| MXL-INSTPRA |
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| REV 3 |
| 02/20 |

# TYPE PRA
# DIGITAL REGISTER

## INSTRUCTION MANUAL














***- FLOWRATE INDICATOR***
***- TOTALIZER***
***- 4-20mA OUTPUT***
***- PULSE OUTPUT***
***- LOW & HIGH FLOWRATE ALARMS***

## To the Owner

Please read and retain this instruction manual to assist you in the operation of this product.

This Instruction Manual provides instruction guide on the operation and programming of the type PRA, 12mm LCD Digital Register.

Should you require further assistance please contact you local Macnaught representative.

Macnaught offer a comprehensive set of web based support materials to compliment our product range.
Access the website by scanning the QR code.

**WWW.MACNAUGHTUSA.COM**

# INDEX

# INTRODUCTION

## FUNCTIONS AND FEATURES

The flow rate / totalizer model PRA 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.
- The glass reinforced polypropylene housing offers IP67 environmental protection.
- Transmitting possibilities with analog and pulse outputs.
- Alarm contacts for high and low flow rates.

## CONFIGURATION OF THE UNIT

The PRA has been designed to be implemented in many types of applications. For that reason, a SETUP-level is available to configure your PRA according to your specific requirements.
It includes several important features, such as K-factors, measurement units etc. All setting are stored in EEPROM memory and will not be lost in the event of power failure.

## DISPLAY INFORMATION

The unit has a large transflective LCD with various kinds of symbols and digits to display measuring units, status information and key-word messages.
Flowrate and total are displayed on 12mm digits.
A backup of the total and accumulated total in EEPROM memory is made every minute.

## MOUNTING EXAMPLES

**Mounting on MX meter body**

**Mounting on wall mount bracket**

## DISPLAY EXAMPLES

**Flow rate example**


**Total example**


Note ! Display features Decimals and various units of measurement

## INSTALLATION

The display has a unique M-lock mounting feature. It can be installed on

- MX meter body
- MX wall mount bracket

To install, secure the display on the cam and rotate quarter turn clock-wise (90 degrees)
To uninstall, hold the display and rotate quarter turn anti clock-wise (90 degrees)

There are no tools required to install/ remove the display

## WARRANTY

For warranty terms & conditions, visit https://www.macnaughtusa.com/warranty

# TECHNICAL SPECIFICATIONS

## 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<br>Total: 8 times/second after key press to one second |
| **Enclosure** | |
| General | Polypropylene housing with Polycarbonate window, EPDM gaskets. UV stabilized |
| Control keys | Two industrial micro-switch keys. UV-resistant keypad. |
| IP Classification | IP67 |
| Cable entry | (2) x M12 * 1.5 |
| Backlight | No |
| Ex approvals | No |
| **Temperature** | |
| Operational | -20°C to +80°C (-4°F to +176°F) |
| **Power supply options** | |
| Battery | Lithium battery - life-time depends upon settings - up to 3 years @ 20°C |
| | Battery specs: 3.6 VDC, 'A' size, type: ER17505 (Ordering code: DR012S) |
| External | 18 - 30 VDC. |
| **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 |

## DISPLAY

| | |
|---|---|
| **Flow rate / Total / Batch total / Accumulated total** | ***(Note: Total and Batch total can be reset to zero)*** |
| Digits | 7 digits |
| Units | L - $m^3$ - UKGAL - USGAL - UKbbl –USbbl - OILbbl |
| Decimals | 0 - 1 - 2 or 3 |
| **Flow Rate** | |
| Time units | /sec - /min - /hr |
| **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) |

# TECHNICAL SPECIFICATIONS

## INPUT

| | |
|---|---|
| **Input** | |
| Input | Reed switch (from flow meter) |
| Frequency | Total: minimum 0 Hz - maximum 120 Hz for total |
| | Flow Rate: 0.01 Hz – maximum 120 Hz |
| K-Factor | 0000.001 - 9,999.999 pulses per Litre |

## OUTPUTS

| | |
|---|---|
| **Analog Output** | |
| Function | This function transmits flow rate   |
| Type | 4-20mA output, passive, loop powered |
| Power Supply | 24VDC |
| Accuracy | 10 bit resolution. Error < 0.05% - update 8 times a second |
| | Software function to calibrate 4.00 mA and 20.00 mA levels precisely within set-up |
| **Pulse Output (Programmable)** | |
| Function | This function transmits accumulated total  |
| Type | Transistor output, passive, isolated |
| Power Supply | Max. 50V DC |
| Max. Load | 20mA |
| Max. Frequency | 100Hz |
| Pulse Length | User definable - between 5 milli-seconds up to 1 second |
| Isolation | 100V DC maximum |
| **Low Flowrate Alarm (Programmable)** | |
| Function | This function transmits alarm in an event of low flowrate  |
| Type | Transistor output, passive, isolated |
| Power Supply | Max. 50V DC |
| Max. Load | 20mA |
| Isolation | 100V DC maximum |
| **High Flowrate Alarm (Programmable)** | |
| Function | This function transmits alarm in an event of high flowrate  |
| Type | Transistor output, passive, isolated |
| Power Supply | Max. 50V DC |
| Max. Load | 20mA |
| Isolation | 100V DC maximum |
| **Zero Flowrate Alarm** | |
| Function | This function displays alarm on LCD in an event of zero flowrate   |
| Type | Visual only (on LCD screen) |

Transistor and analog outputs requires independent external power supplies to operate.

