Dresser Micro Series Volume Corrector
Model IMCW2 Hardware Manual

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1 Information

All printed material contained within this handbook is for information only and is subject to change without notice.

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

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 non-compensated.

2 General Overview

The Dresser™ Integral Micro Series Volume Corrector Model IMCW2 can be installed directly onto all Dresser™ meters and meters from certain other manufacturers. Volume is sensed from the rotation of the impellers via a volume sensor, therefore the input signal to the electronic counter and volume corrector is of high resolution. This translates into extremely high accuracy volume measurement and correction. The lack of a mechanical counter increases the rangeability of the gas meter and decreases the starting flow rate of the meter.

The IMCW2 is designed to measure live pressure (optional) and live temperature (optional) to calculate corrected volume.

The IMCW2 can be equipped with differential pressure transducer (DP) performs mechanical gas meter health diagnostics.

Note: A temperature-only version of the IMCW2, the IMCW2 T-Only is also available. The IMCW2 T-Only measures live temperature, and the operator can configure a fixed line pressure value. All functionality, with exception of the live pressure measurement is identical to that of the IMCW2, and the details contained within this handbook should be read as being applicable to both.

The IMCW2 utilizes E2PROM memory which eliminates the need for back up batteries as all configuration information, logged data and audit log entries will be stored during periods of no power. The data logging facility provides the operator with 3 independent operator configurable logging periods. The audit logging facility provides a means of tracking up to the latest 32 changes to the configuration parameters. Both the data and audit logs are saved as CSV (comma-delimited) files to allow easy import into spreadsheets such as Microsoft® Excel. For further details regarding the data and audit logging facility consult the IMCW2 User Terminal Manual.

The IMCW2 unit is designed and approved intrinsically safe (I.S.) for use in hazardous areas. A serial port allows communication with the unit.

The IMCW2 is configured and calibrated from a laptop computer via the serial port using the Dresser™ Micro Corrector User Terminal (MCUT) software. This will allow:

- Configuration
- Calibration
- Data extraction
- Alarm monitoring

2.1 Hardware Versions

There are three hardware versions of the IMCW2 that relate to the PCB (main circuit board) revision:

Fully analog (up to firmware version 3.03): processes only signals from analog pressure transducers and analog temperature sensors. Transducer calibration is stored on a memory chip installed on the main PCB; therefore, replacement of transducers cannot be performed by the user.

Hybrid analog & digital (firmware version 4.0x): allows for the use of either digital or analog pressure transducers; however only analog temperature sensors can be used. If digital pressure transducers are used, then they can be replaced by the user as the transducer calibration is stored on a memory chip inside the transducer.

Fully digital (firmware version 6.0.0 and higher): allows using only digital pressure transducers and digital temperature sensors and both are able to be replaced by the end user.

In all three hardware versions, the general functionality of the IMCW2 remains the same. Depending on the hardware revision, analog or digital line pressure, monitor pressure, and differential pressure (DP) transducers and temperature sensors are used to build the measurement system.

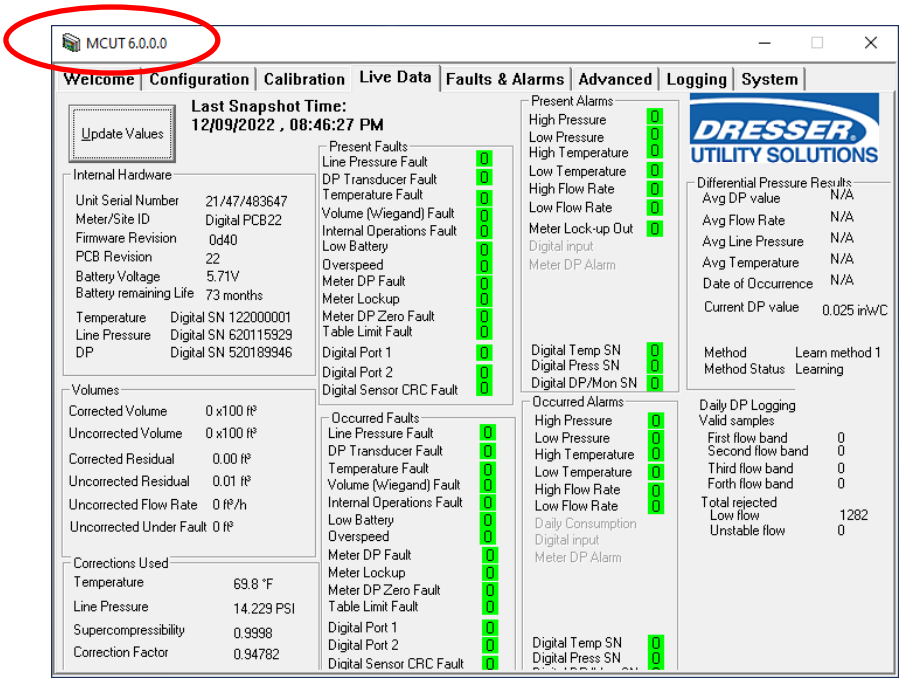
Input signals into the microprocessor include:

- Volume from the dual sensor magnetic pickup
- Temperature - analog or digital signal
- Line Pressure - analog or digital signal
- Differential Pressure (DP) - analog or digital signal. Alternatively, this pressure input could be a monitor pressure signal.
- Push button for display scrolling
- User Terminal software (MCUT) for configuration and calibration

Output signals from the microprocessor include:

- Information parameters on the display
- Serial communication data available locally via the MCUT software, or remotely via a modem
- Volume output pulses available for AMR or Provers
- Fault/Alarm pulses

The Micro Corrector User Terminal software that has been updated to accommodate the fully digital IMCW2 is backward compatible with other IMCW2 versions.



2.2 Models Available

The IMCW2 is factory-built to suit customer order requirements. Options include:

- Pressure measurement (without the pressure option the unit is an IMCW2 T-Only).
- Externally or internally mounted pressure transducer available in various ranges and in gauge or absolute.
- Pulse output via Circular or Cable Gland pulse output connector for IMCW2 T-Only options.
- Analog platinum resistance temperature probe – internally or externally mounted
- Digital temperature probe – internally or externally mounted
- 3 Configuration Protection methods - Canadian (read/write jumper) configuration protection or USA (password) configuration protection and hybrid configuration protection - see sections 7.0

Temperature Probe and Pressure Transducer

Temperature Probe Only

2.2.1 Accessories

The IMCW2 Communication Cable consists of a 2-meter serial link cable terminated in a 7-pin screw locking DIN plug and 9 way "D" connector.

Communication Cables

PC (Serial) to IMC	
Length of Cable	Part Number
6.6'	057135-001
25'	057135-002
50'	057135-003
PC (USB) to IMC	
6.4'	060506-000

Other available accessories include:

- Thermowells - used for external temperature only:

2 inches x ¼" NPT	056091-013
2 inches x 1" NPT	050784-002
4 inches x 1" NPT	050784-001
6 inches x 1" NPT	050784-000

- Pressure/Valve Piping Kits for Line Pressure and Differential Pressure Piping:

Pressure Piping Kits for Non-DP versions

	Approved for use to 350 psig G	Approved for use to 1480 psig G
Length of SS Tubing	Part Number	Part Number
32"	051416-320	051416-310
84"	051416-420	051416-410
120"	051416-520	051416-510

For IMC/W2-dp version, the following piping kits are available:

Length of SS Tubing	Part Number
36"	051416-600
36" with Pipe Plugs	051416-610
36" with Test Plugs	051416-620

2.2.2 Replaceable Components

- Replacement temperature probe
- Replacement line pressure transducer (for fully digital version only)
- Replacement differential pressure transducer (for fully digital version only)
- Replacement magnetic pickup (Micro Generator is no longer available and can replaced with a standard magnetic pickup)
- Replacement battery pack - either alkaline or lithium

3 Safety

The IMCW2 installation must meet Intrinsic Safety requirements, as stated in section 4 (Safety), before beginning installation. It is essential to follow any National Codes of Practice dealing with Intrinsically Safe installations. All Intrinsically Safe circuits must be segregated from non-I.S. circuits, refer to CSA approval 1224451 drawing 061293-000 below.

The IMCW2 is intrinsically safe for installation in Class 1, Div. 1, Group A, B, C, and D locations. Canadian Standards Association (CSA) approval number 1224451.

3.1.1 CSA Intrinsic Safety Diagram

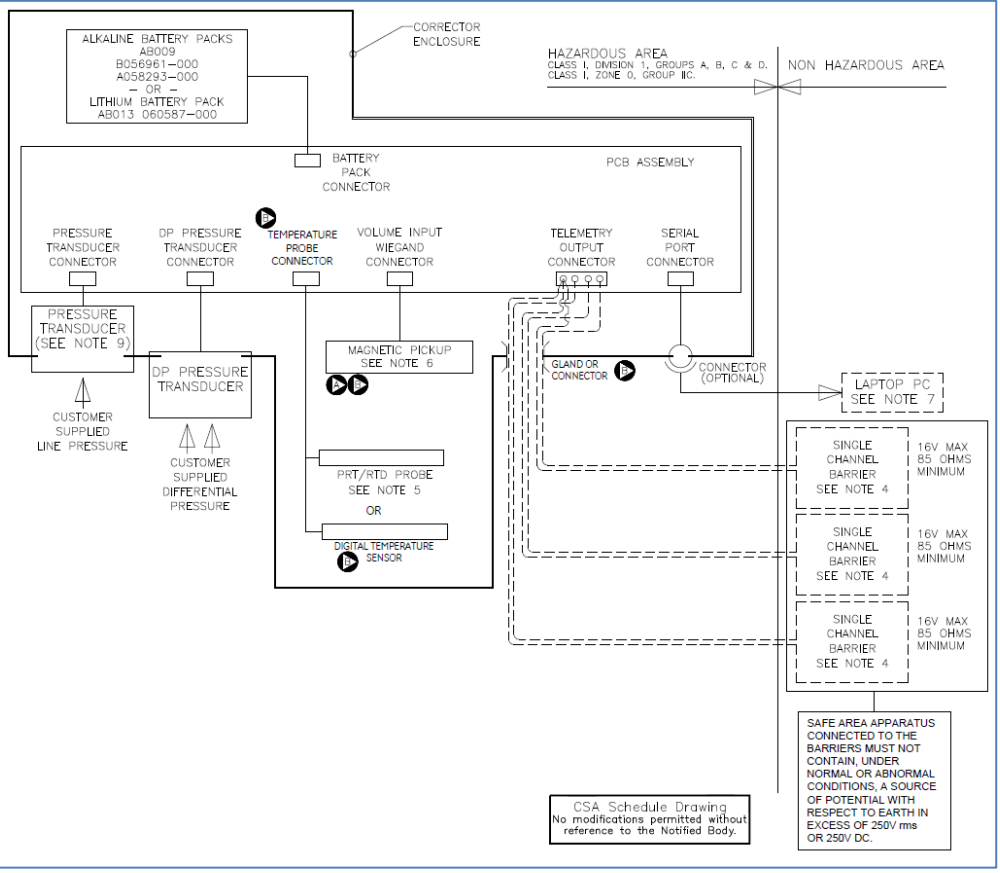
The drawings attached below refer to CSA intrinsic safety diagram (061293-000).

NOTES:

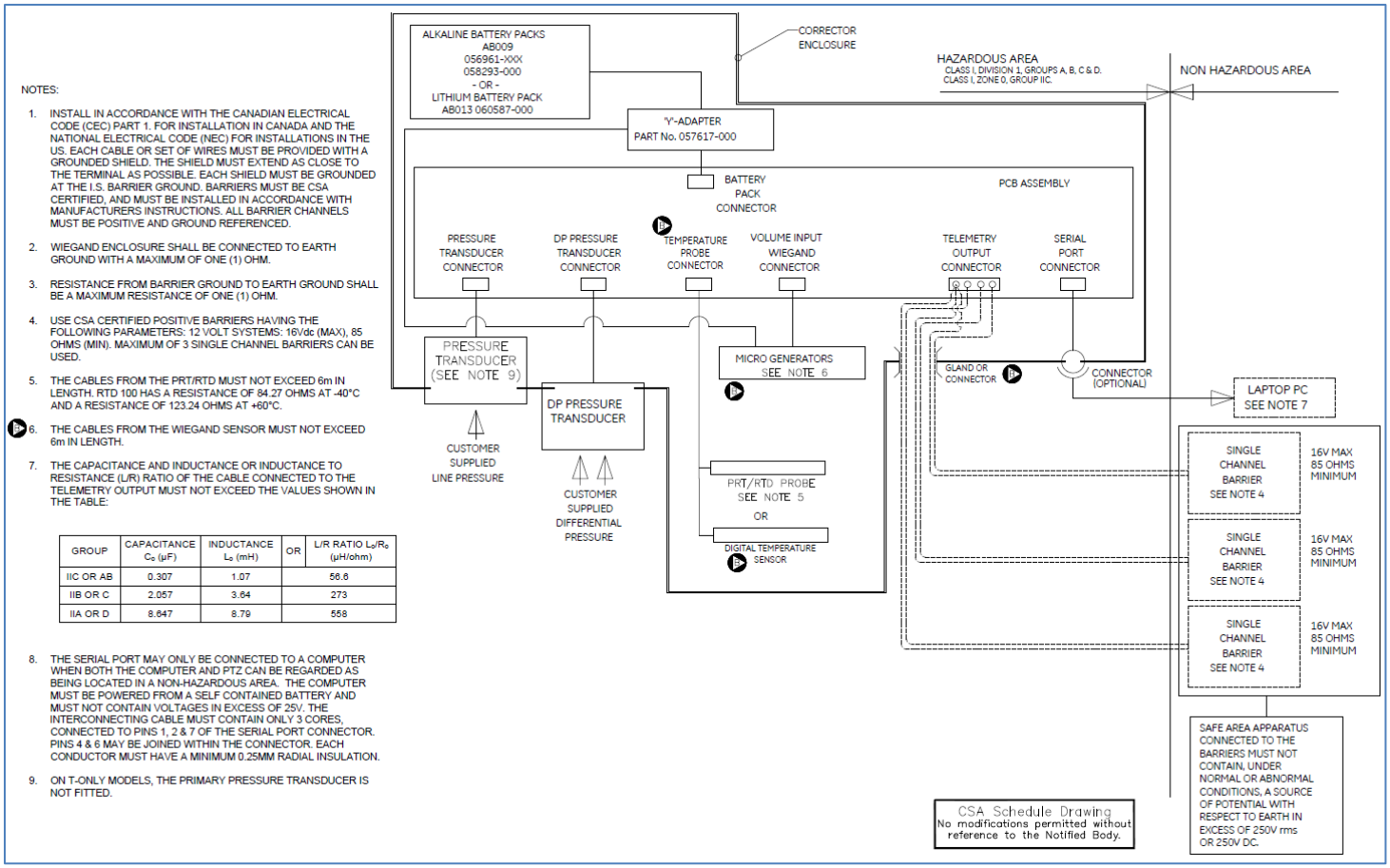
1. INSTALL IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE (CEC) PART 1. FOR INSTALLATION IN CANADA AND THE NATIONAL ELECTRICAL CODE (NEC) FOR INSTALLATIONS IN THE US. EACH CABLE OR SET OF WIRES MUST BE PROVIDED WITH A GROUNDED SHIELD. THE SHIELD MUST EXTEND AS CLOSE TO THE TERMINAL AS POSSIBLE. EACH SHIELD MUST BE GROUNDED AT THE I.S. BARRIER GROUND. BARRIERS MUST BE CSA CERTIFIED, AND MUST BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. ALL BARRIER CHANNELS MUST BE POSITIVE AND GROUND REFERENCED.
2. WIEGAND ENCLOSURE SHALL BE CONNECTED TO EARTH GROUND WITH A MAXIMUM OF ONE (1) OHM.
3. RESISTANCE FROM BARRIER GROUND TO EARTH GROUND SHALL BE A MAXIMUM RESISTANCE OF ONE (1) OHM.
4. USE CSA CERTIFIED POSITIVE BARRIERS HAVING THE FOLLOWING PARAMETERS: 12 VOLT SYSTEMS: 16Vdc (MAX), 85 OHMS (MIN). MAXIMUM OF 3 SINGLE CHANNEL BARRIERS CAN BE USED.
5. THE CABLES FROM THE PRT/RTD MUST NOT EXCEED 6m IN LENGTH. RTD 100 HAS A RESISTANCE OF 84.27 OHMS AT -40°C AND A RESISTANCE OF 123.24 OHMS AT +60°C.
6. THE CABLES FROM THE WIEGAND SENSOR MUST NOT EXCEED 6m IN LENGTH.
7. THE CAPACITANCE AND INDUCTANCE OR INDUCTANCE TO RESISTANCE (L/R) RATIO OF THE CABLE CONNECTED TO THE TELEMETRY OUTPUT MUST NOT EXCEED THE VALUES SHOWN IN THE TABLE:

GROUP	CAPACITANCE C_o (µF)	INDUCTANCE L_o (mH)	OR	L/R RATIO L_o/R_o (µH/ohm)
IIC OR AB	0.307	1.07		56.6
IIB OR C	2.057	3.64		273
IIA OR D	8.647	8.79		558

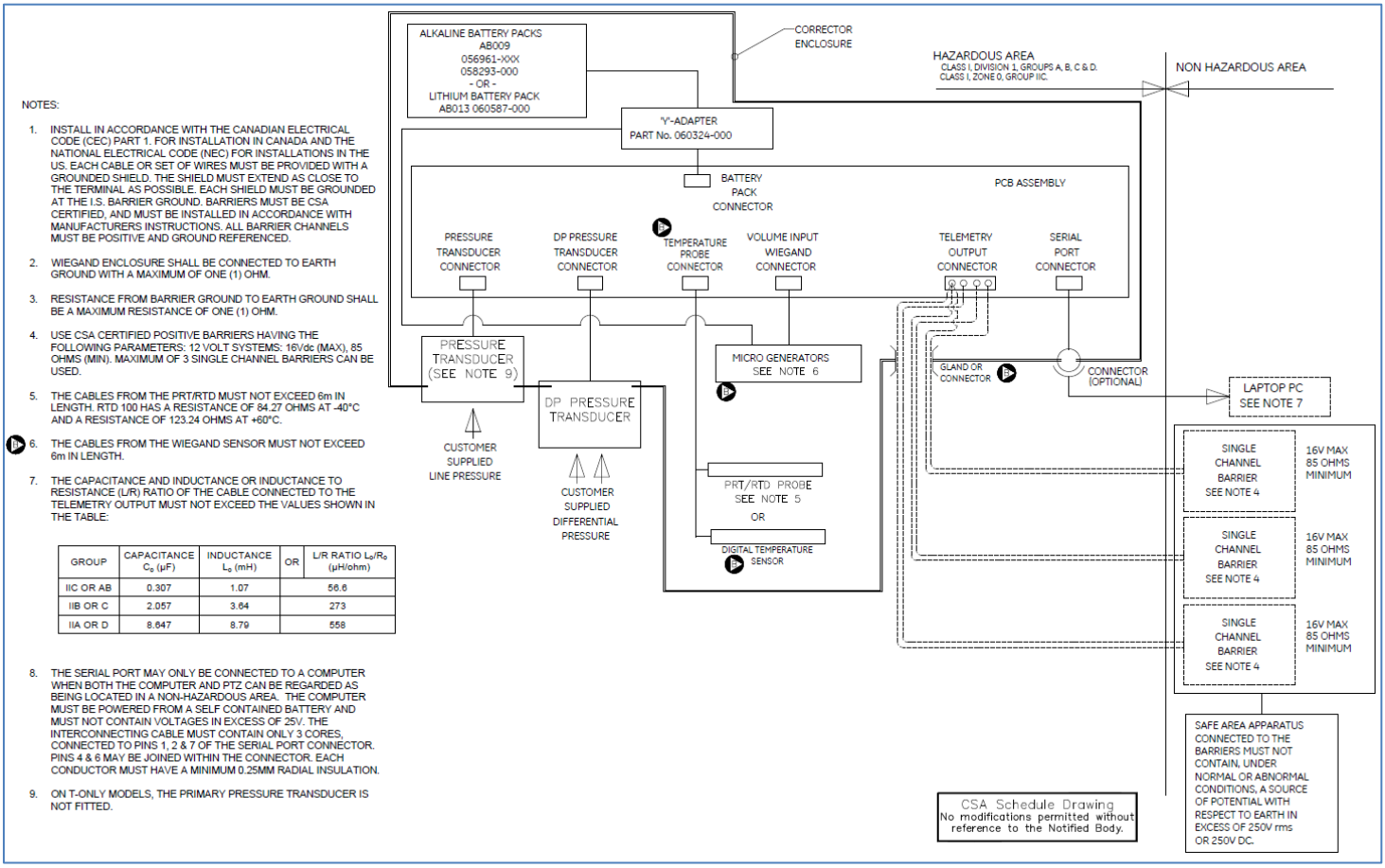
8. THE SERIAL PORT MAY ONLY BE CONNECTED TO A COMPUTER WHEN BOTH THE COMPUTER AND PTZ CAN BE REGARDED AS BEING LOCATED IN A NON-HAZARDOUS AREA. THE COMPUTER MUST BE POWERED FROM A SELF CONTAINED BATTERY AND MUST NOT CONTAIN VOLTAGES IN EXCESS OF 25V. THE INTERCONNECTING CABLE MUST CONTAIN ONLY 3 CORES, CONNECTED TO PINS 1, 2 & 7 OF THE SERIAL PORT CONNECTOR. PINS 4 & 6 MAY BE JOINED WITHIN THE CONNECTOR. EACH CONDUCTOR MUST HAVE A MINIMUM 0.25MM RADIAL INSULATION.
9. ON T-ONLY MODELS, THE PRIMARY PRESSURE TRANSDUCER IS NOT FITTED.



