

USER'S GUIDE
Installation & Operation
Instructions

OPEN CHANNEL FLOWMETER
OCFM



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Introduction

The **OCFM** display is designed for use with Ultrasonic Distance, Pressure and Electromagnetic Area Velocity sensors. The Meter is a 3.6vdc powered and provides cost effective measurement of flow rate in applications where open channel measurement is required. The design concept has focused on simplicity.

The **OCFM** can be used with the following sensors: **OCFM DISPLAY+AVMAG+ULATRASONIC DISTANCE TRANSDUCER, OCFM DISPLAY+AVMAG+PRESSURE TRANSDUCER, OCFM DISPLAY+PRESSURE TRANSDUCER, OCFM DISPLAY+ULTRASONIC DISTANCE**. The display unit utilises a low power high speed microprocessor. The flow total and flow rate are displayed on a LCD display. Low power consumption is achieved by sampling the flow rate at regular intervals and switching the LCD display off. The red indicator LED indicates the flow rate sample being taken and is visible through the display cover. To read the rate and total in low power modes the user presses the **SHOW/SAVE** button. Use the **▲** button to cycle through rate, level and velocity.

Battery life

The **OCFM** can be battery powered and is designed to sleep between flow samples and achieve substantial battery life. Battery life is affected by the sample interval and interruptions to the sleep mode. The sample interval is programmable by the user and interruptions to the sleep mode occur for unsteady flow rates which activate smart sampling and the processor staying awake to produce required output pulses. The maximum battery life is therefore achieved with steady flow, the maximum sample interval i.e. 540s and the fewest number of totaliser pulses per unit volume e.g. pulse per 1m³.

Smart Sampling

The **OCFM** will sleep in low power mode between flow samples see **M2_6**. If flow is detected from zero flow or if the flow rate changes significantly the **OCFM** will enter Smart Sampling mode and sample continuously until the flow rate value is stable, at which time it returns to the programmed sample interval. The sensitivity of the smart sampling is selectable see **M2_7**.

Volumetric Pulse Programming

N.B. The **OCFM** is a low power flow meter. It will sleep between flow samples see **M2_6**. The Battery powered **OCFM** will however stay awake to produce output pulses for up to a maximum time period equal to **50%** of the sample time. That is, an awake time of **30s** is possible for a **60s** sample period. This will impact battery life.

Installation guides

Remote Electronics

The electronics display may be mounted on the wall or a pipe stand. The display housing has dedicated pre-moulded holes for mounting located at the corners. DO NOT drill into the display enclosure, this will void IP rating and warranty. Avoid direct sunlight on the LCD display as this can make it difficult to read and cause fading over time. If mounted in an area where there is exposure to direct sunlight it is advisable to mount the display facing south and provide shade for the display. Avoid mounting the display in any area where there is a possibility of flooding. The display and glands are rated IP67.

Avoid mounting near VSD (variable speed drives) and motors.

The OCFM Batmag meter is not rated for use in hazardous areas.

Look up table (20 point table)

M2_15 is used to programme: **Head vs Area** or **Head vs Rate**.

Programme **M2_1** to select: **AV mag** or **20 point**.

M2_15 select **yes** to enter programming. Head unit of measure is set in **M2_10**.
I.e M or mm.

Area unit of measure is **m, mm, bar, mbar, psi & kpa**.

