults Cleared OK, select OK.
- The cleared fault can be confirmed by selecting the Update Values option on the Live Data screen. Providing the fault condition has been cleared, and the occurred faults register has been cleared, all icons on the Present Faults and Occurred Faults sections will be green with a 0.
- If the problem persists, contact your Dresser Representative.



### 9.3 Clear Uncorrected Volume Under Fault

In all fault conditions, the *Uncorrected Under Fault* volume register will be activated showing the total number of accumulated uncorrected volume units during the period in which the fault was present. Only faults that affect the correction factor will cause the *Uncorrected Under Fault* register to be activated. Under these conditions, both the *Uncorrected Volume* and the *Uncorrected Under Fault* volume will continue to increment, however the *Corrected Volume* 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 correction factor for that period from the 3 readings, which can then be applied to the fault counts to give an estimated corrected volume for the fault period.

#### To clear uncorrected volume under fault register:

- On the Faults & Alarms screen, select the Clear Uncorrected Volume Under Fault option.
- The uncorrected volume under fault register is password protected, therefore a password must be entered to clear this log. A dialog box will be displayed stating Faults Cleared OK, select OK.
- The uncorrected volume under fault register will be cleared.
- The cleared register can be confirmed by selecting the Update Values option on the Live Data screen. The Uncorrected Under Fault register value in the Volumes section will be set to 0.

		MCUT	×
Password	x		
	Enter Password		Uncorrected Volume Under Fault Register Cleared OK
	<u>O</u> K <u>C</u> ancel		OK

# 9.4 Fault Dial out Settings

Note: For details on setting-up and communicating via a modem contact your Dresser representative.

## 9.5 Configuration of Alarm functionality

Select the *Faults and Alarms Screen*. On 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 a pulse output is to be generated in alarm conditions, clear the uncorrected volume under fault, and clear occurred alarms and faults.

## 9.6 Alarm Settings

🗑 MCUT 6.0.0.0				– 🗆 🗙
Welcome Configuration	Calibration Live Data	Faults & Alarms	Advanced Logging	g System
				ESSER.
Faults	3	Alarms		
	Clear Occurred Faults	C	lear <u>O</u> ccurred Alarms	
	Clear <u>U</u> ncorrected Volume Under Fault		<u>A</u> larm Settings	
	Eault Dialout Settings	A	larm <u>D</u> ialout Settings	
		Monitor Calls		

The operator can 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 the Advanced Screen. The operator is also able to specify which alarms should be displayed on the LCD, and whether output pulses should be induced for the various alarm conditions.



**Note:** Meter DP Alarm is also available on Firmware Version 1.93 and higher. However, this alarm is not configurable. It is displayed on the Live Data Screen and can be configured to display on the LCD as well. Additionally, it can be configured to be sent via a pulse output.

### To set the alarm limits:

- 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 IMCW2 via the *Configuration* screen).
- Select the OK option 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.

Note: To upload changes to the Micro Corrector refer to the section entitled Upload to MC

Alarm Settings		×
Limits High Pressure Low Pressure High Temperature Low Temperature High Flow Rate Low Flow Rate	261.072     PSI A       7.25     PSI A       158     °F       -58     °F       2500     ft°/h       -500     ft°/h	Display Pressure Alarm On LCD Temperature Alarm On LCD Flow Rate Alarm On LCD Daily Consumption Alarm on LCD Input alarm on LCD Meter DP Alarm on LCD Monitor Pressure Alarms on LCD Digital Temp SN Digital Press SN
		<ul> <li>□ Digital DP/Mon SN</li> <li>□ Output Pulses</li> <li>□ Output Pulses for Pressure Alarm</li> <li>□ Output Pulses for Temperature Alarm</li> <li>□ Output Pulses for Flow Rate Alarm</li> <li>□ Output Pulses for Daily Consumption Alarm</li> <li>□ Output Pulses for Input Alarm</li> <li>□ Output Pulses for Meter DP Alarm</li> <li>□ Output Pulses for Monitor Pressure Alarms</li> <li>□ Digital Temp SN</li> <li>□ Digital Press SN</li> <li>□ Digital DP/Mon SN</li> </ul>

Alarm Settings Configuration (DP-version shown)

Alarm Parameter	Alarm Limit			
High Pressure	1.5 x maximum pressure of transducer			
Low Pressure	0.5 bar Absolute 7.252 PSI Absolute			
	-0.5 bar Gauge	-7.525 PSI Gauge		
High Temperature	70°C	158°F		
Low Temperature	-50°C -58°F			
High Flow Rate	+ 1.5 x Q <sub>max</sub> *			
Low Flow Rate	- 1.5 x Q <sub>max</sub> *			

### Alarm Parameter / Alarm Limits Reference Table

\*The high and low flow rate alarm limits will automatically update when a new meter type and size are selected.

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

- 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 IMCW2 via the *Configuration* screen). If a parameter is disabled, it may be because it is not available on the IMCW2 that you have.
- Note: If the IMCW2 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.

Note: To upload changes to the Micro Corrector refer to the section entitled Upload to MC

**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 the *Upload to MC* option. Upon display of the *Sent OK* message, select *OK*.

### To specify output pulses for alarm conditions:

• 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 IMCW2 via the *Configuration* screen). If a parameter is disabled, it may be because it is not available on the IMCW2 that you have.



**Note:** If the IMCW2 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.

- For Output Pulses of Digital Temp SN, Digital Press S/N and Digital DP/Mon S/N, refer to 13.5.2 Replacing the digital transducers Alarms.
- Select OK on the Alarm Settings screen.

Note: To upload changes to the Micro Corrector refer to the section entitled Upload to MC

**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 the *Upload to MC* option. On display of the *Sent OK* message select *OK*.

## 9.7 Alarm Dial out Settings and Monitor Calls

(Only for units equipped with an external modem)



Note: For details on setting-up and communicating via a modem contact your Dresser representative.

## 9.8 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. When an alarm condition occurs, an appropriate alarm code is displayed on the LCD (see 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 determined and resolved, the icon in the *Present Alarms* section of the *Live Data* screen will return to green with a "0", and the alarm code on the LCD will no longer be displayed. The appropriate icon on the *Occurred Alarms* screen will remain red with a "1", until the occurred alarms register has been cleared. Following the selection of the *Update Values* options on the *Live Data* screen, and once the occurred alarms have been cleared, the icon in the *Occurred Alarms* section will return to green with a "0".



ALARM	DESCRIPTION/ REASON	LCD with Solid Bell Icon**	LIVE DATA for Fault Names or Voltage Levels If Battery
High Pressure Alarm	Pressure reading greater than user defined high pressure limit.	HP AL	High Temp alarm
Low Pressure Alarm	Pressure reading lower than user defined low pressure limit.	LP AL	Low Temp alarm
High Temperature Alarm	Temperature reading greater than user defined high temperature limit.	Ht AL	High Temp alarm

Low Temperature	Temperature reading lower than user defined low	Lt AL	Low Temp alarm
Alarm	temperature limit.		
High Flow Alarm	Flow is greater than user defined high flow limit.	HF AL	High Flow alarm
Low Flow Alarm	Flow is lower than user defined low flow limit.	LF AL	Low Flow alarm
Volume/High	Volume high consumption alarm.	Vol AL	High Consumption alarm
Consumption			
Alarm			
Tamper Alarm	Tamper wire is cut.	tAnnPEr	Tamper alarm when unit is vandalized.
Digital Temp SN	New temperature sensor is connected, but not yet commissioned via MCUT.	T Sn AL	_
Digital Pressure SN	New line pressure sensor is connected, but not yet commissioned via MCUT.	P Sn Al	-
Digital DP/Monitor SN	New differential pressure sensor is just connected, but not yet commissioned via MCUT.	DP Sn AL	-
Digital Input and Tamper Alarm	By setting some hardware links on the board, the digital input with an external power or the device is setup for a cut wire tamper detect.	D_ln_Al/ tAnnPEr	Digital input
Volume Alarm	By setting some hardware links on the board, the high consumption of volume for a day can be detected by this alarm	vol AL	Daily consumption
Differential Pressure Alarm	defined number of DP values measured in sequence have exceeded the meter DP alarm threshold	DP AL	Meter DP Alarm

\*Digital input / Daily consumption is not used in USA.

\*\* see IMCW2 hardware manual for actual LCD display of alarm codes

**Note:** The user can select which Alarms to display on the LCD. Telemetry Fault pulse outputs can be set to continuous or single-latched pulse as per the AMR connected to the IMCW2. ALL THESE ALARMS HAVE SOLID BELL ICON ON THE LCD. When the present alarm goes away, the blinking bell icon is seen on LCD.

### To clear occurred alarms register:

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



# **10** Advanced Tab

The *Advanced* Tab contains up to 6 options (model dependent); 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.



Advanced Tab (DP-version shown)

### To display the advanced screen:

• Note: The options available on this screen depend on the model and configuration of the IMCW2. If a required option is not available, please contact your Dresser Representative for further details.
### **10.1 Digital Input/Output**

Using "Digital Input/Output" section of "Advanced" tab of User Terminal, two connectors in Terminal Block TB1 i.e. *Not marked (Multipurpose)* and *GND* could be configured as external power input/output or *Digital Input / Tamper Alarm* or *Digital Output / Volume Consumption Alarm or Meter Lockup Output* Note: Refer to the Dresser IMCW2 Hardware Manual.

MCUT 6.	0.0.0						_		×
Welcome	Configuration	Calibration	Live Data	Faults & Alarms	Advanced	Logging DRE UTILITY	System	TIONS	5
	igital Input/Dutput C External Power Digital Input C Consumption Ala Meter Lockup Du C Coto Sensor Digital Input/Dutput	rm Output .tput	T Chang	Irim Table Prover Mode est Pulse Qutputs change Password e Advanced Password	Gas	Meter Health DP Transdur Diagnostic	s setup		

Note: For the fully digital IMCW2, the second connector is marked "Multipurpose."

### 10.1.1 External Power

Two connectors in Terminal Block TB1 i.e. *Not marked (Multipurpose)* and *GND*, are configured by default for external power input. External voltage from 5V to 6V can be supplied to power the unit. **Note:** Refer to the Dresser IMCW2 Hardware Manual.

/elcome   Configuration   Calibration	Live Data   Faults & Alarms	Advanced Logging System
Digital Input/Dutput	<u>I</u> rim Table	Gas Meter Health DP Transducer Units
C Digital Input C Consumption Alarm Output	Prover Mode	Diagnostics setup
C Meter Lockup Dutput	Change Password	
Digital Input/Output Settings	Change <u>A</u> dvanced Password	

#### 10.1.2 Digital Input

MCUT 6.0.0.0		- 🗆 ×
Welcome   Configuration   Calibration   Live	re Data │ Faults & Alarms	Advanced Logging System
		DRESSER. UTILITY SOLUTIONS
Digital Input/Output	<u>I</u> rim Table	Gas Meter Health DP Transducer Units
C External Power	Prover Mode	Diagnostics setup
C Consumption Alare Dutput	Test Pulse <u>O</u> utputs	
C Meter Lockup Output	Change Password	
	Change <u>A</u> dvanced Password	
Digital Input/Output Settings		

Select *Digital Input* on the *Advanced* tab and then click *Digital Input/Output Settings*, this window appears:

Digital Input			×
⊢ Alarm State — The digital inpul	t Alarm State	© LOW © High	
Alarm Message Message on th alarm state	e LCD in	<ul> <li>Digital Input Alarm</li> <li>Tamper</li> </ul>	
Input alarm on I Output Pulses f	LCD for Input Alarm		
	Cancel	<u>0</u> K	

#### **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 an alarm message will appear on LCD.
- Select whether 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.

#### **10.1.3** Consumption Alarm Output

The Consumption Alarm Output facility provides digital signal (i.e., HIGH or LOW signal level) on the digital output terminal. If Maximum Daily Consumption of gas is reached, then an Alarm State is set for the digital output. The operator can set a value of Maximum Daily Consumption, the Start Time for Daily Billing, and the signal level in Alarm State. The operator can also enable or disable the Consumption Alarm Output facility.

MCUT 6.0	0.0.0						_		×
Welcome	Configuration	Calibration	Live Data	Faults & Alarms	Advanced	Logging	System		
						<b>DRE</b> UTILITY	SOLU	TIONS	5
D	igital Input/Output-			<u>T</u> rim Table	Gast	Meter Health DP Transdu	cer Units	1	
	<ul> <li>External Fower</li> <li>Digital Input</li> </ul>			Prover Mode		Diagnostic	s setup	1	
	Consumption Ala	rm Output	Т	est Pulse <u>O</u> utputs					
	C Coto Sensor		<u> </u>	Change Password					
			Chang	e <u>A</u> dvanced Password					
	Digital Input/Output	Settings							

Select *Consumption Alarm Output* on the *Advanced* tab and then click *Digital Input/Output Settings*, this window appears:

Digital Output	X
Digital Output in Alarm 6	r LOW C HIGH
Start Time for Daily Billing 7	:00
Maximum Daily Consumption 10	00000 SCF
Daily Consumption Alarm on LCD	
Output Pulses for Daily Consumpt	ion Alarm
<u></u>	Cancel <u>D</u> K

**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 on the user selection in the Customize LCD screen, the following parameters can be displayed with an abbreviated description on the LCD:

- Accumulated Corrected Volume current day (Cd)
- Accumulated Corrected Volume previous day (Pd)
- Accumulated Corrected Volume current month (Co)
- Accumulated Corrected Volume previous month (Po)
- Highest daily volume in the current month (Ch)
- Highest daily volume in the previous month (Ph)
- Date when it happened: mm-dd-yy (blinking dot)

"Date when it happened" is the last date when Daily Maximum Consumption was reached.

### **10.1.4** Meter Lockup Output

One of the most severe problems in rotary gas meter functionality is meter lockup. Lockup means that the gas meter impellers will stop rotating or rotate with high resistance. This condition usually happens if debris in the natural gas stream enters the meter and blocks impellers' motion. Consequently, natural gas delivery to the consumer is reduced or even stopped. In critical applications for uninterruptible customers, this situation can have grave consequences. Gas meter health monitoring detects this situation, and a meter lockup fault is set. The binary Meter Lockup Output signal can be used to control a bypass valve and facilitate natural gas delivery. The user can decide on the signal level in case of lockup.

MCUT 6.0	.0.0						_		×
Welcome	Configuration	Calibration	Live Data	Faults & Alarms	Advanced	Logging	System		
						<b>DRE</b> UTILITY	SOLU	TIONS	;
Di	gital Input/Output-			<u>I</u> rim Table	Gas M	deter Health- DP Transdu	cer Units	1	
	C Digital Input			Prover Mode		Diagnostic	s setup	1	
	C Consumption Ala	rm Output	Т	est Pulse <u>O</u> utputs					
	C Coto Sensor		<u>(</u>	Change Password					
			Chang	je <u>A</u> dvanced Password					
	Digital Input/Output	Settings							

Select *Meter Lockup Output* on the *Advanced* tab and then click *Digital Input/Output Settings*, this window appears:

Digital Output setup for N	∕leter Lock-u	p ×
Digital Output in Meter Lo	ck-up	C HIGH     C     HIGH     C     H     C     H     C     H     C     H     C     H     C     H     C     H     C     H     C
Clear Lock-up fault	Cancel	0K

Meter Lockup Output functionality

After the gas meter lockup is cleared, the digital output signal is reset to normal state. This resetting is performed on the screen above.

