

| |
|-------|
| DR014 |
| 0411 |
| 0003 |

DRA LCD Instruction Manual



INTRODUCTION

SYSTEM DESCRIPTION OF THE Gx012P

Functions and features

The flow rate / totalizer model DR is a microprocessor driven instrument designed to display flow rate, total and accumulated total.

This product has been designed with a focus on:

ultra-low power consumption to allow long-life battery powered applications (type DR012).

An aluminium housing offering IP67 (NEMA 4X) environmental protection.

Configuration of the unit

The DRA has been designed to be implemented in many types of applications. For that reason, a SETUP-level is available to configure your DRA according to your specific requirements.

It includes several important features, such as K-factors, measurement units etc. All settings are stored in EEPROM memory and will not be lost in the event of power failure.

Display information

The unit has a large transfective LCD with all kinds of symbols and digits to display measuring units, status information, trend-indication and key-word messages.

Flow rate and totals can be displayed by using the S button to move through the various options..

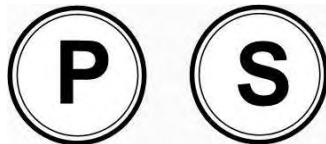
A backup of the total and accumulated total in EEPROM memory is made every minute.

OPERATIONAL

GENERAL

This chapter describes the daily use of the DRA This instruction is meant for users / operators.

CONTROL PANEL



The following keys are available:

Functions of the keys



This key is used to program and save new values or settings. It is also used to gain access to SETUP-level.



This key is used to SELECT the display defaults, ACC.TOTAL, RATE, TOTAL, BATCH. The key is also used in the setup program to scroll through the base levels and options in each level.

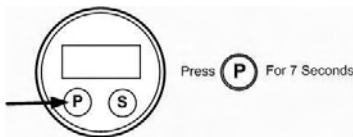


Pressing both keys simultaneously to CLEAR the value for total and batch then press P for NO or S for YES to clear the total/batch. In the setup mode pressing both keys simultaneously whilst in the upper levels of each of the functions will allow modification of the setting and pressing again will save setting.

PROGRAMMING SETUP-LEVEL

GENERAL

Configuration of the DRA is done at SETUP-level. SETUP-level is reached by pressing the PROG/ENTER key for 7 seconds; at which time, setup will be displayed. In order to return to the operator level, PROG will have to be pressed for three seconds. Alternatively, if no keys are pressed for 2 minutes, the unit will exit SETUP automatically. SETUP can be reached at all times while the DRA remains fully operational.



SETUP FUNCTIONS AND VARIABLES DRA

| OPERATE / RUN TIME VARIABLES | | | |
|------------------------------|-------------------|---|---------|
| TOTAL / BATCH TOTAL | | | DEFAULT |
| 11 | UNIT | L, m3, US-GAL, UK-GAL, US-bbl, UK-bbl, OIL-bbl. | L |
| 12 | DECIMALS | 0 - 1 - 2 - 3 | 0 |
| ACCUMULATED TOTAL | | | DEFAULT |
| 21 | UNIT | L, m3, US-GAL, UK-GAL, US-bbl, UK-bbl, OIL-bbl. | L |
| 22 | DECIMALS | 0 - 1 - 2 - 3 | 0 |
| FLOWRATE | | | DEFAULT |
| 31 | UNIT | L, m3, US-GAL, UK-GAL, US-bbl, UK-bbl, OIL-bbl. | L |
| 32 | TIME UNIT | sec - min - hour | min |
| 33 | DECIMALS | 0 - 1 - 2 - 3 | 0 |
| 34 | CALCULATION | per 1 - 255 pulses | 10 |
| 35 | CUT-OFF | 0.1 - 999.9 seconds | 30.0 |
| ALARM | | | DEFAULT |
| 41 | FLOW ALARM | operate - hidden - off | off |
| 42 | FLOW ZERO | on - off | on |
| 43 | ALARM LOW | 0000.000 unit/time unit | 0 |
| 44 | ALARM HIGH | 0000.000 unit/time unit | 99999 |
| 45 | DELAY ALARM | 0... 99 seconds | 0 |
| FLOWMETER | | | DEFAULT |
| 51 | K-FACTOR | 0000.001 - 9999.999 pulses / unit of measure | 1.000 |
| ANALOG OUTPUT | | | DEFAULT |
| 61 | LOW FLOW | 0000.000 - 9,999,999 unit/time unit | 0 |
| 62 | HIGH FLOW | 0000.000 - 9,999,999 unit/time unit | 99999 |
| 63 | LOW CALIB - 4mA | 0 - 9999 | 631 |
| 64 | HIGH CALIB - 20mA | 0 - 9999 | 3200 |
| PULSE OUTPUT | | | DEFAULT |
| 71 | DECIMALS | 0 - 1 - 2 - 3 | 0 |
| 72 | PULSE WIDTH | 0.005 - 1.000 sec | 0 |
| 73 | PULSE PER | X,XXX,XXX quantity | 1000 |
| OTHERS | | | DEFAULT |
| 81 | MODEL / TYPE | DRA | - |
| 82 | SOFTWARE VERSION | xx.xx.xx | - |
| 83 | SERIAL NO. | xxxxxxx | - |