Note !

High and Low flowrate alarm functions has an aditional feature of a delay before the alarm is activated (0 - 99 seconds)

# SET-UP FUNCTIONS

| | | | |
|---|---|---|---|
| **1** | **Total/ Batch Total** | | **Default value** |
| 1.1 | Unit | L - m3 - UKGAL - USGAL - UKbbl –USbbl - OILbbl | L |
| 1.2 | Decimals | 0 - 1 - 2 - 3 | 0 |
| **2** | **Accumulated Total** | | |
| 2.1 | Unit | L - m3 - UKGAL - USGAL - UKbbl –USbbl - OILbbl | L |
| 2.2 | Decimals | 0 - 1 - 2 - 3 | 0 |
| **3** | **Flow Rate** | | |
| 3.1 | Unit | L - m3 - UKGAL - USGAL - UKbbl –USbbl - OILbbl | L |
| 3.2 | Time Period | Second - Minute - Hour | Minutes |
| 3.3 | Decimals | 0 - 1 - 2 - 3 | 0 |
| 3.4 | Calculation | per 1 - 255 pulses (Default 10) | 10 |
| 3.5 | Cut-off | 0.1 - 999.9 seconds (Default 30) | 30 |
| **4** | **Alarm** | | |
| 4.1 | Flow Alarm | Operate - Hidden - Off | Operate |
| 4.2 | Zero Flow Display | On - Off | On |
| 4.3 | Low Flow Alarm | 0 (unit / time) | 0 |
| 4.4 | High Flow Alarm | 0 (unit / time) | 99999 |
| 4.5 | Alarm Delay | 0 - 99 seconds | 0 |
| **5** | **Meter** | | |
| 5.1 | *K-Factor (Pulses per Litre) | 0000.000 to 9999.999 | ’1’ or as per factory settings |
| **6** | **Analog Output** | | |
| 6.1 | Low Flow - 4mA | 0000.000 - 9,999,999 (unit / time) | 0 |
| 6.2 | High Flow - 20mA | 0000.000 - 9,999,999 (unit / time) | 99999 |
| 6.3 | Low Calibration - 4mA | 0 - 9999 | 633 |
| 6.4 | High Calibration - 20mA | 0 - 9999 | 3214 |
| **7** | **Pulse Output** | | |
| 7.1 | Decimals | 0 - 1 - 2 - 3 | 0 |
| 7.2 | Pulse Width | 0.005 - 1.000 seconds | 0 |
| 7.3 | Amount - Pulse per (X) | x,xxx,xxx quantity | 1000 |
| **8** | **OTHERS** | | |
| 8.1 | Type | drA | drA |
| 8.2 | Software Version | 03.xx.xx | 03.xx.xx |
| 8.3 | Serial No. | xxxxxxx | xxxxxxx |

**IMPORTANT**

The settings for Total, Accumulated Total and Flow rate are entirely separate. In this way, different units of measurement and decimals can be used for each e.g. gallons for total and liters for flow rate.

The K-Factor in 5.1 must be entered in pulses per litre (PPL). Entering the k-factor in pulses per gallon (PPG) will result in inaccurate readings. Refer to page 12 for detailed instruction on entering the k-factor.