### **10.2 Trim Table**

The *Trim Table* option provides the facility to improve the meter accuracy characteristics for low flow rates. Trim table settings are provided in accordance with manufacturer guidelines for specific meters. Additionally, the operator can configure a User Defined Trim Table. The advanced password is required if the *Trim Table* settings are to be configured.



**Note:** As per Measurement Canada requirements the Trim Table option is **disabled** for Canadian Micro Correctors.





### To enable the trim table facility:

- From the Advanced screen select the Trim Table option. The Trim Table screen will be displayed.
- Select the *Enable Trim Table* parameter; ensure that a check is displayed in the *Enable Trim Table* parameter check box.
- Select the Send option. Enter the advanced password and select OK, otherwise select Cancel.
- The new details will be uploaded to the IMCW2. On completion a dialog box will be displayed stating that *Trim Table Enabled and Sent*, select *OK*. The *Advanced* screen will be displayed.

# To enable a user defined trim table to enable the accuracy characteristics of the meter correction as specific by the operator:

- From the Advanced screen select the Trim Table option. The Trim Table screen will be displayed.
- Ensure that the *Enable Trim Table* parameter is checked.
- Select the User Defined Trim Table option.
- Select the Send option. Enter the advanced password and select OK, otherwise select Cancel.
- The new details will be uploaded to the IMCW2. A dialog box will be displayed stating that *Trim Table Enabled and Sent*, select *OK*. The *Advanced* screen will be displayed.

### To edit user trim table to configure the accuracy characteristics of the meter correction:

- From the Advanced screen select the Trim Table option. The Trim Table screen will be displayed.
- Ensure that the *Enable Trim Table* parameter is checked.

- Ensure that the *User Defined Trim Table* option is selected.
- Select the *Edit User Trim Table* option. Enter the advanced password and select *OK*, otherwise select *Cancel*. The *Trim Table Setup* screen will be displayed.
- In the *Trim Table Setup* screen, the meter type and size are displayed. If this is different from the meter selected in the *Volume Configuration* screen (accessed via the *Configuration* screen), this should be changed.
- Note: Qmax is determined by the meter type and size selected.

Select the *No. Entries* text box and enter the desired number of entries for the trim table. The new value will be implied as the value entered will be reflected in the number of % of *Qmax* and *Correction Factors* text boxes enabled on the *Trim Table Setup* screen. The acceptable number of entries allowed is between 1 and 16 inclusive.

- Select % of Qmax text box 1, enter the desired value. The acceptable range is between 1 and 10. Subsequent entries (up to 16 allowable) must be less than the previous value, but more than the subsequent value. See the following *Trim Table Setup Screen*.
- Select the *Correction Factor* text box 1 and enter the desired value. The acceptable range is between 0.5 and 1.5 for all *Correction Factor* text boxes. The default *Correction Factor* value is equal to 1 (i.e., no correction is performed). Enter all desired values in all *Correction Factor* text boxes.
- Select the *Save As User Defined* option. Once saved, a dialog box will be displayed stating *Trim Table Saved*, select *OK*. The trim table settings need to be sent to the IMCW2 via the *Trim Table* screen.
- Note: It is possible to save *Trim Table Settings* for each meter type and size, providing the settings are saved when entered. It is then possible the recall these settings.
- From the *Trim Table* screen, ensure that the *User Defined Trim* Table option is selected and select the *Send* option. Enter the advanced password and select *OK*, otherwise select *Cancel*.
- The new details will be uploaded to the IMCW2. A dialog box will be displayed stating that *Trim Table Enabled and Sent*, select *OK*. The *Advanced* screen will be displayed.



**Note:** Once the User Defined Trim Table has been sent to the IMCW2 and the Trim Table Enabled and Sent dialog box has been displayed and accepted, the Trim Table screen will display the Factory Default Trim Table option as selected. It should be noted that the User Defined Trim Table has been sent to the IMCW2, even though the Trim Table screen may suggest otherwise.

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Trim Table S	etup		X
		% of Qmax	Correction Factors
No. Entries	16	1 10	1
Meter Type	Series B	2 8	1
Meter Size	ЗМ	3 6	1
Qmax	3000 ft⁰/h	4 4	1
		5 3.5	1
		6 3	1
		7 2.66	1
		8 2.33	1
		9 2	1
		10 1.75	1
		11 1.5	1
		12 1.25	1
		13 1	1
		14 0.75	1
Save	e As User Defined	15 0.5	1
	Cancel	16 0.25	1

**Trim Table Setup Screen** 

### **10.3 Prover Mode**

The *Prover Mode* facility provides the operator a means of testing the accuracy of the output signals and verifying the volume accumulation. The real time generation of output pulses (of highest priority for the microprocessor) are at least 10 times shorter than the pulses used in *normal operation*, hence a reduced test time.

It is possible to enter Prover Mode in two ways by using:

- MCUT (process described below), or.
- Smart Prove hardware
- Smart Prove interface kit Dresser part number:
  - P/N 058860-100 (Dresser Model 5 Transfer Prover)
  - o P/N 062342-000 (Dresser Model 6 Transfer Prover)



Smart Prove Interface Kit for Model 5 Transfer Prover

Testing the accuracy of the output signals and verifying the volume accumulation by using Smart Prove is described in two Dresser Documents: IOM Smart Prove Manual (for the Dresser Model 5 Prover) and in the Dresser Model 6 Prover Operation and Maintenance Manual for the Dresser Model 6 Prover.

As soon as Prover Mode is entered via the MCUT, the pressure and temperature readings are taken, and these values are used for the duration of this test. The settings in the IMCW2 (corrected and uncorrected volumes and residuals etc.) are saved; when *normal operation* is resumed these values are retrieved. In addition, the settings of the corrected and uncorrected pulse outputs and corrected and uncorrected volume display multipliers can be changed to suit the needs of the *Prover Mode* without changing the configuration used during *normal operation*.

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Prover Mode		×
Corrected Pulse Output	1 • ft <sup>3</sup>	Save Proving Settings
Uncorrected Pulse Output	1 • ft <sup>3</sup>	
Corrected Volume Display Multiplier	x1 💌	
Uncorrected Volume Display Multiplier	x1 💌	
Required Proving settings should be selected	d before entering prover mode.	
Switch MC into Prover Mode Swi	tch MC out of Prover Mode	
	Cancel	ок

#### Prover Mode Screen

### To set the IMCW2 into Prover mode:

• From the *Advanced* screen select the *Prover Mode* option. The *Prover Mode* screen will be displayed.

**Note:** The duration that the IMCW2 is set into *Prover Mode* is 60 minutes and this value is not editable. However, it is possible to switch the IMCW2 out of *Prover Mode* at any time.

- Select the *Corrected Pulse Output* drop down selection box. Select the desired value.
- Select the *Uncorrected Pulse Output* drop down selection box. Select the desired value.
- Select the *Corrected Volume Display Multiplier* drop down selection box. Select the desired value.
- Select the *Uncorrected Volume Display Multiplier* drop down selection box. Select the desired value.
- The new parameters will need to be uploaded to the IMCW2. Select the Save Proving Settings option.
- On completion a dialog will be displayed stating that *New Proving settings sent successfully*, select *OK*. The *Prover Mode* screen will be displayed.
- From within the *Prover Mode* screen select the *Switch MC into Prover Mode* option. A dialog will be displayed informing the operator of the duration of the (1 hour). To continue select *OK*, otherwise select *Cancel*.
- Once *Prover Mode* has been entered a dialog will be displayed stating *Prover Mode Entered OK*. Select *OK*.
- The LCD on the IMCW2 will display *ProvE* followed by the remaining duration (in minutes) of *Prover Mode:*



#### Indication on display after IMCW2 entered Proving Mode by using MCUT

• Once the test is complete, the IMCW2 will switch out of *Prover Mode* and *normal operation* will resume.

### To switch the IMCW2 out of Prover mode:

- From the *Advanced* screen select the *Prover Mode* option. The *Prover Mode* screen will be displayed.
- Select the *Switch MC out of Prover Mode* option. A dialog will be displayed stating *Prover mode successfully cancelled*, select *OK*. The Prover Mode screen will be displayed.
- Normal operation will resume, ProvE will no longer be displayed on the LCD on the IMCW2.
- From the *Prover* Mode screen, select *OK* and the *Advanced* screen will be displayed.

### **10.4 Test Pulse Outputs**

The MCUT provides a *Test Pulse Outputs* function. This allows a verification of the corrected and uncorrected 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 on the *Volume Configuration* screen (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 be added to the corrected and uncorrected 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.

The unit will now send 30 pulses with a pulse width of 125ms to the corrected and uncorrected pulse	
During the test any volume recorded by the gas meter will be added to the corrected and uncorrected totals. Test to the total number of pulses sent out. Do you wish to continue?         Output Selection       Corrected         Corrected       Image: Corrected	: outputs. t pulses will be added
Send Test Pulses Screen	

### To activate the test pulse output facility:

- From the Advanced screen select the Test Pulse Outputs option. 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.
- Enter the advanced password and select *OK*, otherwise select *Cancel*. A dialog will be displayed stating *Test pulse* mode entered successfully. Select *OK*.
- The LCD on the IMCW2 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.

### **10.5 Change Basic or Advanced Password**

All password protected parameters are those that, when changed, will affect the customer's bill. The default password is the number "0". Any new password must be numerical and between 1 and 8 digits long.

### To change the password:

- From the Advanced screen select the Change Password option, the Change Password screen will be displayed.
- Select the *Existing Password* text box and enter the existing password. The factory default password is the number "0".
- Select the *New Password* text box and enter the desired new password (must be numerical and between 1 and 8 digits long).
- Select the *Verify Password* text box and verify the new password.
- Select the *OK* option. A dialog box will be displayed stating *Password changed successfully*. Select *OK*. The *Advanced* screen will be displayed.

Change Password X	Change Password X
Change Password	Change Advanced Password
Existing Password	Existing Password
New Password	New Password
Verify Password	Verify Password
<u>O</u> K	<u>D</u> K
<u>C</u> ancel	<u>C</u> ancel

### **10.6 Gas Meter Health Diagnostics**

'DP Measurement' units and settings are only active for IMCW2-dp version correctors. These settings will only affect differential pressure testing and results, and meter health diagnostics.

MCUT 6.0.0.0					_		×
Welcome Configuration Calibration	Live Data	Faults & Alarms	Advanced	Logging	System		
				DRE	SOLUT	R	5
Digital Input/Output		<u>I</u> rim Table	Gas M	leter Health— DP Transduc	er Units		
C Digital Input		Prover Mode		Diagnostics	s setup		
C Consumption Alarm Output	Т	est Pulse <u>O</u> utputs					
C Coto Sensor	<u>(</u>	Change Password					
	Chang	je <u>A</u> dvanced Password					
Digital Input/Output Settings							

### **10.6.1 DP Transducer Units**

Select 'DP Transducer Units' and the following screen appears. Use the drop-down menu to select between imperial (in WC) and metric (mbar) units. When finished press 'OK'.

MCUT 6.0.0.0					_		Х
Welcome Configuration Calib	ration Live D	ata   Faults & Alarms	Advanced	Logging	System		
				<b>DRE</b> UTILITY	SOLUT	TONS	
Digital Input/Output		Irim Table	Gas	Meter Health DP Transduc	er Units	Б	
C External Power		Prover Mode		Diagnostics	setup		
C Consumption Alarm Outp	ut	Test Pulse <u>O</u> utputs					
Meter Lockup Output     C Coto Sensor		<u>C</u> hange Password					
	C	Change <u>A</u> dvanced Password					
Digital Input/Output Setting	3		-				
	DP Transducer U	nits	×				

DP Transducer Units	5	×
	DP units in/	/C 💽
Cancel		OK

**DP Transducer Units Screen** 

### 10.6.2 Gas meter Health diagnostic setup

Select *Diagnostics setup* and the following screen appears:



### 10.6.3 IMCW2 with Line-Pressure transducer

I emperature	G. Live Measurement	C Fired
	<ul> <li>Live measurement</li> </ul>	<ul> <li>Fixed</li> </ul>
Base Temperature 60 *F	Fixed Temperature	۴F
Pressure		
Units	• Live Measurement	ិ Fixed (T Only)
● PSI ○ bar ○ kPa ○ kgf/cm²		
Base Pressure 14.73 PSI	Fixed Line Pressure	PSI
Atmospheric Pressure PSI	Fixed Pressure Factor	
Supercompressibility		
• Live Measurement O Fixed	Supercompressibility	(Fpv²)
Compressibility - Natural Gas		
Method of Calculation	Heating Value 1050	BTU/ft <sup>®</sup>
Method of Calculation	Heating Value 1050 Specific Gravity 0.58	BTU/ft <sup>®</sup>
Method of Calculation	Heating Value   1050 Specific Gravity 0.58 CD2 0.5	BTU/ft <sup>®</sup>
Method of Calculation	Heating Value 1050 Specific Gravity 0.58 CO2 0.5 N2 0.5	BTU/ft <sup>®</sup>
Method of Calculation NX 19 Low Heating Value  Gas composition	Heating Value 1050 Specific Gravity 0.58 CO2 0.5 N2 0.5	BTU/ft <sup>®</sup>
Method of Calculation NX 19 Low Heating Value Gas composition	Heating Value         1050           Specific Gravity         0.58           C02         0.5           N2         0.5           H2         0	BTU/N <sup>a</sup>
Method of Calculation       NX 19 Low Heating Value       Gas composition	Heating Value 1050 Specific Gravity 0.58 CO2 0.5 N2 0.5 H2 0	BTU/ft <sup>®</sup> _

If the configuration screen has *Live Measurement* selected for pressure:

Then the following *Meter Diagnostic setup and values* screen will appear:

Meter Diagnostic setup and values
Meter Setup
Start Meter Learning Period
Restart DP Logging
• DTAC Software Only
C Learn method 1
C Learn method 2
Specific Gravity 0.58
Diagnostic Range
DP Fixed Line Pressure
Enable Fixed Line Pressure [Gauge]
Fixed Line Pressure 14.7 PSI
IF THE FIXED LINE PRESSURE VALUE USED FOR METER HEALTH MONITORING IS THE SAME AS THE VALUE USED FOR VOLUME CORRECTION, DO NOT SELECT "ENABLE FIXED LINE PRESSURE"
Cancel OK

• Select among the three models for gas meter health diagnostics: *Dresser's Differential Test Acceptance Calculator* (*DTAC*) software, Learn method 1, or Learn method 2. Both learn methods achieve more accurate DP data by

gathering reference values for a specific meter installation. These learned parameters are then used in the mathematical model.