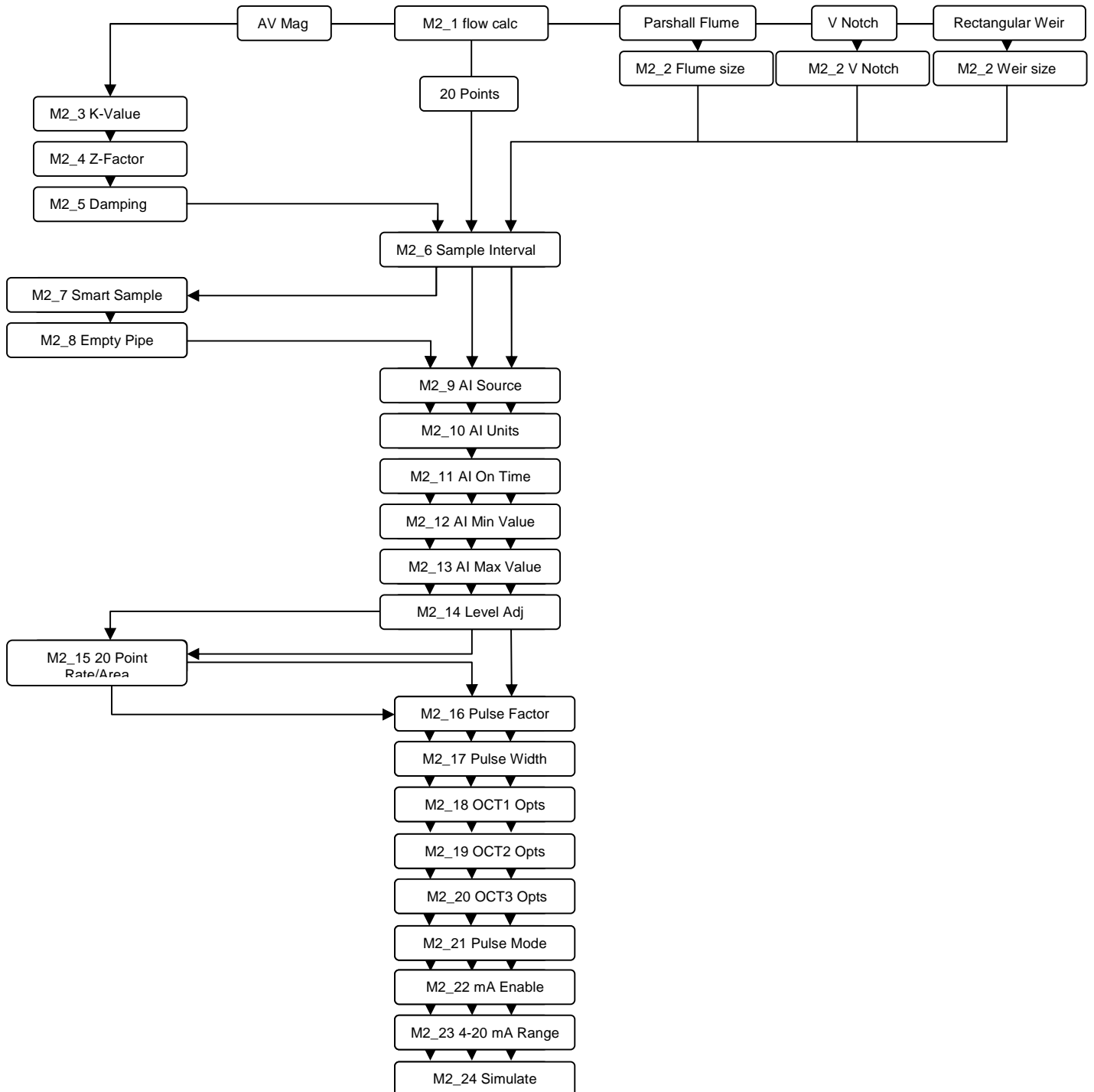
Rate unit of measure is m^3/s only.

Each lookup row is programmable as a pair. Start with the lowest head pair.
At least three rows must be entered to finish the entering process enter a last pair at zero values.