Standard Magnetic Pickup



With optional Micro Generator (Y-Adapter 057617-000)



With optional Micro Generator (Y-Adapter 060324-000)

WARNING

1. **Do not try to open battery pack in hazardous areas.**
2. **The connection of any non-intrinsically safe equipment must be properly assessed by the user. The manufacturer (Dresser™) will not take responsibility for the overall safety of the system.**
3. **For commissioning and reading data the serial port may also be connected to a lap top computer under the following conditions:**

- **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 a hazardous area.**
- **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 it is non-operational. (The presence of the connection can itself create a hazardous condition.**

4. **The temperature probe is only suitable for use at atmospheric pressure and therefore must be used in conjunction with a thermowell which can withstand the line pressure.**
5. **Line pressure transducers, temperature sensor and DP/monitor transducers replacement and connection of wires to IMCW2 terminal blocks can be performed only in no hazardous environment.**
6. **All individual wires connected to the circuit board must have at least 0.25mm (1/100 ins) of insulation.**

CAUTION

Battery pack is static hazard. Clean only with damp cloth.

3.2 Radiated Electromagnetic Emission - Immunity to Electromagnetic Disturbances

The IMCW2 meets the required limit for radiated electromagnetic emission defined by FCC 47 CFR Part 15, Subpart B.

The IMCW2 meets requirements for immunity to electromagnetic disturbances defined in EN 12405-1 standard: Gas meters – Conversion devices and EN 16314 standard: Gas meter – Additional functionalities.

If equipment which is not approved by the manufacturer (Dresser™) is connected to the IMCW2, it is the responsibility of the operator to verify that the requirements of the above-mentioned standards are met. Dresser™ cannot assure that the functionality and volumetric measurement accuracy of the of corrector is maintained.

If for any reason the enclosure of IMCW2 is opened (e.g., to replace a battery pack), precautions should be made to avoid static discharge which can damage electronic components.

4 Installation

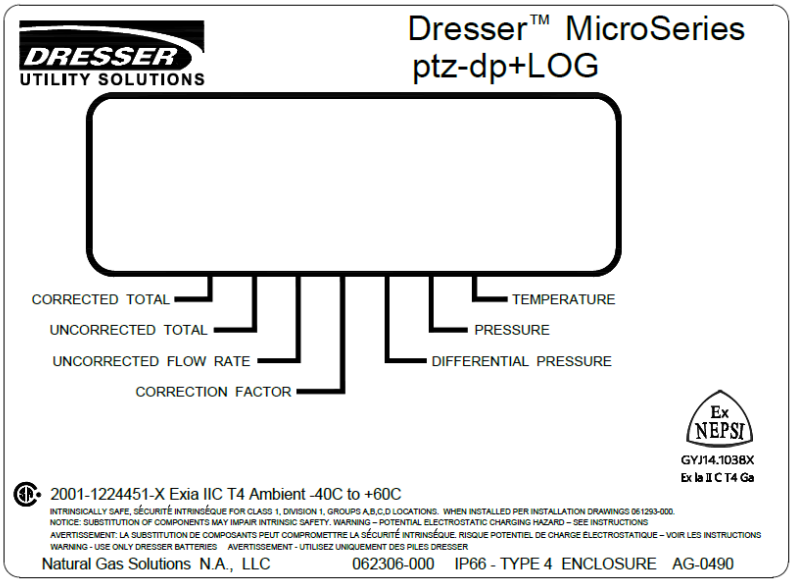
4.1 Unpacking

The following items are supplied with the IMCW2:

	Quantity
IMCW2 Handbook	1
3mm hexagon wrench (Allen key)	1
Spacer	4
M4 x 20 cup fixing screw	3
Calibration certificate	1

A Micro Corrector User Terminal manual is available upon request or via download from the Dresser Utility Solutions website.

Make sure that IMCW2 nameplate has CSA marking and for UK market UKCA marking. If marking is not present, do not install device on the gas line.



Example of IMCW2 front label with CSA and UKCA marking

4.2 Installation of IMCW2 Integral Corrector to Dresser™ Meters

The IMCW2 is mounted directly to the end cover of the rotary meter. For complete IMCW2 Assembly #400 Installation Instructions to Dresser™ Series A and Series B meters, refer to ***BLLN 056684-000 - Field Installation IMCW2 to meter***.

4.3 Environment

The IMCW2 may be operated over the following ranges:

Temperature	-40°C to 60°C (-40°F to 140°F).
Humidity	0 – 95% (condensing).
EMC	Meets FCC class B requirements, EN12405
Ingress	IP66 and NEMA 4X for dust and water penetration, i.e. fully weatherproof.

5 Firmware version and CRC number indication on display

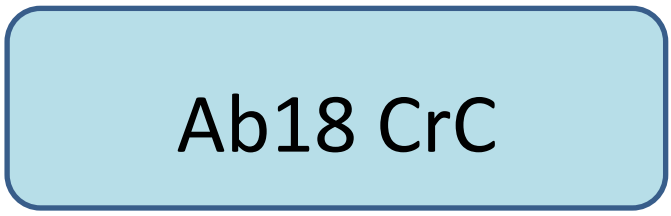
Note: Some metrological authorities require that electronic devices display the installed version of firmware. This is used to verify if the installed firmware version has been approved.

An additional verification is given if a CRC number is calculated live when the metrological authority inspector requests it. The CRC number indicated at that time is compared with the reference CRC number recorded during the firmware version approval process. Matching the live CRC number and the reference CRC number also indicates that the installed firmware is not corrupted. If the firmware is corrupted for any reason, it cannot be used for billing purposes and the requirement is that a fault indication be set.

The firmware revision in the IMCW2 is located on the display if it was selected by using the MCUT software - refer to chapter 6.7 in the Software manual entitled Customize LCD. Note: Certain metrological authorities require that the firmware version always present on the display.

Firmware version shown on display	

The Live CRC number is automatically calculated in the IMCW2 every 11 minutes, or upon request when scrolling the display to “Firmware version”.

Live CRC number shown on display	

Note: The hexagonal number is accompanied with “CrC” indication.

The purpose of the automatic calculation of a Live CRC number every 11 minutes is to confirm that the firmware is not corrupted. If mismatch exists between the Live CRC number and the Reference CRC number, then an “Internal Fault” is set. “Int Flt” is indicated on the display. If this mismatch exists, the IMCW2 should be removed from service.

In addition, the Live CRC number is shown with indication “crc” – lower case letters.

6 Specification and Details

6.1 Pressure Measurement

The IMCW2 is fitted with a pressure transducer, mounted according to requirements. The pressure port is a 1/8” NPT male fitting. The various pressure transducers and associated percentage of accuracy are listed in the below table.

Pressure Transducer Accuracy Reference Table

Pressure Transducer Range	Details
2 Bar (30 psi) A	IMCW2 maximum error of 0.4% of reading from 0.8 Bar A to 2.0 Bar A over operating temperature range of -40°F to +140°F (-40°C to +60°C)
2 Bar (30 psi) G	IMCW2 maximum error of 0.4% of reading from 0.8 Bar G to 2.0 Bar G over operating temperature range of -40°F to +140°F (-40°C to +60°C)
12 Bar (180 psi) A	IMCW2 maximum error of 0.4% of reading from 1 Bar A to 12 Bar A over operating temperature range of -40°F to +140°F (-40°C to +60°C)
12 Bar (180 psi) G	IMCW2 maximum error of 0.4% of reading from 1 Bar G to 12 Bar G over operating temperature range of -40°F to +140°F (-40°C to +60°C)
100 Bar (1480 psi) A	IMCW2 maximum error of 0.4% of reading from 5 Bar A to 100 Bar A over operating temperature range of -40°F to +140°F (-40°C to +60°C)
100 Bar (1480psi) G	IMCW2 maximum error of 0.4% of reading from 5 Bar G to 100 Bar G over operating temperature range of -40°F to +140°F (-40°C to +60°C)

The transducer burst pressure will exceed transducer range +20% for all the transducers provided.

A=Absolute Pressure, G=Gauge Pressure

Note: In firmware version 3.0.0 and higher, a digital pressure transducer can be used.

Fully digital versions of IMCW2 with firmware 6.0.0 and higher use only digital pressure transducers.

Digital Pressure Transducer Accuracy Reference Table

Accuracy 25°C	Accuracy (-25 to 55°C)	Accuracy (-40 to 70°C)
2.8 Bar A	+/- 0.2 % RDG	+/- 0.5 % RDG
12 Bar A	+/- 0.2 % RDG	+/- 0.5 % RDG
100 Bar A	+/- 0.2 % RDG	+/- 0.5 % RDG
2.8 Bar G	+/- 0.04 % FS	+/- 0.1 % FS
12 Bar G	+/- 0.04 % FS	+/- 0.1 % FS
100 Bar G	+/- 0.04 % FS	+/- 0.1 % FS

A=Absolute Pressure, G=Gauge Pressure

6.1.1 Pressure Related Display Parameters

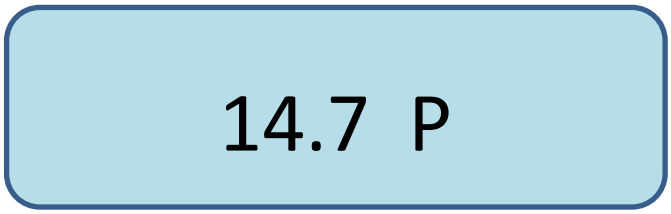
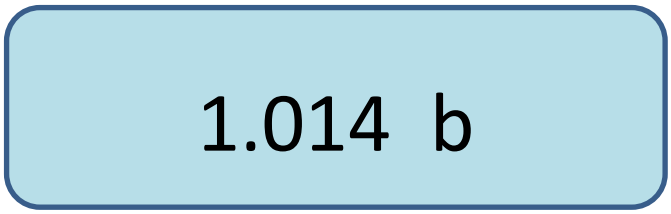
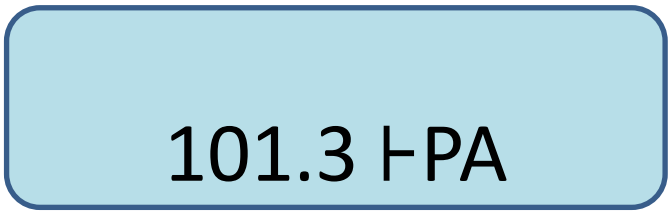
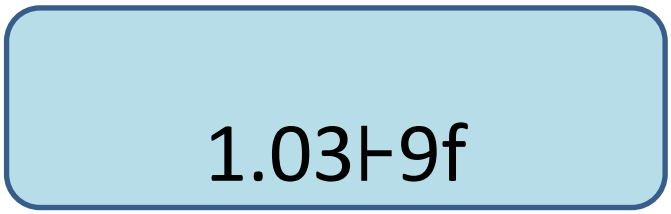
Line pressure related parameters available on display:

- Line Pressure value with abbreviated units
- Line Pressure fault
- High Pressure alarm
- Low Pressure alarm
- Line Pressure Serial Number alarm (digital transducer only)

6.1.1.1 Line Pressure

Line pressure indication on the display must be selected using the MCUT software. The pressure value is updated every 30 seconds. A chevron accompanies the pressure value shown on the display. This chevron points to the “Pressure” description on the front label.

Pressure can be shown on the display in the following units of measure: [psi], [bar], [kPa] and [kg/cm^2].

Pressure indicated in [psi]	
Pressure indicated in [bar]	
Pressure indicated in [kPa]	
Pressure indicated in [kg/cm^2]	

6.1.1.2 Pressure Fault

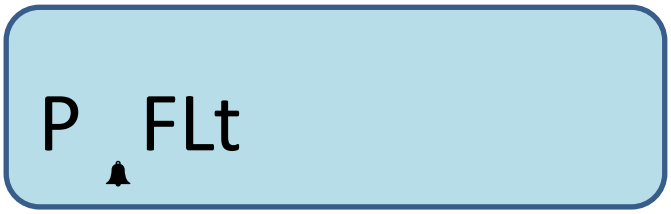
A Line Pressure fault is set if:

- The pressure value cannot be read from the transducer
- The pressure value indicated is outside the range of the transducer

Because this is a fault condition set by the IMCW2 automatically, no setup is required and this event is recorded in the Audit Log with date/time of occurrence.

If a pressure fault is present:

- Bell icon is solid on the LCD
- Description of the pressure fault is shown on LCD
- Live data screen shows Present and Occurred Flow fault in “Fault section” of Live Data screen,
- If the option is chosen to pulse out fault pulses, then fault pulses are sent to the receiving device at this point.

Indication of Pressure fault on display	

If the fault condition disappears then:

- Bell is blinking on display
- Fault pulses are no longer sent

If occurrence of the fault is acknowledged by the operator and the fault is cleared, then:

- No bell is present on display,

The event of clearing the fault is recorded in Audit log with a date/time stamp. Clearing the fault can be performed with or without the Micro Corrector User Terminal software.

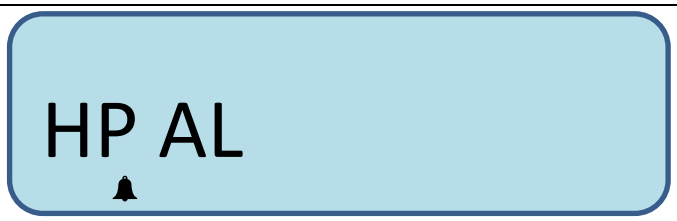
Note: It is not possible to clear a “Present” fault.

6.1.1.3 High Pressure and Low-Pressure alarms

The operator can set minimum and maximum Pressure values using the MCUT software. A pressure alarm will be set by the IMCW2 if the pressure value is outside of these limits. If a High or a Low Pressure Alarm is set, this event is recorded in the Audit log.

If an alarm is present then a solid bell is shown on display, refer to figures below.

- Description of alarm is shown on display
- Fault pulses are sent out via the output pulse connector

High Pressure alarm indicated on display.	
Low Pressure alarm indicated on display.	

If the alarm condition disappears then:

- Bell is blinking on LCD,
- Fault pulses are stopped.

If occurrence of alarm is acknowledged by operator and the alarm is cleared, then:

- No bell is present on LCD.

The event of clearing alarm is recorded in the Audit log with a date/time stamp. Clearing the alarm can be performed with or without the User Terminal software.

Note: It is not possible to clear a “Present” alarm.

6.1.1.4 Line Pressure Transducer Serial Number Alarm

This alarm is available only if a digital line pressure transducer is used in the system. This alarm is set if line pressure transducer was replaced, but it was not commissioned by an authorized person to work in the system. Refer to the appropriate section in the IMCW2 User Terminal Software Manual.

If the “Pressure Serial Number” alarm is set, this event is recorded in Audit log.

If an alarm is present, a solid bell is shown on display.

If this is selected in UT “Alarm Setting” then:

- Description of the alarm is shown on the display
- Fault pulses are sent via the output pulse connector

Note: Functionality of line pressure transducer continues as designed despite the alarm being set

Alarm indication for line pressure transducer not commissioned to work in the system	

If the line pressure transducer is then properly commissioned using the MCUT software, then:

- Bell stops blinking on LCD
- Fault pulses are stopped
- Alarm record is deleted from Audit log

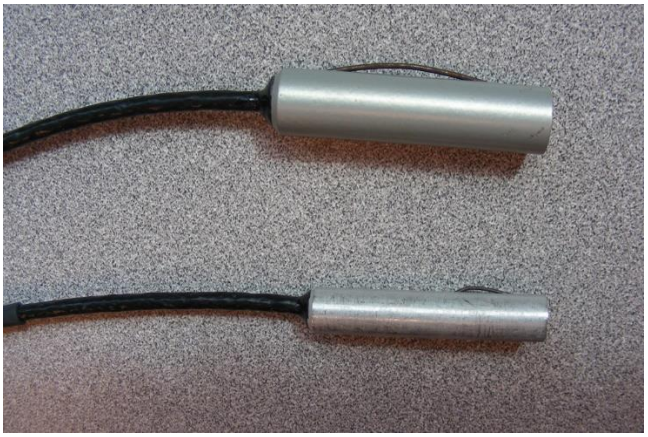
Note: It is not possible to clear a “Present” alarm.

6.2 Temperature Measurement

For IMCW2 units with Firmware Revision up to V3.0.3.

Temperature measurement is performed by a 4-wire Class A 100-ohm platinum resistance thermometer (temperature probe) supplied as an option with the IMCW2. External temperature probes are available with either a 5 or 10-foot armored cable. The temperature accuracy of the IMCW2 is better than 0.5°C (0.9°F) over the temperature range -40°C to 60°C (-40°F to 140°F).

For connection details refer to section 9.7 (Temperature Measurement (TB2)).



Series A

Series B

For IMCW2 units with Firmware 6.0.0. or higher

Temperature measurement is performed by **a digital temperature sensor**. This temperature probe design provides an accurate gas temperature measurement that less influenced by the ambient temperature of the gas meter.
Accuracy for temperature is better than 0.2 C (0.4F) over the temperature range -40°C to 60°C (-40°F to 140°F).

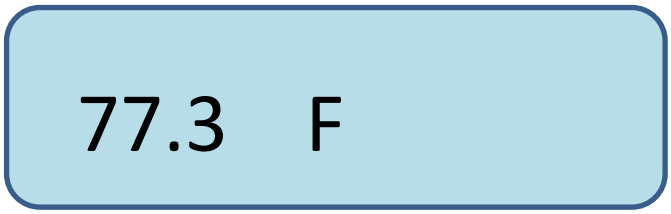
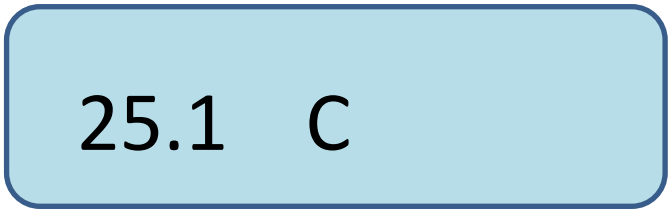
6.2.1 Temperature related parameters available on display

Temperature related parameters available on display:

- Temperature value with abbreviated units
- Temperature fault
- High Temperature alarm
- Low Temperature alarm
- Temperature Serial Number alarm (digital transducer only)

6.2.1.1 Temperature

- Displaying the temperature indication must be selected using the MCUT software. The temperature value is updated every 30 seconds. A chevron accompanies the temperature value shown on display. This chevron points to the “Temperature” description on the front label.
- Temperature can be shown on the display in either Fahrenheit [F] or Celsius [C].

Temperature value indicated in [F]	
Temperature value indicated in [C]	

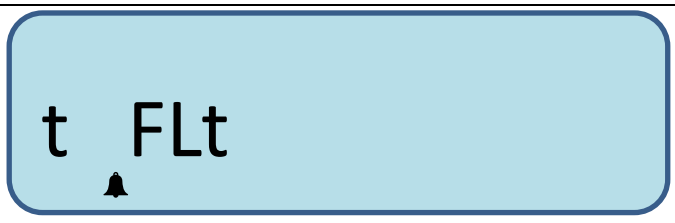
6.2.1.2 Temperature fault

A temperature fault will be set if:

- A temperature value cannot be read by the sensor
- The temperature value read is out of range for the sensor

Because this is a fault condition, this is set by the IMCW2 automatically, no setup is required. The temperature fault is recorded in the Audit Log with date/time of occurrence. If this fault is present, then:

- Bell is solid on LCD)
- Description of fault is shown on display
- Live data screen shows Present and Occurred Flow fault in the “Fault section” of the Live Data screen
- Fault pulses are sent via the output pulse connector

Indication of Temperature fault on display	

If the fault condition disappears, then:

- Bell is blinking on display
- Fault pulses are stopped

If the occurrence of the fault is acknowledged by operator and the fault is cleared, then:

- No bell is present on display.

The event of clearing a fault is recorded in the Audit log with date/time stamp. Clearing the fault can be performed with or without the MCUT software.

Note: It is not possible to clear a “Present” fault.