- *DTAC Software Only* This mathematical model will qualify the results of DP testing based on the following parameters: line pressure (measured), flow rate (measured), specific gravity (configured) and meter size/type (configured). Selection of "DTAC Software Only" immediately starts full meter diagnostics, including DP meter alarm.
- Learn method 1 This learning method is available for selection if the meter size and type is included in the DTAC software. During the learning period, the DTAC software is used to analyze Meter DP fault and Meter Lockup fault. If the learning period is successfully completed, then all meter diagnostics are performed based on learned mathematical model parameters. If the learning period is unsuccessful, then the DTAC software is used for full meter diagnostics (including meter DP alarm).
- Learn method 2 This learning method is available for selection if the meter data is not included in DTAC software, or there is a reason not to use DTAC. If the learning period is successfully completed, then all meter diagnostics are performed based on learned mathematical model parameters. If the learning period is unsuccessful, then DP diagnostics are not available.
- Once a learning method is chosen, press 'Start Meter Learning Period' to initialize the analysis model.
- Learning can be re-started at any time; however, if the previous learning period was successfully completed, the MCUT will show a warning and ask for confirmation to continue.

All mathematical models for gas meter health diagnostics used in IMCW2 characterized gas composition by its specific gravity value. Meter Diagnostic Setup/Value screen, allows entering this value. Default value is 0.6.

All mathematical models for gas meter health diagnostics used in IMCW2 requires value of line pressure of gas flowing through gas meter. If IMCW2 is equipped with line pressure transducer, then the measured value of pressure is used for diagnostics. If IMCW2 is not equipped with line pressure transducer then the user must manually enter the pressure correction factor, based on the output pressure of pressure regulator installed in the system. The value of pressure correction does not influence billing and is used only for gas meter health diagnostics, refer to Appendix A - The IMCW2 LCD Displayed Messages for details.

### 10.6.4 IMCW2 with Temperature-only (no Line-Pressure transducer)

If the configuration screen has *Fixed (t Only)* selected for pressure:

Compensations Configuration		
Temperature		
Units ● °F ⊂ °C	• Live Measurement	
Base Temperature 60 °F	Fixed Temperature Fixed Temperature	
Pressure		
Units	C Live Measurement 💽 Fixed (T Only)	
● PSI C bar C kPa C kgf/cm²	C Absolute 📀 Gauge	
Base Pressure 14.73 PSI	Fixed Line Pressure 0 PSI	
Atmospheric Pressure 14.73 PSI	Fixed Pressure Factor 1	
Supercompressibility		
C Live Measurement C Fixed	Supercompressibility (Fpv²)	
Compressibility - Natural Gas		
Method of Calculation	Heating Value 1050 BTU/ft®	-
	Specific Gravity 0.58	
NX 19 Low Heating Value	CO2 0.5 %mol	
Gas composition	N2 0.5 %mol	
	H2 0 %mol	
	<u>C</u> ancel <u>O</u> K	
	<u>C</u> ancel <u>O</u> K	

Then the following *Meter Diagnostic setup and values* screen will appear:

Meter Diagnostic setup and values	x
Meter Setup	
Start Meter Learning Period	
Restart DP Logging	
• DTAC Software Only	
C Learn method 1	
C Learn method 2	
Specific Gravity 0.58	
Diagnostic Range	
DP Fixed Line Pressure	
Enable Fixed Line Pressure [Gauge]	
Fixed Line Pressure 14.7 PSI	
IF THE FIXED LINE PRESSURE VALUE USED FOR METER HEALTH MONITORING IS THE SAME AS THE VALUE USED FOR VOLUME CORRECTION, DO NOT SELECT "ENABLE FIXED LINE PRESSURE"	
Cancel	

There are two scenarios that utilities use for pressure correction with Temperature-only units (without Line-pressure transducers)

### First scenario:

The fixed Line-pressure value (at the pressure regulator) is entered by the operator into the correction screen. Then in this scenario the pressure correction is performed by the IMCW2. This value (example 20 psi below) is used for the Meter-Health diagnostics.

Do not select the Enable Fixed Line Pressure box in this scenario.

mpensations Configuration		Meter Diagnostic setup and values
Temperature		Meter Setup
Units ●°F C°C	Eive Measurement O Fixed	Start Meter Learning Period
Base Temperature 60 °F	Fixed Temperature F	
Pressure		Restart DP Logging
Units	C Live Measurement 📀 Fixed (T Only)	· · · · · · · · · · · · · · · · · · ·
● PSI ○ bar ○ kPa ○ kgf/cm²	C Absolute 💿 Gauge	• DTAC Software Only
B B 14.72 BOI	5° UL D 20 DOL	C Learn method 1
Base Pressure 14.75 PSI	Fixed Line Pressure 20 PSI	C Learn method 2
Atmospheric Pressure 14.73 PSI	Fixed Pressure Factor 2,3578	
		Specific Gravity U.58
Supercompressibility		Disguestia Bauga
C Live Measurement 💿 Fixed	Supercompressibility (Fpv²)	
Compressibility - Natural Gas		
Method of Calculation	Heating Value 1050 BTU/ft <sup>2</sup> -	🗧 🗖 Enable Fixed Line Pressure 🛛 [Gauge
	Specific Gravity 0.58	Fixed Line Fressure
NX 19 Low Heating Value 🚽		
	CU2  0.5 %mol	USED FOR METER HEALTH
G as composition	N2 0.5 %mol	MONITORING IS THE SAME AS THE
	H2 0 %mol	CORRECTION, DO NOT SELECT
	112	"ENABLE FIXED LINE PRESSURE"
	<u>C</u> ancel <u>O</u> K	Cancel OK

### Second scenario:

The gas utility performs pressure correction at the billing center. Then the *Fixed Pressure Factor* correction on the screen is set to the value of "1".

In the Meter Diagnostic Setup and Values screen you must select the Enable Fixed Line Pressure box and enter a value (example below: meter is exposed to 20 psi) into the Fixed Line Pressure field:

pensations Configuration		Meter Diagnostic setup and value
emperature		Meter Setup
Jnits ● °F O °C	Live Measurement     C Fixed	Start Meter Learning Per
Base Temperature 60 °F	Fixed Temperature F	
ressure		Restart DP Logging
Jnits	C Live Measurement 💿 Fixed (T Only)	
●PSI C bar C kPa C kgf/cm²	C Absolute C Gauge	<ul> <li>DTAC Software Only</li> </ul>
ase Pressure 14.73 PSI	Fixed Line Pressure 0 PSI	C Learn method 1
		C Learn method 2
Atmospheric Pressure 14.73 PSI	Fixed Pressure Factor 1	Specific Gravity 0.58
upercompressibility		
🗋 Live Measurement 🛛 💽 Fixed	Supercompressibility (Fpv²)	Diagnostic Hange
ompressibility - Natural Gas		DT - ixed Line Pressure
lethod of Calculation	Heating Value 1050 BTU/ft® 🚽	Enable Fixed Line Pressure
19 10 Law Hardina Value	Specific Gravity 0.58	Fixed Line Pressure 20
AX 13 Low Heating Value	CO2 0.5 %mol	IF THE MALE SHOWING
1	N2 0.5 %mol	USED FOR METER HEALTH MONITORING IS THE SAME AS
Gas composition		VALUE USED FOR VOLUME
	HZ I MON	CONTRECTION, DU NUT SELEC

## **11** Logging Tab

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 Excel<sup>®</sup>. 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.

MCUT 6.0.0.0	- 🗆 X
Welcome   Configuration   Calibration   Live Data   Faults & Alarms   Advanced	Logging System
	DRESSER. UTILITY SOLUTIONS
Download Data Log	
Download <u>A</u> udit Log	
Download DP Log	
Logging <u>S</u> etup	

### Logging Screen

### To display the logging screen:

- From the MCUT 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 IMCW2. If a required option is not available, please contact your Dresser Representative for further details.

### **11.1 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.

Download Data Log			×
_l.oo1			
Logging Frequency Logs Acquired Logs Available Time/Date of First Log Available Time/Date of Last Log Available	Every 1 Minutes 1221 1221 12:21:00 PM 06/27/2005 8:41:00 AM 06/28/2005	Download Logs From Download Logs To Download Log <u>1</u>	Time         Date           12:21 PM         06/27/05           8:41 AM         06/28/05
Log2 Logging Frequency Logs Acquired Logs Available Time/Date of First Log Available Time/Date of Last Log Available	Every 2 Minutes 610 610 12:22:00 PM 06/27/2005 8:40:00 AM 06/28/2005	Download Logs From Download Logs To Download Log <u>2</u>	Time         Date           12:22 PM         06/27/05           8:40 AM         06/28/05
Log3 Logging Frequency Logs Acquired Logs Available Time/Date of First Log Available Time/Date of Last Log Available	Every 4 Minutes 305 305 12:24:00 PM 06/27/2005 8:40:00 AM 06/28/2005	Download Logs From Download Logs To Download Log <u>3</u>	Time         Date           12:24 PM         06/27/05           8:40 AM         06/28/05
Options Cumulative/ Index Read Log Reverse Chronological	Consumption <u>P</u> er Log Chronological	C Download From Last Log	
C m <sup>2</sup> C	m <sup>3</sup> MCF C MMC	CF	⊻iew Last Log
<u>R</u> efresh Data			

Download Data Log Screen

### 11.1.1 Download Data 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 *Log3* 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 the *Download Data Log* option. 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 the *Refresh Data* option 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 the *Download Log* option. 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 display which may also be used. Select the *Save* option.
- 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 the *View Last Log* option. 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 the *Close* option.

### 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.

### 11.1.2 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 IMCW2.

### **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.

### 11.1.3 Downloaded Volume Units

There is a possibility to present logged corrected and uncorrected volume in different units.

If the IMCW2 is configured as Imperial, then volume is logged in ft3 (CF) and can also be presented in m3.

If the IMCW2 is configured as metric, then volume is logged in m3 and can also be presented in either MCF (ft3/1000) or in MMCF (ft3/1000000).

### **11.2 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.

Acquired 76 10 10	Available 32 10 10
)ownload <u>A</u> 0	udit Log
oad Commit	: Log
0	0
lf-containe	d event log
Canc	el
	)ownload ≜ 0 oad Commil 0 -!f-containe 

**Download Audit Log Screen** 

Audit Log Parameter						
	Meter Type					
	Meter Size					
	Flow Sense					
	Corrected Multiplier					
	Uncorrected Multiplier					
Mahama Canfinantian	Corrected Pulse Output					
volume Configuration	Uncorrected Pulse Output					
	Pulse Output Allocation					
	Pulse Width					
	Corrected Volume					
	Uncorrected Volume					
	Uncorrected Volume under Fault					
	Temperature Units					
	Base Temperature					
	Temperature Mode (Fixed or Live)					
	Fixed Temperature					
	Pressure Units					
Corrections	Base Pressure					
Configuration	Atmospheric Pressure					
	Fixed Pressure Factor					
	Fixed Line Pressure					
	Pressure Mode (Fixed or Live)					
	Supercompressibility					
	Fixed Pressure Type (Gauge or Absolute)					
	Temperature Calibration Offset					
Calibration	Temperature Calibration Span					
Calibration	Pressure Calibration Offset					
	Pressure Calibration Span					
	High Pressure Alarm Limit					
	Low Pressure Alarm Limit					
Alexan Cattings	High Temperature Alarm Limit					
Alarm Settings	Low Temperature Alarm Limit					
	High Flow Rate Alarm Limit					
	Digital Input/Tamper					

Advanced Options	Trim Table Settings	
	Prover Mode	
	Test Pulses Output	
	Password Change	
	Advanced Password Change	

**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 the *Download Audit Log* option. 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 the *Refresh Data* option 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 the *Download Audit Log* option. 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 the *Save* option.
- 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 the *Cancel* option.

	А	В	С	D	E	F	G
1	Audit Log						
2	Unit Serial Number	21/47/483647					
3	Meter/Site ID	Digital PCB22					
4	Meter Type	Series B					
5	Meter Size	3M					
6	Number of Logs Stored	52					
7	Log Number	Date	Time	Parameter changed	Old value	New value	
8	1	03/31/2022	10:10:50 AM	Fault Register	Unknown	0 (Fault Register Cleared )	
9	2	05/16/2022	10:45:40 AM	Alarm Register	Unknown	224 (Digital Temp SN Digital Press SN Digital DP/Mon SN )	
10	3	05/16/2022	10:56:29 AM	Alarm Register	224	128 (Digital DP/Mon SN )	
11	4	05/16/2022	10:56:30 AM	Alarm Register	128	0 (Alarm Register Cleared )	
12	5	05/27/2022	3:21:08 PM	Fault Register	0	128 ( Digital Port 2)	
13	6	05/27/2022	3:29:37 PM	Fault Register	128	192 ( Digital Port 1 Digital Port 2)	
14	7	05/27/2022	3:29:38 PM	Alarm Register	0	64 (Digital Press SN )	
15	8	05/27/2022	3:30:15 PM	Alarm Register	64	64 (Digital Press SN )	
16	9	05/27/2022	3:30:18 PM	Alarm Register	64	0 (Alarm Register Cleared )	
17	10	06/09/2022	3:20:15 PM	Fault Register	192	0 (Fault Register Cleared )	
18	11	06/09/2022	3:21:10 PM	Alarm Register	0	32 (Digital Temp SN )	
19	12	06/09/2022	3:21:11 PM	Alarm Register	32	0 (Alarm Register Cleared )	
20	13	06/09/2022	3:24:17 PM	Fault Register	0	0 (Fault Register Cleared )	
21	14	06/09/2022	3:24:17 PM	Fault Register	0	0 (Fault Register Cleared )	
22	15	06/09/2022	3:24:18 PM	Alarm Register	0	0 (Alarm Register Cleared )	
23	16	06/09/2022	3:24:18 PM	Alarm Register	0	0 (Alarm Register Cleared )	
24	17	06/11/2022	12:00:07 PM	Fault Register	0	1 (Pressure Fault Occurred)	
25	18	06/11/2022	12:00:07 PM	Fault Register	0	64 ( Digital Port 1)	
26	19	06/22/2022	11:57:26 AM	Fault Register	64	0 (Fault Register Cleared )	
27	20	06/22/2022	11:57:26 AM	Fault Register	64	0 (Fault Register Cleared )	
28	21	07/07/2022	11:21:34 AM	Qmax	16000	2000	1
29	22	07/07/2022	11:21:34 AM	Low Flow Rate Alarm Limit	-4000	-500	1
30	23	07/07/2022	11:21:34 AM	High Flow Rate Alarm Limit	20000	2500	1
31	24	07/07/2022	11:21:34 AM	Meter Size	Romet Imperial RM16000	Series B 2M	
32	25	07/07/2022	3:52:06 PM	High Pressure Alarm Limit	2175.6	261.07	1
33	26	07/07/2022	3:53:49 PM	High Pressure Alarm Limit	261.07	261.072	
34	27	07/07/2022	5:34:41 PM	Meter Type	Series B	Series A (LMMA)	
35	28	07/07/2022	5:34:41 PM	Meter Size	Series B 2M	Series A (LMMA) 2M	
36	20	07/07/2022	5-2/1-/11 DM	High Draccure Alarm Limit	261 072	261.07	1