Explanation of SETUP-functions

SETUP PARAMETERS

| SETUP PARAMETERS | |
|---|---|
| TOTAL/BATCH TOTAL 1.1 | <p>SETUP - 1.1 determines the measurement unit for total and batch total The following units can be selected:</p> <p style="text-align: center;">L - m3 - UKGAL - USGAL - UKbbl - USbbl - OILbbl</p> <p>Alteration of the measurement unit will have consequences for operator and SETUP-level values. Please note that the K-factor has to be adapted as well; the calculation is not done automatically.</p> |
| DECIMALS 1.2 | <p>The decimal point determines for total and batch total the number of digits following the decimal point. The following can be selected:</p> <p style="text-align: center;">0000000 - 111111.1 - 22222.22 - 3333.333</p> |
| | |
| TOTAL ACCUMULATED 2.1 | <p>SETUP - 2.1 determines the measurement unit for accumulated total. The following units can be selected:</p> <p style="text-align: center;">L - m3 - UKGAL - USGAL - UKbbl - USbbl - OILbbl</p> <p>Alteration of the measurement unit will have consequences for operator and SETUP-level values. Please note that the K-factor has to be adapted as well; the calculation is not done automatically.</p> |
| Decimals 2.2 | <p>The decimal point determines for accumulated total the number of digits following the decimal point. The following can be selected:</p> <p style="text-align: center;">0000000 - 111111.1 - 22222.22 - 3333.333</p> |
| Flow Note | <p><i>The settings for total and flow rate are entirely separate. In this way, different units of measurement can be used for each e.g. cubic meters for total and liters for flow rate. The display update time for flow rate is one second or more.</i></p> |
| | |
| FLOW RATE 3.1 | <p>SETUP - 21 determines the measurement unit for flow rate. The following units can be selected:</p> <p style="text-align: center;">L - m3 - UKGAL - USGAL - UKbbl - USbbl - OILbbl</p> <p>Alteration of the measurement unit will have consequences for operator and SETUP-level values. Please note that the K-factor has to be adapted as well; the calculation is not done automatically</p> |
| TIME UNIT 3.2 | <p>The flow rate can be calculated per second (SEC), minute (MIN), hour (HR) or day (DAY).</p> |
| DECIMALS 3.3 | <p>This setting determines for flow rate the number of digits following the decimal point. The following can be selected:</p> <p style="text-align: center;">00000 - 1111.1 - 2222.22 - 3333.333</p> |
| CALCULATION 3.4 | <p>The flow rate is calculated by measuring the time between a number of pulses, for example 10 pulses. The more pulses the more accurate the flow rate will be. The maximum value is 255 pulses.</p> <p>Note: <i>the lower the number of pulses, the higher the power consumption of the unit will be (important for battery powered applications).</i></p> <p>Note: <i>for low frequency applications (below 10Hz): do not program more than 10 pulses else the update time will be very slow.</i></p> <p>Note: <i>for high frequency application (above 1kHz) do program a value of 100 or more pulses.</i></p> |
| CUT-OFF TIME 3.5 | <p>With this setting, you determine a minimum flow requirement thresh-hold, if during this time less than XXX-pulses (SETUP 26) are generated, the flow rate will be displayed as zero. The cut-off time has to be entered in seconds - maximum time is 999 seconds (about 15 minutes).</p> |
| | |
| FLOW METER K FACTOR 51 | <p>With the K-factor, the flow meter pulse signals are converted to a flow rate. The K-factor is based on the number of pulses generated by the flow meter per selected measurement unit (SETUP 1.1), for example per liter. The more accurate the K-factor, the more accurate the functioning of the system will be.</p> |
| SETTING K-FACTOR | <p>The setting allows a K Factor with up to 3 decimal places and 4 whole numbers eg; 1234.123</p> |