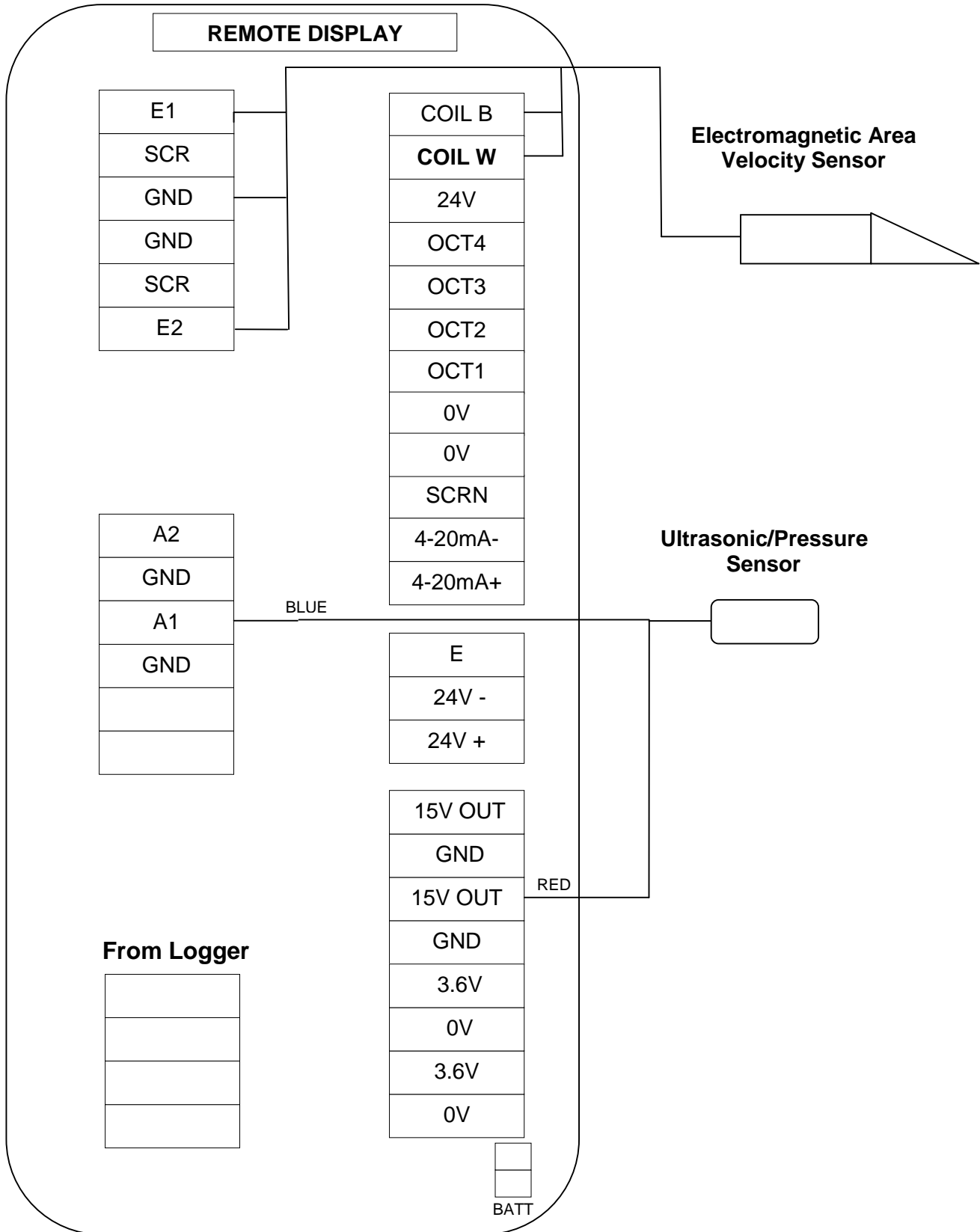
: **NB** Note the table will populate remaining pairs extrapolating linear **Head vs. Area / Flow** rate relationship.