## 11.3 Download DP log

Unit SN	04/20/94168					
Meter/Site ID	DP CUST					
Meter Type	Series B					
Meter Size	7M					
Number of						
Logs Stored	34					
			Avg DP	Avg Flow	Avg Line	Avg Line
Log Number	Date	Time	Value	Rate	Pressure	Temperature
Reference DP						
Logs						
1	10/12/2021	11:26:50 AM	0.462	3755	8.146	87.13
2	10/13/2021	9:54:50 AM	0.315	3342	8.153	85.64
3	10/14/2021	10:26:20 AM	0.223	2516	8.145	86.07
4	10/15/2021	9:47:50 AM	0.3	3233	8.165	84.38
5	10/16/2021	10:14:50 AM	0.538	3813	8.15	84.65
6	10/17/2021	10:20:20 AM	0.477	3829	8.133	85.36
7	10/18/2021	10:27:50 AM	0.297	3211	8.128	87.09
8	10/19/2021	9:44:50 AM	0.388	3484	8.143	84.62
9	10/20/2021	9:43:20 AM	0.356	3470	8.141	84.34
10	10/21/2021	9:42:50 AM	0.427	3384	8.144	84.34
11	10/22/2021	9:50:20 AM	0.363	3528	8.14	83.05
12	10/23/2021	9:53:20 AM	0.628	4906	8.121	84.18
13	10/24/2021	10:23:20 AM	0.191	2434	8.121	85.56
14	10/25/2021	10:11:50 AM	0.287	3210	8.145	82.93
15	10/26/2021	9:53:20 AM	0.341	3382	8.119	84.38
16	10/27/2021	10:10:20 AM	0.394	3636	8.123	83.2
17	10/28/2021	9:37:50 AM	0.412	3558	8.229	81.67
18	10/29/2021	10:04:50 AM	0.443	3775	8.258	82.3
19	10/30/2021	10:14:50 AM	0.328	3345	8.263	83.16
20	10/31/2021	10:12:50 AM	0.193	2457	8.23	84.18
21	11/01/2021	9:35:50 AM	0.304	3531	8.214	82.03
22	11/02/2021	10:04:20 AM	0.397	3610	8.265	77.6
23	11/03/2021	9:54:50 AM	0.416	3510	8.246	76.34
24	11/04/2021	10:03:50 AM	0.335	3346	8.239	79.91
25	11/05/2021	9:50:20 AM	0.405	3425	8.265	77.63
Current DP						
Logs						
26	03/05/2022	9:49:20 AM	0.302	3599	8.35	66.12
27	03/06/2022	9:46:20 AM	0.357	3567	8.399	66.08
28	03/07/2022	10:11:50 AM	0.265	3645	8.37	68.31
29	03/08/2022	9:57:20 AM	0.273	3548	8.345	67.49
~~~			0.007	2500	~ ~ ~ ~	67 68

Example of DP Test log

### **11.4 Logging Setup**

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

Log1         Logging Frequency            Minutes             Daily             Daily             Monthly          Log2         Loging Frequency            Minutes             Hour             Daily             Monthly          Log2         Loging Frequency            Minutes             Hour             Daily             Log3 Required             Log3 Required             Log3            Log3            Log3            Log3 Frequency             Minutes             Hour             Daily             Hour             Daily             Monthly             Logs Required             Maximum 0

Logging Setup Screen

The logged parameters available for selection include:

- Corrected Volume
- Uncorrected Volume
- Correction Factor
- Uncorrected Volume Under Fault
- Average Corrected Flow Rate
- Peak Corrected Flow Rate

- Peak Uncorrected Flow Rate
- Supercompressibility
- Minimum Pressure
- Maximum Pressure
- Average Pressure
- Ending Pressure
- Minimum Temperature
- Maximum Temperature
- Average Temperature
- Ending Temperature
- 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. For the monthly data log all months are assumed to have a maximum of 28 days. The default logged parameters are corrected volume, uncorrected volume, correction factor, uncorrected volume under fault, average pressure, average temperature, average corrected flow rate, peak corrected flow rate 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) within the *Logging Setup* dialog e.g. *Maximum 523*.

### To display the logging setup dialog:

- From the MCUT select the *Logging* tab. The *Logging* screen will be displayed.
- From the *Logging* screen select the *Logging* Setup option. The *Logging* Setup dialog will be displayed.

### **11.4.1 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 the *Logging* Setup option. 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 the Upload Logging Setup option.



**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/off required logged parameters:

- From the *Logging* screen select the *Logging Setup* option. 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 the Upload Logging Setup option.

**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.

### 11.4.2 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, for *Log2*, the *Log2* section and for *Log3*, the *Log3* section).

### To specify the logging frequency:

- From the *Logging* screen select the *Logging* Setup option. 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<sup>th</sup> day of every month at 23:30).
- Repeat for each *Log* as required.
- Select the Upload Logging Setup option.
- 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.



1<sup>st</sup> Warning Screen

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



2<sup>nd</sup> Warning Screen

## **12 Monitor Pressure**

IMCW2's with firmware version 1.91 or higher, can be equipped with a second pressure transducer, a Monitor Pressure transducer, in addition to a Line Pressure transducer. This transducer can be absolute or gauge type. Pressure units selected on the Configuration screen must be the same for both the line and monitor transducers. Monitor pressure values are shown on the Live Data screen and can be logged in the Data Logs.

Logging setup allows selection of:

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

The firmware senses if the Monitor Pressure transducer fails, and a fault is set. This set fault, occurred and present, can be seen on the Live Data screen. A Pressure Monitor fault is registered in the Audit Log – Date/Time stamped, and **Pm FLt** is displayed on the LCD.

The Monitor Pressure transducer can be recalibrated at one or two points. Refer to the Calibration Tab for more details.

## 13 System tab

System Tab has been added starting from version 3.00 and MCUT version 5.0.0.0. The system screen contains information about hardware configuration, metrological protection, and integrity of the system. This screen has the following four sections:

- Internal Hardware
- Temperature
- Digital ports
- Digital Sensors CRC

🙀 MCUT 6.0.0.0								_ [	×
Welcome Config	ıration	Calibratio	on Live Data	Faults a	& Alarms	Adva	nced   Logg ng	System	
⊂ Internal Hardware Unit Serial Numt Meter/Site	per 21/47	/483647 1	emperature Serial	22000001	Digital F Port 1	Ports Sensor	Line Pressure	Port 2 Senso	DP/Monitor
Firmware Revisi PCB Revisi Firmware Ref CF Firmware Live CF	on 0d40 on 22 3C 0x69E 3C 0x69E	5			Serial F	Number Tirmware Identity	620115929 1.61 10000A	Serial Number Firmware Identity	520189946 1.61 00025G
Battery Selecti Battery remaining L Temperatu Pressure Sens Monitor/DP Sens Commissioned Pressure S Commissioned Monitor/D Line Pressure R Monitor/DP R Metrological Protectio Volume Sense	on Alkalir fe 78 mo re Digital or Digital or Digital N 12200 N 62011 P 52018 ange 100 ange 100 ange 0.2 n Passw or Wiega	ne nths 00001 5929 9946 1bar bar ord and 1	Digital Sensors CRC Temperat Temperat Press Press Mon/DP Press Mon/DP Press	, ure Live CR ure Live CR ure Ref CR ure Live CR ure Ref CR	C 0x116 C 0x116 C 0x505 C 0x505 C 0xDFA9 C 0xDFA9				

System Tab

### **13.1 Internal Hardware section:**

🗑 MCUT 6.0.0.0								_	×
Welcome Config	uration	Calibrat	ion Live Data	Faults 8	Alarms	Advanced	Logging	System	
Welcome Configu Internal Hardware Unit Serial Numl Meter/Site Firmware Revisi PCB Revisi Firmware Ref CF Firmware Live CF Battery Selecti Battery remaining L Temperatu Pressure Sens Monitor/DP Sens	uration per 21/47 ID 0 on 0d40 on 22 RC 0x69E RC 0x69E RC 0x69E on Alkalir ife 78 mo re Digital cor Digital cor Digital cor Digital	Calibrat	ion Live Data Temperature Serial Digital Sensors CR Tempera Tempera Press Press Mon/DP Press	Faults &	Alarms Digital F Port 1 Serial F Ox116 Ox116 Ox505 Ox505 Ox505 Ox505	Advanced	Logging Pressure 5929 A	System	DP/Monitor r 520189946 e 1.61 y 00025G
Commissioned Pressure S Commissioned Monitor/I Line Pressure R Monitor/DP R Metrological Protectio Volume Sens	Ange 100 Ange 100 Ange 0.2 Ange 0.2 Ange 0.2 Ange 0.2	5929 39946 Dear bar vord and	Mon/DP Pres	sure Ref CR(	DxDFA9				

The Internal hardware section is divided into sub-sections that display the following details of the system:

- Unit Serial Number Serial number allocated during factory configuration, which the operators cannot modify
- Meter/Site ID enables the operator to allocate the ID and modify the ID, as needed
- Firmware revision displays the firmware version in the unit
- PCB revision displays the revision number of PCB
- Firmware Ref CRC displays the CRC number calculated by the firmware on day released, and is saved as reference
- Firmware Live CRC displays the CRC number automatically calculated periodically or upon user request
- Battery type displays the type of battery installed either alkaline or lithium
- Battery remaining life displays the battery life timeline
- Temperature displays the type of temperature transducer either analog or digital
- Pressure Sensor displays the type of pressure transducer either analog or digital
- Monitor/DP sensor displays the type of Monitor/DP transducer either analog or digital
- Commissioned Temperature S/N displays the serial number of the digital temperature transducer that is commissioned to work in the system
- Commissioned Pressure S/N displays the serial number of digital pressure transducer that is commissioned to work in the system
- Commissioned Monitor/DP S/N displays the serial number of digital monitor pressure transducer or DP transducer that is commissioned to work in the system
- Line Pressure Range displays pressure range of line pressure transducer
- Monitor/DP Range displays pressure range of monitor pressure transducer or DP transducer
- Metrological Protection displays type of protection of metrological parameters: password, hardware or combination password/hardware

## **13.2 Temperature**

🗑 MCUT 6.0.0.0		– 🗆 X
Welcome Configuration Calibr	ation   Live Data   Faults & Alarms   Advanced   Loggi	ng System
⊤ Internal Hardware —		TESSER.
Unit Serial Number 21/47/483647 Meter/Site ID 0 Firmware Revision 0d40 PCB Revision 22 Firmware Ref CRC 0x69E5	Temperature Serial 122000001 Port 1 Sensor Line Pressure Serial Number 620115929 Firmware 1.61 Identity 10000A	Port 2 Sensor DP/Monitor Serial Number 520189946 Firmware 1.61 Identity 000256
Firmware Live CRC 0x69E5		
Battery Selection Alkaline Battery remaining Life 78 months	Digital Sensors CRC Temperature Live CRC 0x116 Temperature Ref CRC 0x116	
Temperature Digital Pressure Sensor Digital Monitor/DP Sensor Digital	Pressure Live CRC 0x505 Pressure Ref CRC 0x505	
Commissioned Temp SN 122000001 Commissioned Pressure SN 620115929 Commissioned Monitor/DP 520189946	Mon/DP Pressure Live CRC 0xDFA9 Mon/DP Pressure Ref CRC 0xDFA9	
Line Pressure Range 100 bar Monitor/DP Range 0.2 bar Metrological Protection Password		

This section indicates the serial number of the digital temperature transducer. This takes place during the factory configuration. The users cannot change the serial number therefore, the operator can use this number for system integrity checking.

### **13.3 Digital Ports**

🗑 MCUT 6.0.0.0			- 🗆 X
Welcome Configuration Calibra	ition   Live Data   f	aults & Alarms   Advanced   Lo	igging System
□ Internal Hardware		Digital Ports	DRESSER.
Unit Serial Number 21/47/483647 Meter/Site ID 0 Firmware Revision 0d40 PCB Revision 22 Firmware Ref CRC 0x69E5 Firmware Live CRC 0x69E5	Temperature Serial 12:	2000001 Port 1 Sensor Line Press Serial Number 620115925 Firmware 1.61 Identity 10000A	ure Port 2 Sensor DP/Monitor 9 Serial Number 520189946 Firmware 1.61 Identity 00025G
Battery SelectionAlkalineBattery remaining Life78 monthsTemperatureDigitalPressure SensorDigitalMonitor/DP SensorDigitalCommissioned Temp SN122000001Commissioned Pressure SN620115929Commissioned Monitor/DP520189946Line Pressure Range100 barMonitor/DP Range0.2 barMetrological ProtectionPasswordVolume SensorWiegand	Digital Sensors CRC Temperature Temperature Pressure Pressure Mon/DP Pressure Mon/DP Pressure	Live CRC 0x116 e Ref CRC 0x505 e Ref CRC 0x505 Live CRC 0x505 e Ref CRC 0xDFA9 e Ref CRC 0xDFA9	

There are two digital ports in the IMCW2 that connect digital line pressure, digital monitor pressure, and digital DP transducers. There is information about what type is connected to a particular digital port. Each digital transducer has the following information:

- Serial number
- Firmware version
- Identity

Above data is assigned during transducer manufacturing. The users cannot change any of the above information therefore, the operator can use all of these for system integrity checking.

## **13.4 Digital Sensors CRC**

🗑 MCUT 6.0.0.0		– 🗆 X
Welcome Configuration Calib	ation   Live Data   Faults & Alarms   Advanced   Logging	System
Welcone       Configuration       Calib         Internal Hardware       Unit Serial Number       21/47/483647         Meter/Site ID       0         Firmware Revision       0d40         PCB Revision       22         Firmware Ref CRC       0x69E5         Firmware Live CRC       0x69E5         Battery Selection       Alkaline         Battery remaining Life       78 months         Temperature       Digital         Pressure Sensor       Digital         Monitor/DP Sensor       Digital         Commissioned Temp SN       122000001         Commissioned Pressure SN       620115929	ation       Live Data       Faults & Alarms       Advanced       Logging         Image: Constraint of the pressure of the pressur	System System Port 2 Sensor DP/Monitor Serial Number 520189946 Firmware 1.61 Identity 00025G
Commissioned Monitor/DP 520189946		
Monitor/DP Range 0.2 bar		
Volume Sensor Wiegand		

There may be up to three digital transducers connected into the system. Comparing the reference CRC number with live CRC number allows for detection of firmware corruption of the digital transducer. If corruption occurs, then a fault is set.

# **13.5** Pressure and Temperature Transducer replacement functionality in the fully digital IMCW2.

#### 13.5.1 Introduction

The replacement of the digital pressure and temperature transducers and changing the values of any metrological parameter are protected in the Micro Corrector by two methods:

- Software password
- Hardware switch with two positions
  - R/W (Read/Write)
  - RO (Read-only)

During the manufacturing process, Dresser configures the method of protection and assigns a serial number (S/N) to the digital transducers. The operator cannot change either the method of protection or the serial number of the transducer. The digital pressure and temperature transducers are commissioned to work in the Micro Corrector during the factory configuration.

The operator/user can replace a digital transducer if the software password is known (in the case of metrology software protection) or if the hardware switch is set in Read/Write position.

The operator can change all metrological parameters from the default factory configuration if the hardware switch is set in the Read/Write position. The operator must follow the procedures described below to replace the digital transducers. If the hardware switch is set in Read-only position, the operation/user cannot change any design parameters. A metrological seal protects access to the switch and to the terminals.

#### 13.5.2 Replacing the digital transducer – Alarms

After connecting a new digital transducer, a solid bell icon appears on the Micro Corrector LCD display. The solid bell icon indicates that the firmware has noticed a digital transducer with an unknown serial number and an alarm is set.