6.2.1.3 High and Low Temperature Alarms

The operator can set minimum and maximum temperature values. If the temperature value sensed is outside these parameters, a temperature alarm will be set, and this event recorded in the Audit Log.

If an alarm is present, a solid bell is shown on the display. If this option is selected using the MCUT, then:

- Description of the alarm is shown on the display
- Fault pulses are sent via the output pulse connector

High Temperature alarm indicated on display.	
Low Temperature alarm indicated on display.	

If the alarm condition disappears then:

- Bell remains blinking on the LCD
- Fault pulses are stopped

If the alarm is acknowledged by the operator and the alarm is cleared, then:

- No bell is present on LCD

The event of clearing the alarm is recorded in the Audit log with a date/time stamp. Clearing the fault can be performed with or without the User Terminal software.

Note: It is impossible to clear a “Present” alarm.

6.2.1.4 Temperature Sensor Serial Number Alarm

This alarm is available only if the IMCW2 is fitted with a digital temperature sensor. This alarm is set if the temperature probe was replaced but not commissioned by an authorized person. Refer to section 16.5 of the IMCW2 User Terminal Software Manual.

If the Temperature Serial Number alarm is set, the event is recorded in the Audit log. If an alarm is present, then a solid bell is shown on display. If selected in the MCUT software as an Alarm Setting, then:

- Description of the alarm as shown on display
- Alarm pulses are sent via the output pulse connector.

Note: Functionality of the temperature sensor continues as designed even when an alarm is set

Alarm indication for temperature transducer not commissioned to work in the system	

If the temperature sensor is properly commissioned to work in the system (MCUT must be used) then:

- The bell stops blinking on LCD
- Alarm pulses are stopped
- The alarm record is erased from Audit log

Note: It is not possible to clear a “Present” alarm.

6.3 Volume Input

The IMCW2 accepts volume pulses generated by the magnetic pickup sensor inserted into the mag well of the Dresser™ rotary meter. The following flow sensing sequences are operator configurable using the User Terminal software:

- Forward + Reverse
- Forward – Reverse
- Reverse – Forward
- Reverse Only
- Forward Only

The value of the input pulses depends on the meter size. Dresser™ meters can be either Series A (LMMA), Series B, Series G or Series B High Pressure. There are several meter models for both Series A and Series B, and this is operator-configurable using the MCUT software. The IMCW2 can also be configured to work with Romet gas meters. For further details, consult the IMCW2 User Terminal Software Manual.

6.3.1 Volume/ Volume Related Display Parameters

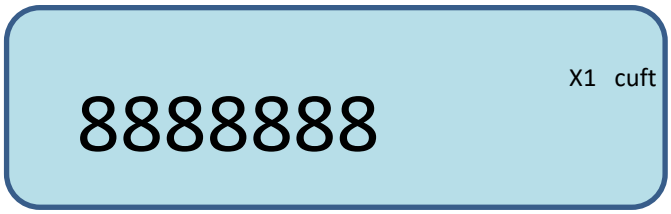
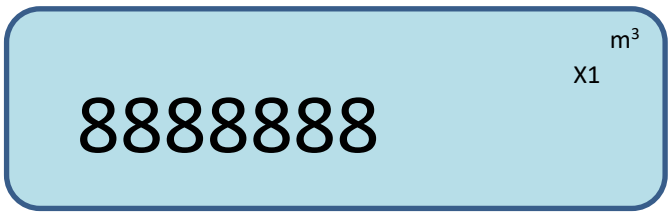
The following volumes measured by the IMCW2 are shown on the display if selected by the user during configuration:

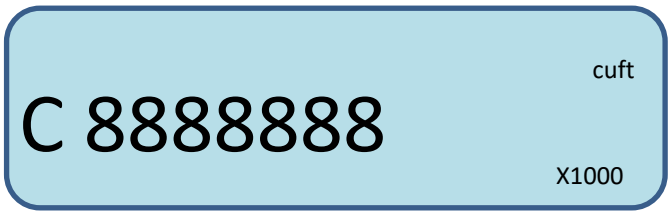
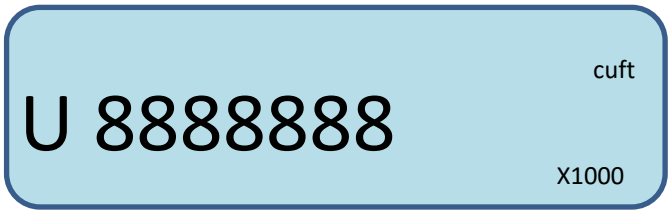
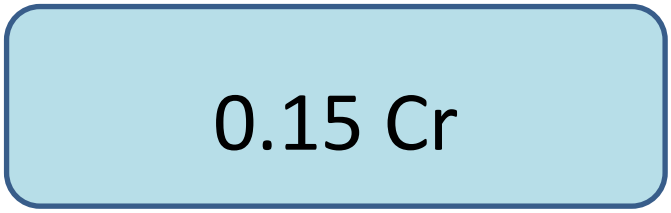
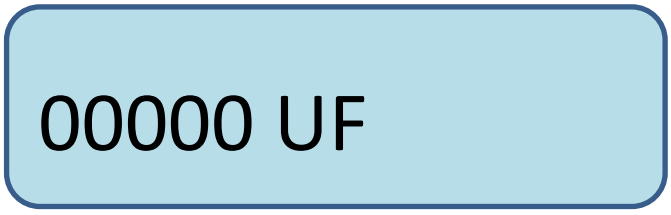
- Corrected volume
- Corrected volume residual
- Uncorrected volume
- Uncorrected volume residual
- Uncorrected volume under fault conditions

A chevron highlights the corrected and uncorrected volume values shown on the display and the chevrons indicate the "Corrected Volume" and "Uncorrected volume" positions on the front label. Volume is presented in cubic feet [CF] for imperial meters, or cubic meters [m^3] for metric meters and are displayed below. Selection of the meter type and other parameters is only possible using the MCUT software, refer to Section 6.3.

If volume on display is presented with 7 digits or less, then it is possible to distinguish volume with "C" for corrected volume and "U" for uncorrected volume. The corrected volume residual is shown on the display as "Cr" and the uncorrected volume residual is shown on the display as "Ur".

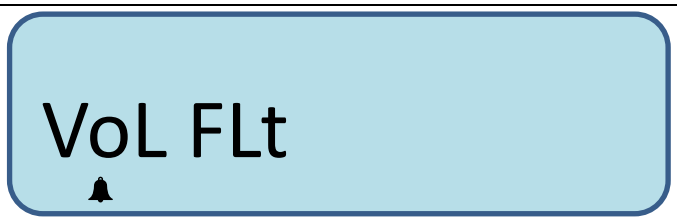
Uncorrected volume under fault conditions is accumulated if corrected volume cannot be accumulated - for example, when line pressure or temperature transducers fail. Uncorrected volume under fault conditions is shown on the display as "UF".

Abbreviation on display for imperial volume units, cubic feet	
Abbreviation on display for metric volume units, cubic meters	

Corrected volume distinguished with letter “C”, if selected	
Uncorrected volume distinguished with letter “U”, if selected	
Corrected volume residual shown as “Cr”	
Uncorrected volume residual shown as “Ur”	
Uncorrected volume under fault conditions shown as “UF” on display	

6.3.1.1 Volume fault

Volume sensor consists of two Wiegand sensors. If any of them does not generate volume pulses, then a “Volume fault” is displayed.

Volume Fault indicated on display	

Because this is a fault condition, this is set by IMCW2 automatically, no setup is required.

If “Volume fault” is set that this event is recorded in Audit log with date/time of occurrence.

If fault is present, then:

- Bell is solid on LCD), refer to display above
- Description of fault is shown on LCD, refer to display above
- Live data screen shows Present and Occurred Flow fault in “Fault section” of Live Data screen,
- Fault pulses are sent to output pulse connector.

If fault condition disappears, then:

- Bell is blinking on display,
- Fault pulses on display.

If occurrence of fault is acknowledged by operator and fault is cleared, then:

- No bell is present on display.

Event of clearing fault is recorded in Audit log with date/time. Clearing the fault can be performed without User Terminal, or with User Terminal.

Note: It is not possible to clear a “Present” alarm.

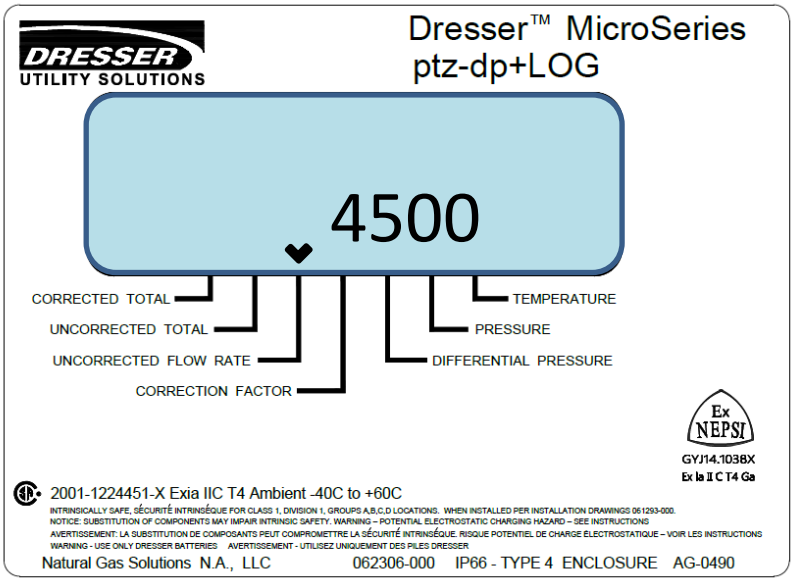
6.3.2 Flow Rate related parameters available on display

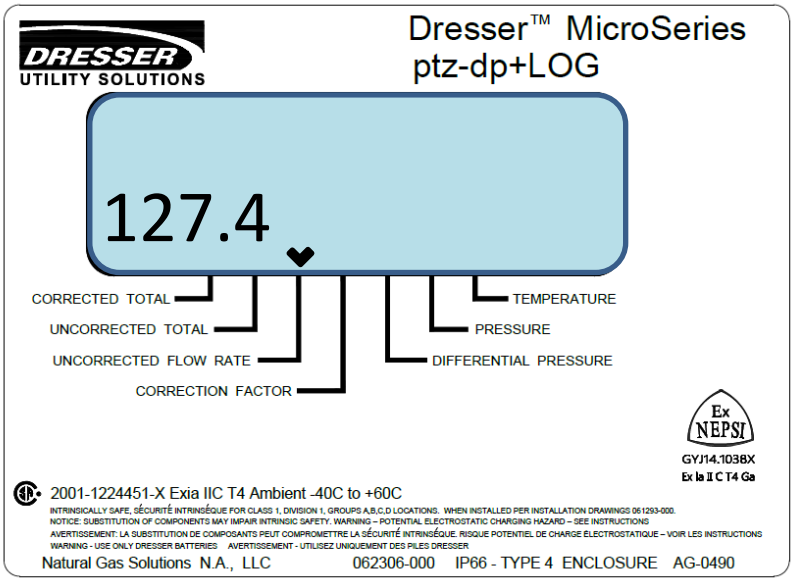
Gas flow related values available on IMCW2 display:

- Instantaneous actual (uncorrected) flow rate,
- Peak uncorrected flow rate,
- Overspeed fault,
- High flow alarm,
- Low flow alarm.

6.3.2.1 Uncorrected Flow Rate

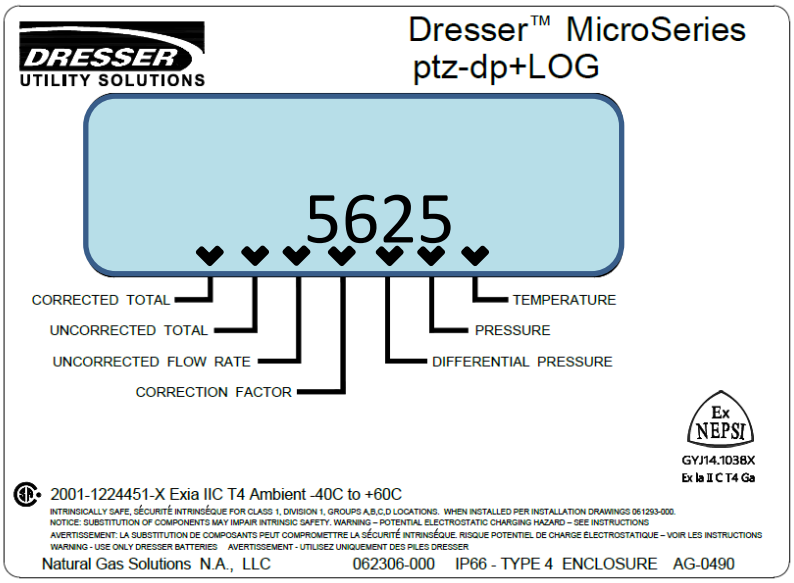
Uncorrected or actual flow rate is available on display if it was selected in display selection of UT. A chevron accompanies Uncorrected Flow Rate shown on display. This chevron points to “Uncorrected Flow Rate” description on label. Depending on meter type, flow rate is presented in cubic feet per hour [CFH] for imperial meters, or in cubic meters per hour [m^3/h] for metric meters.

Uncorrected Flow rate indicated in [CFH] on display	

Uncorrected Flow rate indicated in [m3/h] on display	

6.3.2.2 Peak Uncorrected Flow Rate

Peak Uncorrected Flow Rate is used for proper meter sizing based on the total connected load of all the devices at that location. Peak Uncorrected Flow Rate must be enabled to be displayed on the LCD using the MCUT software.

Peak Uncorrected Flow Rate distinguished with chevrons	

The Peak Uncorrected Flow Rate value can be reset on the display by scrolling to the peak uncorrected flow rate position on the LCD, press the scroll button and wait for the “PF Clr” indication to appear.

Indication that Peak Uncorrected Flow Rate value was successfully reset	

6.3.2.3 Overspeed Fault

An overspeed fault is set if the uncorrected flow rate measured by the meter exceeds 125% of maximum allowable flow rate (Qmax) for that meter size. The overspeed fault is not dependent on the choice for flow sensing – the overspeed fault is set whether the flow is set in forward or reverse direction and exceeds 125% of Qmax.

Because this is a fault condition, this is set by the IMCW2 automatically, no setup is required and this event is recorded in the Audit Log with date/time of occurrence.

If this fault is present, then:

- Bell Icon is solid on LCD)
- Description of fault is shown on LCD
- Live data screen shows Present and Occurred Flow fault in “Fault section” of Live Data screen
- Fault pulses are sent via the output pulse connector.

Indication of overspeed flow fault on display	

If the fault condition disappears, then:

- Bell icon is blinking on display
- Fault pulses are stopped.

If occurrence of the fault is acknowledged by the operator and the fault is cleared, then:

- No bell is present on display.

Fault clearing is recorded in the Audit log with a date/time stamp. Clearing the fault can be performed with or without the MCUT software.

Note: It is not possible to clear a “Present” alarm.

6.3.2.4 High and Low Flow Alarms

The operator can set minimum and maximum uncorrected flow values so that a high or low flow alarm will be set by the IMCW2 if the flow rate is outside of acceptable limits. If “High or Low Flow Alarm” is set, then this event is recorded in the Audit log.

If the alarm is present, a solid bell is shown on the display.
If this alarm setting is selected in the MCUT, then:

- Description of alarm is shown on display
- Fault pulses are sent via the output pulse connector

High Flow alarm indicated on display.	
Low Flow alarm indicated on display.	

If the alarm condition disappears then:

- Bell icon is blinking on LCD
- Fault pulses are stopped.

If alarm occurrence is acknowledged by operator and the alarm is cleared, then:

- No bell is present on LCD,

Clearing the alarm is recorded in the Audit log with a date/time stamp. Clearing the alarm can be performed with or without the MCUT software.

Note: It is not possible to clear a “Present” alarm.

6.4 Volume Correction

The IMCW2 performs volume correction based on:

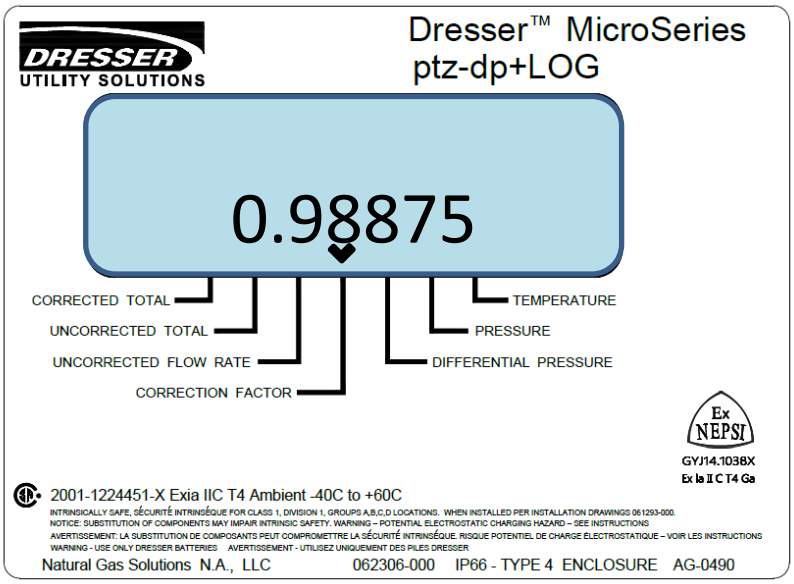
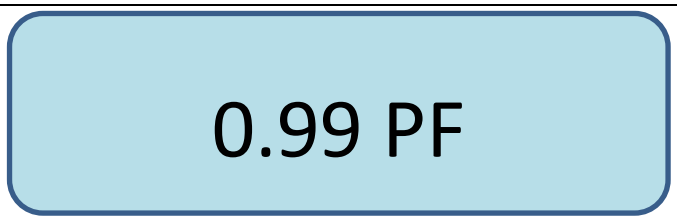
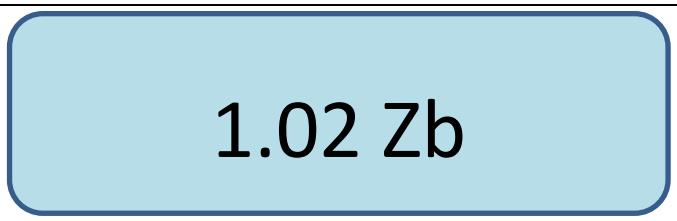
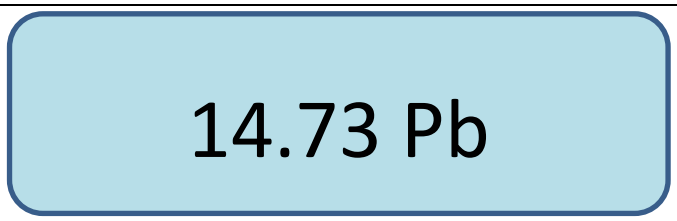
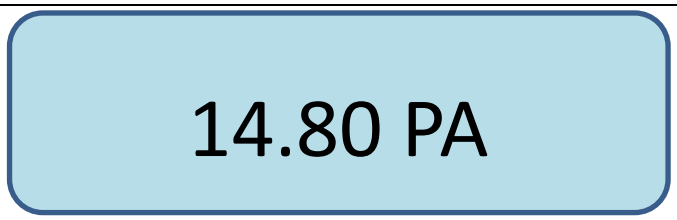
- Uncorrected volume measurement
- Line pressure measurement
- Temperature measurement
- Compressibility calculation - refer to section 6.4.3 in Software Manual.

IMCW2 calculates a correction factor that is applied to the uncorrected volume to obtain corrected volume. The correction factor is shown on display if selected during display configuration. The value of the correction factor is shown with a chevron indicating the position of the “Correction Factor” field on the front label.

Additional parameters related to volume correction can also be selected to be displayed:

- Pressure factor
- Supercompressibility factor
- Base pressure
- Atmospheric pressure (available only for IMCW2 units fitted with gauge transducers)

Note: Values of base and atmospheric pressures are displayed in the units selected for line pressure.

Correction factor with chevron indicating position on the front label	
Pressure factor value with “PF” indication	
Supercompressibility value with “Zb” indication	
Base pressure value with “Pb” indication	
Atmospheric pressure value (gauge pressure transducers only) with “PA” indication	

6.5 Supercompressibility

6.5.1 Introduction

Supercompressibility can be calculated by selecting a 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.