***The k-factor in 5.1 MUST ALWAYS be entered in pulses per LITRE, regardless of units in 1.1, 2.1 and 3.1**

# EXPLANATION OF SET-UP FUNCTIONS

| | | |
|---|---|---|
| **1** | **Total/ Batch Total** | |
| 1.1 | Unit | This determines the measurement unit for Total and Batch total.<br>The following units can be selected:<br>L - m3 - UKGAL - USGAL - UKbbl –USbbl - OILbbl |
| 1.2 | Decimals | This determines the number of digits and decimal points for total and batch total.<br>The following decimals can be selected (for 0, 1, 2 and 3 respectively)<br>0000000 - 111111.1 - 22222.22 - 3333.333 |
| **2** | **Accumulated Total** | |
| 2.1 | Unit | This determines the measurement unit for Accumulated Total.<br>The following units can be selected:<br>L - m3 - UKGAL - USGAL - UKbbl –USbbl - OILbbl |
| 2.2 | Decimals | This determines the number of digits and decimal points for accumulated total.<br>The following decimals can be selected (for 0, 1, 2 and 3 respectively)<br>0000000 - 111111.1 - 22222.22 - 3333.333 |
| **3** | **Flow Rate** | |
| 3.1 | Unit | This determines the measurement unit for flow rate.<br>The following units can be selected:<br>L - m3 - UKGAL - USGAL - UKbbl –USbbl - OILbbl |
| 3.2 | Time Period | This determines the time unit for flow rate<br>The following units can be selected:<br>/SEC (Second) - /MIN (Minute) - / HR (Hour) |
| 3.3 | Decimals | This determines the number of digits and decimal points for flow rate.<br>The following decimals can be selected (for 0, 1, 2 and 3 respectively)<br>0000000 - 111111.1 - 22222.22 - 3333.333 |
| 3.4 | Calculation | 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.<br>***Note:*** *the lower the number of pulses, the higher the power consumption of the unit will be (important for battery powered applications).*<br>***Note:*** *for low frequency applications (below 10Hz): do not program more than 10 pulses else the update time will be very slow.*<br>***Note:*** *for high frequency application (above 1kHz) do program a value of 100 or more pulses.* |
| 3.5 | Cut-off | With this setting, you determine a minimum flow requirement thresh-hold, if during this time less than XXX-pulses (setup 3.4) are generated, the flow rate will be displayed as zero.<br>The cut-off time has to be entered in seconds - maximum time is 999 seconds (about 15 minutes). |
| **4** | **Alarm** | ***(Transistor output according to the Low/ High flowrates)*** |
| 4.1 | Alarm | This enables/ disables the alarm feature.<br>The following settings can be selected:<br>Off: Function disabled.<br>Operate: Function enabled.<br>Hidden: Does not display alarms on LCD. |
| 4.2 | Zero Flowrate Alarm | This function displays alarm on LCD in an event of zero flowrate<br>On: An alarm will be generated as long as there is no flowrate.<br>Off: No alarm<br>***Note:*** *Zero flow alarm works only when 4.3 has a value greater than zero.*<br>***Note:*** *The alarm is visual only, there is no contact output for this alarm.* |

# EXPLANATION OF SET-UP FUNCTIONS

| | | |
|---|---|---|
| 4.3 | Low Flowrate Alarm | Enter Low flowrate value here. An alarm will be generated as long as the actual flow rate is lower than this number.<br>With value 0.0 this function is disabled. |
| 4.4 | High Flowrate Alarm | Enter High flowrate value here. An alarm will be generated as long as the actual flow rate is higher than this number.<br>With value 0.0 this function is disabled. |
| 4.5 | Delay | This function allows a delay period before the alarm is activated 0 - 99 seconds. |
| **5** | **METER** | |
| 5.1 | *K-Factor (Pulses per Litre) | With the K-factor, the flow meter pulse signals are converted to a flow rate. The more accurate the K-factor, the more accurate the functioning of the system will be.<br>The setting allows a K Factor with up to 3 decimal places and 4 whole numbers e.g. 1234.123<br>***Please note that the K-Factor entered in 5.1 must be in pulses per litre (PPL). Entering the k-factor in pulses per gallon (PPG) will result in inaccurate readings. Refer to page 12 for detailed instruction on entering the k-factor.*** |
| **6** | **Analog Output** | ***(4-20mA signal according to the flow rate)*** |
| 6.1 | Minimum Flowrate | Enter here the flow rate at which the output should generate 4mA - in most applications at flow rate "zero".<br>***Note:*** *Units will be automaticlly picked from sections 3.1, 3.2 and 3.3*<br>***Important:*** *In an event if the actual flow rate goes further below than the progam value, the unit will not generate less than 4mA. As an example, if 6.1 is set at 10 ltr/min and the actual flow rate goes down upto 9 ltr/min, or even lower, the unit will still generate 4mA.*<br>*An easy way to tackle this is to program this value a little lower, say for example, 9.5 ltr/min, this way it can be detected that the actual flow rate is below required minimum rate.* |
| 6.2 | Maximum Flowrate | Enter here the flow rate at which the output should generate 20mA - in most applications at maximum flow.<br>***Note:*** *Units will be automaticlly picked from sections 3.1, 3.2 and 3.3*<br>***Important:*** *In an event if the actual flow rate goes further high than the progam value, the unit will not generate higher than 20mA . As an example, if 6.2 is set at 100 ltr/min and the actual flow rate goes high upto 101 ltr/min, or even higher, the unit will still generate 20mA.*<br>*An easy way to tackle this is to program this value a little higher, say for example, 100.5 ltr/min, this way it can be detected that the actual flow rate is above required maximum rate.* |
| 6.3 | Calibration/ Tuning (4mA) | When the display reaches the minimum flowrate (as defined in 6.1), the analog output should be precisely 4mA. However, this value might differ slightly due to external influences for example temperature or loop characteristics etc. In this case, 6.3 can be used to tune to 4mA precisely.<br>***Note:*** *This is a tuning parameter and only to be used if required.*<br>***Warning:*** *Before tuning the signal, be sure that the analog signal is not being used for any application.*<br>**How to Tune**: Once you are in the SETUP PROG mode, ±4mA can be tuned to exact 4mA by incrementing/ decrementing the digits on the LC display. The tuning is directly active and immediate. Press and release 'P' and 'S' buttons simulteneously to save changes.<br>***Note:*** *If required, the analog output can be progammed 'up-side-down'. In that case, 4mA represents the maximum flow rate and 20mA represents the minimum flow rate.* |