#### Solid bell icon on display after a new digital transducer is connected to Micro Corrector

During the configuration process, under the "Alarm Setting" tab, the operator can select checkboxes for alarm indicators to be shown on the display in addition to the bell icon.



Select alarm indication on the LCD display for connection of Digital Temperature Sensor, Line and/or DP Pressure Transducers If a new transducer is connected, then the following indication is shown on the LCD display:

- T Sn AL for digital temperature sensor
- **P Sn AL** for digital line-pressure transducer
- **DP Sn AL** for digital DP transducer

An example of the display indication for the line pressure transducer:



Alarm indication on LCD when a new line pressure transducer is connected to the IMCW2

During the configuration process, under the "Alarm Setting" tab, the operator can select checkboxes so that the fault/alarm will generate output pulses for this alarm for setup information:

Alarm Settings		×
Limits High Pressure Low Pressure High Temperature Low Temperature High Flow Rate Low Flow Rate	4.5     bar A       0.5     bar A       70     °C       -50     °C       106.2     m²/h       -21.2     m²/h	Display Pressure Alarm On LCD Temperature Alarm On LCD Flow Rate Alarm On LCD Daily Consumption Alarm on LCD Input alarm on LCD Meter DP Alarm on LCD Monitor Pressure Alarms on LCD Digital Temp SN Digital Press SN Digital DP/Mon SN
		Output Pulses         Output Pulses for Pressure Alarm         Output Pulses for Temperature Alarm         Output Pulses for Flow Rate Alarm         Output Pulses for Daily Consumption Alarm         Output Pulses for Input Alarm         Output Pulses for Meter DP Alarm         Output Pulses for Monitor Pressure Alarms         V       Digital Temp SN         V       Digital DP/Mon SN

Select Fault/Alarm output pulses when a new Digital Temperature Sensor, Line or DP Pressure Transducers are added

#### 13.5.3 Replacing a digital transducer - Logging

When the Micro Corrector detects a digital transducer with an unknown serial number, it triggers an alarm. This event is logged with a time/date stamp in the Micro Corrector Audit Log:

				Alarm		
2	21	17/02/2022	11:02:08 AM	Register	32	96 (Digital Temp SN Digital Press SN )

#### Example of an Audit Log entry when a new digital line-pressure transducer is connected to the IMCW2.

The Audit Log can be downloaded from a Micro Corrector by using the Micro Corrector User Terminal (MCUT). The operator should always commission a new digital transducer to work with the Micro Corrector. Only after commissioning, can the operator ensure proper functioning of the measurement system. However, the metrology is also continued under the following situations:

- A transducer with the same type and range replaces the existing transducer (in special circumstances)
- Unrecognized serial numbers send an alarm, but there is no actual fault in the system.

#### 13.5.4 Commissioning a new digital transducer

The Micro Corrector sends the following messages after MCUT downloads data from the device. This message depends on the method of protection and the position of the switch. The operator should commission the transducer to work in the IMCW2.



Message in MCUT when a new temperature sensor is connected to the IMCW2

with either software password protection or metrological protection switch set in Read/Write position



Message in MCUT when a <u>new pressure sensor</u> is connected to the IMCW2

with either software password protection or metrological protection switch set in Read/Write position

In the case of the hardware switch being in Read-only position, the operator must change the switch position to Read/Write and again communicate with the Micro Corrector. Then the following message appears on the screen:



Message in MCUT when a <u>new temperature or pressure sensor</u> is connected to the IMCW2

#### with the metrological protection switch set in Read Only position

The operator should follow this process to commission a new digital transducer:

- Press the "Upload" button on the Configuration screen.
- Enter the password if the metrology is protected by a software password.
- Execute the commissioning of the transducer if metrology is protected by the hardware switch position.
- Ensure the solid bell icon is removed from the Micro Corrector display.

The operator should check the System tab if new transducer serial number is commissioned to work with Micro Corrector. The section "Internal Hardware" shows serial numbers of commissioned digital transducers:

- Temperature (Commissioned Temp SN)
- Line pressure (Commissioned Pressure SN)
- DP or Monitor Pressure (Commissioned Monitor/DP SN)

These serial numbers <u>must</u> match serial numbers of digital transducers connected to the Micro Corrector. Pressure transducers serial numbers are shown in the section "Digital Ports". If the serial numbers do not match, then the commissioning process must be repeated.



System Tab showing replaced and commissioned Pressure Transducers and Temperature Sensor

#### 13.5.5 Commissioning a new digital transducer – Logging

The replacement of a digital transducer, after commissioning, is recorded in the Audit Log with a Time/Date stamp.

The following information is included in the log:

- Serial number of original digital transducer
- Serial number of new digital transducer
- Original digital transducer ranges and type
- New digital transducer ranges and type

Audit Log					
Unit Serial Number	01/22/000004				
Meter/Site ID	0				
Meter Type	Series B Metric	:			
Meter Size	3M				
Number of Logs					
Stored	4				
			Parameter		
Log Number	Date	Time	changed	Old value	New value
1	17/02/2022	12:43:21 PM	Pressure SN	620190108	520127786
			Line Pressure		
2	17/02/2022	12:43:21 PM	Range	<u> </u>	<b>12</b>
			Line Pressure		$\smile$
3	17/02/2022	12:43:21 PM	Туре	Absolute	Gauge
4	17/02/2022	12:43:21 PM	Temperature SN	122000002	222000002

Audit Log with record of changing temperature sensor and line pressure transducers after commissioning

- The Audit log shows that a 3-bar absolute transducer was replaced by a 12-bar gauge transducer.
- The newly commissioned serial numbers are also shown on the "Live Data" screen in the "Internal Hardware" section.
- The operator should ensure there are no faults and alarms indicated in "green" and "0" as shown below.

#### Live Data screen with fully commissioned Pressure Transducers and Temperature Sensor

The commissioning of a new digital pressure transducer ensures correct alarm settings. Under the Alarm Settings tab, the operator must change the transducer type and set the low and high-pressure alarms limits.

Alarm Settings		×
Limits High Pressure Low Pressure High Temperature Low Temperature	18 bar G -0.5 bar G 70 °C -50 °C	Display Pressure Alarm On LCD Temperature Alarm On LCD Flow Rate Alarm On LCD Daily Consumption Alarm on LCD Input alarm on LCD Meter DP Alarm on LCD
High Flow Rate	106.2 m³/h  -21.2 m³/h	<ul> <li>Monitor Pressure Alarms on LCD</li> <li>Digital Temp SN</li> <li>Digital Press SN</li> <li>Digital DP/Mon SN</li> </ul>
		Output Pulses Output Pulses for Pressure Alarm Output Pulses for Temperature Alarm Output Pulses for Flow Rate Alarm Output Pulses for Daily Consumption Alarm Output Pulses for Input Alarm Output Pulses for Meter DP Alarm Output Pulses for Meter DP Alarm Output Pulses for Monitor Pressure Alarms Digital Temp SN Digital Press SN Digital DP/Mon SN
		<u>Cancel</u> <u>D</u> K

Live Data screen after the replaced Pressure Transducers and Temperature Sensor are commissioned

When connecting a different type of line-pressure transducer (Absolute or Gauge pressure), the operator should verify the correction parameters on the "Corrections Configuration" screen.

Dresser Measurement	: IMCW2 User	Terminal	Software	Manual
---------------------	--------------	----------	----------	--------

Corrections Configuration	
Units C °F 🔍 °C	• Live Measurement C Fixed
Base Temperature 15 °C	Fixed Temperature C
Pressure Units	• Live Measurement C Fixed (T Only)
O PSI O bar O kPa O kgf/cm² Base Pressure 1.01325 bar	Fixed Line Pressure bar
Atmospheric Pressure bar	Fixed Pressure Factor
Supercompressibility Live Measurement C Fixed	Supercompressibility (Fpv²)
Compressibility - Natural Gas Method of Calculation	Heating Value
Detailed Method	Specific Gravity CO2 %mol
Gas composition	N2 %mol
	H2 %mol
	<u>Cancel</u> <u>D</u> K

Correction Configurations screen with an absolute pressure transducer

## 13.5.6 Corrector functionality if a new digital transducer is <u>NOT</u> commissioned to work with the corrector

After a new digital transducer is connected to the corrector, a solid bell icon appears on the display and a S/N Alarm description is displayed (if configured). This icon and description will remain on the display until the transducer is commissioned to work in the corrector.

Connecting the MCUT and communicating with the Micro Corrector activates messages for the operator to commission the new transducer. If the operator fails to commission the new transducers, warnings appear in multiple tabs.

Serial Number (S/N) alarms are displayed on the "Live Data" screen (in RED) in the "Present and Occurred Alarms" section if new temperature and pressure sensors are connected, but not commissioned yet:

- Digital Temperature Transducer Serial Number (Digital Temp SN)
- Digital Line Pressure Transducer Serial Number (Digital Press SN)
- Digital DP/Monitor Pressure Transducer Serial (Digital DP/Mon SN)

Note: The temperature and line-pressure is measured by the newly connected transducers (section "Correction Used").



#### Live Data screen with Serial Number alarms after replacement of Pressure Transducers and Temperature Sensor

If the line-pressure transducer is not commissioned to work in the system, various faults and alarms will be displayed e.g., pressure fault, pressure alarm, table limit fault.

- The "System" tab presents the current status of the Micro Corrector.
- The "Digital Ports" section shows the serial numbers of the Line pressure and DP/Monitor pressure transducers that are connected to the corrector. This section also includes information regarding the firmware version, the range, and the type of transducers.
- The "Temperature" section shows the serial number of the temperature sensor that is connected and currently

measuring temperature.

- The "Internal Hardware" section displays the following information regarding the temperature sensor and pressure transducers:
  - Temperature, Line Pressure and DP/Monitor Pressure transducer type (analog or digital)
  - Commissioned Temperature sensor serial number
  - Commissioned Line-Pressure transducer serial number
  - Commissioned DP/Monitor Pressure transducer serial number
  - Commissioned Line Pressure transducer range
  - Commissioned DP/Monitor Pressure transducer range



#### System Tab shown when new sensors are connected but not commissioned to the IMCW2

Note: If a new digital transducer is <u>NOT</u> commissioned to work in the Micro Corrector and, the serial number of the connected transducers does not match the serial number of those commissioned, the original transducer serial number is shown.

The following shows the "System" tab for the Micro Corrector in this situation:

- Commissioned (original) line pressure transducer serial number 620190108
- Commissioned (original) line pressure transducer range 3 bar
- Commissioned (original) temperature transducer serial number 122000002
- New line pressure transducer serial number 520127786
- New line pressure transducer range 12 bar
- New temperature transducer serial number 222000002



System Tab shown when new sensors are connected but not commissioned



Pressure transducer alarm ranges and units are set for the original transducer - various faults and alarms need to be set (e.g., pressure fault, pressure alarm, table limit fault) using the Alarm Setting screen

## **14 Battery Replacement**

The Type of battery pack installed in IMCW2 is configured during factory configuration. The IMCW2 can be powered by either an alkaline or lithium battery pack. Proper procedure for replacement of the battery pack is described in the **Dresser Measurement IMCW2 Hardware Manual**. The battery pack should be replaced when either "LOW BATTERY" or "END OF BATTERY LIFE" faults are displayed. The additional function of calculating the "Remaining battery life" is available beginning with firmware version 3.00 and MCUT version 5.0.0.0. The battery packs and their features are as follows:

#### Alkaline battery pack.

The firmware calculates the battery life based on the battery voltage.

#### Lithium battery pack.

The firmware calculates the battery life based on the date of battery pack installation. When the new battery pack is installed, then the operator must follow the process described in Section 13.3. This process enables the firmware to reset a new date for the remaining battery life.

Usually, a replacement battery pack is this same type as configured during factory configuration, however the user can elect to change of the type of battery pack.

## **14.1 Installed battery pack information**

The MCUT screen displays information on the type of battery pack installed in the corrector. To access the MCUT screen, follow these instructions:

Under *Configuration* tab, select *Battery Type* to open the Battery type window.

Wetcone       Configuration       Live Data       Faults & Alarms       Advanced       Logging       System         Volume Configuration       Meter Size       3M         Meter Size       3M       Image: System         Meter Size       3M         RevVInit Volume       1412.590 rev/m²         Meter Size       3M         RevVInit Volume       1412.590 rev/m²         Meter Size       3M         RevVInit Volume       0 m²         Uncorrected Volume       1 m²         Uncorrected Nultiplier       x1         Uncorrected Pulse Output       1 m²         Uncorrected Pulse Output       1 m²         Uncorrected Pulse Output       1 m²         Pulse Output 1       Uncorrected         Pulse Output 3       Fault         Fault Output Polarity       Normally OFF         Corrections Configuration       Image: Set Date & Image: Set Date & Image: Set Date & Image: Set Date & Image: Set Onfiguration File <th>資 MCUT 5.0</th> <th>0.0</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>_</th> <th></th> <th>×</th>	資 MCUT 5.0	0.0								_		×
Volume Configuration         Meter Type       Series B Metric         Meter Size       3M         Rev/Unit Volume       1412.590 rev/m²         Meter/Size ID       0         Flow Sense       Forward - Reverse         Corrected Volume       0 m²         Uncorrected Nulliplier       x1         Uncorrected Nulliplier       x1         Uncorrected No. digits       8         Enable U / C on LCD       N/A         Corrected Pulse Output       1 m²         Pulse Output 1       Uncorrected Pulse Output         Pulse Output 2       Corrected         Pulse Output 3       Fault         Pulse Output 4       Uncorrected Pulse Output 5         Pulse Output 3       Fault         Pulse Output 4       Uncorrected Pulse         Pulse Output 3       Fault         Fault Output Mode       Single Latched Pulse         Paule Output 4       Corrections         Imperature Units       °C         Base Temperature       15.6         Temperature Units       °C         Pressure Units       °C         Pressure Units       °C         Pressure Units       °C         Pressure Units       °	Welcone	Configuration	alibration	Live Data	Faults	& Alarms	Advanced	Loggin	g System			
