

MXL-INSTPRA
REV 1
08/13

TYPE PRA DIGITAL REGISTER

INSTRUCTION MANUAL



To the Owner

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

This Instruction Manual provides a instruction guide on the set-up 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 web based support materials to compliment our product range. Access the website by scanning the QR code.



INTRODUCTION

SYSTEM DESCRIPTION OF THE Gx012P

Functions and features

The flow rate / totalizer model PR 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 IP65 environmental protection.

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 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..

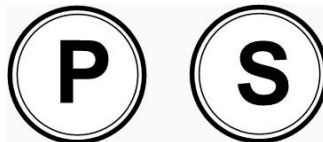
A backup of the total and accumulated total in EEPROM memory is made every minute.

OPERATIONAL

GENERAL

This chapter describes the daily use of the PRA 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.

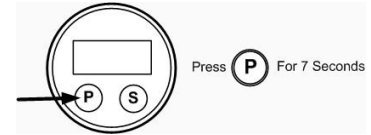


Pressing both keys simultaneously to CLEAR the value for total and batch then press P for NO or S for YES to clear the total/batch. In the setup mode pressing both keys simultaneously whilst in the upper levels of each of the functions will allow modification of the setting and pressing again will save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

PROGRAMMING SET-UP LEVEL

GENERAL

Configuration of the PRA 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 PRA remains fully operational.



SETUP FUNCTIONS AND VARIABLES PRA

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	PRA	-
82	SOFTWARE VERSION	xx.xx.xx	-
83	SERIAL NO.	xxxxxxx	-

EXPLANATION OF SET-UP FUNCTIONS

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>Please note that the K-Factor entered in 5.1 should be in pulses per litre and unit adjustment is 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>Please note that the K-Factor entered in 5.1 should be in pulses per litre and unit adjustment is 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>Please note that the K-Factor entered in 5.1 should be in pulses per litre and unit adjustment is 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 5.1	<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 flow rate 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.

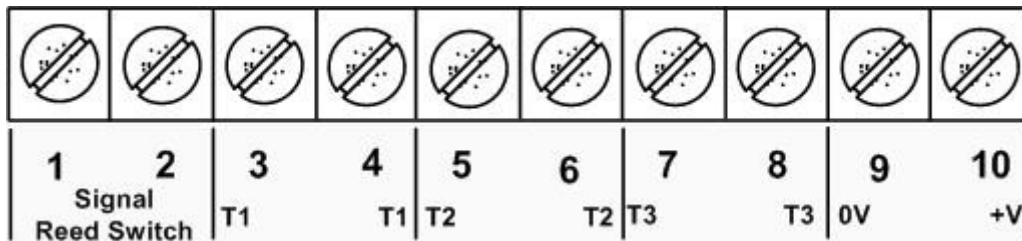
DECIMALS 7.1	Sets the decimals for the pulses per 7.3
WIDTH OF PULSE 7.2	<p>The pulse width determines the time that the transistor will be switched; in other words the pulse length. The minimum time between the pulses is as long as the selected period time.</p> <p>Pulse widths are between 5 m sec to 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 PRA 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

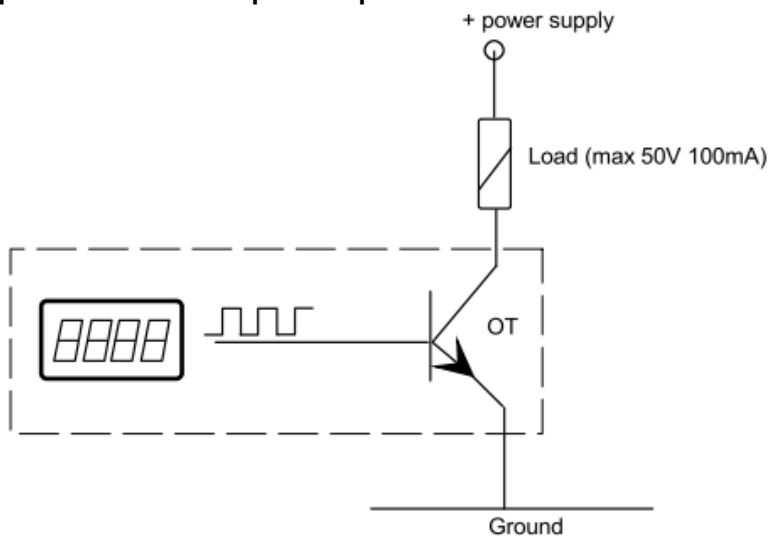
Connecting any other sensor type could cause damage to the electronics module