# EXPLANATION OF SET-UP FUNCTIONS

| | | |
|---|---|---|
| 6.4 | Calibration/ Tuning (20mA) | When the display reaches the maximum flowrate (as defined in 6.2), the analog output should be precisely 20mA. However, this value might differ slightly due to external influences for example temperature or loop characteristics etc. In this cae, 6.4 can be used to tune to 20mA precisely.<br>***Note:*** *This is a tuning parameter and only to be used if required.*<br>***Warning:*** *Before tuning the signal, be sure that the analog signal is not being used for any application.*<br>**How to Tune**: Once you are in the SETUP PROG mode, ±20mA can be tuned to exact 20mA by incrementing/ decrementing the digits on the LC display. The tuning is directly active and immediate. Press and release 'P' and 'S' buttons simulteneously to save changes.<br>***Note:*** *If required, the analog output can be progammed 'up-side-down'. In that case, 4mA represents the maximum flow rate and 20mA represents the minimum flow rate.* |
| **7** | **Pulse Output** | ***(Transistor output according to the accumulated total)*** |
| 7.1 | Decimals | This determines the number of decimal points to be used in section 7.3 |
| 7.2 | Pulse Width | Range: 0.005 to 1.000 seconds (i.e. 5 milli seconds to 1 second)<br>This value determines the time that the output will be active; in other words the pulse duration.<br>A value 0.0 disables the whole pulse output function<br>The pulse signal always has a 50% duty cycle<br>***Note:*** *Care should be taken while programming this value as the frequency could go out of range and pulses could be missed.* |
| 7.3 | Amount - Pulse per (X) | Enter here the value of (X)<br>This setting generates ONE pulse for every (X) amount of volume passed.<br>***For example;***<br>If (X) is entered as 0.1 and the units are set in litres, the module will generate ONE pulse per every 0.1 litres. In other words, it will generate 10 pulses per litre (1 ÷ 0.1 = 10)<br>If (X) is entered as 5 and the units are set in gallons, the module will generate ONE pulse per every 5 gallons. In other words, it will generate 0.2 pulses per gallon (1 ÷ 5 = 0.2)<br>***Note:*** *Measurement units (e.g. Litres/ Gallons) will be automaticlly picked from section 1.1*<br>***Note:*** *Decimal points will be picked from section 7.1*<br>***Warning:*** *The minimum value that can be set for (X) is 0.001, with this value the module will generate ONE pulses every 0.001 units of measurement.*<br>***Note:*** *This function is not meant to increase the resolution or k-factor. It is advised not to exceed flow meter's k-factor.* |

**IMPORTANT**

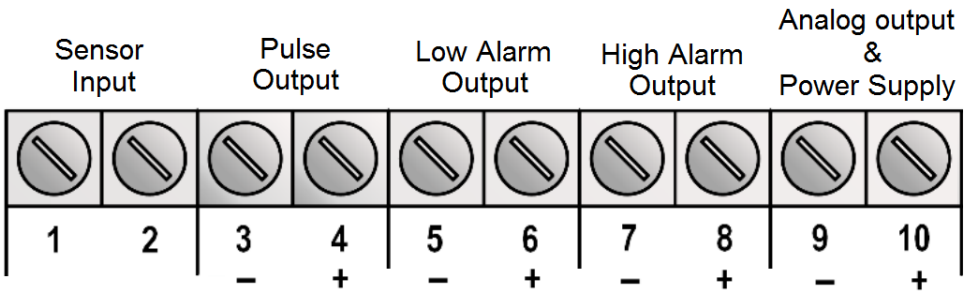
The settings for Total, Accumulated Total and Flow rate are entirely separate. In this way, different units of measurement and decimals can be used for each e.g. gallons for total and liters for flow rate.

The K-Factor in 5.1 must be entered in pulses per litre (PPL). Entering the k-factor in pulses per gallon (PPG) will result in inaccurate readings. Refer to page 12 for detailed instruction on entering the k-factor.

Note !

***The k-factor in 5.1 MUST ALWAYS be entered in pulses per LITRE, regardless of units in 1.1, 2.1 and 3.1**

# TERMINAL CONNECTORS

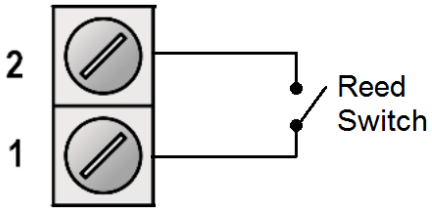



## Terminals 1 - 2 | Sensor input (from flow meter)

The 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 2 position terminal block is not polarity conscious so the reed switch wires can be connected in any order.

Note !

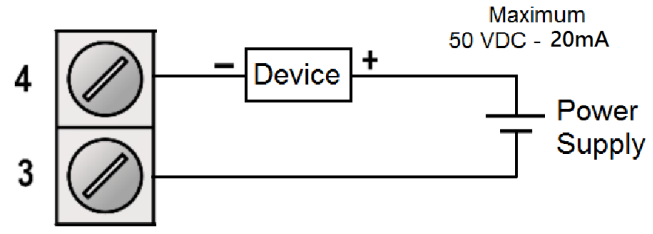
For meter mounted displays, these terminals come connected from factory. No further connections are required by end-user.
For remote displays, Reed switch (from flow meter) to be connected by the end-user.