Meter Type       Series B Metric         Meter Size       3M         Rev/Unit Volume       1412:590 rev/m²         Meter/Site ID       0         Flow Sense       Forward - Reverse         Corrected Volume       0 m²         Uncorrected Multiplier       x1         Uncorrected Pulse Output       1 m²         Pulse Vidth       187 ms         Pulse Output 1       Uncorrected         Pulse Output 2       Corrected Pulse         Pulse Output 3       Fault         Fault Output Mode       Single Latched Pulse         Fault Output Mode       Single Latched Pulse         Fault Output Mode       Live Measurement         Fixed Temperature       15.6         Temperature Inits       °C         Base Temperature       N/A         Fixed Temperature       N/A         Pressure Units       PSI         <	Volume Conf	iguration		^	_							
Meter Size       3M         Rev/Unit Volume       1412.590 rev/m²         Meter/Site ID       0         Flow Sense       Forward - Reverse         Corrected Volume       0 m²         Uncorrected Volume       0 m²         Uncorrected Multiplier       x1         Corrected Multiplier       x1         Corrected Multiplier       x1         Corrected No. digits       8         Uncorrected No. digits       8         Uncorrected Pulse Output       1 m²         Uncorrected Pulse Output       1 m²         Uncorrected Pulse Output       1 m²         Pulse Output 1       Uncorrected         Pulse Output 1       Uncorrected         Pulse Output 1       Uncorrected         Pulse Output 3       Fault         Fault Output Mode       Single Latched Pulse         Pulse Output 3       Fault         Fault Output Mode       Single Latched Pulse         Temperature Units       "C         Base Temperature       15.6         Temperature Units       "C         Pressure Units       PSI         Pressure Units       PSI	Meter Type		Series B Metric									
Rev/Unit Volume       1412.590 rev/m²         Meter/Site ID       0         Row Sense       Forward - Reverse         Corrected Volume       0 m²         Corrected Volume       0 m²         Corrected Multiplier       x1         Uncorrected Multiplier       x1         Uncorrected No. digits       8         Uncorrected No. digits       8         Uncorrected No. digits       8         Uncorrected Pulse Output       1 m²         Uncorrected Pulse Output 1       10 m²         Pulse Output 1       Uncorrected         Pulse Output 3       Fault         Fault Output Polarity       Normally OFF         Corrections Configuration       Customer         Temperature       N/A         Pises Temperature       N/A         Pressure Units       YA         Pressure Units       PSI	Meter Size		ЗМ						1255			
Meter/Site ID       0         Flow Sense       Forward - Reverse         Corrected Volume       0 m <sup>2</sup> Uncorrected Volume       0 m <sup>2</sup> Corrected Multiplier       x1         Uncorrected Multiplier       x1         Corrected Multiplier       x1         Corrected Multiplier       x1         Corrected Multiplier       x1         Corrected No. digits       8         Enable U / C on LCD       N/A         Corrected Pulse Output       1 m <sup>2</sup> Uncorrected Pulse Output       1 m <sup>2</sup> Pulse Output 1       Uncorrected         Pulse Output 2       Corrected         Pulse Output 3       Fault         Fault Output Mode       Single Latched Pulse         Fault Output Mode       Single Latched Pulse         Fault Output Mode       Live Meassurement         Fixed Temperature       N/A         Pressure Units	Rev/Unit V	olume	1412.590 rev/m					NATUR	RAL GAS S	OLUT	IONS	
Flow Sense       Forward - Reverse         Corrected Volume       0 m²         Uncorrected Volume       0 m²         Corrected Multiplier       x1         Uncorrected Multiplier       x1         Corrected No. digits       8         Uncorrected No. digits       8         Enable U / C on LCD       N/A         Corrected Pulse Output       1 m²         Uncorrected Pulse Output       1 m²         Use Output 1       Uncorrected         Pulse Output 2       Corrected         Pulse Output A       Fault Output Polarity         Normally OFF       Corrections Configuration File         Corrections Configuration       Set Date & Imperature         Temperature Units       °C         Base Temperature       15.6         Temperature Mode       Live Measurement         Fixed Temperature       N/A <t< td=""><td>Meter/Site</td><td>ID</td><td>0</td><th></th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Meter/Site	ID	0									
Corrected Volume       0 m²         Uncorrected Volume       0 m²         Corrected Multiplier       x1         Uncorrected Multiplier       x1         Corrected No. digits       8         Uncorrected No. digits       8         Uncorrected Polse Output       1 m²         Corrected Pulse Output       1 m²         Corrected Pulse Output       1 m²         Uncorrected Pulse Output       1 m²         Pulse Width       187 ms         Pulse Output 1       Uncorrected         Pulse Output 2       Corrected         Pulse Output 3       Fault         Fault Output Polarity       Normally OFF         Corrections Configuration       Customer         Ease Temperature       15.6         Temperature Mode       Live Measurement         Fixed Temperature       N/A         Pressure Units       °C         Pressure Units       °C         Pressure Units       PSI <td>Flow Sense</td> <td></td> <td>Forward - Rever:</td> <th>se</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Flow Sense		Forward - Rever:	se								
Uncorrected Volume       0 m²         Corrected Multiplier       x1         Uncorrected Multiplier       x1         Corrected No. digits       8         Uncorrected No. digits       8         Enable U / C on LCD       N/A         Corrected Pulse Output       1 m²         Pulse Output 1       Uncorrected         Pulse Output 2       Corrected         Pulse Output 3       Fault         Fault Output Mode       Single Latched Pulse         Pulse Output 2       Corrected         Corrections Configuration       Image: Save Configuration File         Temperature Units       "C         Temperature Mode       Live Measurement         Fixed Temperature       N/A         Pressure Units       PSI	Corrected V	/olume	0 m <sup>3</sup>					í				
Corrected Multiplier       x1         Uncorrected Multiplier       x1         Corrected No. digits       8         Uncorrected No. digits       8         Enable U / C on LCD       N/A         Corrected Pulse Output       1 m³         Uncorrected Pulse Output       1 m³         Pulse Width       187 ms         Pulse Output 1       Uncorrected         Pulse Output 2       Corrected         Pulse Output 3       Fault         Fault Output Mode       Single Latched Pulse         Fault Output Mode       Single Latched Pulse         Fault Output Mode       Single Latched Pulse         Fault Output Mode       'C         Base Temperature       15.6         Temperature Units       'C         Fixed Temperature       N/A         Pressure Units       PSI         V/A       Pressure Units	Uncorrecte	d Volume	0 m <sup>2</sup>			⊻ok	ume		Connect with M	IC		
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Corrected No. digits       8         Uncorrected No. digits       8         Enable U / C on LCD       N/A         Corrected Pulse Output       1 m²         Uncorrected Pulse Output       1 m²         Pulse Output 1       Uncorrected         Pulse Output 1       Uncorrected         Pulse Output 2       Corrected         Pulse Output 3       Fault         Fault Output Mode       Single Latched Pulse         Fault Output Polarity       Normally OFF         Corrections Configuration       Customize ICD         Temperature Units       *C         Base Temperature       15.6         Temperature Mode       Live Measurement         Fixed Temperature       N/A         Pressure Units       PSI	Uncorrecte	d Multiplier	×1			Corro	ations		Linkand to MC			
Uncorrected No. digits       8         Enable U / C on LCD       N/A         Corrected Pulse Output       1 m²         Uncorrected Pulse Output       1 m²         Uncorrected Pulse Output       1 m²         Pulse Vidth       187 ms         Pulse Output 1       Uncorrected         Pulse Output 2       Corrected         Pulse Output 3       Fault         Fault Output Mode       Single Latched Pulse         Fault Output Mode       Single Latched Pulse         Fault Output Polarity       Normally OFF         Corrections Configuration       Customize ICD         Temperature Mode       Live Measurement         Fixed Temperature       N/A         Pressure Units       PSI	Corrected N	lo. digits	8				cuons		Opload to MC	<i>,</i>		
Enable U / C on LCD       N/A         Corrected Pulse Output       1 m³         Uncorrected Pulse Output       1 m³         Pulse Output 1       Uncorrected         Pulse Output 1       Uncorrected         Pulse Output 2       Corrected         Pulse Output 3       Fault         Fault Output Mode       Single Latched Pulse         Corrections Configuration       Customize LCD         Temperature Units       "C         Base Temperature       15.6         Temperature Mode       Live Measurement         Fixed Temperature       N/A         Pressure Units       PSI	Uncorrecte	d No. digits	8		1				e Modem To Cr	nnect		
Corrected Pulse Output       1 m²         Uncorrected Pulse Output       1 m²         Pulse Width       187 ms         Pulse Output 1       Uncorrected         Pulse Output 2       Corrected         Pulse Output 3       Fault         Fault Output Mode       Single Latched Pulse         Fault Output Mode       Single Latched Pulse         Fault Output Polarity       Normally OFF         Corrections Configuration	Enable U /	C on LCD	N/A			Set Date	e& <u>T</u> ime	L 0°	ie modelii ro ee	111660		
Uncorrected Pulse Output       1 m²         Pulse Width       187 ms         Pulse Output 1       Uncorrected         Pulse Output 2       Corrected         Pulse Output 3       Fault         Fault Output Mode       Single Latched Pulse         Fault Output Mode       Single Latched Pulse         Fault Output Polarity       Normally OFF         Corrections Configuration	Corrected F	ulse Output	1 m²		_							
Pulse Width       187 ms         Pulse Dutput 1       Uncorrected         Pulse Dutput 2       Corrected         Pulse Dutput 3       Fault         Fault Output Mode       Single Latched Pulse         Fault Output Mode       Single Latched Pulse         Fault Output Polarity       Normally OFF         Corrections Configuration	Uncorrecte	d Pulse Output	1 m²			Custom	ing LCD		Pattern Tura			
Pulse Dutput 1       Uncorrected         Pulse Dutput 2       Corrected         Pulse Dutput 3       Fault         Fault Output Mode       Single Latched Pulse         Fault Output Mode       Single Latched Pulse         Fault Output Polarity       Normally OFF         Corrections Configuration	Pulse Width	า	187 ms			Custom			battery Type			
Pulse Dutput 2       Corrected         Pulse Dutput 3       Fault         Pulse Dutput 3       Fault         Fault Output Mode       Single Latched Pulse         Fault Output Polarity       Normally OFF         Corrections Configuration	Pulse Outp	ut 1	Uncorrected									
Pulse Dutput 3       Fault         Fault Output Mode       Single Latched Pulse         Fault Output Polarity       Normally OFF         Corrections Configuration	Pulse Outp	ut 2	Corrected			MC Comm	ns Settings	ι	JT Comms Settj	ngs		
Fault Output Mode       Single Latched Pulse         Fault Output Polarity       Normally OFF         Corrections Configuration	Pulse Outp	ut 3	Fault		_		-			-		
Fault Output Polarity     Normally OFF       Corrections Configuration     Image: Configuration File       Temperature Units     *C       Base Temperature     15.6       Temperature Mode     Live Measurement       Fixed Temperature     N/A       Pressure Units     PSI	Fault Outpu	it Mode	Single Latched F	Pulse						_		
Corrections Configuration       Temperature Units       °C         Base Temperature       15.6         Temperature Mode       Live Measurement         Fixed Temperature       N/A         Pressure Units       PSI	Fault Outpu	it Polarity	Normally OFF			<u>O</u> pen Confi	guration File	<u>S</u> a	ive Configuratio	n File		
Temperature Units     *C       Base Temperature     15.6       Temperature Mode     Live Measurement       Fixed Temperature     N/A       Pressure Units     PSI	Corrections 0	Configuration			_							
Base Temperature     15.6       Temperature Mode     Live Measurement       Fixed Temperature     N/A       Pressure Units     PSI	Temperatur	e Units	°C					Custome	a			
Temperature Mode     Live Measurement     Report Heading       Fixed Temperature     N/A     Image: Control of the second s	Base Temp	erature	15.6		Rep	ort						
Fixed Temperature     N/A       Pressure Units     PSI	Temperatur	e Mode	Live Measureme	nt	Re	port Heading						
Pressure Units PSI V	Fixed Temp	erature	N/A								_	
	Pressure Ur	nits	PSI	~								
Include Data Snapshot In Report						Include Data	Snapshot In Rep	port	Create <u>R</u> e	port		

Selecting *Battery Type* displays information on which battery pack type is installed in the corrector. Battery type configuration is done during the factory manufacturing process, but it can be changed by the user during battery pack replacement if required.

## 14.2 IMCW2 configured with Alkaline Battery Pack

If the IMCW2 is configured with an Alkaline Battery Pack, then the following window appears:

B	Battery type ×
	Battery Selection
	Alkaline
	C Lithium
	Lithium Battery Details
	Battery Warning Date 03-24-2031
	Battery End Life Date 03-24-2033
	New Lithium battery is installed
	Cancel OK

**Battery Type Screen** 



## 14.3 IMCW2 configured with Lithium Battery Pack

If the IMCW2 is configured with a Lithium Battery Pack, the following window appears:

Battery type ×
Battery Selection
C Alkaline
<ul> <li>Lithium</li> </ul>
Lithium Battery Details
Battery Warning Date 03-03-2031
Battery End Life Date 03-03-2033
New Lithium battery is installed
Cancel OK

#### Lithium Battery Pack Screen

If Lithium battery pack is installed, the following details are displayed:

- Battery Warning Date: Date when "Low Battery" warning will be set
- Battery End Life Date: Date when "End of Battery Life" warning will be set

#### Resetting lithium battery pack life after battery pack replacement

There are two options to reset the remaining lithium battery pack life:

- Using MCUT Software
- Using the Scroll Button

Instructions on using the Scroll button to reset battery life are also contained in the *Dresser Measurement IMCW2 Hardware Manual.* 

#### **Option 1** - Procedure to reset remaining battery life using MCUT when a new lithium pack is installed:

- After the lithium battery pack has been replaced, connect the MCUT to set the new battery installation date.
- Under *Configuration* tab, select *Battery Type*.
- Press New Lithium Battery is installed button and select Yes to confirm that the battery is changed.



**Battery Change Confirmation Screen** 

• A dialog box will be displayed stating *Battery New Dates Send Successful*. Select OK.