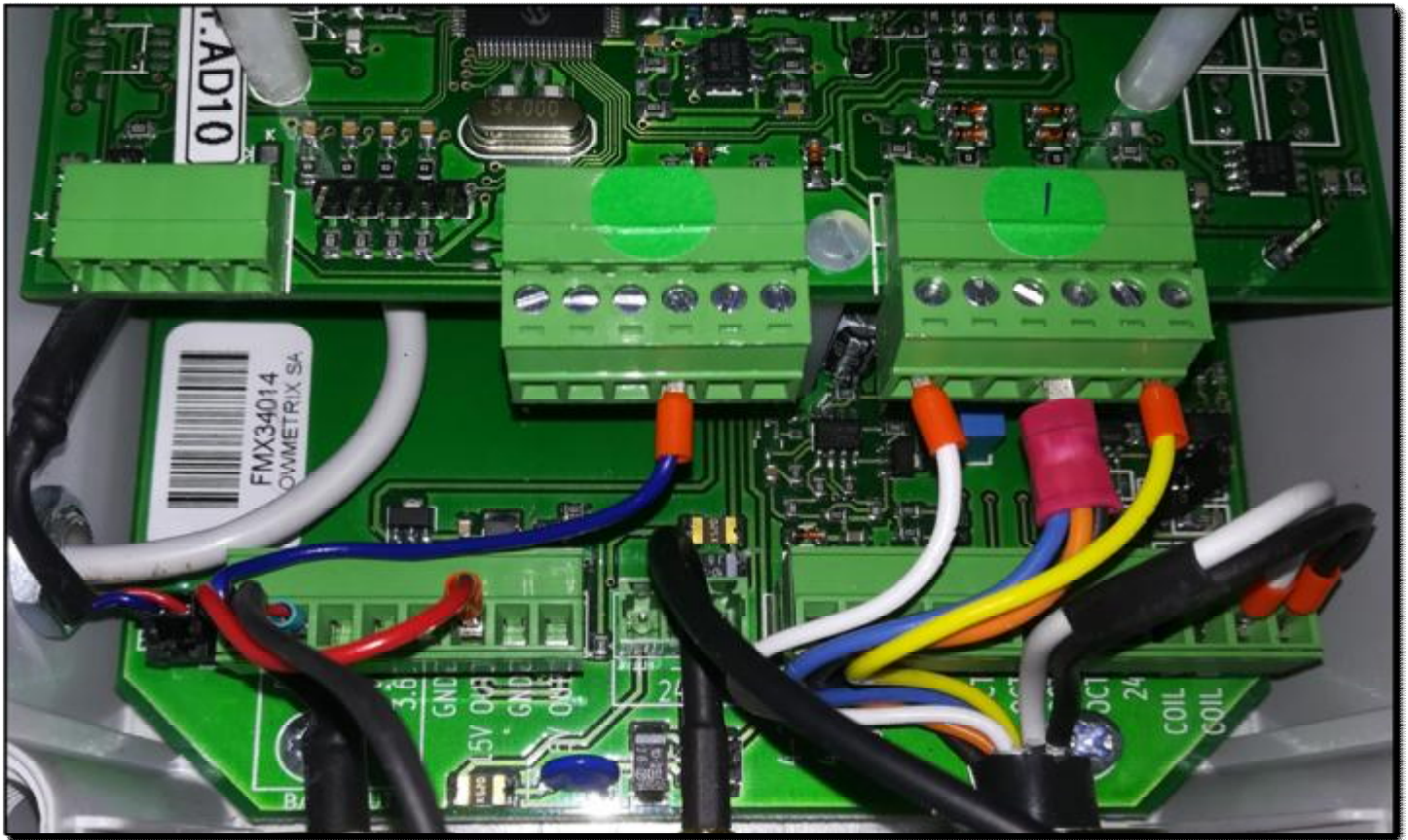
For the best performance calculate a larger number of points in the lookup table.
The relationship between points on the table is linear.

Flow Calculation



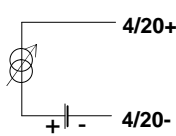
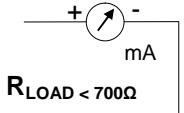
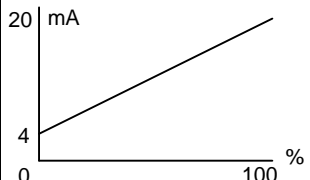
Wiring Diagram