Connecting any other type of sensor could cause damage to the unit

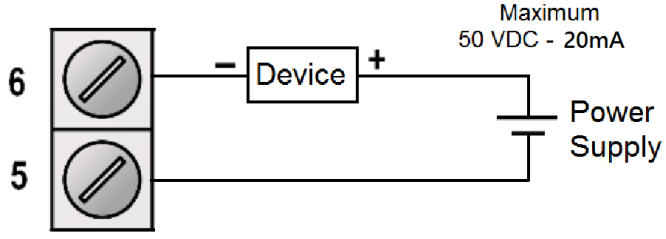
## Terminals 3 - 4 | Pulse Output (Programmable)

This function transmits accumulated total. The output is transistor based - passive (requires external power)
Below is a typical connection drawing;



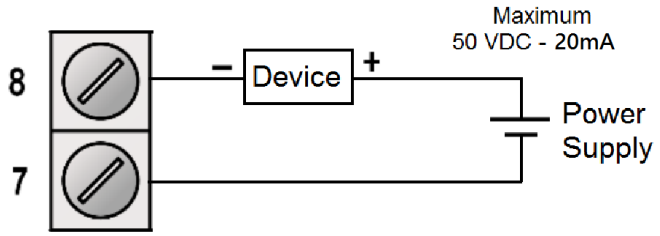

## Terminals 5 - 6 | Low Alarm Output (Programmable)

This function transmits alarm in an event of low flowrate. The output is transistor based - passive (requires external power)
Below is a typical connection drawing;




## Terminals 7 - 8 | High Alarm Output (Programmable)

This function transmits alarm in an event of high flowrate. The output is transistor based - passive (requires external power)
Below is a typical connection drawing;

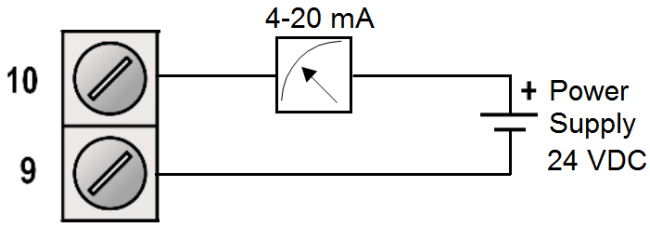



## Terminals 9 - 10 | Analog Output & Power Supply

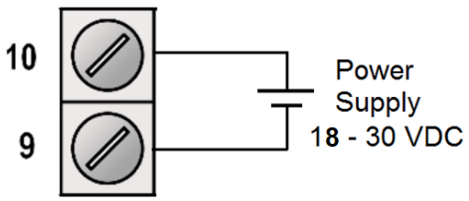
Terminals 9 and 10 offers two functions;

- Analog output (Output)
- Power Supply (Input)

As Analog Output, the unit generates 4 - 20 mA proportional to the flow rate. The output is passive and loop powered.
Below is a typical connection drawing;




As power supply input, the unit accepts external power supply of 18 - 30VDC. Do connect the "-" to terminal 9 and the "+" to terminal 10. When power is applied to these terminals, the (optional) internal battery will be disabled / enabled automatically to extend the battery life time.




Note !

Battery is optional to use if external power is applied.

# PROGRAMMING SET-UP LEVEL

This chapter describes the daily use and programming of the PRA Digital Register. The instructions are meant for users / operators.

**MODES OF OPERATION**

RUN mode: This is the normal operating mode. RUN icon on the screen represents this mode.

SETUP mode: This mode is to view settings. SET-UP icon on the screen represents this mode.

SETUP PROG mode: This mode is to modify settings. SET-UP PROG icon on the screen represents this mode.

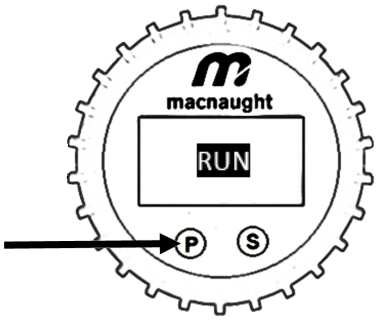
**FUNCTION OF THE BUTTONS**

Below are the functions of 'P' and 'S' buttons during different modes of operation.

| Mode | P | S | P S (Press and release simultaneously) |
|---|---|---|---|
| **RUN** | **Toggle screens;** Flowrate, Total, Batch and Accumulated total **Access to Setup mode** | **Toggle screens;** Flowrate, Total, Batch and Accumulated total | **Resets Total and Batch total** (Press P for NO or S for YES when prompted) |
| **SETUP** | **Toggle sub-functions Access to Run mode** | **Toggle main-functions** | **Access to Setup-Prog mode** (while in a sub-function) |
| **SETUP PROG** | **Apply a new value to a sub-function** | **Apply a new value to a sub-function** | **Save changes** |

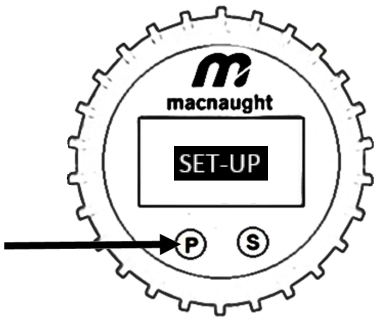
Setup mode is reached by pressing the 'P' button for 7 seconds; at which time, setup will be displayed on the LC display. In order to return to the Run mode, 'P' will have to be pressed for 3 seconds. Alternatively, if no keys are pressed for 2 minutes, the unit will exit setup mode automatically.
Setup can be reached at all times while the display remains fully operational.