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

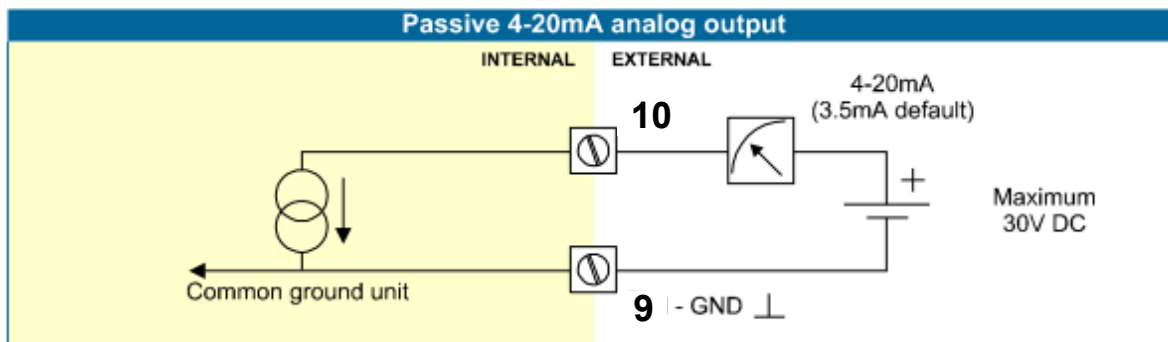
Example for scaled 1 pulse per litre the output must be programmed as follows:
 In menu 7.1 set 2222.22
 In menu 7.2 set 10 or more (10mS or more if needed)
 In menu 7.3 set 1.00

Example Pulse/Alarm Output Setup

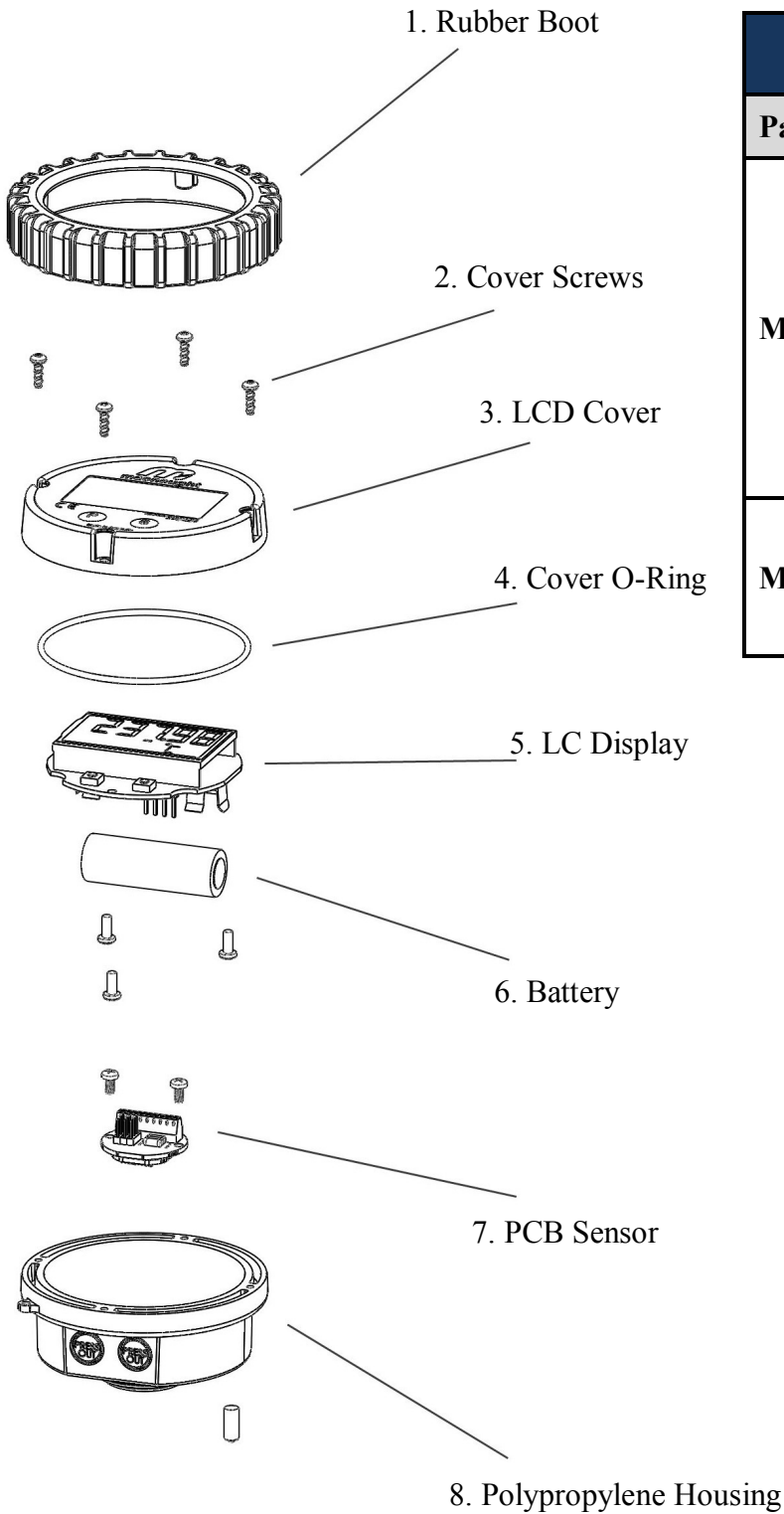


Passive 4~20mA setup

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.