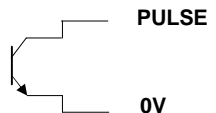
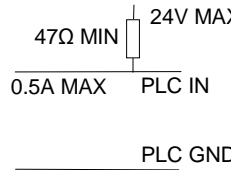
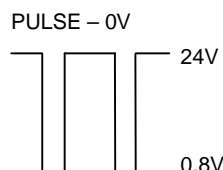
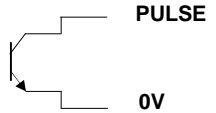
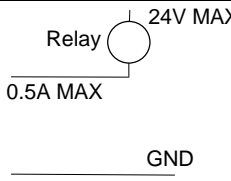
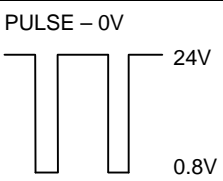
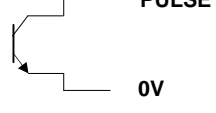
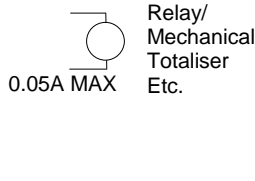
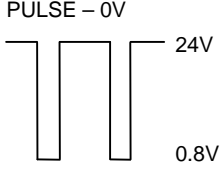
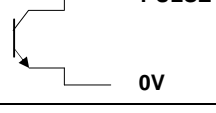
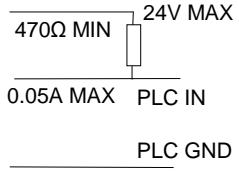
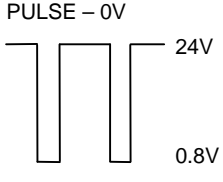


Output Function

- The 4-20mA signal output requires external supply of 24VDC \pm 2VDC connected at **24v + & - terminals**. The active 4-20mA output signal is available at terminals 4/20+ & 4/20+ proportional to the flow rate. 4mA = 0 flow rate. The full-scale value (i.e. 20mA) is the flow rate figure programmed into menu item M2_22.

OUTPUT	OCFM TERMINAL	EXT. CIRCUIT	SIGNAL
Flow rate Current Loop (Active, requires external supply at + & - terminals)			

- The **OCFM** will produce a totaliser pulse string of equal mark space ratio after it has sampled the flow rate. The totaliser pulse output signal is either a 24V pulse available between the **24V** terminal and the **OCT** terminal, or an open collector output between **OCT** terminal and the **0V** terminal. The 24V pin requires external supply of 24VDC \pm 2VDC at **24v + & - terminals**. The width of the pulse is selectable in menu item M2_17. The error message "**pulse-out error**" will be displayed if the pulse string cannot be produced within half the sample period.

OCT 1, 2, 3, 4			
OUTPUT	OCFM TERMINALS	EXT. CIRCUIT	SIGNAL
Totaliser pulse Binary Output (Open-Collector) External supply and pull up resistor			
Totaliser pulse Binary Output (Open-Collector) External supply and relay/counter			
Totaliser pulse Binary Output (Open-Collector) Internal/External supply and relay/counter			
Totaliser pulse Binary Output (Open-Collector) Internal/External supply and external pull up resistor			

Keypad System

The **OCFM** has a 4-button programming system.

- The **MENU** button (**M**) is used to scroll through the menu structure.
- The **SAVE** button (**S**) is used to view rate and total during low power modes, to save entered changes to the flow meter programme.
- The **▲** is used to view voltage during run or sleep mode.
- The **▶** and **▲** buttons are used to change numbers and scroll through options.

Menu System / setup

The **OCFM** menu system is easy to use and designed for programming simplicity.

With the **OCFM** powered up it will test the sensor wiring and test that liquid is present. If correct, the flow total and flow rate are displayed, if not an error message is displayed.

F0000100	I	= Forward total or Reverse Total see M1_7 tot display
3.9768	l/s	= Flow rate

All set-up requirements are contained in the menus, and each item is stepped to by pressing the **M** button.

NB. The new data is only stored if the **Save & exit** instruction is executed.

Press **▶** repeatedly until cursor is under digit to be edited

Press **▲** repeatedly until desired value is displayed

Press **M** to continue

START PROGRAMMING - Press MENU

Main Menu

The Main Menu consists of **Password?**, **Change?**, **Units?**, **Menu-1**, **Menu-2**, and **Save & exit**

Password?