**ENTERING INTO SETUP MODE**




Press P for 7 seconds

**EXITING FROM SETUP MODE**




Press P for 3 seconds

Once programming is done, visit the parameters again to make sure the changes are saved correctly.

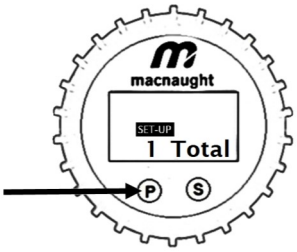
# K-FACTOR PROGRAMMING

**HOW TO FIND A K-FACTOR OF YOUR METER**
The K-factor could be found on either of;

- Flow meter's body
- Flow meter's test report
- Contact Macnaught providing the Serial Number of the flow meter

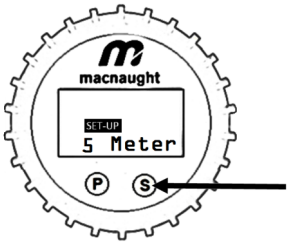
**PROGRAMMING K-FACTOR IN THE DISPLAY**
Always enter the K-factor in **pulses per LITRE (PPL).** Entering the k-factor in pulses per gallon (PPG) will result in inaccurate readings.

Follow below steps to enter the k-factor if you are in RUN mode

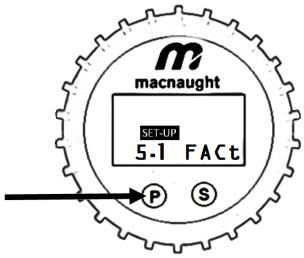



Press (P) for 7 seconds.

This will enter into Setup model

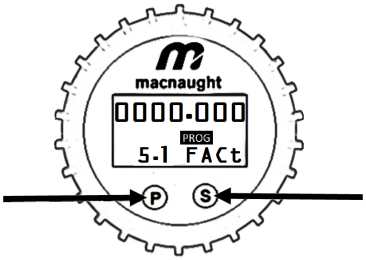



Press (S) four times until it shows function 5 'METER'




Press (P)

This will show sub-function 5.1 'FACt (i.e. K-factor)'




Press and release (P) and (S) simultaneously

This will enter in programming mode. The screen show PROG and the left most digit start flashing

Press (P) to change the numeric value and press (S) to move to the next digit.

Once the k-factor is entered, press and release (P) and (S) simultaneously. This will save the changes.

Press (P) for 3 seconds to go to the Run mode

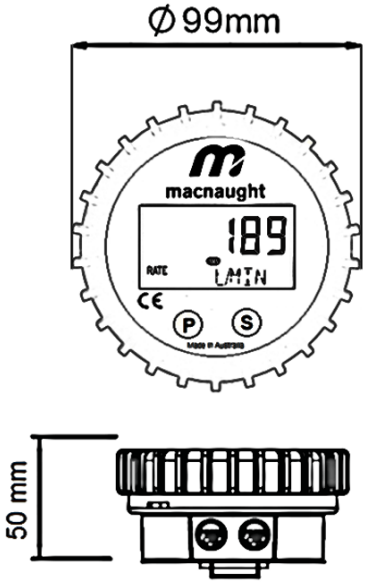
**PPG to PPL Conversion**
If the flow meter's body or test report shows the k-factor in pulses per gallon (PPG), it needs to be converted into pulses per LITRE (PPL) first.
Divide the PPG k-factor by **3.7854** to convert into PPL.

As an example: If the PPG k-factor is 136.70, the PPL k-factor is 36.112

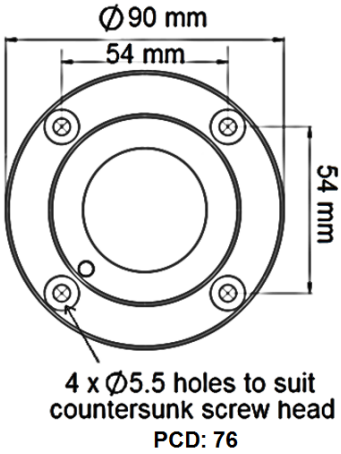
Note ! **The display accepts k-factor in pulses per LITRE only**
**Once the programming is done, visit the parameters again to make sure the changes are saved correctly**