SERVICE KITS



SERVICE KITS	
Part Number	Items
MXS-DIS-PRA	2. Cover Screws
	3. LCD Cover
	4. Cover O-Ring
	5. LC Display
	6. Battery
	7. PCB Sensor Board
MXS-PCB-PR	8. PP Housing

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. 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	Two industrial micro-switch keys. UV-resistant silicone keypad.
Painting	?????
Meter mount enclosures	Dimensions: 100mm diameter
Classification	IP67
Cable entry	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

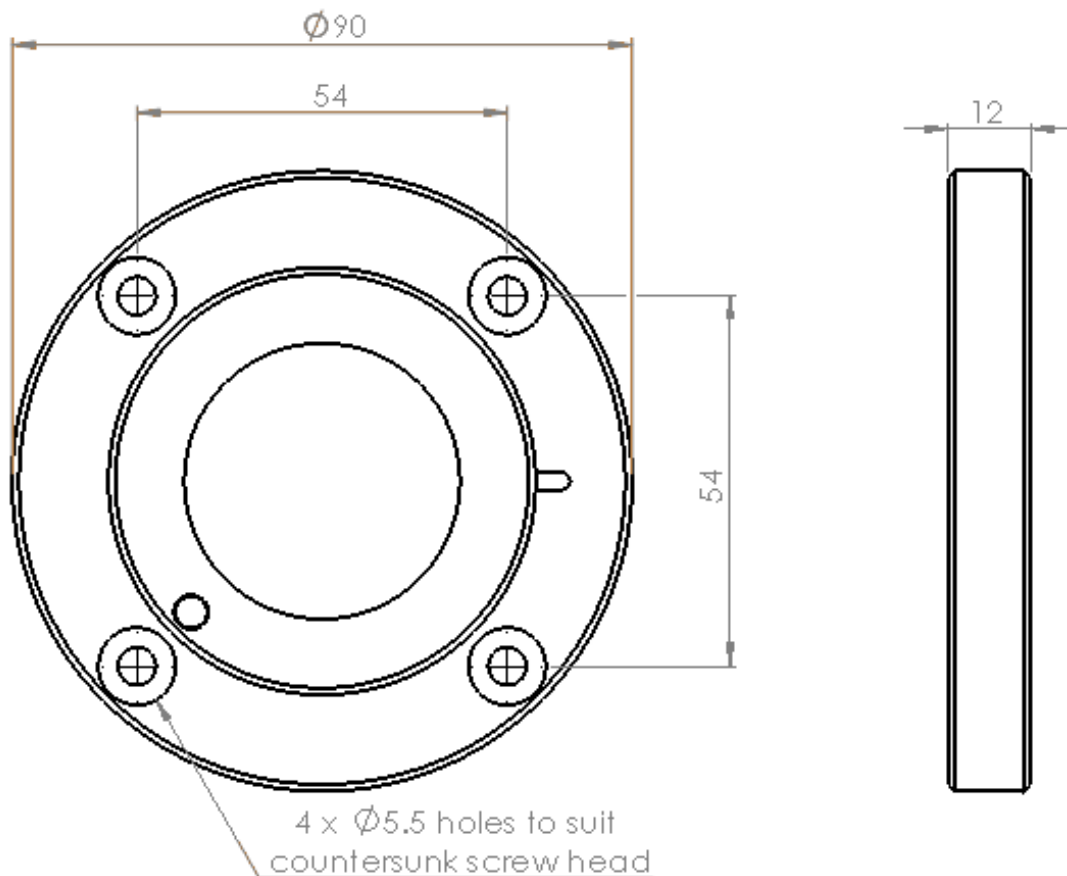
Total / Batch total / Accumulated total	
Digits	7 digits.
Units	L, m3, US-GAL, UK-GAL, US-bbl, UK-bbl, OIL-bbl.
Decimals	0 - 1 - 2 or 3.
Note	total and batch total can be reset to zero.
Operator functions	
Displayed functions	Flow Rate. Total (can be reset to zero by the operator). Batch total (can be 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 .

OUTPUTS

Analogue output	
Function	transmitting flow rate.
Type	Passive 4-20mA output - output loop powered.
Accuracy	10 bit. Update 8 times a second. Software function to calibrate the 4.00mA and 20.00mA levels precisely within set-up.
Minimum operating voltage	8V DC
Power supply	18-30V DC
Switch outputs	
Function	One scaled pulse output - transmitting accumulated total. One high flowrate and one low flowrate alarm output.
Pulse output	Max. frequency 100Hz. Pulse length user definable between 5msec up to 1 second.
Type OT	Passive transistor output - isolated. Load max. 50V DC - 100mA.
Isolation	100V DC maximum.

WALL MOUNT BRACKETS

The PR series is available with a Wall Mount Bracket option for applications requiring remote mount display. Following is a dimensional drawing for the wall mount bracket.



RECORDED 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	PRA		
82 software version	30.05.01		
83 serial number			



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