Enter the required password. The flow meter is shipped with the password 2000. (Default password = **1973**). The set-up can be viewed without the password, however, no changes can be saved at the **Save & exit** menu item and the error message **wrong password** is displayed.

Press ► repeatedly until cursor is under digit to be edited

Press ▲ repeatedly until desired value is displayed and **M** to continue

Change ? 2000

Providing the correct password was entered, a new password can now be entered. Enter the required password.

Press ► repeatedly until cursor is under digit to be edited

Press ▲ repeatedly until desired value is displayed

Press **M** to continue

Units? Metric

Metric and **US** units of rate and total measurement are available.

Press ▲ until desired units are displayed and **M** to continue.

Menu-1 M-cont S-enter

Press **S** to enter or **M** to continue

Menu-2 M-cont S-enter

Press **S** to enter or **M** to continue

Cal mode M-cont S-enter

Press **S** to enter or **M** to continue (Cal mode is a hidden menu)

Save & exit M-cont S-yes

Press **S** to save and exit or **M** to continue

MENU-1 Flow Data

M1_1 rate units
l/s

Press ▲ repeatedly until desired units are displayed and **M** to continue.

M1_2 tot units
m³

Select the unit in which you wish to totalise.

Press ► repeatedly until cursor is under digit to be edited.

Press ▲ repeatedly until desired value is displayed and **M** to continue.

M1_3 max flow
100l/s

This is the maximum flow rate of the flow tube.

Press ► repeatedly until cursor is under digit to be edited

Press ▲ repeatedly until desired value is displayed and **M** to continue

NB If maximum flow rate is exceeded it will read 0 flow.

M1_4 clr total?
save tot

Select between **clear tot** to clear the existing flow total, **save tot** to keep the existing flow total. Press ▲ to select option required and **M** to continue.

M1_5 %cutoff
2%

0%, 1%, 2%, 3%, 5% & 10% of full scale **M1_3** cutoff settings are available.

Select the level below which the Batmag meter will output zero flow rate.

Press ▲ to select the required value and **M** to continue to **Main Menu**.

M1_6 Total opts
Grand

The top line of the LCD display is used for the totaliser. A **Grand** totaliser and a **Resettable** Totaliser are selectable. To reset the Resettable totaliser press **DATA** and **VOLTAGE** buttons simultaneously.

M1_7 tot display
auto

Auto, scroll, fwd settings are available. Auto displays forward flow and total during forward flow and displays reverse flow and total during reverse flow. Scroll alternates between displaying forward flow and total, reverse flow and total and net flow and total. Net only displays net total.

Press ▲ to select the required value and **M** to continue.

**M1_8 auto disp
off**

Choose between **off** and **60 seconds**. Auto display will turn the display on every 60 seconds for 5 seconds.

Press **▲** to select the required value and **M** to continue.

MENU - 2 Setup Data

**M2_1 Flow calc
AV mag**

AV mag, 20 point table, parshall flume, V notch, rectangular weir are available.

Press **▲** repeatedly until desired sensor type is displayed and **M** to continue.

**M2_2 sensor type
Flume size**

Parshall flume - flume size, V notch - notch angle, Rect weir - weir size are available.

Press **▲** repeatedly until desired sensor type is displayed and **M** to continue.

**M2_3 K-value
1.000**

Menu is only visible when AV mag is selected in M2_1.

Enter the calibration coefficient stamped on the flow tube.

Press **▶** repeatedly until cursor is under digit to be edited.

Press **▲** repeatedly until desired value is displayed and **M** to continue.

**M2_4 z-factor
0.000**

Menu is only visible when AV mag is selected in M2_1.

In case of flow readings in no flow conditions, choose an offset value to zero the reading.

Press **▲** to increment until desired offset value is displayed.

Press **▶** to decrement until desired offset value is displayed.

Press **M** to continue.

**M2_5 damping
minimum**

Menu is only visible when AV pressure/ AV u-sonic is selected in M2_1.