4 - ALARM



With these settings, it is determined how the flow rate will be monitored and the functionality of the transistor outputs be determined.

| | |
|-----------------------------|--|
| ALARM 4.1 | Setting the function of the Alarm The following settings can be selected: Off: Function disabled. Operate: Full function of the low flow alarm. Hidden: Does not display alarms on LCD. |
| ALARM VALUE ZERO 4.2 | The Zero alarm is set with this setting. An alarm will be generated as long as there is no flow rate. Select Off to disable |
| ALARM VALUE LOW 4.3 | The low alarm is set with this setting. An alarm will be generated as long as the flow rate is lower than this. With value 0.0 this function is disabled. |
| ALARM VALUE HIGH 4.4 | The high alarm is set with this setting. An alarm will be generated as long as the flow rate is higher than this. With value 0.0 this function is disabled. |
| DELAY TIME ALARM 4.5 | This function allows a delay period before the alarm is activated 0—99 seconds. |

6 - ANALOG OUTPUT

A linear analog (0)4-20mA signal is generated according to the flow rate with a 10 bits resolution. The settings for flow rate (SETUP - 2) influence the analog output directly.

The relationship between rate and analog output is set with the following functions:

| | |
|-----------------------------|--|
| MINIMUM FLOWRATE 6.1 | Enter here the flow rate at which the output should generate the minimum signal (0/4mA or 0V) - in most applications at flow rate "zero". The number of decimals displayed depend upon SETUP 23. The time and measuring units (L/min for example) are dependant upon SETUP 21 and 22 but are not displayed. |
| MAXIMUM FLOWRATE 6.2 | Enter here the flow rate at which the output should generate the maximum signal (20mA or 10V) - in most applications at maximum flow. The number of decimals displayed depend upon SETUP 23. The time and measuring units (L/min for example) are dependant upon SETUP 21 and 22 but can not be displayed. |
| TUNE MIN / 4MA 6.3 | <p>The initial minimum analog output value is 4mA . However, this value might differ slightly due to external influences such as temperature for example. The 4mA value can be tuned precisely with this setting.</p> <div style="text-align: center;">  </div> <p><i>Before tuning the signal, be sure that the analog signal is not being used for any application!</i></p> <p>After pressing PROG, the current will be about 4mA The current can be increased / decreased with incrementing or decrementing the numbers and is <u>directly active</u>. Press ENTER to store the new value. Remark: the analog output value can be programmed “up-side-down” if desired, so 20mA at minimum flowrate for example!</p> |
| TUNE MAX / 20MA 6.4 | <p>The initial maximum analog output value is 20mA. However, this value might differ slightly due to external influences such as temperature for example. The 20mA value can be tuned precisely with this setting.</p> <div style="text-align: center;">  </div> <p><i>Before tuning the signal, be sure that the analog signal is not being used for any application!</i></p> <p>After pressing PROG, the current will be about 20mA. The current can be increased / decreased with incrementing or decrementing the numbers and is <u>directly active</u>. Press ENTER to store the new value. Remark: the analog output value can be programmed “up-side-down” if desired, so 4mA at maximum flow rate for example!</p> |

7 - PULSE OUTPUT

One transistor output is available as scaled pulse output according to the accumulated total.