**Battery Date Change Screen** 

#### Option 2 - New Lithium Battery installation – procedure to reset remaining battery life with Scroll Button

Requirement: Indication of "Battery Voltage" must be selected on display.

Condition for replacement: "Low voltage threshold" or "Critical voltage threshold" was reached.

Low voltage threshold or critical voltage threshold are reached if:

- Lithium battery to be replaced has been installed for at least 10 years.
- Battery voltage is below 5.45 [V] constantly for at least 24 hours.
- Battery voltage is below 5 [V].

All these conditions will cause two icons (battery and bell) to show on the corrector display, as follows:



#### Low Battery fault on display

"Low Battery Fault" is shown on the "Live Data" screen in MCUT, and "Low Battery Fault" is recorded in the Audit Log.

As battery voltage is drops further, eventually a message prompting battery replacement will appear on the display:



Message prompting user to immediately replace battery pack

**Note:** If the battery pack is disconnected and the corrector is powered from the super-cap, voltage constantly drops. Voltage will eventually drop below 5 [V] and two icons will start to blink on the display. When the corrector reaches "Critical voltage threshold", follow the process below for battery replacement.

Process:

- Replace lithium battery pack
- Scroll on the display to "Battery Voltage"
- Check to determine if the battery voltage is above 5.55 Volts
- Hold the scroll button down for 10 seconds
- The following indication will appear on the display



Message indicating that remaining battery life was updated after battery pack replacement

The display now indicates that remaining battery life was successfully updated after lithium battery pack replacement. The "Low Battery" fault is automatically cleared from both the display and Live Data screen and is logged in the Audit Log – see below.

#### Audit Log Table

Audit Log					
Unit Serial Number	21/47/483647				
Meter/Site ID	0				
Meter Type	Series B Metric				
Meter Size	3M				
Number of Logs Stored	2				
Log Number	Date	Time	Parameter changed	Old value	New value
1	06/05/2021	1:35:00 PM	Fault Register	Unknown	128 (Low Battery Occurred)
2	06/05/2021	1:37:58 PM	Fault Register	128	0 (Fault Register Cleared)

#### Note:

- **1.** If the new lithium battery pack installation date is not reset, then the corrector performance and functionality remain unchanged. The warning dates for "Remaining Battery Life" will relate to the old lithium battery pack.
- **2.** For the alkaline battery pack, the installation date is not set because the "Remaining Battery Life" calculation is based on the battery voltage.
- **3.** Password (US version) or changing the metrological seal to "Read/Write" position (Canadian version) is not required to reset lithium battery installation date.

## **15** Meter Health Diagnostics

Rotary gas meter health diagnostics is provided for meters equipped with an IMCW2 that is fitted with a differential pressure (DP) transducer. The diagnostic is based on the differential pressure value measured between inlet and outlet differential pressure test connections that are installed in the rotary gas meter as cited in ANSI B109.3 Appendix A.

Two independent methods are available to diagnose health of the gas meter:

- Daily DP Logging
- Evaluation of gas meter health against learned DP base line (mathematical model)

In general, the value of differential pressure depends on:

- Gas meter type/size,
- Flow rate of gas,
- Line pressure,
- Gas composition,
- Temperature

This is the reason that the health diagnostic of gas meter must involve DP measurement accompanied with measurement of other parameters.

### **15.1 DP Daily Logging**

State Public Utility Commissions (PUC's) regulate the monitoring and reporting of differential pressure test results. The IMCW2 gathers DP related parameters in a designated log that is accessible from the "Logging" tab after the "Download DP Log" button is selected:

MCUT 5.1.0.3		- 🗆 🗙
Welcome   Configuration   Calibration   Live	e Data   Faults & Alarms   Advanced	Logging System
		DRESSER. UTILITY SOLUTIONS
	Download Data Log	
	Download Audit Log	
	Download DP Log	
	Logging <u>S</u> etup	

Logging screen

The following screen appears with the information regarding number of acquired and available logs:

Download DP Log	×
No. DP Test Logs	Acquired Available 5 5
<u>R</u> efresh Data	Download DP Log
<u>V</u> iew Last Log	[]

Download DP Log screen

The downloaded log is visible when the "View last downloaded file" button is selected.

The following parameters are recorded:

- Average DP value from valid samples
- Average flow rate corresponding to DP samples
- Average line pressure
- Average line temperature

• Date/Time

Example of a daily DP Log:

Number of Logs Stored	5					
Log Number	Date	Time	Avg DP Value	Avg Flow Rate	Avg Line Pressure	Avg Line Temperature
			inWC	ft³/h	PSI	°F
Reference DP Logs						
1	5/5/2022	2:44:13 PM	0.677	1048	33.967	73.1
2	5/6/2022	9:29:43 AM	0.996	1048	34.672	72.53
3	5/7/2022	9:29:43 AM	0.998	1494	34.646	73.26
4	5/8/2022	9:29:43 AM	0.997	1492	34.604	72.78
5	5/9/2022	9:29:43 AM	0.997	1494	34.639	73.29

The IMCW2 display shows values from the latest daily log if this option is selected. Five values are shown twice on display, each for 6 seconds. Chevrons blink to notify the user that DP test results are available. Refer to the *Dresser Measurement IMCW2 Hardware Manual* for further information.

The IMCW2 measures DP values every 30 seconds and gathers samples of valid differential pressure values in four flow bands:

- Minimum flow rate for DP logging 40 %
- 40-60 %
- 60 80 %
- 80 100 % of maximum flow for gas meter (meter Qmax)

The "Daily DP logging" section on the Live Data screen allows the user to view the diagnostics of the DP Logging functionality. There is information regarding current day status of the DP data gathered. The number of valid samples in each flow range is presented, as is the number of rejected samples because of "Low flow" or "Unstable flow".

🗑 MCUT 5.1.0.3			- 🗆	$\times$
Welcome   Configuration   Calibra	tion Live Data Faults &	Alarms Advanced L	ogging   System	
Update Values       05/10/2022, 10:4         Internal Hardware       01/22/000004         Meter/Site ID       0         Firmware Revision       0d33         PCB Revision       22         Battery Voltage       6.06V         Battery remaining Life       143 months         Temperature       Digital SN 122000002	A5:40 AM Present Faults Line Pressure Fault DP Transducer Fault Temperature Fault Volume (Wiegand) Fault Unternal Operations Fault Low Battery OVerspeed Weter DP Fault Meter DP Zero Fault U	High Pressure       0         Low Pressure       0         High Temperature       0         Low Temperature       0         High Flow Rate       0         Low Flow Rate       0         D aily Consumption       0         Digital input       0         Meter DP Alarm       0	DRESSER UTILITY SOLUT Differential Pressure Res Avg DP value Avg Flow Rate Avg Flow Rate Avg Line Pressure Avg Temperature Date of Occurrence	sults 1.003 inW( 2482 ftº/h 2.396 bar 71.1 °F 05/10/202 9:29:43 At 005 inWC
Line Pressure Digital SN 620190112 DP Digital SN 520185150	Digital Port 1 0	Digital Temp SN 0 Digital Press SN 0 Digital DP/Mon SN 0	Method Learn Method Status Learnin Completion	method 2 ng eted
Volumes         Corrected Volume       413577 ft <sup>9</sup> Uncorrected Volume       179846 ft <sup>9</sup> Corrected Residual       0.99 ft <sup>9</sup> Uncorrected Residual       0.77 ft <sup>9</sup> Uncorrected Flow Rate       2480 ft <sup>9</sup> /h         Uncorrected Under Fault       0 ft <sup>9</sup> Corrections Used       71.5 *F         Line Pressure       2.39665 bar         Supercompressibility (Fpv <sup>2</sup> )       1.0000	Digital Sensor CRC Fault Occurred Faults Line Pressure Fault DP Transducer Fault Temperature Fault Volume (Wiegand) Fault Internal Operations Fault Low Battery Overspeed Meter DP Fault Meter Lockup Meter DP Zero Fault Table Limit Fault Digital Port 1	Doccurred Alarms High Pressure 0 Low Pressure 0 High Temperature 0 Low Temperature 0 Low Temperature 0 High Flow Rate 0 Low Flow Rate 0 Daily Consumption Digital input Meter DP Alarm	Comple Daily DP Logging Valid samples First flow band Second flow band Third flow band Forth flow band Total rejected Low flow Unstable flow	0 0 0 60 0
Correction Factor 2.31319	Digital Port 2 0 Digital Sensor CRC Fault 0	Digital Temp SN 0 Digital Press SN 0 Digital DP/Mon SN 0		

Live Data screen showing Daily DP Logging section.

Samples are gathered for a 24-hour period starting each day at 9 AM (contract start time). The default value for "DP log Sample Size" is 60.

The differential pressure sample is valid if the following conditions are met:

- Corresponding flow rate was higher than "Minimum flow" rate for DP diagnostics
- Flow rate was stable i.e., flow change was not greater than "Flow Stability Limit"
- Flowing gas conditions were within DP minimum and maximum temperature range

If a valid DP sample is registered, then corresponding values of Flow Rate, Line Pressure and Temperature are also gathered. If in any flow band, the number of samples reaches "DP log sample Size," then the average values of DP, flow, pressure, and temperature are calculated.

The size of the Daily DP log is 50 entrees. The first 25 values obtained during the learning period are <u>never</u> overwritten – these are considered the baseline differential for that meter. The next 25 values are overwritten by newer logs. The users can compare the most recent DP daily logs with the 25 DP daily logs acquired as the baseline.

If the IMCW2 is removed from one meter and installed on different gas meter, it is advisable to restart the Daily DP Logging function for the new meter, which can be done by pressing "Restart DP Logging" on the "Meter Diagnostics setup and values" screen.

## **15.2 Meter Health Diagnostics**

#### 15.2.1 Introduction

Gas meter health is evaluated based on DP value measured over gas meter inlet and outlet. The diagnostic is performed by comparison of measured DP values with theoretical DP value for these conditions, i.e., DP base line. The theoretical value is based on the mathematical model experimentally built.

The mathematical model must include effect of:

- Gas meter type/size,
- Flow rate of gas,
- Line pressure,
- Gas composition,
- Temperature

There are two mathematical models used in IMCW2 that calculate the value of DP in function of mentioned above parameters:

- Dresser Differential Pressure Test Acceptance Calculator (DTAC) Software
- IMCW2 mathematical model with learned coefficient

**Note:** The DP value depends also on gas composition. Mathematical models in the IMCW2 use specific gravity of the flowing gas as gas composition characterization. The value of the specific gravity must be entered in the IMCW2. There are two linked screens provided in the MCUT to enter this value.

- DP Measurement Setup
- Compressibility calculation Gross Methods setup screen.

There are three main indicators of gas meter health, refer to section "Gas Meter Diagnostics - Indicators":

- Meter Alarm;
- Meter Fault;
- Meter Lockup.

#### 15.2.2 Selection of DP baseline for gas meter diagnostics

The DP mathematical model that is used for gas meter diagnostic is selectable from two options:

- Dresser Differential Pressure Test Acceptance Calculator (DTAC) Software
- Baseline DP of the gas meter, learned after IMCW2-dp installation

There are two DP baseline learning methods:

- Learning Method 1
- Learning Method 2

The selection of the method is available on the "Advanced" tab in the "Gas Meter Health" section:

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MCUT 5.1	1.0.3						-		×
Welcome	Configuration	Calibration	Live Data	Faults & Alarms	Advanced	Logging	System	1	
						<b>DRE</b> UTILITY	Y SOLU	TION	s
D	igital Input/Output-			<u>⊥</u> rim Table	Gast	Meter Health DP Transdu	icer Units	1	
	<ul> <li>External Power</li> <li>Digital Input</li> </ul>			Prover Mode		Diagnostic	cs setup		
	C Consumption Ala	rm Output	Т	est Pulse <u>O</u> utputs					
	C Meter Lockup Du	utput		hange Password					
			Chang	ge <u>A</u> dvanced Password					
	Digital Input/Output	Settings							

IMCW2 Advanced Tab

After "Gas Meter Health" button is pressed, then the screen with method selection is shown:

Meter Setup			
Start Meter L	earning P	eriod	
Restart D	P Loggin	9	
C DTAC Software (	Inly		
C Learn method 1			
Eearn method 2			
Specific Gravi	y 0.6		j
Diagnos	tic Range		
DP Fixed Line Pressu	re		
Enable Fixed Line	Pressure	[Gau	ge]
Fixed Line Pressure	60		PSI
Do not select "Enable box if fixed pressure v volume correction is e regulator setup. Other and enter "Fixed Line to pressure regulator s	e Fixed Lir alue used qual to pr wise, sele Pressure setup.	ne Pres I for billi essure ct the I '' value	sure" ng box equal

Meter Diagnostic setup and values screen

If the Dresser DTAC Software is selected for gas meter diagnostics, then the "Starting Meter Learning Period" option is not available. If Learning Method 1 or 2 is selected, then this button is available to start the DP baseline learning.

The Dresser DP calculator (DTAC software) is a released software tool that helps the user qualify results of manual DP testing. The latest revisions to this legacy software have resulted in important changes to the mathematical model. The mathematical model used in the DTAC software is used in the IMCW2. This model requires values of line pressure, flow rate, specific gravity, and meter size/type. Not all Dresser meter types are included in this software.

A rotary gas meter can show different DP values in one installation than in a different installation for this same flow, pressure, temperature, and gas conditions. Therefore, the IMCW2 uses learned parameters for the installed rotary meter based on the mathematical model for gas meter diagnostics. It is preferable if the rotary meter is either new or clean and in good working condition. The learning period is generally initiated just after meter installation into the meter set.

During this learning period, values of DP are gathered as a function of flow rate, line pressure, line temperature, and gas composition. All these parameters are measured by the IMCW2 except for gas composition. The gas composition is determined based on its specific gravity and must be defined by the user.

After the learning period is successfully completed, parameters for the mathematical model of DP are calculated. Learned Base DP line is now defined and can be used for gas meter diagnostics. Baseline DP is stored in non-volatile memory - even if the battery is disconnected and later reconnected, DP baseline is restored. Only if the user chooses to start and successfully complete new learning, will the previous DP baseline be overwritten.



**Note:** If the meter size or type is changed during the learning period, then the new learning must be initiated, and a warning is displayed in MCUT

#### 15.2.3 Fixed line pressure for T-only IMCW2

Certain applications that require temperature only live correction – for example when correction for applied pressure is made in utility billing software by using fixed pressure values from the pressure regulator. In this case, the pressure correction factor in volume corrector is set to 1. The Fixed Factor value for pressure correction does not represent live pressure and cannot be used for gas meter diagnostics. IMCW2 has separate functionality that allows for setting the fixed line pressure for gas meter diagnostics only. This value will not be used for billing purposes. The operator must make the selection "Enable Fixed Line Pressure" in the "DP Fixed Line Pressure" section of the "Meter Diagnostic setup and values" screen.