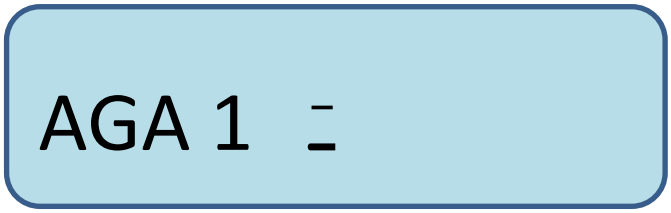
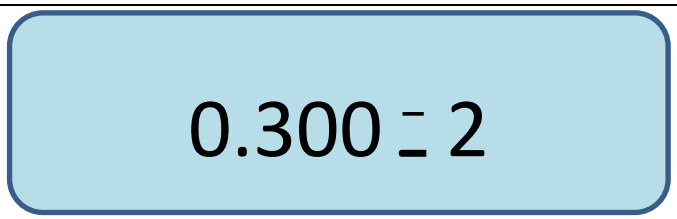
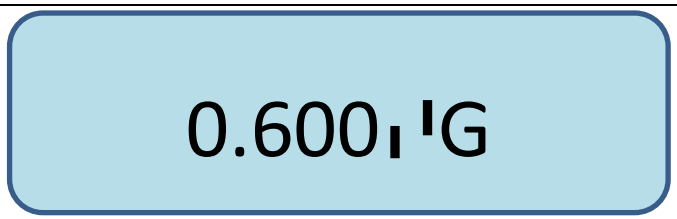
6.5.2 Gas Composition Parameters available on display

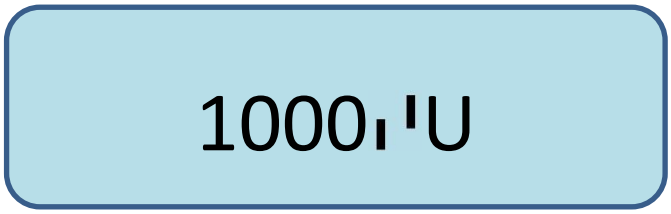
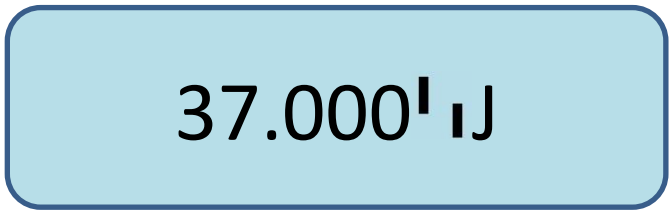
For firmware version 6.0.0 and higher, gas composition parameters used for compressibility calculations are available on the display, if this option is selected using the MCUT software. Refer to section 6.4.3. in the Software Manual for details.

6.5.2.1 AGA 8 Gross Method 1

Parameter values for supercompressibility calculations using this method appear on the LCD as follows:

- Chosen supercompressibility method
- Carbon dioxide CO2 [%mol]
- Specific gravity
- Heating Value [BTU/ft3] or [MJ/m3]

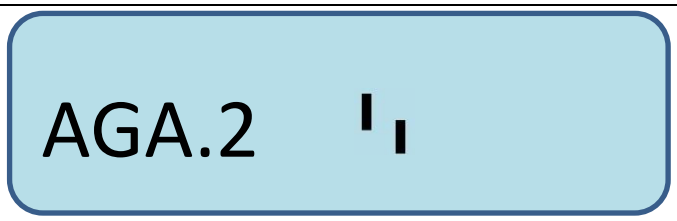
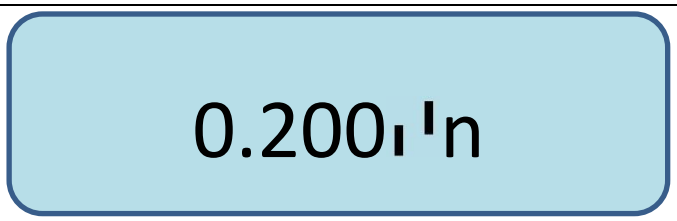
Indication of AGA 8 gross method 1 on display	
Indication of carbon dioxide (CO2) content	
Indication of Specific Gravity value on display	

Indication of gas mixture Heating Value in [BTU/ft3]	
Indication of gas mixture Heating Value in [MJ/m3]	

6.5.2.2 AGA 8 Gross Method 2

Parameter values for supercompressibility calculations using this method appear on the LCD as follows:

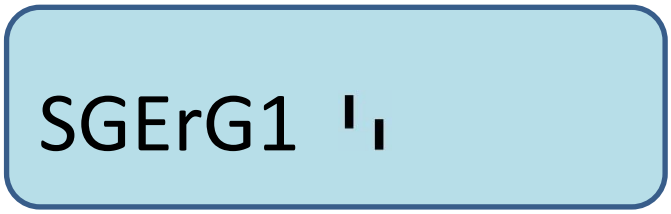
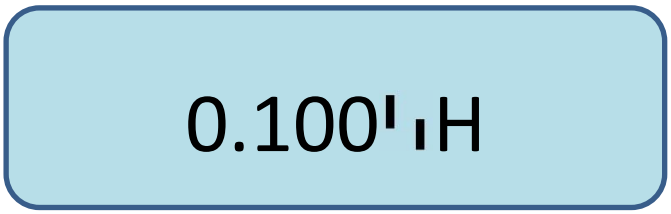
- Chosen supercompressibility method
- Carbon dioxide CO2 [%mol]
- Specific gravity
- Nitrogen N2 [%mol]

Indication of AGA 8 gross method 2 on display	
Indication of nitrogen (N2) content in gas mixture	

6.5.2.3 SGERG Method 1

Parameter values for supercompressibility calculations using this method appear on the LCD as follows:

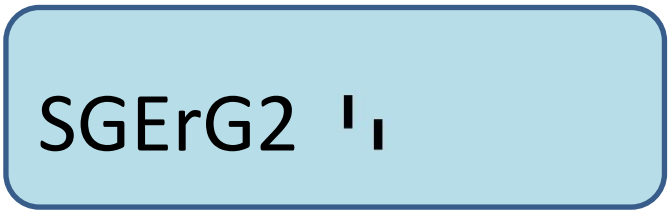
- Chosen supercompressibility method
- Carbon dioxide CO2 [%mol]
- Hydrogen H2 [%mol]
- Heating Value in [BTU/ft3] or [MJ/m3]

Indication of SGERG method 1 on display	
Indication of hydrogen (H2) content in gas mixture	

6.5.2.4 SGERG Method 2

Parameter values for supercompressibility calculations using this method appear on the LCD as follows:

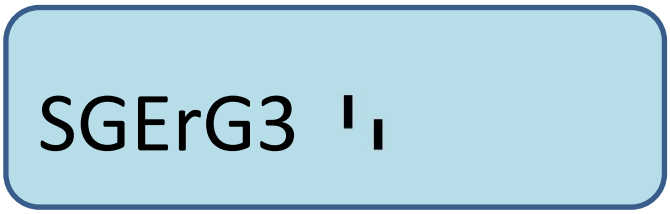
- Chosen supercompressibility method
- Specific gravity
- Hydrogen H2 [%mol]
- Heating Value in [BTU/ft3] or [MJ/m3]
- Nitrogen N2 [%mol]

Indication of SGERG method 2 on display	

6.5.2.5 SGERG Method 3

Parameter values for supercompressibility calculations using this method appear on the LCD as follows:

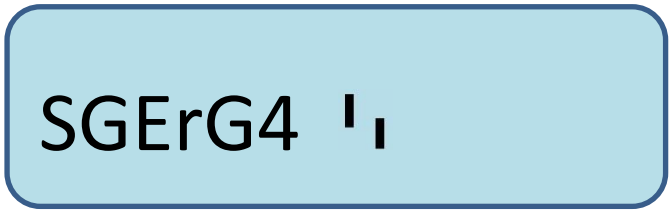
- Chosen supercompressibility method
- Carbon dioxide CO2 [%mol]
- Specific gravity
- Hydrogen H2 [%mol]
- Nitrogen N2 [%mol],

Indication of SGERG method 3 on display	

6.5.2.6 SGERG Method 4

Parameter values for supercompressibility calculations using this method appear on the LCD as follows:

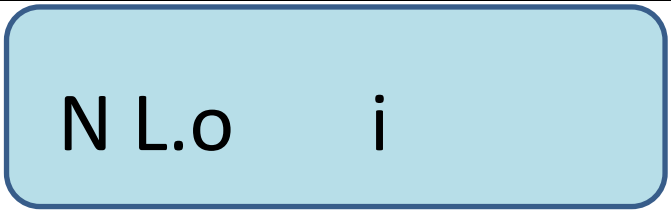
- Chosen supercompressibility method
- Carbon dioxide CO2 [%mol]
- Hydrogen H2 [%mol]
- Heating Value in [BTU/ft3] or [MJ/m3]
- Nitrogen N2 [%mol]

Indication of SGERG method 4 on display	

6.5.2.7 NX19 Low Heating Value

Parameter values for supercompressibility calculations using this method appear on the LCD as follows:

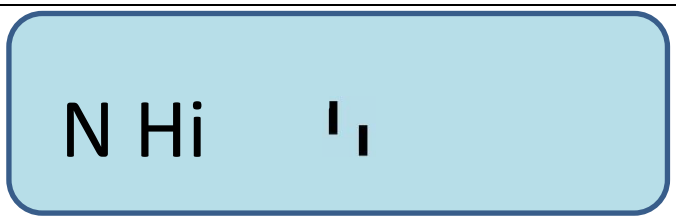
- Chosen supercompressibility method
- Carbon dioxide CO2 [%mol]
- Specific gravity
- Nitrogen N2 [%mol]

Indication of NX19 Low Heating Value method on display	

6.5.2.8 NX19 High Heating Value

Parameter values for supercompressibility calculations using this method appear on the LCD as follows:

- Chosen supercompressibility method
- Carbon dioxide CO2 [%mol]
- Specific gravity
- Heating Value in [BTU/ft3] or [MJ/m3]
- Nitrogen N2 [%mol]

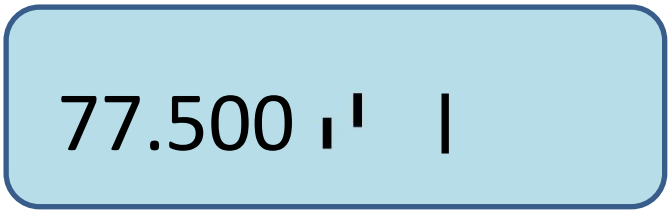
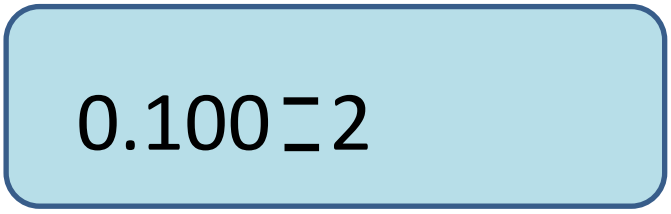
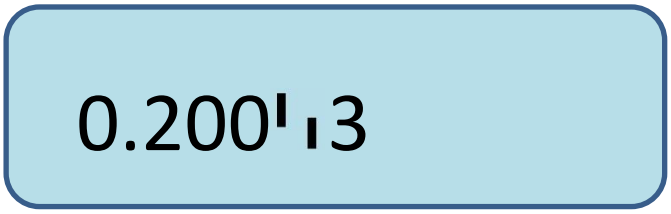
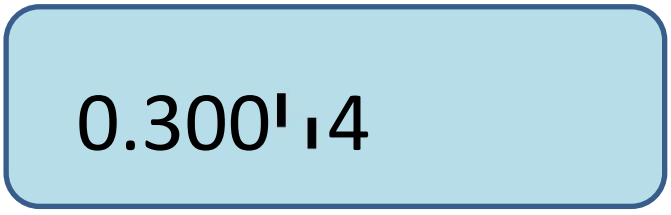
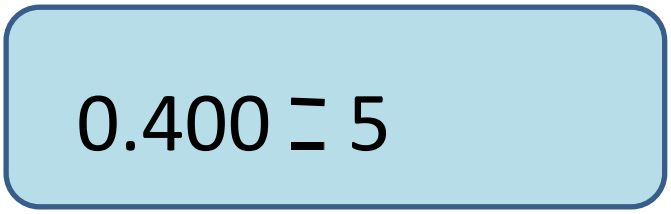
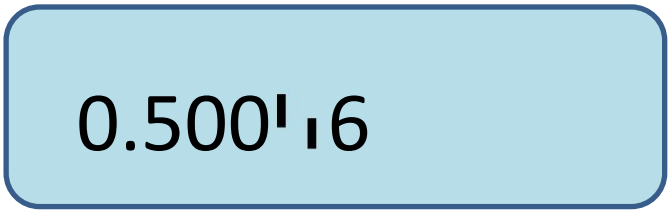
Indication of NX19 High Heating Value method on display	

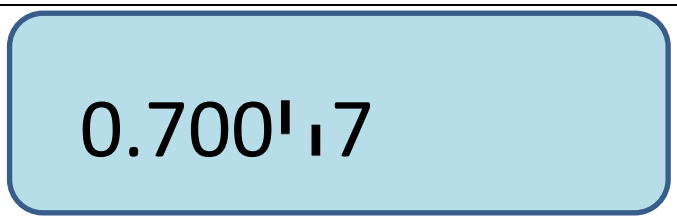
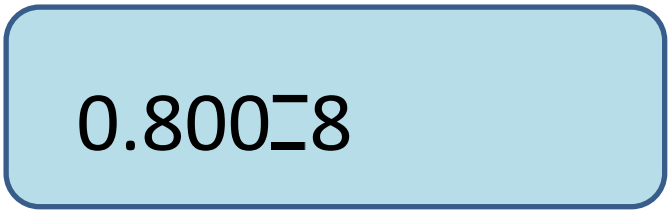
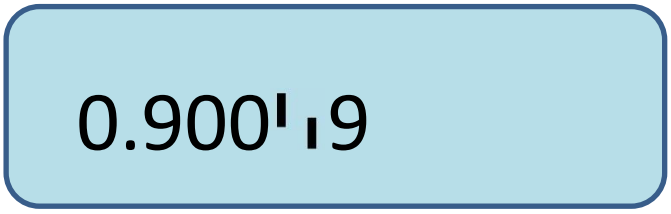
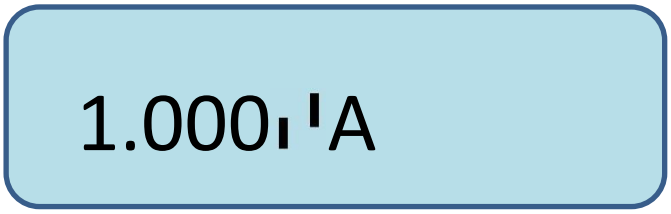
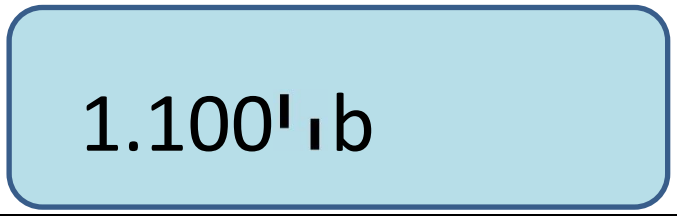
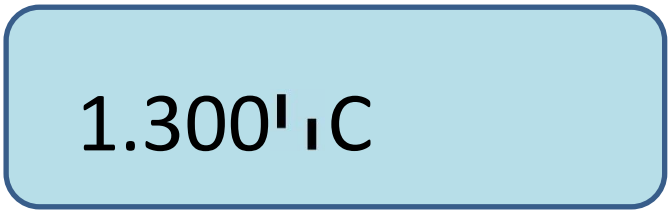
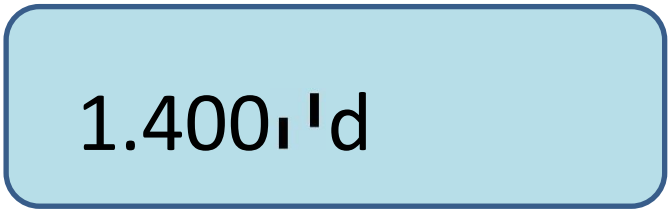
6.5.2.9 AGA 8 Detailed Method

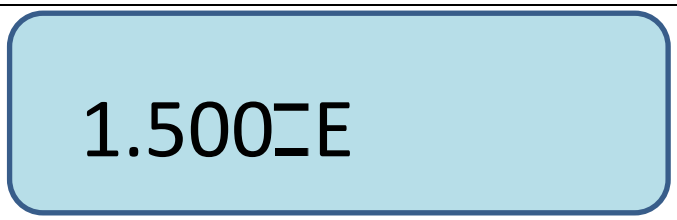
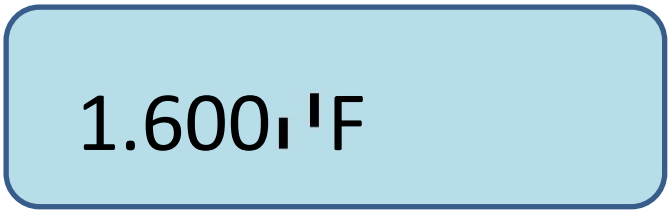
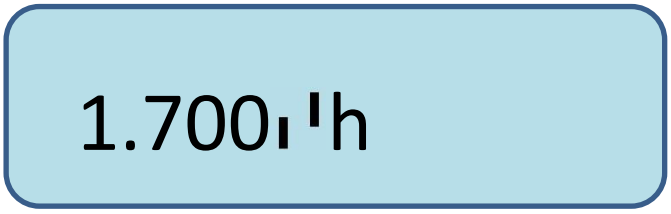
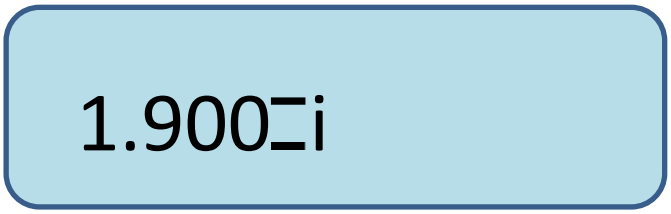
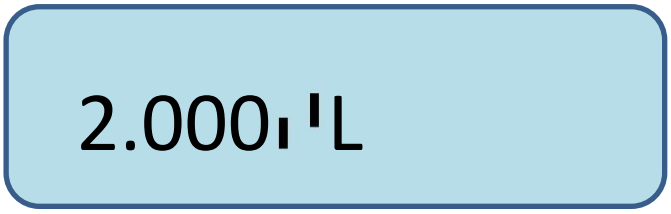
Gas composition percentages for supercompressibility calculations using this method appear on the LCD in the following order.

- Chosen supercompressibility method
- Methane
- Ethane
- Propane
- Water
- Hydrogen Sulfide
- Carbon Monoxide
- Oxygen,
- iButane
- nButane
- iPentane
- nPentane
- nHexane
- NHeptane
- nOctane
- nNonane
- nDecane
- Hydrogen
- Helium
- Argon
- Nitrogen

Note: Only parameters with values that are not zero are displayed.

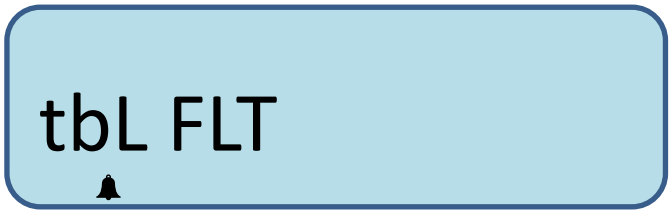
Indication of AGA 8 detailed method on display	
Indication of methane content in gas mixture	
Indication of ethane content in gas mixture	
Indication of propane content in gas mixture	
Indication of water content in gas mixture	
Indication of hydrogen sulfide content in gas mixture	
Indication of carbon monoxide content in gas mixture	

Indication of oxygen content in gas mixture	
Indication of iButane content in gas mixture	
Indication of nButane content in gas mixture	
Indication of iPentane content in gas mixture	
Indication of nPentane content in gas mixture	
Indication of nHexane content in gas mixture	
Indication of nHeptane content in gas mixture	

Indication of nOctane content in gas mixture	
Indication of nNonane content in gas mixture	
Indication of nDecane content in gas mixture	
Indication of Helium content in gas mixture	
Indication of Argon content in gas mixture	

6.5.3 Supercompressibility Calculation Fault

The various methods of calculating supercompressibility are described in section 6.4.3 of the Software Manual. If the measured values of temperature or pressure are outside of the allowable ranges for a particular compressibility calculation method, then the supercompressibility value cannot be calculated and is indicated as a “Table Limit Fault.