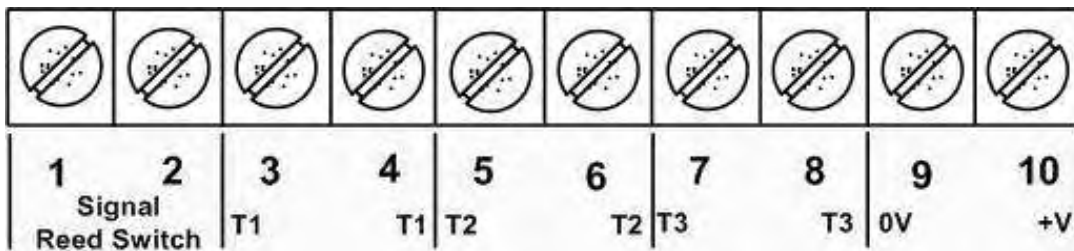
| | |
|------------------------------|---|
| DECIMALS 7.1 | Sets the decimals for the pulses per 7.3 |
| WIDTH OF PULSE 7.2 | <p>The pulse width determines the time that the transistor will be switched; in other words the pulse length. The minimum time between the pulses is as long as the selected period time.</p> <p>Pulse widths are between 5 m sec to 1 sec at 5 m sec this is a frequency of 100Hz</p> <p>Note: <i>If the frequency should go out of range - when the flow rate increases for example - an internal buffer will be used to "store the missed pulses": As soon as the flow rate reduces again, the buffer will be "emptied".</i></p> <p><i>It might be that pulses will be missed due to a buffer-overflow, so it is advised to program this setting within it's range.</i></p> |
| PULSE PER 7.3 | According to the measurement unit settings for total, a pulse will be generated every X-quantity. Enter this quantity here while taking the displayed decimal position and measuring unit into account. i.e. set to 00000.10 = 10 pulses per unit of measure selected |

Connections

The DRA unit can only accept a reed switch input, this sensor has been selected as the most common sensor and requires very little power with small effect on battery life.

The reed switch is not polarity conscious so the reed switch wires can be connected in any order to pins 1 and 2

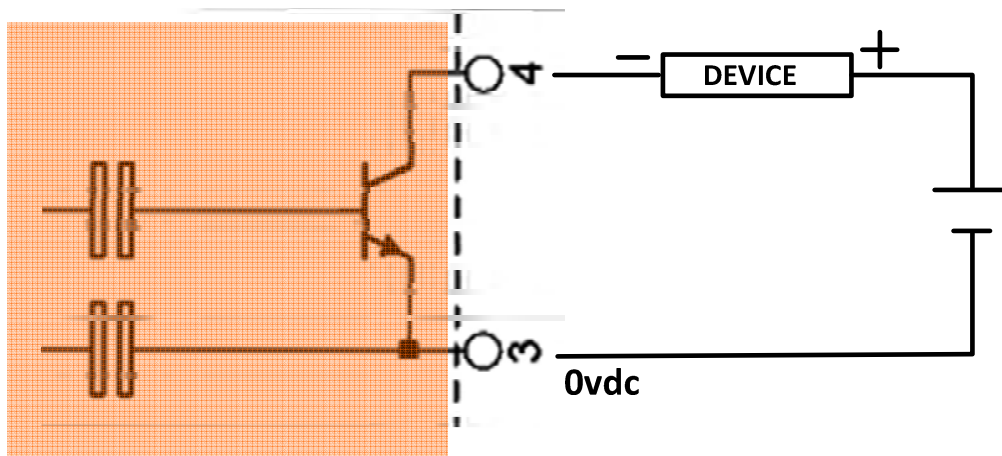
Connecting any other sensor type could cause damage to the electronics module