The actual value of pressure from the pressure regulator should be entered.

## **15.3 Gas meter Health Diagnostics - Indicators**

There are three main indicators of gas meter health:

- Meter Alarm
- Meter Fault
- Meter Lockup

Information regarding gas meter health is available on the Live Data screen and on the IMCW2 display. In addition, fault output pulses are generated.

The Dresser DTAC software is used for meter health diagnostics as follows:

- For full meter health diagnostics (fault, lock-up & alarm) if it is selected on "Meter Diagnostic setup and values"
- For meter DP fault and meter Lockup diagnostics during Method 1 learning.
- For full meter DP diagnostic if Method 1 learning fails.

#### 15.3.1 Meter DP Alarm

Meter DP alarm is set by the corrector if a defined number of DP values measured in sequence have exceeded the meter DP alarm threshold:

🗃 MCUT 5.1.0.3			- 0	×
Welcome Configuration Calibration	ation Live Data Faults &	Alarms Advanced L	ogging System	
Last Snapshot T 05/11/2022 , 023 Internal Hardware Unit Serial Number 01/22/000004 Meter/Site ID 0 Firmware Revision 0d33 PCB Revision 22 Battery Voltage 6.04V Battery remaining Life 143 months Temperature Digital SN 122000002 Line Pressure Digital SN 620190112 DP Digital SN 520185150	ime: 55:28 PM Present Fault DP Transducer Fault OD Transducer Fault OD Transducer Fault OVolume (Wiegand) Fault Internal Operations Fault Low Battery Overspeed Meter DP Fault Meter DP Zero Fault Table Limit Fault Digital Port 1	Present Alarms High Pressure U Low Pressure U Low Temperature U High Temperature U Low Flow Rate U Low Flow Rate U Daily Consumption Digital Input Meter DP Alarm	Differential Pressure Results           Avg DP value         0.996 inWC           Avg DP value         0.996 inWC           Avg Dre value         0.996 inWC           Avg Dre value         0.996 inWC           Avg Dre value         0.996 inWC           Avg Flow Rate         1985 ft²/h           Avg Temperature         73.6 'F           Date of Occurrence         0.993 inWC           Current DP value         0.993 inWC           Method         Learn method 2	I
Volumes         Corrected Volume       527677 ft²         Uncorrected Volume       229317 ft²         Corrected Residual       0.67 ft²         Uncorrected Residual       0.02 ft²         Uncorrected Flow Rate       995 ft²/h         Uncorrected Under Fault       0 ft²         Corrections Used	Digital Port 2 U Digital Sensor CRC Fault U Occurred Faults Line Pressure Fault D Temperature Fault U Temperature Fault U Volume (Wiegand) Fault D Internal Operations Fault U Uverspeed U Meter DP Fault U Meter DP Fault U Meter DP Fault U Meter DP Fault U Digital Port 1 U Digital Port 2 U Digital Sensor CRC Fault U	Digital DP/Mon SN 0 Digital DP/Mon SN 0 Occurred Alarms High Pressure 0 High Temperature 0 High Temperature 0 High Flow Rate 0 Low Flow Rate 0 Dow Flow Rate 0 Digital input Meter DP Alarm Digital Temp SN 0 Digital Press SN 0 Digital DP/Mon SN 0	Completed Daily DP Logging Valid samples First flow band 0 Second flow band 60 Forth flow band 0 Total rejected Low flow 0 Unstable flow 0	

#### Meter DP Alarm Set

The <u>Meter DP Alarm</u> threshold is defined as the result of the multiplication of the theoretical DP value and an alarm factor. Only valid DP samples are used as they were defined in "DP Daily Log" paragraph.

If the number of sequential events is equal to the alarm sample size, the Meter DP Alarm is set. If the valid DP sample is below the alarm threshold value, then the counting of DP samples is reset.

Alarm is shown on the Live Data screen and on the IMCW2 display as **Meter AL**. Fault output pulses are generated and the event is registered in the Audit Log, Date/Time stamped.

#### 15.3.2 Meter DP Fault

The <u>Meter DP Fault</u> is set if the defined number of DP values measured in sequence have exceeded the meter fault threshold:

(iii) MCUT 5.1.0.3		- 🗆 X
Welcome Configuration Calibra	tion Live Data Faults & Alarms Advanced	Logging System
Last Snapshot T 05/11/2022,02: Internal Hardware Unit Serial Number 01/22/000004 Meter/Site ID 0 Firmware Revision 0d33 PCB Revision 22 Battery Voltage 6.03V Battery remaining Life 143 months Temperature Digital SN 122000002	ime:     Present Alarms       16:13 PM     High Pressure     Uow Pressure       Present Faults     Uow Pressure     Uow Pressure       DP Transducer Fault     Uow Temperature     Uow Temperature       Volume (Wiegand) Fault     Uow Flow Rate     Uow Flow Rate       Low Battery     Uow Sattery     Uogital input       Overspeed     Meter DP Fault     Meter DP Alarm       Meter DP Zero Fault     Uow Fault     Uow Flow Rate	DIFFERENCE OF CONTINUES
Line Pressure Digital SN 620190112 DP Digital SN 520185150	Table Limit Fault U Digital Port 1 0 Digital Temp SN 0 Digital Port 2 0 Digital Press SN 0 Digital Port 2 0 Digital DP/Mon SN 0	Method Learn method 2 Method Status Learning
Volumes         Corrected Volume       526171 ft <sup>9</sup> Uncorrected Volume       228663 ft <sup>9</sup> Corrected Residual       0.56 ft <sup>9</sup> Uncorrected Residual       0.49 ft <sup>9</sup> Uncorrected Flow Rate       990 ft <sup>9</sup> /h         Uncorrected Under Fault       0 ft <sup>9</sup>	Uigital Sensor CHC Fault     Occurred Alarms       Occurred Faults     Occurred Alarms       Line Pressure Fault     Occurred Alarms       DP Transducer Fault     Ocurred Faults       Temperature Fault     Ocurred Faults       Volume (Wiegand) Fault     Ocurred Faults       Internal Operations Fault     Ocurred Faults       Low Battery     Ocurred Faults       Overspeed     Ocurred Faults       Meter DP Fault     Meter DP Alarm	Daily DP Logging         Valid samples         First flow band       0         Second flow band       0         Third flow band       60         Forth flow band       0         Total rejected       0         Low flow       0         Unstable flow       0
Temperature     73.7 °F       Line Pressure     2.39625 bar       Supercompressibility (Fpv²)     1.0000       Correction Factor     2.30378       Correction Factor     2.30378	Meter DP Zero Fault 0 Table Limit Fault 0 Digital Port 1 0 Digital Port 2 0 Digital Temp SN 0 Digital Sensor CRC Fault 0 Digital Press SN 0	

**Meter DP Fault Set** 

The Meter DP fault threshold is defined as result of the multiplication of the theoretical DP value and a fault factor. Only valid DP samples are used as defined in the "DP Daily Log" description.

If the number of sequential events is equal to the defined fault sample size the fault is set. If a valid DP sample is below the fault threshold value, then the counting of DP samples is reset. The Meter Fault Threshold Counter is shown on the Advanced Diagnostics screen. **Meter Ft** is visible on the Live Data screen and on the IMCW2 display. Fault Pulse outputs are generated and the event is registered in Audit Log, Date/Time stamped.

#### 15.3.3 Meter Lockup

Meter DP Lockup is set if the defined number of DP values measured in sequence have exceeded the meter lock-up threshold. This fault is evaluated only below "Minimum Flow".

Welcome Configuration Calibr	ation Live Data Faults &	Alarms Advanced	Logging System		
Last Snapshot 05/11/2022 , 01 05/11/2022 , 01 Unit Serial Number 01/22/000004 Meter/Site ID 0 Firmware Revision 0d33 PCB Revision 22 Battery Voltage 6.07V Battery remaining Life 143 months Temperature Digital SN 12200002 Line Pressure Digital SN 1520190112	Time: :02:09 PM Present Faults Line Pressure Fault DP Transducer Fault DT Transducer Fault Volume (Wiegand) Fault Internal Operations Fault Low Battery Dverspeed Meter DP Fault Meter DP Fault Meter DP Fault Meter DP Fault Meter DP Fault Meter DP Fault Meter DP Fault	Present Alarms High Pressure Low Pressure Low Temperature Low Temperature High Flow Rate Low Flow Rate Daily Consumption Digital input Meter DP Alarm	Differential Pressure Results Avg DP value Avg Flow Rate Avg Line Pressure Avg Temperature Avg Temperature Date of Occurrence Current DP value 3.975 in/VC	DPt	Static
DP     Digital SN 520185150       Volumes     Corrected Volume       Corrected Volume     227602 ft²       Uncorrected Residual     0.16 ft²       Uncorrected Residual     0.92 ft²       Uncorrected Flow Rate     196 ft²/h       Uncorrected Under Fault     0 ft²       Corrections Used     Temperature       Temperature     73.3 *F       Line Pressure     2.39751 bar       Supercompressibility (Fpv²)     1.0000       Correction Factor     2.30639       Iv     DEBUG ACTIVE	Digital Port 1 Digital Port 2 Digital Sensor CRC Fault Occurred Faults Dressure Fault DP Transducer Fault DP Transducer Fault Oversperature Fault Oversperature Fault Overspeed Meter DP Fault Meter DP Fault Meter DP Zero Fault Digital Port 2 Digital Sensor CRC Fault	Digital Temp SN U Digital DeryMon SN D Occurred Alarms High Pressure D High Tensere D Low Pressure D High Temperature D Low Temperature D Low Temperature D Joy Rate D Daily Consumption Digital input Meter DP Alarm D Digital Temp SN D Digital Temp SN D Digital DP/Mon SN D	Method       Learn method 2         Method Status       Learning         Completed       Completed         Daily DP Logging       Vaild samples         First flow band       0         Third flow band       0         Total rejected       0         Low flow       0         Unstable flow       0         Unstable flow       0         Learnt Coefficient       3.538 m/vC         Learnt Coefficient       4.69e-007         Health Coefficient       4.69e-007         Health Coefficient       1.420 vec         DP offset       -0.145 in/vC         Date/Time of       10:31:43 AM         last DP offset       0.5/11/2022         L. Meth 2       Lapsed         DP Zero Press       0.140 bar         Threshold       1.40 bar	DP USed trace Debug value 1 Debug value 2	339339 150 202.5

#### Meter Lockup Set

The DP meter fault threshold is a result of the multiplication of a theoretical DP value for "Minimum Flow" and a lockup factor. The number of sequential events must be equal to the lockup sample size before a fault is set. If the valid DP sample is below the lockup threshold value, then the counting of DP samples is reset. **DP LOC** is displayed on the Live Data screen and on the IMCW2 display. Fault Pulse output is generated, and the event is registered in the Audit Log, Date/Time stamped.

DP ALARM/FAULTS	DESCRIPTION/ REASON	LCD with solid bell icon	LIVE DATA for fault names
Meter DP alarm	Meter DP alarm s set when the alarm limit set by Dresser is exceeded	dP AL	Meter DP Alarm
DP serial number Alarm	This alarm is set when a new DP sensor is connected but not yet commissioned via MCUT	dP Sn AL	
DP transducer fault	If the DP sensor is not connected due to wire disconnect or the DP value is out of range	Pnn fLt	DP transducer fault (Pressure monitor sensor shares this same fault name
DP Zero fault	This fault occurs during pipeline installation, when the natural offset of DP sensor at zero flow ,after offset is removed is higher than set value for DP zero limit by Dresser	dP Zero	Meter DP Zero fault
Meter DP Fault	When the flow is greater than 30% , Meter DP fault is set when the fault limit set by Dresser is exceeded	dP fLt	Meter DP fault
Meter DP lockup	When the flow is less than 30% and the DP value is greater than the value set by Dresser for lockup limit this fault is set	dP LOC	Meter lockup

## Appendix A - LCD Displayed Messages

The parameters displayed on the LCD of the IMCW2 can be accessed via the scroll button on the either the front panel or on the side of the IMCW2 enclosure. In addition to the parameters listed in *Customize LCD* screen, further *messages* are displayed for informational purposes.

Note: Some of these *messages* are dependent on the corrector model.

LCD Parameter	Additional Information	Example
Corrected Volume	Maximum 9 digits. The display multiplier and volume units are also displayed.	999999999 x100 cu ft
Uncorrected Volume	Maximum 9 digits. The display multiplier and volume units are also displayed	9999999999 x100 cu ft
Flow Rate	In addition to the flow rate value the volume units will be displayed.	0.0 m3
Correction Factor	Value only.	
Meter Size*	Meter Series, meter size	b 3 nn
Line Pressure	Pressure reading and pressure units displayed.	1.001b
Differential Pressure	Inlet/Outlet meter differential pressure reading units displayed.	00.001
Temperature	Temperature reading and temperature units displayed.	50.1C
Uncorrected Volume Under Fault	Maximum 5 digits. The letters UF are displayed to signify Uncorrected volume under Fault. The display multiplier and volume units are also displayed.	99999UF x100 cu ft
Corrected Residual	Maximum 3 digits (and 2 decimal places). The letters Cr are displayed to signify Corrected Residual. The display multiplier and volume units are also displayed.	199.99Cr x100 cu ft
Uncorrected Residual	Maximum 3 digits (and 2 decimal places). The letters Ur are displayed to signify Uncorrected Residual. The display multiplier and volume units are also displayed.	199.99Ur x100 cu ft
Firmware version	Firmware version followed by Fr.	1.83Fr
Atmospheric Pressure	Atmospheric pressure reading followed by PA.	1.01 PA
Base Pressure	Base pressure reading followed by Pb.	1.01 Pb
Pressure Factor	Pressure factor value followed by PF.	1.00 PF
Supercompressibi lity	Supercompressibility value followed by Zb	1.002b Zb
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)	
DP Test Screen	Last valid DP test results (Avg DP value, avg flow rate, avg line pressure, avg temp, and date of occurrence) will be displayed with all blinking chevrons on LCD. These values will cycle twice on the screen.	
Max Peak Flow Rate	Maximum peak flow rate will be displayed with all solid chevrons on LCD.	

#### **Reference Table - Messages Displayed on LCD**

Units	Description
x0.1	0.1 Display multiplier
x1	1 Display multiplier
x10	10 Display multiplier
x100	100 Display multiplier
x1000	1000 Display multiplier
cu ft	Cubic feet
m <sup>3</sup>	Cubic meters
b	Bar
Р	PSI
-PA	KPa/cm <sup>2</sup>
-9F	Kgf/cm <sup>2</sup>
I	Inches of Water Column
nnb	mbar
P FLt	Pressure Fault
Pm FLt	Monitor or DP Pressure Fault
t FLt	Temperature Fault
VoL FLt	Volume Fault
Int FLt	Internal Operation Fault
Lo bAtt	Low battery condition.
HP AL	High Pressure Alarm
LP AL	Low Pressure Alarm
Ht AL	High Temperature Alarm
Lt AL	Low Temperature Alarm
HF AL	High Flow Alarm
LF AL	Low Flow Alarm
d_In_AL	Digital Input Alarm
tAnnPEr	Tamper Alarm
vol AL	Volume Consumption Alarm
ProvE XX	IMCW2 is in Prover mode; remaining minutes will also be displayed
ProvE?	Pressing the Scroll Button will put the IMCW2 into Prover mode
dIAL Out	IMCW2 has entered modem dial out mode.
CLr Flt	Clear Fault – pressing the Scroll Button will clear any occurred fault and alarm.
PULSES	IMCW2 is in test pulse output mode.
dP FLt	Meter DP Fault
dP AL	Meter DP Alarm
dP LOC	Meter Lockup Fault
OS FLt	Overspeed Fault

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