“Table Limit” fault indication on LCD	

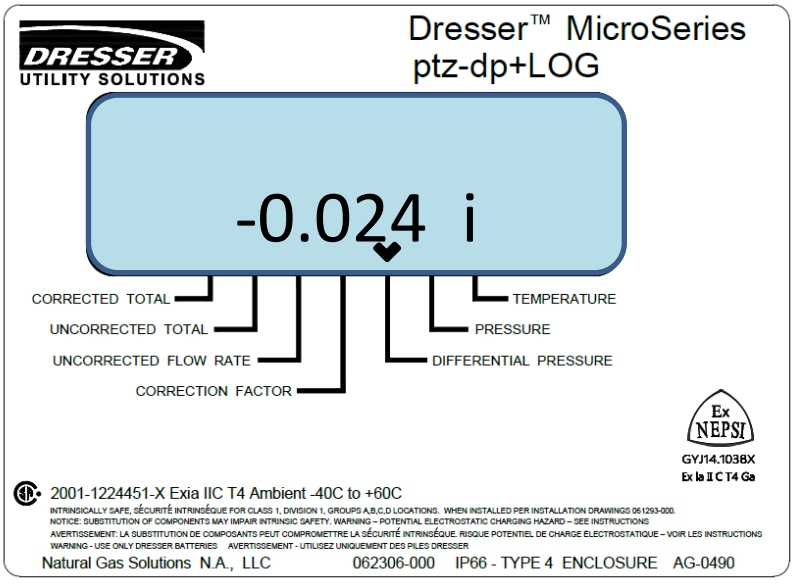
6.6 Gas Meter Health Diagnostics

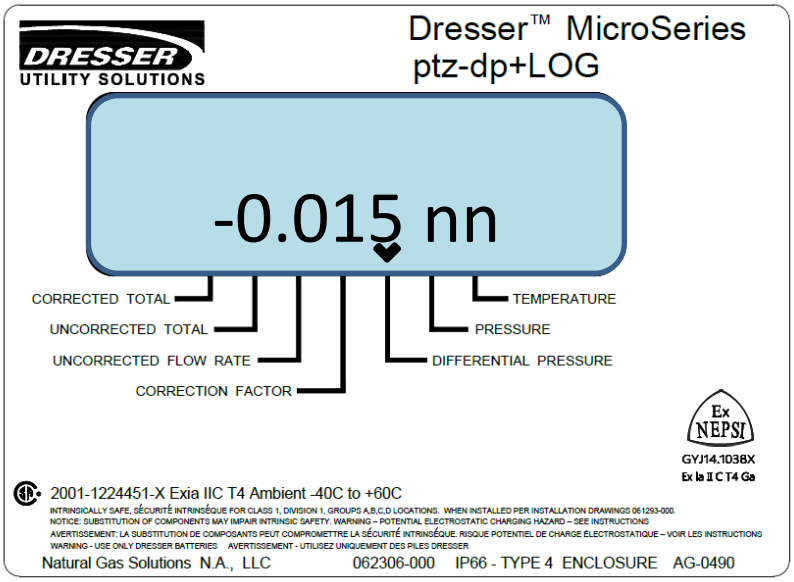
Gas meter health diagnostics is based on differential pressure (DP) measurement, refer to section 17 in the Software Manual. The IMCW2 must be equipped with a differential pressure transducer that is piped to the inlet and outlet differential pressure taps on the gas meter. There are two main methods of gas meter health diagnostics:

- DP fault, DP alarm and DP lockup indicating required action/service for gas meter.
- Daily logging of selected parameters related to gas meter health.

6.6.1 Differential Pressure Transducer

Differential pressure (DP) parameter display must be selected using the MCUT software. The DP value on the display is updated every 30 seconds. A chevron on the LCD points to the “Differential Pressure” parameter on the front label of the IMCW2. Differential pressure can be displayed in either [inWC] or [mbar}.

DP value indicated in [inWC]	

DP value indicated in [mbar]	

6.6.2 Differential Pressure Transducer related faults and alarms

- DP transducer fault
- Meter DP Zero fault
- Digital DP/Mon SN alarm

6.6.2.1 DP Transducer Fault

A DP transducer fault is set if the corrector cannot receive this value from the DP transducer which is primarily caused by either wire disconnection or if a measured value is out of range. Because this is a fault condition, this is set by the IMCW2 automatically, no setup is required. If a “DP Transducer fault” is set, this event is recorded in the Audit Log with date/time of occurrence.

If a fault is present:

- Bell icon is solid on the LCD,
- Description of the fault is shown on LCD
- Live data screen shows both Present and Occurred faults in the “Fault section” of the Live Data screen
- Fault pulses are sent via the output pulse connector

Indication of DP transducer fault on display	

If the fault condition disappears:

- Bell icon remains blinking on display
- Fault pulses are stopped

If occurrence of the fault is acknowledged and fault is cleared:

- No bell is present on display

The event of clearing the fault is recorded in the Audit Log with a date/time stamp. Faults can be cleared with or without using the MCUT software.

Note: It is not possible to clear a “Present” alarm.

If the DP transducer is digital and communication with transducer fails, then the following indication appears on the LCD.

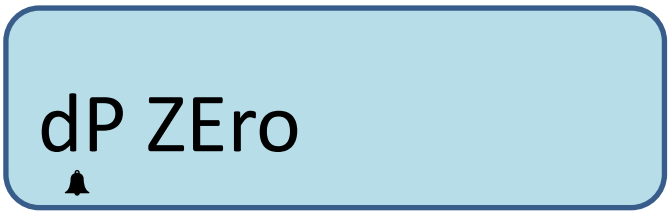
Communication with DP transducer failed	

6.6.2.2 Meter DP Zero Fault

The DP transducer will indicate 0 [in”WC] or 0 [mbar], if its inputs are exposed to the same pressure. Actual transducers have a small offset depending on values of line pressure and temperature. The IMCW2 automatically removes this offset if there is no gas flow through the gas meter. There is however, a limit to the amount of the offset value that can be removed because sometimes a DP transducer can be faulty. If the value of the offset is higher than the allowable limit, then a “Meter DP Zero” fault is set. Because this is a fault condition, this is set by the IMCW2 automatically, no setup is required and this event is recorded in the Audit Log with a date and time of occurrence.

If this fault is present:

- Bell icon is solid on LCD
- Description of the fault is shown on LCD
- Both a Present and Occurred fault is displayed in the “Fault section” of the Live Data screen
- Fault pulses are sent via the output pulse connector

Meter DP zero fault as displayed on LCD	

If the fault condition disappears:

- Bell icon remains blinking on the display
- Fault pulses are stopped

If the fault is acknowledged and cleared:

- No bell is present on display
- The event of clearing the fault is recorded in the Audit Log with a date/time stamp. Faults can be cleared with or without using the MCUT software.

Note: It is not possible to clear a “Present” alarm.

6.6.2.3 DP/Mon Serial Number Alarm

This alarm is available only if a digital DP transducer is used in the system. This alarm is set if the DP transducer was replaced, but it was not commissioned by a person authorized to do so. Refer to section 16.5 of Software Manual.

If a “DP/Mon Serial Number” alarm is set, the event is recorded in the Audit log.

- If an alarm is present, then a solid bell is shown on display

If this is selected in the MCUT “Alarm Settings”:

- Description of the alarm is shown on display
- Alarm pulses are sent via the output pulse connector

Note: Even though this alarm is set, the DP transducer maintains full functionality

Alarm indication for DP transducer not properly commissioned	

When the DP transducer is commissioned using the MCUT software:

- Bell icon stops blinking on LCD
- Alarm pulses are stopped
- Alarm record is erased from the Audit log

Note: It is not possible to clear a “Present” alarm.

6.6.3 Gas Meter Health Diagnostics - related faults and alarms

The IMCW2 indicates the following parameters related to gas meter health:

- Meter DP fault
- Meter DP lockup
- Meter DP alarm

Detailed information regarding these parameters is presented in section 17.2 of the Software Manual.

6.6.3.1 Meter DP Fault

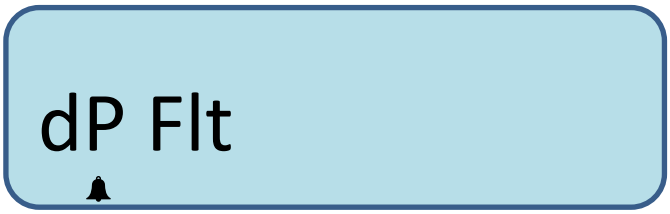
A Meter DP fault is set by the IMCW2 if the Differential Pressure results value exceeds the value recommended by Dresser™. The DP value depends on the following:

- Gas flow
- Gas composition
- Line pressure
- Temperature

Note: Gas flow must be higher than 30% of the maximum flow rate of gas meter before this fault is detected.

Dresser™ recommends a site visit to diagnose the reason for the increased differential pressure and that action be taken to remedy the situation.
If a “Meter DP fault” fault is set the event is recorded in Audit Log with date/time of occurrence.
If the fault is present:

- Bell icon is solid on the LCD
- Description of fault is shown on the LCD
- Present and Occurred Flow faults will be shown in the “Fault section” of the Live Data screen
- Fault pulses are sent via the output pulse connector.

Meter DP fault indicated on display	

If the fault condition disappears:

- Bell icon remains blinking on the display
- Fault pulses are stopped.

If the fault is acknowledged and cleared:

- No bell is present on display
- The event of clearing the fault is recorded in the Audit Log with a date/time stamp. Faults can be cleared with or without using the MCUT software.

Note: It is not possible to clear a “Present” alarm.

6.6.3.2 Meter Lockup Fault

A meter lockup fault is set if the value of the DP exceeds the value recommended by for flows lower than 30% of the maximum flow rate of the meter. When this fault is present, the meter impellers may stop rotating because of some obstruction in the meter cylinder.

If this fault occurs, Dresser™ recommends immediate diagnosis of the reason and action to fix the problem.
If “Meter lockup fault” fault is set, this event is recorded in the Audit Log with date/time of occurrence.
If this fault is present:

- Bell icon is solid on the LCD
- Description of fault is shown on LCD
- Present and Occurred fault is displayed in the “Fault section” of the Live Data screen
- Fault pulses are sent via the output pulse connector

Meter lockup fault indicated on display	

If the fault condition disappears:

- Bell icon remains blinking on display.
- Fault pulses are stopped.

If the fault is acknowledged and cleared:

- No bell is present on display.
- The event of clearing the fault is recorded in the Audit Log with a date/time stamp. Faults can be cleared with or without using the MCUT software.

Note: It is not possible to clear a “Present” alarm.

6.6.3.3 Meter DP Alarm

A Meter DP alarm is set by the IMCW2 if the value of the DP test exceeds the value recommended by Dresser™.

DP value depends upon:

- Gas flow
- Gas composition
- Line pressure
- Temperature

Note: Gas flow must be higher than 30% of the maximum flow rate of the meter for this alarm to be detected.

If “Meter DP alarm” is set, this event is recorded in Audit Log with date/time of occurrence.

If this alarm is present:

- Bell icon is solid on the LCD
- Present and Occurred alarm is shown in the “Alarm section” of Live Data screen

In addition, if this is selected using the MCUT:

- Description of alarm is shown on LCD
- Alarm pulses are sent via the output pulse connector
- Description of alarm is shown on the LCD

Meter DP alarm indicated on display	

If the alarm condition disappears:

- Bell icon remains blinking on display
- Alarm pulses are stopped

If the alarm is acknowledged by operator and is cleared:

- No bell is present on display

The event of clearing alarm is recorded in the Audit log with a date/time stamp. Clearing the alarm can be performed with or without the MCUT software.

Note: It is not possible to clear a “Present” alarm.

6.6.4 Daily logging parameters related to gas meter health

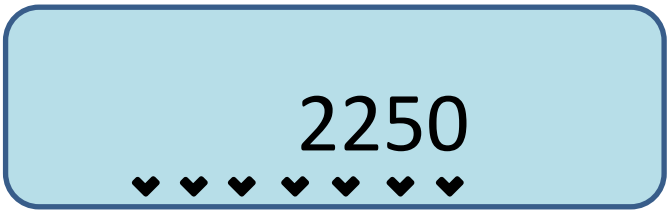
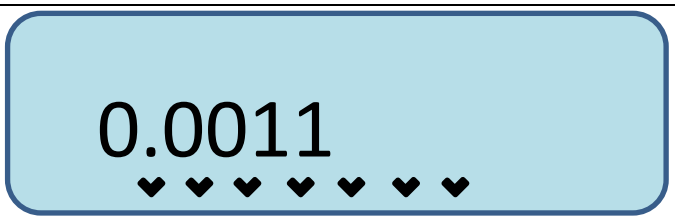
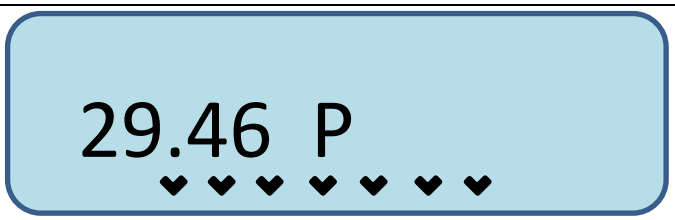
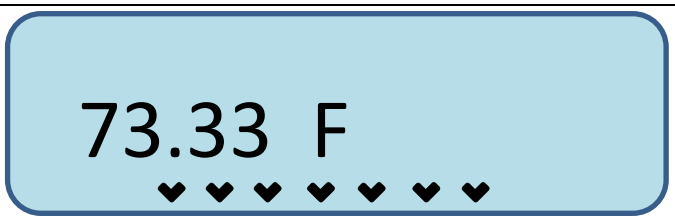
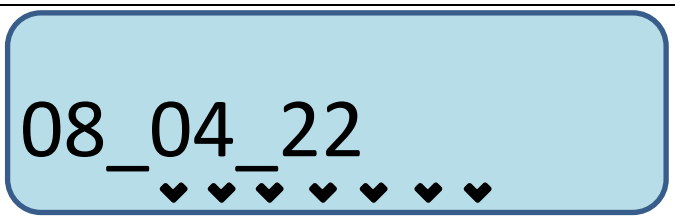
Section 17.1 of the Software Manual describes in detail this functionality. Note that valid samples of DP require a flow rate higher than 30% of maximum flow rate for the meter. There might be days when this condition is not met.

If selected using the MCUT software, the following parameters are available on the display:

- Average DP value from valid samples.
- Average flow rate corresponding to DP samples
- Average line pressure corresponding to DP samples
- Average line temperature corresponding to DP samples
- Date of occurrence

The display shows the latest daily results, however earlier results are logged and available for download using the MCUT.

Note: All of these parameters can be viewed on the LCD by pressing the scroll button. When all the chevrons are blinking, this indicates the latest DP Test Results.

Average value of valid DP samples	
Average Flow rate	
Average Line Pressure	
Average Line Temperature	
Date of recording of daily log	

6.7 Pulse Outputs

There are 3 user configurable and isolated Form-A pulse outputs (uncorrected, corrected and fault), and 2 ground terminals. These ground terminals are isolated from the other ground terminals of the IMCW2. Each output is an open drain connection capable of sinking 10mA and withstanding up to 15 Volts (5 Volts max. above +40°C or +104°F). An external "pull up" resistor or current source is normally required to ensure that the circuit will function correctly. The significance of the pulse outputs is operator configurable using the User Terminal software and may be set independently for uncorrected and corrected volume to 0.1 / 1 / 10 / 100 / 1000 as required by the operator and as defined by meter type.

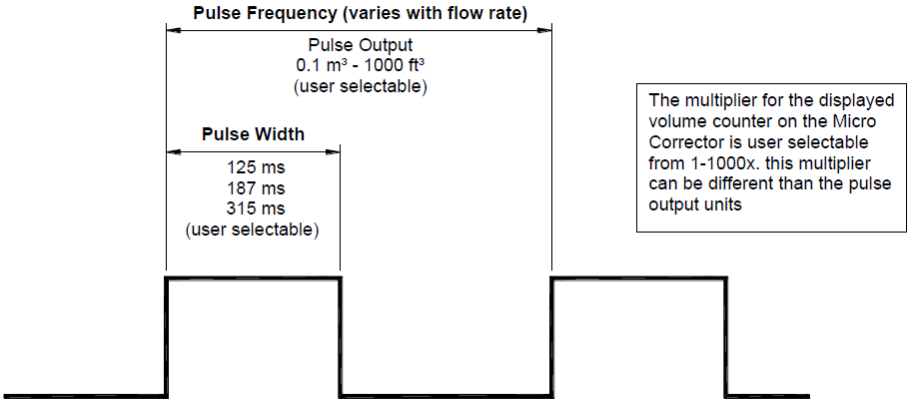
The Pulse outputs are connected to a terminal block (TB3) mounted internally and by default provide:

- Uncorrected volume pulses.
- Corrected volume pulses.
- Fault / Alarm indication

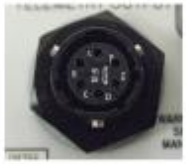
The uncorrected and corrected outputs are isolated from each other (via GND1 (uncorrected) and GND2/3 (corrected). The fault output shares the GND2/3 ground terminal with the corrected output.

Refer to the Software Manual, section 6.3 (Volume Configuration) for changing pulse output configuration and other setup.

The "ON" duration of the pulses at outputs 1 and 2 may be configured by the user to 62.5mS, 125mS, 187mS or 315mS to suit the driven equipment. The Fault/Alarm (when configured) indication will pulse at approximately 1Hz when a Fault condition is present. Fault/Alarm output can be configured as latched High or Low voltage level, using the MCUT software.



The options for pulse output connection types on the IMCW2 are shown below:



Circular

Conduit Plug

Conduit with Cable

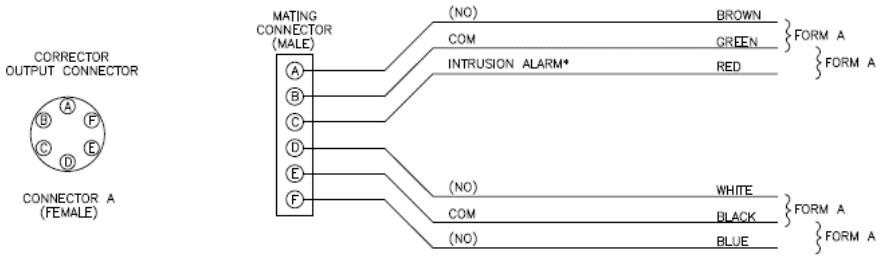
Cable Gland
no cable

Cable Gland
with cable

Example of a Cable Gland and Military Style Circular Connector

This is the "**standard**" wiring diagram for the circular pulse output connector.

- Pulse Output 1 (brown) - Pin A
- GND 1 (green) - Pin B
- GND 3 (red) - Pin C
- Pulse Output 2 (white) - Pin D
- GND 2 (black) - Pin E
- Pulse Output 3 (blue) - Pin F



* IF INSTALLED. OTHERWISE, IT'S CONNECTED TO COM (GREEN)

FIRMWARE VERSION	WIRE COLOR AT TB3					
	BROWN	GREEN	RED	WHITE	BLACK	BLUE
1.6X	UNC	COM	COM/ INTRUSION*	COR	COM	FAULT/ ALARM
1.82– 1.86	UNC	COM1 (UNC)	COM1	COR	COM2 (COR,FLT)	FAULT/ ALARM
1.87– 1.89	OUT1	COM1 (OUT1)	COM1	OUT2	COM2 (OUT 2,3)	OUT3
1.90+	PULSE OUTPUT1	GND1	GND1	PULSE OUTPUT2	GND2/3	PULSE OUTPUT3

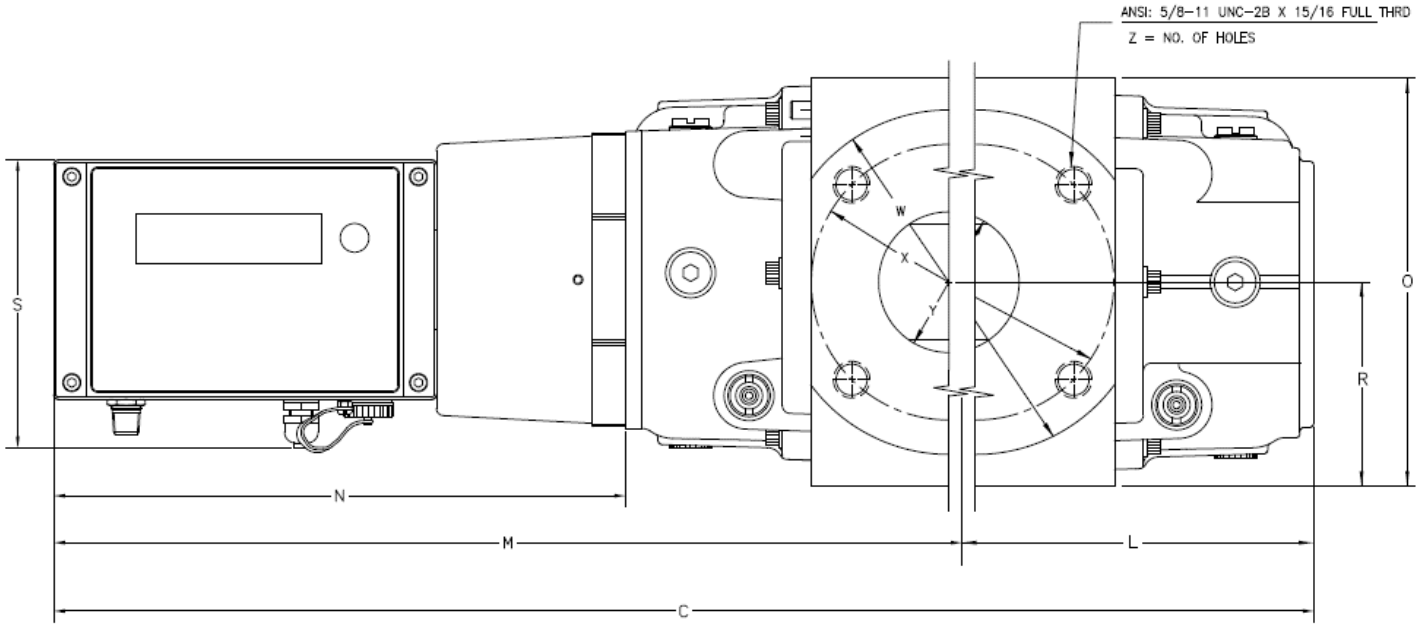
Note: Dresser™ also provides "**custom**" wiring so your wiring may differ from the "standard" diagram shown above.