| | |
|------|-----------------------------------|
| 1 | Reed Switch Sensor Input |
| 2 | Reed Switch Sensor Input |
| 3 T1 | Pulse Output - 0V |
| 4 T1 | Pulse Output to 0V on Device |
| 5 T2 | Low Alarm 0V |
| 6 T2 | Low Alarm to 0V on Device |
| 7 T3 | High Alarm 0V |
| 8 T3 | High Alarm to 0V on Device |
| 9 | Analogue Output & Power Supply 0V |
| 10 | Analogue Output & Power Supply |

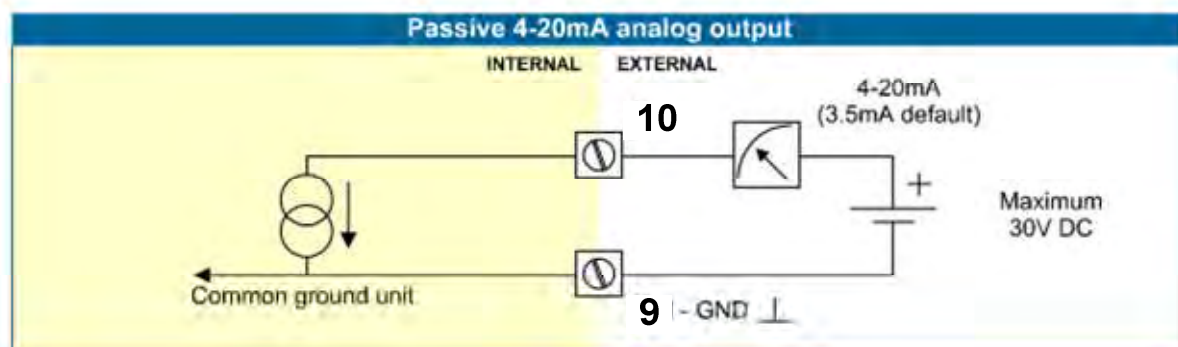
Example for scaled 1 pulse per litre the output must be programmed as follows:
 In menu 7.1 set 22222.22
 In menu 7.2 set 10 or more (10mS or more if needed)
 In menu 7.3 set 1.00

Pulse/Alarm Output Setup
 Terminals 3 & 4 Pulse
 Terminals 5 & 6 Low Alarm
 Terminals 7 & 8 Hi Alarm