# DIMENSIONS

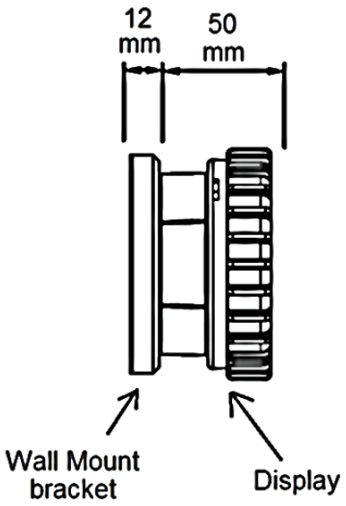
## Display



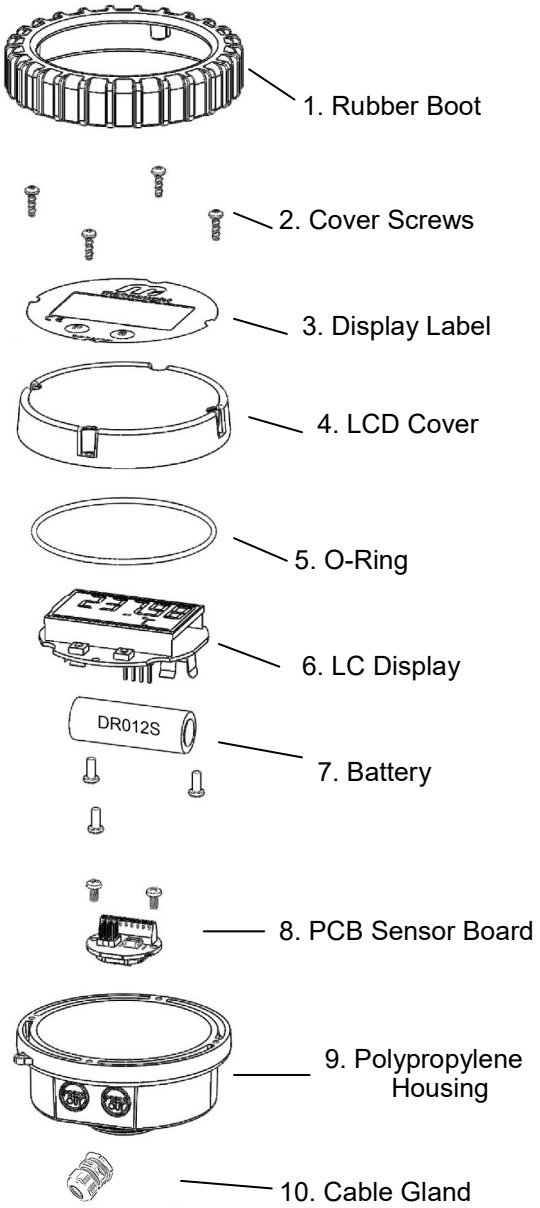

## Wall Mount bracket




## Display with Wall Mount bracket




# EXPLODED VIEW




# ORDERING CODE

| Part Number | Item Description |
|---|---|
| MXD-ES | Display |
| MXS-WMB | Wall mount bracket |
| PRA-RMP | Display + Wall mount bracket |

Wall mount bracket is required for remote installation

# SERVICE KITS

| Kit Part Number | Item Description | Item Number |
|---|---|---|
| DR012S | Battery | 7 |
| MXS-PCB-RH | PCB Sensor Board | 8 |
| MXS-PCB-PR | PCB Sensor Board | 8 |
| | PP Housing | 9 |
| MS1279S | Display Label | 3 |
| MS685S | Cable gland - M12 | 10 |
| MXS-DIS-PRA | Cover Screws | 2 |
| | Display Label | 3 |
| | LCD Cover | 4 |
| | O-Ring | 5 |
| | LC Display | 6 |
| | Battery | 7 |

Note !

PCB Sensor Board has 1 x Reed switch and 1 x Hall effect sensor as standard (unless a special board is requested)

# TROUBLESHOOTING

**DISPLAY IS BLANK**
The battery could either be dead or not connected properly. Inspect/ replace the battery.

**DISPLAY SHOWS INCORRECT READING**
Check the k-factor. Make sure the decimals are taken care of. It should be in pulses per litre.

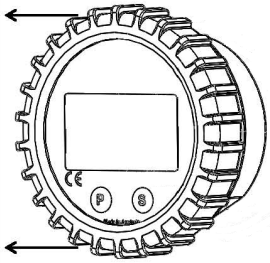
**DISPLAY SHOWS NO FLOW**
Check the wiring between the PCB sensor board (Item no 8) and LC display board (Item no 6). Check for loose connections and clean the termials if required. Replace the PCB sensor board if wiring and programming are ok.

**bAt LOW ALARM**
This is Low Battery alarm. Replace the battery.

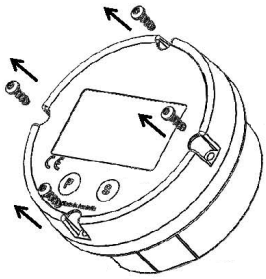
**RPL bAt ALARM**
This is the final warning of low battery. The unit will shutdown any time. Replace battery.