Minimum, medium, maximum damping settings are available

Press **▲** to select the required value and **M** to continue

**M2_6 sampl inter
60s**

Continuous, 60s, 120, 180s, 240s, 360s, 540s settings are available. Maximum battery life will be achieved at **540s** sampling.

Select the interval at which the Batmag meter will sample flow.

Press **▲** to select the required value and **M** to continue to **Main Menu**

**M2_7 smart sampl
off**

Menu is only visible when AV mag is selected in M2_1.

Minimum, Medium, Maximum sensitivity and **off** settings are available. Smart sampling is activated when a significant change in measurement occurs. Press **▲** to select the required value and **M** to continue.

**M2_8 empty pipe
Sensitivity 5**

Empty pipe sensitivity levels **1, 2, 3, 4, 5** and **Disabled** are available. Empty pipe detection response is affected by cable length and liquid conductivity. If necessary empty pipe detection response can be amended.

**M2_9 AI source
4-20mA (level)**

AI source is either from a level sensor or distance sensor. **4-20mA** is used for **level** and **0-20mA** is used for **distance**. Press **▲** to select the required value and **M** to continue.

**M2_10 AI units
m**

AI is the analog input for distance sensor. Choose **Metres (m), Millimetres (mm), Bar, Millibar (mbar), kilopascals (kpa) and Pounds per square inch (psi)**. Press **▲** to select the required value and **M** to continue.

**M2_11 AI on time
15 s**

Enter a number between **0** and **99**. This is the time it takes the sensor to switch on in seconds.

Press **▶** repeatedly until cursor is under digit to be edited. Press **▲** repeatedly until desired value is displayed and **M** to continue

**M2_12 AI min val
0.00**

Press **▶** repeatedly until cursor is under digit to be edited. Press **▲** to select the required value and **M** to continue.

**M2_13 AI max val
0000**

Press **▶** repeatedly until cursor is under digit to be edited. Press **▲** to select the required value and **M** to continue.

**M2_14 level adj
0000**

Enter the zero distance.

Press **▶** repeatedly until cursor is under digit to be edited.

Press **▲** repeatedly until desired value is displayed and **M** to continue.

M2_15 set area?
no

Yes and **no** are available. If **yes**, press **M** to enter **set area** menu.
Press **▶** repeatedly until cursor is under digit to be edited.
Press **▲** repeatedly until desired value is displayed and **M** to continue.
No leaves table unchanged. **Yes** enters the table for programming.
NB Lookup table flow rate UOM must be inserted as m³/s.

M2_16 puls-factor
1.000m³/puls

Volume in **m³** per pulse is programmable.
Press **▶** repeatedly until cursor is under digit to be edited.
Press **▲** repeatedly until desired value is displayed and **M** to continue.

M2_17 puls-width
50ms

The output pulse width can be varied.
Press **▲** repeatedly until the desired value is displayed and **M** to continue
N.B. pulse width is fixed with equal mark space ratio.

M2_18 OCT1 opts
FWD Total

Pulse output is available for **FWD Total, REV Total, FWD/REV Total, Empty pipe Alarm, Low Battery Alarm, REV Flow Alarm**
Press **▲** to select the option required and **M** to continue.

M2_19 OCT2 opts
FWD Total

Pulse output is available for **FWD Total, REV Total, FWD/REV Total, Empty pipe Alarm, Low Battery Alarm, REV Flow Alarm**
Press **▲** to select the option required and **M** to continue.

M2_20 OCT3 opts
FWD Total

Pulse output is available for **FWD Total, REV Total, FWD/REV Total, Empty pipe Alarm, Low Battery Alarm, REV Flow Alarm**
Press **▲** to select the option required and **M** to continue.

M2_21 Puls mode
frequency

Pulse mode is available for
Press **▲** to select the option required and **M** to continue

**M2_22 mA enable
mA disabled**

24Vdc is required at +/- terminals. Select between **mA disabled** and **mA enabled**. The 4-20mA signal is held steady between samples and adjusted at each sample of flow rate, i.e. a 60s sample interval will have a 60s interval between changes in 4-20mA signal.