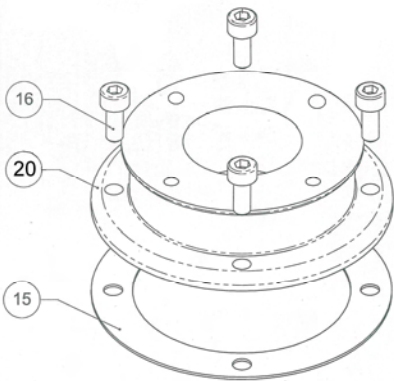
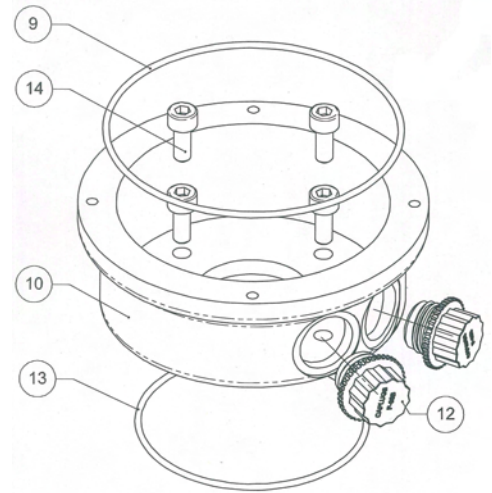
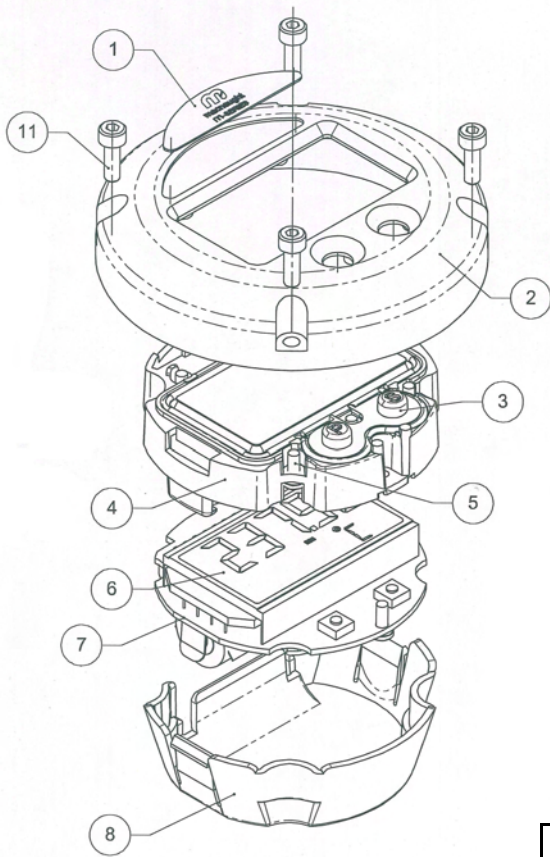


Passive 4~20mA setup

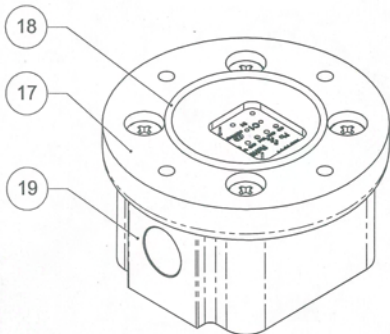
A passive 4-20mA signal proportional to the flowrate is available with this option. When a power supply is connected but the output is disabled, a 3.5mA signal will be generated.
 Max. driving capacity 1000 Ohm.



Parts List



Adaptor Spares to suit M6 to M100



To Suit M05/M1/M2

| Item. | Part No. | Qty | Description |
|-------|----------|-----|---|
| 1 | DR004S | 1 | Label |
| 2 | DR001S | 1 | Front housing |
| 3 | DR011S | 1 | Button / Gasket moulded |
| 4 | DR009S | 1 | Upper PCB housing |
| 5 | N102S | 6 | Housing screw set M3 x 8 pan head taptite |
| 6 | DR008S | 1 | DRA Electronics module (excluding battery) |
| 7 | DR012S | 1 | Battery (ER17505 Lithium 3.6V) |
| 8 | DR010S | 1 | Rear PCB housing |
| 9 | BS042S | 1 | NBR O'Ring |
| 10 | DR002MS | 1 | Rear aluminium housing (12mm conduit connections) |
| 10 | DR002NS | 1 | Rear aluminium housing (NPT conduit connections) |
| 11 | MS119S | 4 | Bolt SS SHCS M4 x 12mm |
| 12 | NA272S | 2 | M12 x 1.5 cap plug (Includes o'rings) |
| 12 | NA283S | 2 | 3/8" NPT cap plug (Includes o'rings) |
| 13 | BS037S | 1 | NBR O'Ring |
| 14 | MS115S | 4 | Bolt SS SHCS M5 x 12mm |
| 15 | MS300S | 1 | Nitrile adapter gasket — Adaptor |
| 16 | MS115S | 4 | Bolt SS SHCS M5 x 12mm— Adaptor |
| 17 | DR006S | 1 | M05/M1/M2 Adaptor Cap |
| 18 | BS029S | 1 | Nitrile O'Ring |
| 19 | | | See M05/M1/M2 flow meter instruction manual |
| 20 | DR003S | 1 | Adaptor (M6/M10/M40/M50/M80/M100) |