6.8 Meter Dimensions

MODEL		DIMENSIONS								
		UNIT	C	L	M	N	O	P	R	S
2M	G40	IN	19 39/64	5 21/32	14	8 45/64	6 31/32	6 3/4	3 31/64	4 11/16
		mm	498	144	355	221	177	172	88,5	119
3M	G65	IN	20 27/32	6 1/4	14 39/64	8 45/64	6 31/32	6 3/4	3 31/64	4 11/16
		mm	529	159	371	221	177	172	88,5	119
5M	G100	IN	23 45/64	7 11/16	16	8 45/64	6 31/32	6 3/4	3 31/64	4 11/16
		mm	602	195	407	221	177	172	88,5	119

MODEL		DIMENSIONS									
		CAPACITY	UNIT	C	L	M	N	O	P	R	S
7M		7,000 cfh	IN	23 25/64	6 1/2	16 57/64	8 45/64	8 7/8	9 1/2	4 7/16	4 11/16
		200 m^3/h	mm	594	165	429	221	225,4	241,3	112,7	119
11M		11,000 cfh	IN	26 31/32	8 9/32	18 45/64	8 45/64	8 7/8	9 1/2	4 7/16	4 11/16
		310 m^3/h	mm	685	211	475	221	225,4	241,3	112,7	119
16M	G250	16,000 cfh	IN	31 21/32	10 5/8	21	8 45/64	8 7/8	9 1/2	4 7/16	4 11/16
		450 m^3/h	mm	804	270	534	221	225,4	241,3	112,7	119

MODEL	DIMENSIONS										
	CAPACITY	UNIT	C	L	M	N	O	P	R	W	X
23M 175	23000 cfh	IN	32 48/64	12 1/4	19 61/64	8 45/64	18	16	9	11	9 1/2
	651 m^3/h	mm	833	311	507	221	457	406	229	279	240
38M 175	38000 cfh	IN	38 13/64	14 31/32	22 45/64	8 45/64	18	18	9	11	9 1/2
	1076 m^3/h	mm	971	380	577	221	457	457	229	279	240
56M 175	56000 cfh	IN	41 39/64	16 31/32	24 3/8	8 45/64	18	21	9	13 1/2	11 3/4
	1586 m^3/h	mm	1057	431	619	221	457	533	229	343	295



(IMCW2 and Meter Dimension Considerations)

6.9 Serial Port

The IMCW2 is fitted with an external 7 pin screw locking DIN connector for the serial port connections. Logic levels are 5 – 12V into the IMCW2 with a 5V nominal output from the IMCW2 (RS232 / RS232C levels).

Serial communication cable – Dresser™ Part Number 057135-001 and USB to Serial Port Adapter Kit – Dresser™ Part Number 060506-000 can be used to communicate via a PC to the IMCW2.

A serial port is used to connect modems for remote communications. The serial port can be used for proving a meter with an IMCW2 installed.

- Output pulses from volume sensor characterizing gas meter body accuracy – pin 3 on serial connector
- Uncorrected output pulses from IMCW2 – pin 2 on serial connector, if IMCW2 is in “Prove Mode”
- Corrected output pulses from IMCW2 – pin 5 on serial connector if IMCW2 is in “Prove Mode”

Note: GND is available on pin 7 on the serial connector.

Refer to section 8 in this manual for Volume accuracy measurement.

6.10 Display Scroll Button

The IMCW2 is equipped with a single scroll button. It is located on the front face of the enclosure in older versions of the product, or on the left side of the front enclosure in newer versions of the IMCW2. The scroll button can be used for the following:

- Scrolling through the parameters shown on the display

Note: Parameters to be displayed are selectable using the MCUT software.

- Clearing occurred faults and alarms
- Resetting the installation date for your new Lithium Battery pack
- Saving corrected and uncorrected actual volume into memory
- Resetting the value of Peak Uncorrected Flow Rate shown on display

Older front button

New side button

6.10.1 Clearing occurred faults and alarms

Occurred faults and alarms can be cleared with both the User Terminal software and with the scroll button. Faults and/or alarms can be cleared if the bell icon on the display is blinking. Clearing faults and alarms with the scroll button is recorded in the audit log and is date/time stamped.

Procedure for clearing occurred faults and alarms using the scroll button:

- Scroll to the test screen which is scrolling 8's

- Wait for the message "CLr FLt" to appear on the display and then push the scroll button to clear the faults/alarms.

Indication on display that occurred faults/alarms can be cleared using the scroll button	

6.11 Display

The display is permanently active and operational over the temperature range -40°C to 60°C (-40°F to 140°F).

Depending on the model option chosen and the operator's configuration of the unit, the front panel selector button enables the IMCW2 to display the following parameters:

- Corrected Volume
- Uncorrected Volume
- Flow Rate
- 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 – 3 additional parameters connected with Daily Consumption can be selected from the following 7 options:
  - Accumulated Corrected Volume previous day,
  - Accumulated Corrected Volume current day,
  - Accumulated Corrected Volume previous month,
  - Accumulated Corrected Volume current month,
  - Highest daily volume in the previous month,
  - Highest daily volume in the current month,
  - Date of last consumption alarm
- Maximum peak flow
- Differential pressure result***
- Gas composition****

Refer to Appendix B for examples of each screen.

*Only available if the IMCW2 is fitted with a gauge line transducer
** IMCW2's with a DP transducer fitted will show Differential Pressure in the Meter Size position. Meter Size is displayed on an alternate screen.
*** Only available for IMCW2-DP
****Only available for firmware version 6.0.0 and higher.

It is possible to specify which parameters are displayed on the LCD and which parameter is displayed by default. When shipped, the IMCW2 will display all parameters with the Corrected Volume being default.

In alarm/fault conditions a message is displayed on the LCD indicating the nature of the alarm or fault – refer to Appendix.

6.12 Memory

The IMCW2 has non-volatile memory and upon battery failure, will retain all the totals obtained within the last hour of operation and all set up data. These will be available and ready for use as soon as power is restored.

Data logs (order dependent) are continually stored in the memory; the total number of logs depends on the configuration of both the log parameters and logging periods; a data log may contain any of the following information:

- Corrected Volume
- Uncorrected Volume
- Correction Factor
- Uncorrected Volume Under Fault
- Average Corrected Flow Rate
- Peak Corrected Flow Rate
- Supercompressibility
- Minimum Pressure
- Maximum Pressure
- Average Pressure
- Ending Pressure
- Minimum Temperature
- Maximum Temperature
- Average Temperature
- Ending Temperature
- Battery Voltage
- Average Monitor/DP Pressure (IMCW2 with Monitor/DP transducer)
- Minimum Monitor/DP Pressure (IMCW2 with Monitor/DP transducer)
- Maximum Monitor/DP Pressure (IMCW2 with Monitor/DP transducer)

For further information regarding the data logs consult the IMCW2 User Terminal Handbook.

6.13 Internal Power Supply

The IMCW2 is powered by an internal alkaline (nominal life of 5 years) or optional lithium (nominal life of 12 years) battery pack. The actual length of the battery life will depend on the conditions of use. The state of the battery is monitored, and a low battery alarm is given at least 2 months before the batteries are exhausted. It is recommended that the front panel selector button is pressed before changing the battery (see section 9.1(Replacing the Battery Pack)).

Short term power is supplied via super capacitors to allow the unit to continue to function during battery replacement.

Note: Change battery type and clear any faults or alarms in MCUT application.

Alkaline Battery Pack

Lithium Battery Pack

7 Configuration Protection

7.1.1 USA Configuration

All measurement parameters can be configurated using the serial communications cable and the MCUT software. Password protection is applied to these parameters. Such protection is called software protection.

7.1.2 Canadian/EU Configuration

Note: To comply with Canadian/EU Regulations the IMCW2 is designed with a Hardware (physical jumper) protection link which allows a Read-Only style of communication between the operator's computer and the IMCW2.

The protection link is shipped in the Read/Write position but can be switched to the Read-Only position. When in the Read-Only position it is not possible to make changes to the measurement parameters without physically breaking a seal. Initial set up and configuration of the IMCW2 will require the protection link to be placed in the Read/Write position, refer to section 7.1.4 (Setting the Read/Write Hardware Protection Link).

7.1.3 Hybrid Configuration Protection

Note: To comply with Canadian/EU regulations the IMCW2 can be configured so selected metrological parameters are protected with software password protected with the hardware link.

IMCW2 Model Options Reference Table

IMCW2 Model	Line Transducer Range and Mounting Type	Pulse Options	Factory Configuration Options
PTZ + Log	2 Bar/30 PSI Gauge/Absolute Internal and External	Single/Dual Circular or Cable Gland or Single Conduit Type Connections	Password Protection Canadian/EU W & M Link Trim Table Enable/Disable
	12 Bar/180 PSI Gauge/Absolute Internal and External		
	100 Bar/1480 PSI Gauge or Absolute - External		
PZ + Log	Same transducer ranges as available for PTZ + Log	Single/Dual Circular or Cable Gland or Single Conduit Type Connections	Password Protection Canadian/EU W & M Link Trim Table Enable/Disable
T + Log	Not applicable	Single/Dual Circular or Cable Gland or Single Conduit Type Connections	Password Protection Canadian/EU W & M Link Trim Table Enable/Disable
PTZ + Log-dp	2 Bar/30 PSI Gauge/Absolute External Mounting Only	Single Circular, Cable Gland, or Conduit Type Connections	Password Protection Canadian/EU W & M Link Trim Table Enable/Disable
	12 Bar/180 PSI Gauge/Absolute External Mounting Only		
PZ + Log-dp	Same transducer ranges as available for PTZ + Log-dp	Single Circular, Cable Gland or Conduit Type Connections	Password Protection Canadian/EU W & M Link Trim Table Enable/Disable
T + log-dp	Not Applicable	Single/Dual Circular or Cable Gland or Single Conduit Type Connections	Password Protection Canadian/EU W & M Link Trim Table Enable/Disable

Hardware Protection with physical Jumper

Links on the main IMCW2 board allow for specific functionality. They are usually installed during factory configuration.

If the IMCW2 is factory configured for hardware protection of metrological parameters, then three positions LK2 control functionality.

- R/W (Read/Write) position, possibility to change value of metrological parameters,
- RO (Read Only) position, no possibility to change value of metrological parameters.

This is applicable to all versions of boards.

The Advanced Tab on the User Terminal Software - the "Digital Input/Output" section, allows for the selection of following functionality. For further information refer to the MCUT Software Manual.

1. Default setting "External Power"
   a. The IMCW2 can be powered by an external power source with voltage between 5[V] and 6[V].
   b. No extra links required (LK11 or LK12)
2. Default setting "External Power" and one position LK12 installed – the IMCW2 can power an external device (e.g., sensor from its battery pack through 100k resistor)
3. Setting "Digital Input"
   a. No extra link required (LK11 or LK12)
4. Setting "Consumption Alarm Output" or "Meter Lockup Output"

   One position link LK11 must be installed.

   Two positions Links LK13 and LK14 must be installed in "W" position.

   If an alternative volume sensor is used, then:

   - Two positions - Links LK13 and LK14 must be installed in the C position,
   - One position - Links LK15 and LK17 must be installed.

7.1.4 Setting the Read/Write Hardware Protection Link

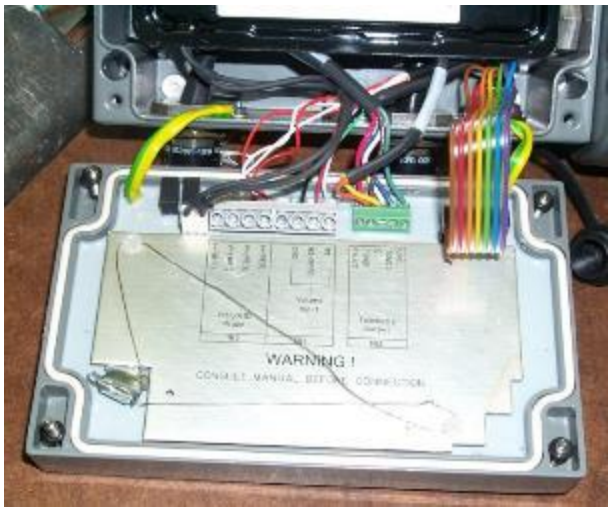
Note: If the IMCW2 is fitted with a hardware-protection jumper and operator configuration is required, the unit's Read/Write link will need to be switched to the Read/Write position.

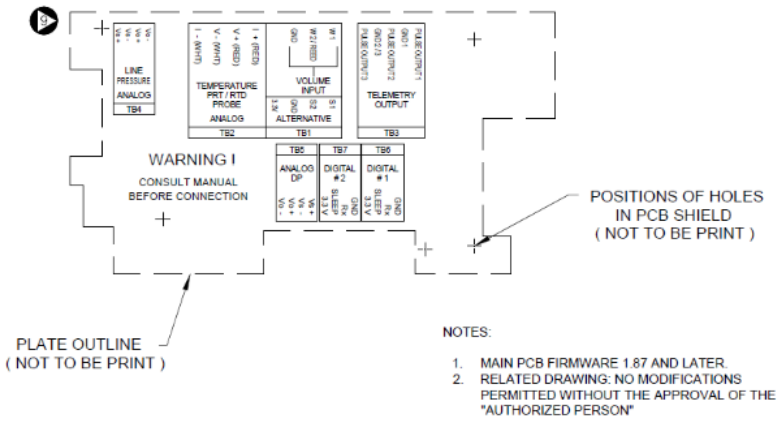
To set the Read/Write link:

1. If the IMCW2 is in a hazardous area the setting of the Read/Write Hardware Link should NOT be carried out as the PCB protection plate is removed. The set-up procedure should be carried out prior to installation.

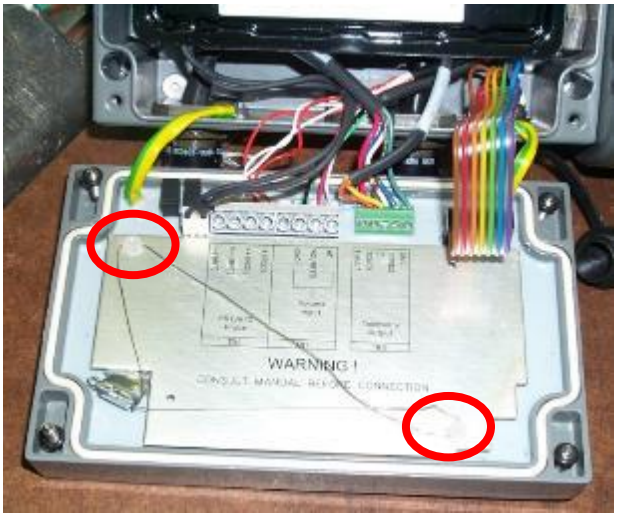
2. Remove the 4 screws securing the IMCW2 front using the supplied 3mm hexagon wrench (Allen key).

3. Lift the front panel forward to expose the Board Protection Plate that covers the main circuit board.





4. Remove the 2 Board Protection Plate retaining screws (breaking the Wire seal).



5. Identify the Read/Write protection link; remove it from the Read-Only position and replace it in the Read/Write position.

R/W = Read Write

6. The necessary parameter changes can now be carried out via the User Terminal software (for further information consult the IMCW2 User Terminal Software Manual).

7. Once the necessary parameter changes have been uploaded to the unit remove the Read/Write link from Read/Write position and replace in the Read Only position.

RO = Read Only

8. Replace the 2 Protection Plate retaining screws. Any required seal must be replaced by the appropriate authority before re-closing the unit.

9. The IMCW2 front panel should be mated to the case checking that no wiring is pinched between the panel and body.

10. Reinstall the 4 front panel fixing screws and tighten these by hand until all screws are started. The use of anti-seizing compound is recommended.

11. Carefully hold the front panel against the body to form the seal and tighten the 4 securing screws using a 3mm hexagon wrench (Allen key).

8 Volume Accuracy Measurement

8.1 Volume Accuracy Measurement using Pulse Outputs

Any prover e.g., bell prover or transfer prover that accepts volume pulses can be used to prover test the uncorrected volume accuracy of a meter with an IMCW2 installed. This is the combined uncorrected volume accuracy of both the gas meter and IMCW2.

Some provers – such as the Dresser™ Model 5 and Model 6 Transfer Provers - can test the combined corrected volume accuracy of the gas meter and IMCW2.

There are also certain test fixtures available that simulate the gas meter, sometimes called volume testers. Such fixtures evaluate only the accuracy of the IMCW2 uncorrected and corrected volume.

The volumetric value of output pulses in normal operation can be high and the volume registers are checked by firmware periodically and volume pulses can be generated in bursts. For those reasons, the accuracy test using this method could be long. The IMCW2 offers the option of "Proving Mode" that allows for a decrease in prover test time. For further information refer to section 10.2 (Prover Mode) in the MCUT Software Manual.

If the MCUT is used to set the IMCW2 in "Proving Mode," then the display indicates the following:

Indication on display after IMCW2 is set in Proving Mode using the MCUT	ProvE 60

Dresser™ offers both hardware and software allowing for an automated accuracy test from telemetry output pulses in "normal" and "proving" modes. For further information refer to the following Dresser™ publications:

- For the Dresser™ Model 5 Transfer Prover - Installation/Operation/Maintenance Manual IOM: Smart Prove
- For the Dresser™ Model 6 Transfer Prover - Dresser™ Model 6 Prover Operation and Maintenance Manual.

8.2 Volume Accuracy Measurement using the Serial Port

Dresser™ also offers hardware and software allowing for automated accuracy test from serial port connector in "Proving Mode". For further information refer to the following Dresser™ publications:

- For the Dresser™ Model 5 Transfer Prover - Installation/Operation/Maintenance Manual IOM: Smart Prove
- For the Dresser™ Model 6 Transfer Prover - Dresser™ Model 6 Prover Operation and Maintenance Manual.

If the Smart Prove hardware kit (*Dresser™ Part Number 058860-100*) is used to automatically set the IMCW2 in "Proving Mode," the display indicates the following:

Indication on display after IMCW2 is set in Proving Mode using the Dresser™ Smart Prove Cable	ProvE --

Note: Testing only the accuracy of the basic meter using pulses from the IMCW2 volume sensor does not require entering “proving mode”. These pulses are often called high frequency (HF).

9 Maintenance

There is no requirement for routine maintenance of the IMCW2. A pressure check may be performed by applying a known test pressure to the pressure transducer and reading the pressure value from the front panel display of the IMCW2. The error as a percentage of reading should be calculated as follows:

$$100 \times ((P_{ind} - P_{true}) / P_{true})$$

Where P_{ind} is the indicated pressure reading on the display and P_{true} is the known measured pressure. Any difference should be less than 0.7% or such other value defined by local Weights and Measures requirements (for P_{true} higher the 20% of full scale). If this value is exceeded, please contact Dresser™ for further information so that the cause of the inaccuracy may be investigated. For further details, refer to section 9.2 (Pressure Transducer Recalibration). The temperature calibration may also be performed by immersing the temperature probe into a container of liquid of a known temperature. For further details, refer to section 9.4 (Temperature Sensor Recalibration).

9.1 Replacing the Battery Pack

Note: In line with our Intrinsic Safety Certifications (section 3), the IMCW2 must only be powered by an approved Dresser™ battery pack, refer to approvals stated in a subsequent section of this manual.

If the low battery indication is active, the battery pack should be changed within the next 2 months. Beginning with firmware version 3.0.0 and MCUT Version 5.0.0.0, remaining battery life is indicated on the Live Data screen.