**REPLACING THE BATTERY**
The battery is located on the rear side of LC display (item no 6). This can be accessed by removing the rubber boot (item no 1) and screws (item no 2). After replacing the battery (Part no: DR012S), make sure the o-ring (item no 5) stays intact with the LCD cover. Apply a thin layer of grease to the o-ring if required.
Re-install the cover, screws and boot. See illustration below;

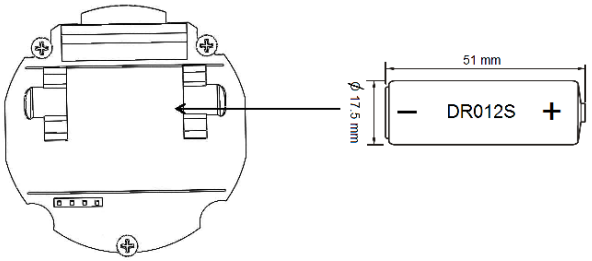
1. Remove Rubber Boot



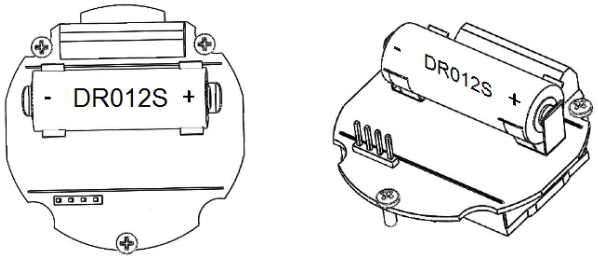
2. Remove 4 screws



3. Install the battery with orientation as shown




4. Re-install the cover, screws and boot




Note !

Backup of settings and running totals are stored in flash memory. The display will retain these values in an event if battery is removed for replacement.

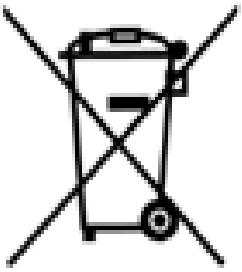
# NOTES

For your record, it is advisable to note down any changes in the parameters

PO/ Reference no: _____
Flow Meter model: _____
Flow meter Serial: _____

| | | | Default value | Date:__/__/____ Enter your settings here | Date:__/__/____ Enter your settings here |
|---|---|---|---|---|---|
| **1** | **Total/ Batch Total** | | | | |
| | 1.1 Unit | L - m3 - UKGAL - USGAL - UKbbl –USbbl - OILbbl | L | | |
| | 1.2 Decimals | 0 - 1 - 2 - 3 | 0 | | |
| **2** | **Accumulated Total** | | | | |
| | 2.1 Unit | L - m3 - UKGAL - USGAL - UKbbl –USbbl - OILbbl | L | | |
| | 2.2 Decimals | 0 - 1 - 2 - 3 | 0 | | |
| **3** | **Flow Rate** | | | | |
| | 3.1 Unit | L - m3 - UKGAL - USGAL - UKbbl –USbbl - OILbbl | L | | |
| | 3.2 Time Period | Second - Minute - Hour | Minutes | | |
| | 3.3 Decimals | 0 - 1 - 2 - 3 | 0 | | |
| | 3.4 Calculation | per 1 - 255 pulses (Default 10) | 10 | | |
| | 3.5 Cut-off | 0.1 - 999.9 seconds (Default 30) | 30 | | |
| **4** | **Alarm** | | | | |
| | 4.1 Flow Alarm | Operate - Hidden - Off | Operate | | |
| | 4.2 Zero Flow Display | On - Off | On | | |
| | 4.3 Low Flow Alarm | 0 (unit / time) | 0 | | |
| | 4.4 High Flow Alarm | 0 (unit / time) | 99999 | | |
| | 4.5 Alarm Delay | 0 - 99 seconds | 0 | | |
| **5** | **Meter** | | | | |
| | 5.1 *K-Factor (Pulses per Litre) | 0000.000 to 9999.999 | '1' or as per factory settings | | |
| **6** | **Analog Output** | | | | |
| | 6.1 Low Flow - 4mA | 0000.000 - 9,999,999 | 0 | | |
| | 6.2 High Flow - 20mA | 0000.000 - 9,999,999 | 99999 | | |
| | 6.3 Low Calib - 4mA | 0 - 9999 | 633 | | |
| | 6.4 High Calib - 20mA | 0 - 9999 | 3214 | | |
| **7** | **Pulse Output** | | | | |
| | 7.1 Decimals | 0 - 1 - 2 - 3 | 0 | | |
| | 7.2 Pulse Width | 0.005 - 1.000 seconds | 0 | | |
| | 7.3 Amount (Pulse per) | x,xxx,xxx quantity | 1000 | | |

## *WEEE Directive - Waste Electrical and Electronic Equipment*



The WEEE Directive requires the recycling of waste electrical and electronic equipment in the European Union.

Whilst the WEEE Directive does not apply to some of Macnaught's products, we support its policy and ask you to be aware of how to dispose of this product.

The crossed out wheelie bin symbol illustrated and found on our products signifies that this product should not be disposed of in general waste or landfill.

Please contact your local dealer national distributor or Macnaught Technical Services for information on product disposal.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