TECHNICAL SPECIFICATION

GENERAL

| | |
|---|---|
| Display | |
| Type | High intensity reflective numeric and alphanumeric LCD, UV-resistant. |
| Digits | Seven 12mm (0.47") and seven 8mm (0.31"). Various symbols and measuring units. |
| Refresh rate | Flow Rate: once per second. Total: 8 times/second after key press to one second. |
| Enclosures | |
| General | Aluminium with Polycarbonate window, silicone and EPDM gaskets. UV stabilized and flame retardant material. |
| Control Keys Painting | Two industrial micro-switch keys. UV-resistant silicone keypad. ????? |
| Meter mount enclosures Classification Cable entry | Dimensions: 100mm diameter IP67 Black Anodised |
| Operating temperature | |
| Operational | -20°C to +60°C (-4°F to +140°F). |
| Power supply | |
| Battery powered | Lithium battery - life-time depends upon settings - up to 3 years @ 20°C. |
| Terminal connections | |
| Type: | Terminal strip. Wire max. 1mm ² |
| Data protection | |
| Type | Backup of all settings and running totals in flash memory. |
| Environment | |
| Electromagnetic compatibility | Compliant ref: EN 61326-1:2006, EN61010-1:2001 |

INPUT

| | |
|--|--|
| Total / Batch total / Accumulated total | |
| Digits | 7 digits. |
| Units | L, m3, US-GAL, UK-GAL, US-bbl, UK-bbl, OIL-bbl. |
| Decimals | 0 - 1 - 2 or 3. |
| Note | total and batch total can be reset to zero. |
| Operator functions | |
| Displayed functions | Flow Rate. Total (can be reset to zero by the operator). Batch total (can be reset to zero by the operator). Accumulated total (non resettable) |
| Flow Meter | |
| Type | reed-switch |
| Frequency | Total: minimum 0 Hz - maximum 120 Hz for total Flow Rate: 0.01 Hz – maximum 120Hz. |
| K-Factor | 0000.001 - 9,999.999 pulses per unit of measure |
| Flow Rate | |
| Digits | 7 digits. |
| Units | L, m3, US-GAL, UK-GAL, US-bbl, UK-bbl, OIL-bbl. |
| Decimals | 0 - 1 - 2 or 3. |
| Time units | /sec - /min - /hr . |

List of configuration settings

| SETTING | DEFAULT | DATE : | DATE : |
|----------------------------|-----------|--------------------------|--------|
| 1 - TOTAL | | Enter your settings here | |
| 11 unit | L | | |
| 12 decimals | 0000000 | | |
| | | | |
| 2- ACCMULATED TOTAL | | | |
| 21 unit | L | | |
| 22 decimals | 0000000 | | |
| | | | |
| 3 - FLOWRATE | | | |
| 31 unit | L | | |
| 32 time unit | /min | | |
| 33 decimals | 0000000 | | |
| 34 calculation / pulses | 010 | | |
| 35 cut-off time | 30.0 sec. | | |
| | | | |
| 4 - Alarm | | | |
| 41 alarm | disabled | | |
| 42 flow zero | on | | |
| 43 alarm low | 0 | | |
| 44 alarm high | 9999 | | |
| 45 delay alarm | 0 | | |
| | | | |
| 5 - FLOWMETER | | | |
| 51 k factor | 1.000 | | |
| | | | |
| 6 - ANALOG OUTPUT | | | |
| 61 4 mA | 0 | | |
| 62 20 mA | 99999 | | |
| 63 max. tune min 4 mA | | | |
| 64 tune max 20 mA | | | |
| | | | |
| 7 - PULSE OUTPUT | | | |
| 71 decimal | 0 | | |
| 71 impulse width | 0 | | |
| 72 pulse per | 1000 | | |
| | | | |
| 8 - OTHERS | | | |
| 81 model | DRA | | |
| 82 software version | 30.05.01 | | |
| 83 serial number | | | |