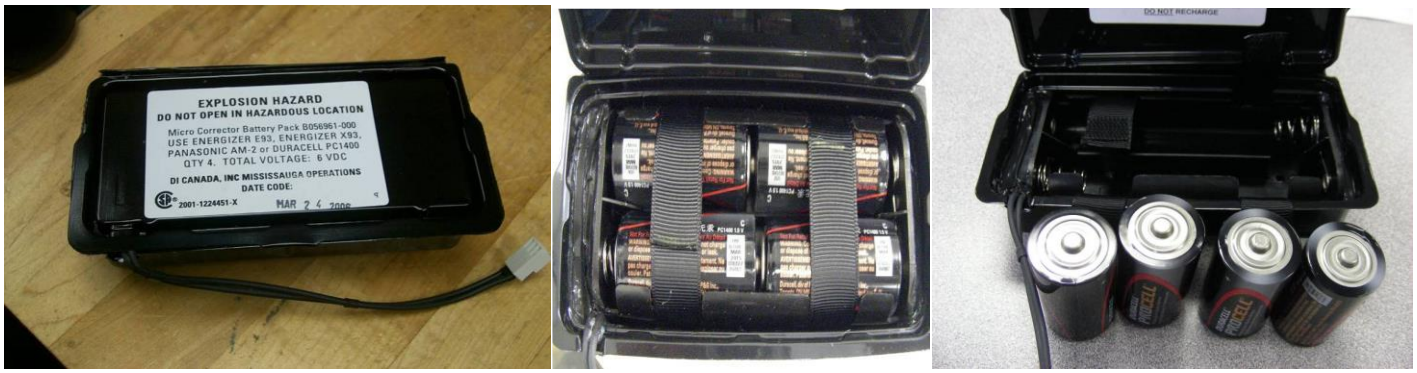
Discharged packs/cells should not be left inside the IMCW2, as discharged cells are more prone to leak than are new or partially used cells. If the IMCW2 is to be stored for any length of time, the battery pack should be removed and stored separately.

If the internal battery voltage is low, the battery icon will be displayed when the front panel button is pressed. The icon will be present until the display test is selected, or the default corrected total display is set or the battery voltage rises above the low threshold.

Note: The low battery fault latch will only be set when the battery voltage has been low for 24 consecutive hours.

Sealed Alkaline Pack

Sealed Lithium Pack



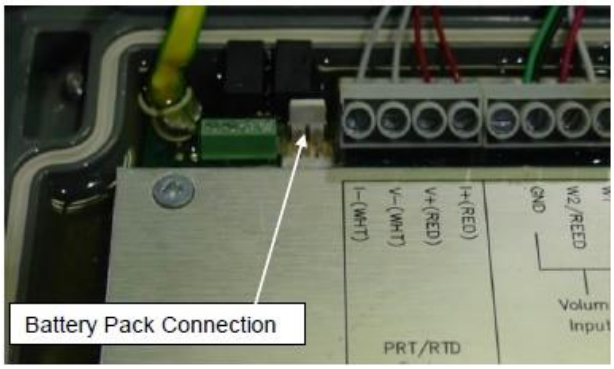
Replaceable Alkaline-Cell Pack

Before replacing the battery pack press the front panel selector button on the IMCW2. This operation ensures that the latest corrected and uncorrected totals are stored in the permanent memory of the IMCW2. Super capacitors will maintain normal operation of the unit during battery replacement. For protection against static damage, it is essential that anti-static precautions are taken when the IMCW2 is opened.

The battery pack affects the intrinsic safety approval of the IMCW2 and must be replaced with the correct Dresser™ battery pack. To replace the battery pack:

1. Press the front panel selector button on the front of the IMCW2.
2. Unscrew the 4 screws holding the front panel of the IMCW2 using a suitable Allen wrench.

3. Unplug the battery connector from the main circuit board mounted behind the front panel.



4. Use a screwdriver to remove the 4 screws (and 4 washers) holding the battery pack.
5. Remove the old battery pack.

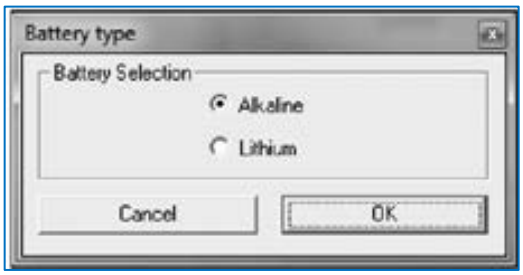
6. Place the new battery pack in to position and replace the 4 screws and 4 washers.

7. Plug the new battery pack into the main circuit board, such that the battery plug engages correctly with the connector locking ramp on the circuit board.

8. Confirm that the IMCW2 displays the default parameter of the LCD, and that normal operation has resumed.
9. Carefully replace the front cover so that the battery lead and other wires are not trapped between the back enclosure and front panel.
10. Replace and retighten the screws in a criss-cross pattern, holding the front panel.

Note: Observe any local regulations on disposal of the battery pack.

Note: If the battery is changed then be sure to change the battery type (alkaline or lithium) by connecting with serial cable and MCUT application.



Battery Type Selection in MCUT Software

9.2.1 New Lithium Battery installation – procedure to reset remaining battery life with Scroll Button on Firmware Version 3.0.0 or higher

If a lithium battery pack is replaced, the operator must reset the installation date of the battery pack. Refer to the MCUT Software Manual, section 15.3 for further information.
Requirement: Indication of “Battery Voltage” must be selected on display.
Condition for replacement: “Low voltage threshold” or “Critical voltage threshold” was reached.

The low voltage threshold or critical voltage threshold can be reached if:

- Lithium battery pack 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 trigger two icons (battery and bell) to blink on the display of the corrector and the message displayed on the LCD is as follows:

Low Battery fault on display	

If the battery voltage drops even further, eventually a message prompting the user to replace the battery is displayed:

Message prompting the user to immediately replace the battery pack	

Note: If the battery pack is disconnected and the IMCW2 is powered only from the super-cap, the voltage constantly drops. Eventually the voltage will be below 5 [V] and two icons will start to blink on the display. The IMCW2 has now reached "Critical voltage threshold". The following process should be followed for battery pack replacement.

- Replace the lithium battery pack
- Scroll to the Battery Voltage" display indication
- Check to see if the battery voltage indicated is above 5.55 [V]
- Hold the scroll button down for 10 seconds and the following will appear on the display:

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

Note: If a new Alkaline Battery is installed – installation date does not be set as "Remaining Battery Life" and indications on display are based on battery voltage (firmware 3.0.0 or above).

9.2 Internal Operation Fault

The IMCW2 firmware monitors the operation of the microprocessors located on the main board. If a problem with microprocessor functionality is detected, then an "Internal Operation" fault is set

Internal Operation fault indicated on display	

This fault is also set when power supply interruption occurs e.g., when the battery pack is replaced. If a new battery pack is installed, the "Internal Operation" fault disappears from the display and is shown as "occurred" on the Live Data screen. This fault can be cleared by using the User Terminal software or via the scroll button.

If an "Internal Operation" fault is present on the display and does not disappear after the new battery pack is connected, then the IMCW2 should be removed from service.

9.3 Pressure Transducer Calibration

Recalibration of the pressure transducer should not be required. However, the IMCW2 may be pressure calibrated by the operator, using the serial port of the IMCW2 and the User Terminal software. It is possible to calibrate either the zero only or both the zero and the span.

Note: During the pressure calibration process multiple pressure readings are automatically compared over a period to ensure that the readings are stable. If the readings are not stable, the calibration process will not be successful

For further details regarding the pressure calibration refer to the IMCW2 User Terminal Software Manual

9.4 Temperature Calibration

Temperature recalibration should not be required. However, the IMCW2 may be temperature calibrated by the operator, using the serial port of the IMCW2 and the User Terminal software.

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. As an alternative use a vacuum flask filled with liquid which is well stirred and place the temperature probe and calibrated thermometer in this.
2. Simulate the temperature probe using a calibrated resistance box set to values corresponding to 2 different temperatures. If this option is chosen, then the temperature probe must be disconnected from the IMCW2, and the resistance box must be connected as a 4-wire resistor in its place.

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

For further details regarding the temperature calibration refer to the IMCW2 User Terminal Software Manual.

9.5 Restoring Factory Defaults

It is possible to restore the factory defaults for calibrated pressure and temperature using the MCUT software.

9.6 Service

Replacement of any IMCW2 components is subject to local metrology authority approvals.

Any IMCW2 build with a main board version 20 or higher allows for replacement of:

- Volume sensor (mag-pickup)
- Temperature sensor
- Battery pack

Additionally, any IMCW2 build with a main board version 21 or higher, in addition to those components mentioned above, also allows for replacement of:

- Line pressure transducer if the transducer is digital
- DP/monitor pressure transducer if the transducer is digital

Any IMCW2 build with main board version 22 or higher, allows for the replacement of all digital transducers.

NOTE: Repair of the circuit board itself should not be attempted as this may invalidate I.S. approval of the product.

9.7 Replacing Sensors and Components

Service should only be performed by a person competent and knowledgeable about installation of intrinsically safe equipment and totally conversant with the National Code of Practice.

For protection against static damage, it is essential that anti-static precautions are taken when the IMCW2 is opened for installation or maintenance.

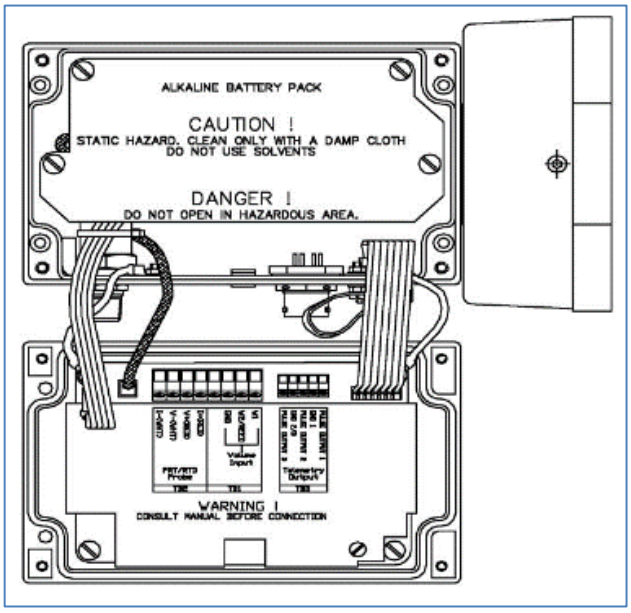
9.7.1 Location of the Connection Terminals

When the IMCW2 enclosure is opened, the location of the connection terminals will appear as in the figure below.

1. Remove the 4 screws securing the IMCW2 front panel using the 3mm hexagon wrench (Allen key) supplied.
2. Lift the front panel forward to expose the PCB protection plate.
   Carry out the electrical installation as required:
   - Volume Input (TB1)
   - Temperature Measurement (TB2)
   - Pulse Output (TB3)
3. When complete, the IMCW2 front cover should be replaced and secured.
4. Ensure that no wiring is trapped between the cover and body prior to reinstalling the front cover.
5. Reinstall the 4 front panel mounting screws and tighten these a little by hand until all screws are started. Use of anti-seize compounds is recommended.

Note: If the case is to be wired and sealed by the Weights and Measures authority, the 4 spacers supplied should be fitted under each head of the lid securing screws so that the wiring holes are accessible when the screws are fully tightened.

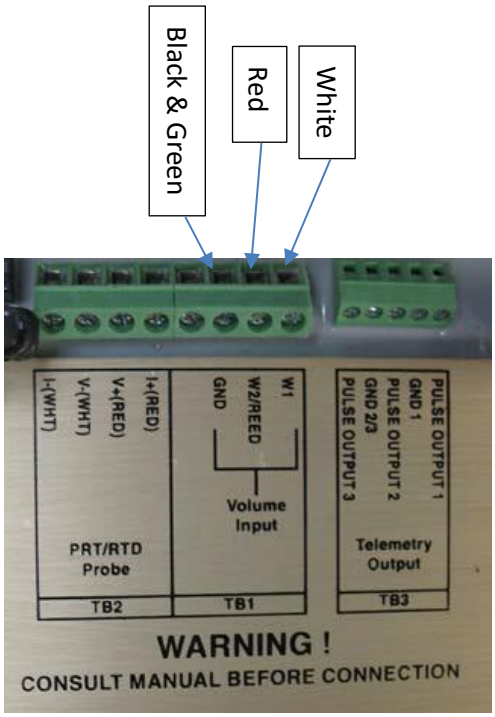
6. Carefully hold the front cover against the body to form the seal and tighten the 4 securing screws using a 3mm hexagon wrench (Allen key). Ensure that cables are not trapped in the lid seal.



Location of the Connection Terminals for board versions 20 and older

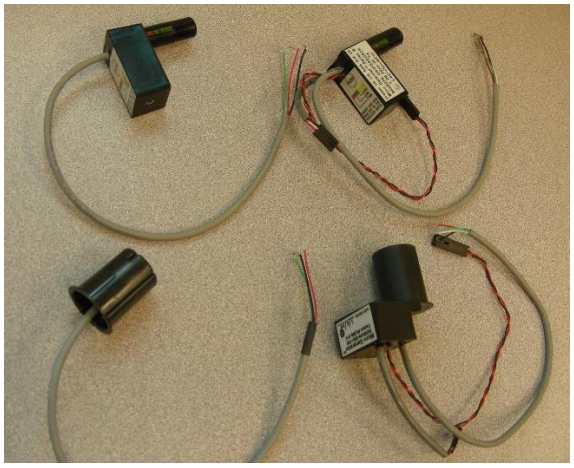
9.7.1.1 Volume Input (TB1)

The magnetic volume pickup should be connected to the W1, W2/REED and GND Volume Input terminals of TB1, as shown below:



Volume Input Connections (TB1)

Series B – Old style



Series B – Micro Generator

Series A – Old style

Series A – Micro Generator

Series B – New style

Series A – New style

9.7.1.2 Temperature Measurement (TB2)

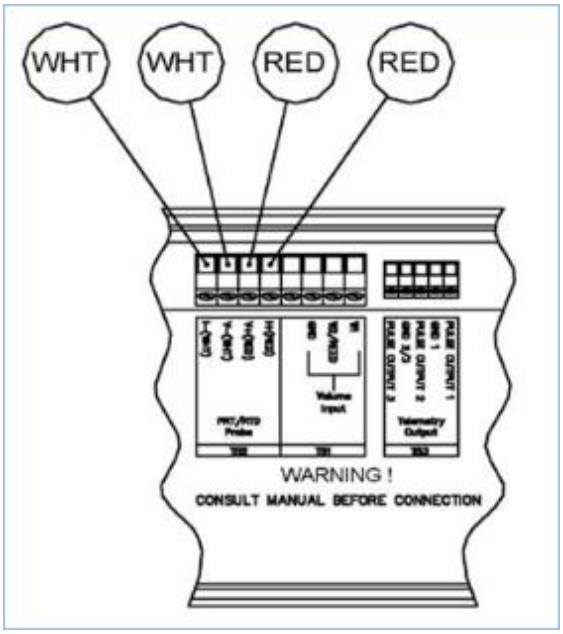
Measurement of temperature in the IMCW2 can be performed by using either an analog or digital temperature probe - dependent on the board revision level.

9.7.1.2.1 Temperature Measurement (TB2) - Analog Temperature Probe PRT/RTD

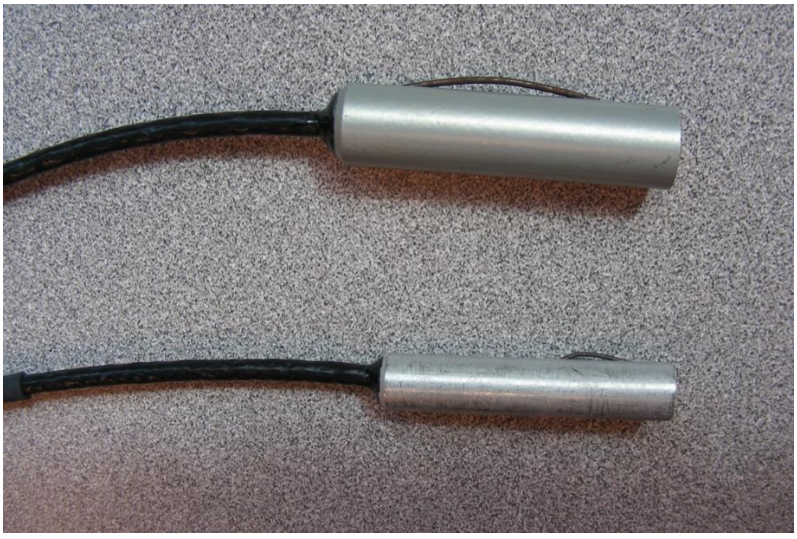
The temperature measurement is accomplished via an analog temperature probe in board revision 21 and older. Current is injected through a pair of connections and the voltage measured across the other pair.

The wires should be connected to the PRT/RTD Probe terminals of TB2, as shown below (Temperature Probe Connections).

There are 2 pairs of wires which are essentially connected directly together inside the probe. A wire from each pair must be connected to the "I" terminals and the other wire from the same pair to the corresponding "V" terminal.



Analog Temperature Probe Connections (TB2)

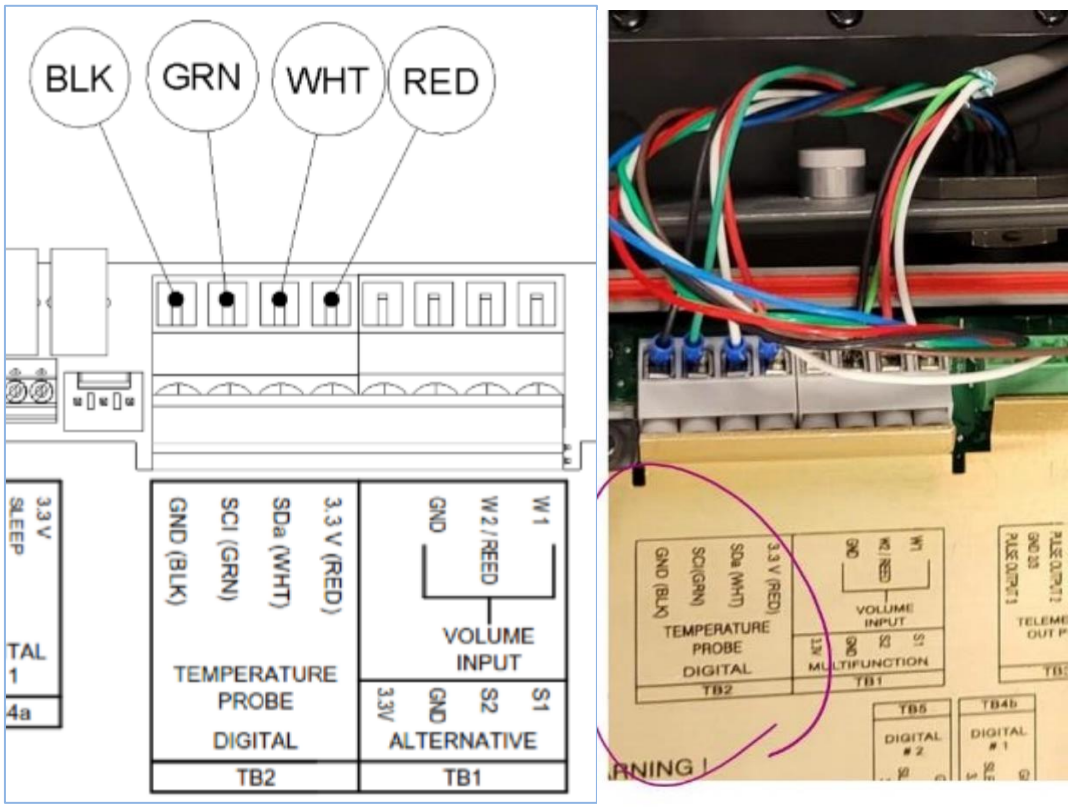


Analog Temperature Probes for Dresser™ Series A (top) and Series B Meters (bottom)

9.7.1.2.2 Temperature Measurement (TB2) – Digital Temperature Probe

The temperature measurement is accomplished via a digital temperature probe starting in board revision 22.

The wires should be connected to the TB2 terminal, as shown below (Digital Temperature Probe Connections).