Press **▲** to select the option required and **M** to continue.

**M2_23 4-20 range
100l/s**

Enter the maximum flow rate at which to output 20mA. mA must be enabled **M2_22**
Press **▶** repeatedly until cursor is under digit to be edited
Press **▲** repeatedly until desired value is displayed and **M** to continue

**M2_24 simulate
100.0**

The output current can be driven to any percentage of full scale by entering the desired value. This facility can be used for testing the mA loop, if activated.

Press **▶** repeatedly until cursor is under digit to be edited.

Press **▲** repeatedly until desired value is displayed and **M** to continue.

**Save & Exit
M-cont S-yes**

NOTE:

Changes that are made to values in the menu system will only be saved when accessing the **Save & Exit** menu and the **S** button is pressed.

Error/Warning Messages

ERROR MESSAGE	ERROR	POSSIBLE SOLUTION
<ul style="list-style-type: none"> Puls-out error 	<ul style="list-style-type: none"> Totaliser count-rate too high 	<ul style="list-style-type: none"> Select larger total units, e.g. m³, Ml

During sleep, if pulses take longer than a second, on average, to output then the puls-error message is shown. The equation is;

Error if: (max flow) / (tot units) * (puls-factor) * (sampling) * (puls-width) *2 > 1000ms

Troubleshooting

PROBLEM	POSSIBLE SOLUTION
<i>Meter not reading</i>	
<ul style="list-style-type: none"> No display Zero flow No flow 	<ul style="list-style-type: none"> Press SAVE to power LCD Check if the sensor is powered Establish a flow.
<i>Meter reading lower/higher than expected</i>	
<ul style="list-style-type: none"> Incorrect setup data programmed Faulty display unit (signal converter) 	<ul style="list-style-type: none"> Program correct setup data Replace display unit

Warranty

Flowmetrix SA CC warrants to the purchaser that the equipment to be delivered hereunder will be free from defects in materials, workmanship and title and will be of the kind and quality designated in the proposal.

The foregoing warranties exclusive and in lieu of all other warranties whether express or implied including any warranty of merchantability or of fitness for a particular purpose.

Warranties other than the above will only be effective if written and signed by an officer of Flowmetrix SA CC

If within 1 (one) year from the date of delivery, the equipment delivered hereunder does not meet the warranties specified above, Flowmetrix SA CC shall thereupon correct such defects, at its sole discretion, either by repairing or by replacing the instrument in its entirety.

The costs of returning the equipment to Flowmetrix SA CC and for the repaired or replaced item being returned to the purchaser shall be for the account of the purchaser.

The liability of Flowmetrix SA CC is conditioned upon the equipment covered hereunder being handled, installed, operated, maintained, stored or used, as the case may be, in strict accordance with the written instructions or technical direction supplied by

Flowmetrix SA CC, and is further conditioned upon the purchasers prompt written notice (within 30 days) to Flowmetrix SA CC of such defects.

Flowmetrix SA CC makes no warranties which extend to the items covered hereby due to improper handling, installation, operation, maintenance, storage or use; abnormal or undisclosed environmental conditions; or operating or use in an otherwise improper manner.

The liability of Flowmetrix SA CC to the purchaser, except as to title, arising out of the supplying of the equipment or its use, under this warranty article, shall not, in any case, exceed the cost of correcting defects in the equipment as herein provided and upon the expiration of the warranty described herein, all such warranty liability shall terminate. The foregoing shall constitute sole warranty remedy of the purchaser and the sole warranty liability of Flowmetrix SA CC.

Goods Return Procedure

Damaged or defective equipment should be returned to the supplier prepaid. Do not return goods until written authorisation to do so as been obtained. Returned goods must have accompanying them a letter stating the following:

- Your company name and order number
- The contact person at your company
- Serial number and name of product
- Description of damage and cause if known
- Nature of any repair attempted by the user
- Type of repair, replacement or adjustment requested