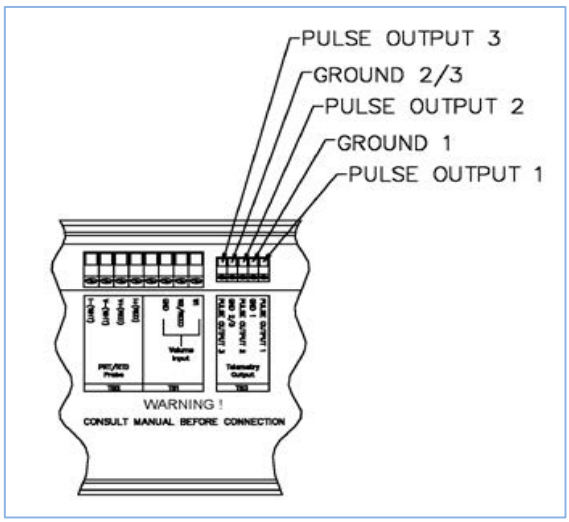


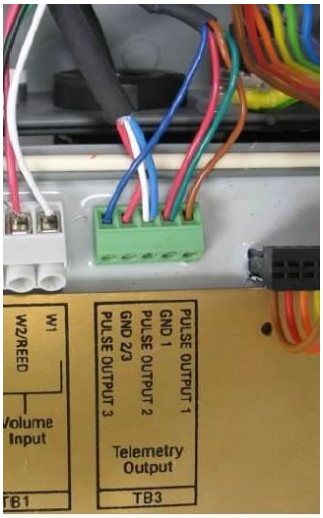
Digital Temperature Probe Connections (TB2)

Digital Temperature Probe for Dresser™ Series A and Series B Meters

9.7.1.3 Pulse Output (TB3)

The diagram below [Pulse Output Connection (TB3)] shows the connections for the pulse output. Any connections to this terminal must follow CSA approval drawing 061293-000. Other Dresser™ approved products, such as the Chatterbox (isolation unit) may be connected to the pulse outputs. Any equipment connected to the pulse output must be individually assessed to ensure that the system is safe. The Dresser™ will not take responsibility for the overall safety of the system.





Pulse Output Connections

Note: Connection of output pulses is the same for board revisions 20, 21 and 22.

9.7.1.4 Line Pressure Measurement

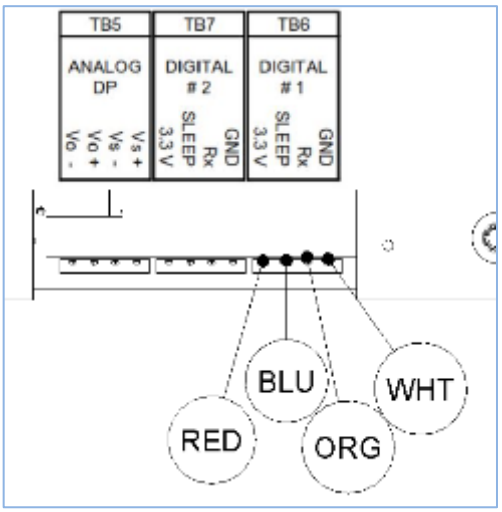
Line pressure is measured by an analog pressure transducer up to board revision 20, by either an analog or digital line pressure transducer for board revision 21, and a digital pressure transducer for board revision 22 or higher.

9.7.1.4.1 Analog line pressure transducer in board revision 20 and 21

The analog line pressure transducer is connected to the (TB4) terminal. Usually, this connection is permanent. The calibration of the analog pressure transducer is stored in memory located on the main board. The replacement of this transducer requires re-calibration and therefore it is not possible for the end user to replace it.

9.7.1.4.2 Digital line pressure transducer in board revision 21

The digital line pressure transducer is connected to (TB6), refer to the diagram below.

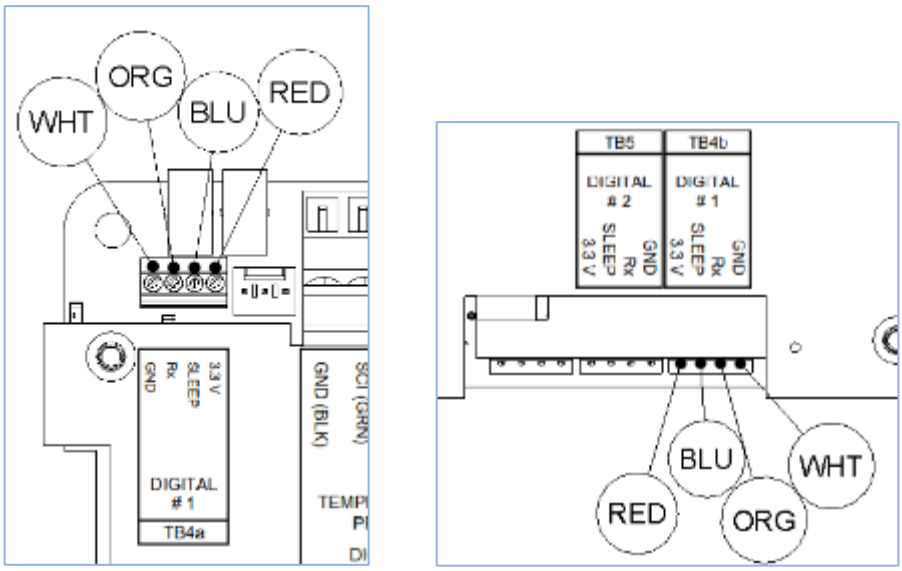


Digital line pressure transducer connection in IMCW2 board revision 21

Note: Some digital transducers have an additional black wire. It shall be connected to GND (or left unconnected).

9.7.1.4.3 Digital line pressure transducer in board revision 22

The digital line pressure transducer is connected to either terminal block (TB4) or (TB4a) – refer to the drawing below. Terminal block (TB4a) is covered by the plate and disconnecting/replacing line pressure transducer can be performed only if the plate is removed. This allows for the placement of the hardware metrological seal.



Digital line pressure transducer connection in IMCW2 board revision 21

Note: Some digital transducers have additional black wire. It shall be connected to GND (or left unconnected).

9.7.1.5 Differential/ Monitor Pressure Measurement

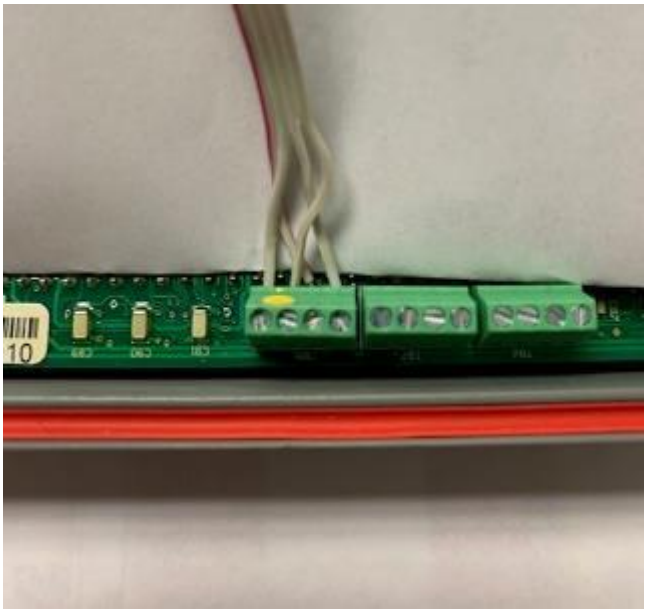
The differential pressure transducer is used for gas meter health diagnostics and the monitor pressure transducer is used for sensing line pressure – for example, sensing line pressure ahead of the regulator. Neither of these sensors are used for billing purposes. Generally, the IMCW2 will have both a line pressure transducer and a differential pressure or monitor pressure transducer, however, gas meter health diagnostics are available for T-only correctors as well.

The IMCW2 uses analog differential/monitor pressure transducers up to board revision 20, analog or digital differential/monitor pressure transducers in board revision 21, and only digital sensors starting with board revision 22.

Calibration of these analog pressure transducers is stored in memory located on the board. Replacing these transducers requires re-calibration and therefore it is not possible for end users to replace them. Terminal block (TB5) is used to connect analog transducers during manufacturing of the IMCW2, with board revisions 20 or 21.

9.7.1.5.1 Differential/Monitor Pressure Measurements with Analog Pressure Transducer

IMCW2 board revision 20 has terminal block (TB5) designated for connection of analog Differential or Monitor Pressure transducers. Connection/replacement of these transducers cannot be performed by the end user, as the transducer calibration is saved on the main board. Markings on how to connect these transducers are not included on the cover plate. If for any reason the DP transducer is disconnected, refer to the below for reconnection.

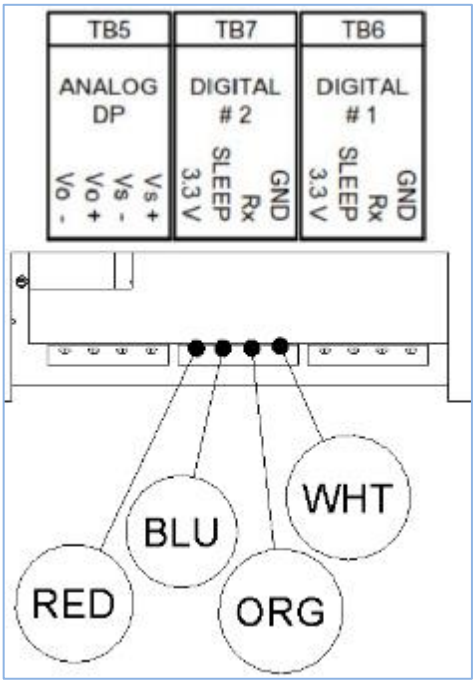


Analog DP transducer connected to (TB5) on IMCW2 board revisions 20 and 21

IMCW2 board revision 21 can accommodate an analog differential or monitor pressure transducer connected to TB5. Even though there are markings on the cover plate on how to connect the analog transducer, replacement of this transducer by the end user is not possible.

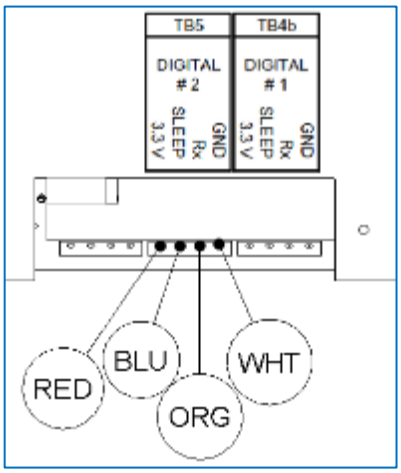
9.7.1.5.2 Differential/Monitor Pressure Measurement with Digital Pressure Transducer

IMCW2 board revision 21 has a terminal block (TB7) designated for the connection of digital DP/Monitor Pressure transducers. Refer to below for connection reference.



Monitor/DP Pressure Transducer connection in IMCW2 board revision 21

IMCW2 board revision 22 has a terminal block location (TB5) designated for the connection of DP/ Monitor Pressure transducers.



Digital DP/Monitor Pressure Transducer connection in IMCW2 board revision 22

Note: Some digital transducers have an additional black wire. It shall be connected to GND (or left unconnected).

9.7.2 Replacement of Digital Temperature Probes and Pressure Transducers

Digital pressure transducers can be used in the IMCW2 board revision 21, and digital pressure transducers and digital temperature probes are used in board revision 22.

Some metrological authorities place hardware seals on that plate. Replacing the digital transducer will require metrological re-verification.

Refer to Dresser™ manual ***IMCW2 Digital Transducer Replacement*** for more information on transducer replacement.

9.7.2.1 Digital transducer faults indicated on display

Digital transducers used in the IMCW2 have a reference CRC number calculated by the firmware during manufacturing - refer to section 16.4 in the MCUT Software Manual. If firmware corruption appears, then a “CRC Fault” is indicated on the display. If this fault is indicated together with a digital transducer communication fault, then most likely the transducer has somehow become disconnected. If a “CRC Fault” is displayed without other faults, then most likely firmware corruption has happened, and the transducer must be replaced.

Appendix A - List of Faults/Alarms on IMCW2 Display

The table below details the summary of faults and alarms that can be indicated on the IMCW2 display along with necessary actions that should be taken by the operator.

FAULT	DESCRIPTION/REASON	LCD	LIVE DATA for Fault Names	Volume Accumulation	NOTES	Ref. Section
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.	6.3.1.1
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	–	6.1.1.1
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.	–	6.2.1.2
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.	6.4.1
Low Battery Fault	Low battery voltage below 5.3 V.	**Blinking bell icon**	Low Battery Alarm warning (not on live data)	Accumulates active volume.	–	6.13
–	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.	–	6.13
–	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.	6.13
–	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.	–	6.13
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.	9.2
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.	6.3.1.1

Digital Port 1 Fault	When the digital sensor communication fails on port 1 of board.	**d1 Flt** and **Alarm Bell Icon**	Digital Port 1	Volume accumulation stops.	–	--
Digital port 2 fault	When the digital sensor communication fails on port 2 of board.	**d2 Flt** and **Alarm Bell Icon**	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.	5.0

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

ALARM	DESCRIPTION/ REASON	LCD with Solid Bell Icon	LIVE DATA for Fault Names or Voltage Levels If Battery	Ref. Section
High Pressure Alarm	Pressure reading greater than user defined high pressure limit.	**HP AL**	High Temp alarm	6.1.1.3
Low Pressure Alarm	Pressure reading lower than user defined low pressure limit.	**LP AL**	Low Temp alarm	6.1.1.3
High Temperature Alarm	Temperature reading greater than user defined high temperature limit.	**Ht AL**	High Temp alarm	6.2.1.3
Low Temperature Alarm	Temperature reading lower than user defined low temperature limit.	**Lt AL**	Low Temp alarm	6.2.1.3
High Flow Alarm	Flow is greater than user defined high flow limit.	**HF AL**	High Flow alarm	6.3.2.4
Low Flow Alarm	Flow is lower than user defined low flow limit.	**LF AL**	Low Flow alarm	6.3.2.4
Volume/High Consumption Alarm	Volume high consumption 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**	High 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**	–	9.7.2
Digital Pressure SN	New line pressure sensor is connected, but not yet commissioned via MCUT.	**P Sn Al**	–	9.7.2
Digital DP/Monitor SN	New differential pressure sensor is just connected, but not yet commissioned via MCUT.	**DP Sn AL**	–	9.7.2
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_In_Al/ tAnnPEr**	Digital input	--

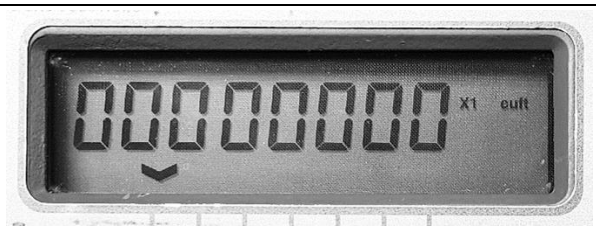
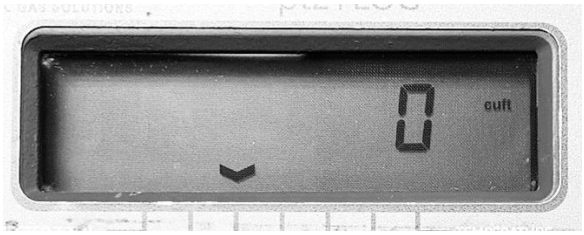
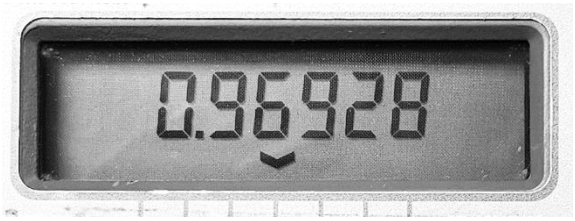
Table 3. Fault/Alarm parameter and limit list (extreme)

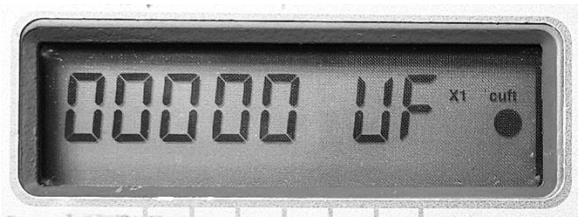
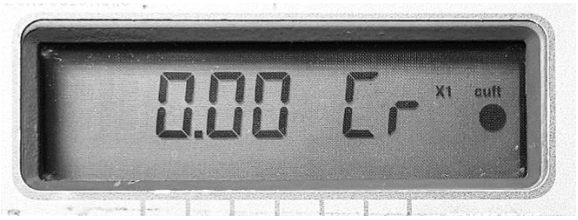
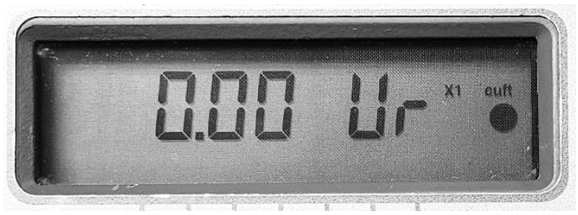
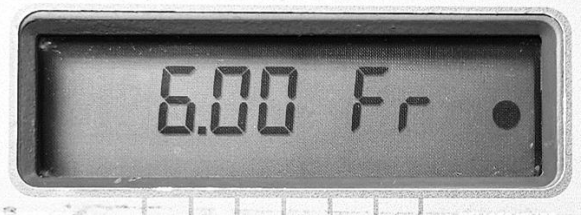
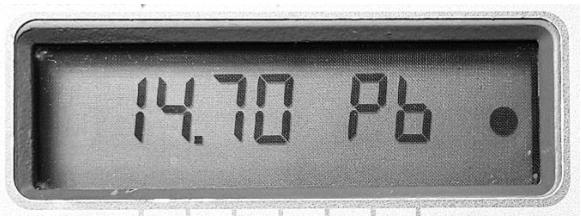
Alarm Parameter	Alarm Limit	
High Pressure	1.5 x maximum pressure of transducer	
Low Pressure	0.5 bar Absolute	7.252 PSI Absolute
	-0.5 bar Gauge	-7.525 PSI Gauge
High Temperature	70°C	158°F
Low Temperature	-50°C	-58°F
High Flow Rate	+ 1.5 x Q_{max}*	
Low Flow Rate	- 1.5 x Q_{max}*	

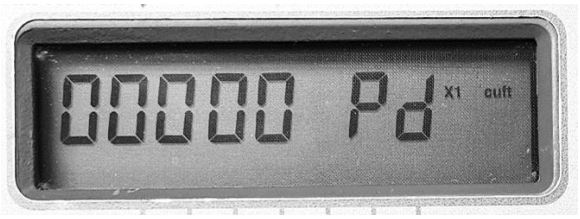
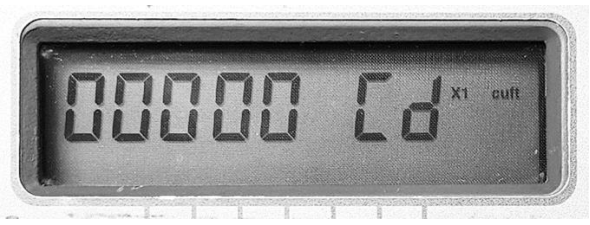
DP Alarms/Faults - only on units fitted with a Differential Pressure Transducer – Reference Section 6.6

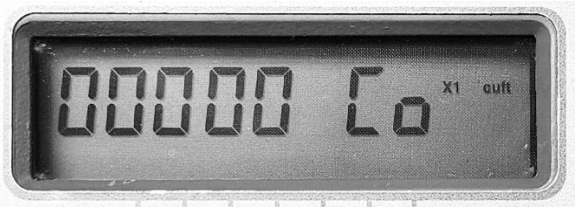
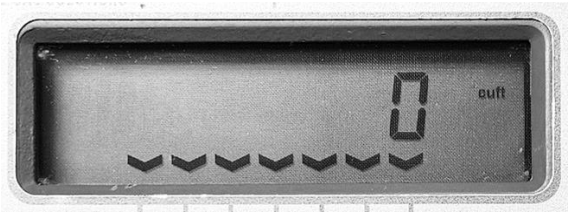
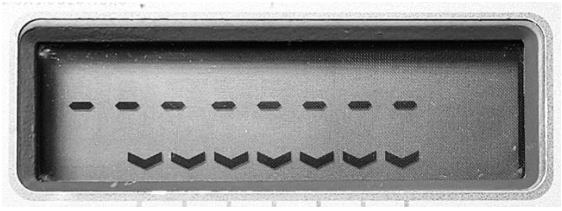
DP ALARM/FAULTS	DESCRIPTION/ REASON	LCD with solid bell icon	LIVE DATA for fault names
Meter DP alarm	Meter DP alarm s set when the alarm limit set by Dresser™ is exceeded	**dP AL**	Meter DP Alarm
DP serial number Alarm	This alarm is set when a new DP sensor is connected but not yet commissioned via 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 B - Table of main LCD Display screens

Name	Picture on LCD Display
Corrected Volume	
Uncorrected Volume	
Flow Rate	
Correction Factor	
Meter Size	
Line Pressure	

Temperature	
Uncorrected Volume Under Fault	
Corrected Residual	
Uncorrected Residual	
Firmware Version	
Base Pressure	
Pressure Factor	

Supercompressibility	
Battery Voltage	
Current Date	
Current Time	
Accumulated Corrected Volume previous day	
Accumulated Corrected Volume current day	
Accumulated Corrected Volume previous month	

Accumulated Corrected Volume current month	
Highest daily volume in the previous month	
Highest daily volume in the current month	
Date of last consumption alarm	
Maximum peak flow	
Differential pressure result	

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