USER'S GUIDE

Installation & Operation
Instructions

BETA METER
ELECTROMAGNETIC FLOWMETER

FLOWMETRIX SA cc

BETA METER

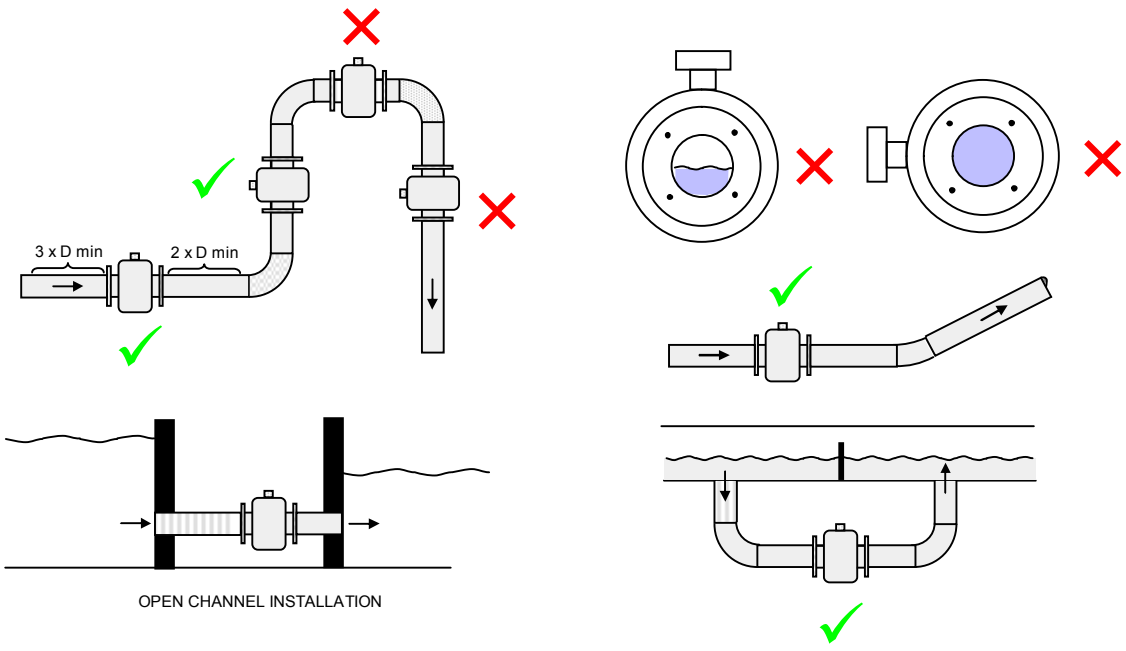
Doc Date: 31/07/2007

Introduction

The Safmag β-meter provides cost effective measurement of flowrate in applications where mechanical flowmeters are traditionally utilized. The design concept has focused on simplicity, whilst retaining all benefits associated with the use of an electromagnetic flowmeter.
The β-meter comprises a flowtube sensor and a display unit which is mounted remote from the sensor. The display unit utilises a high speed, 16 bit microprocessor with 32 Kbyte flash memory. The flow total and flow rate are displayed on a LCD display, and standard features include an isolated 4 – 20 mA output signal together with a pulse output.

Sensor / Flowtube mounting

The flowtube may be installed in horizontal or vertical pipelines. If installed horizontally, the measuring electrodes should be in the horizontal plane. The flowtube should be **full of liquid at all times**. Install the flowtube with at least 3 pipe diameters of straight pipe upstream, and 2 pipe diameters downstream.
Ensure that the gaskets do not protrude into the pipe. This could affect accuracy of the flowmeter. Flowtubes installed in non-conductive pipework (eg PVC HDPE) or lined pipework should have **earthing rings** installed and electrically bonded to the flowtube ground.

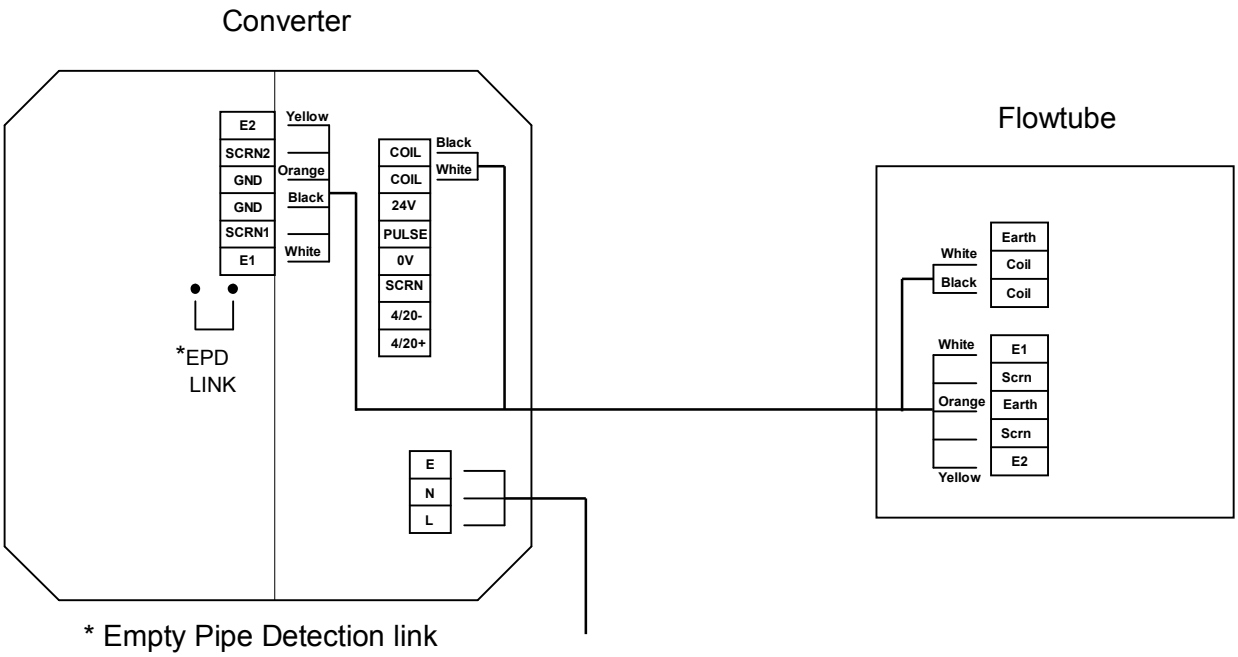


OPEN CHANNEL INSTALLATION

Application Guidelines

1. The velocity at maximum flow should be greater than 1 m/s. (select the meter size accordingly)
2. The minimum flow velocity the flowmeter will measure is 0,3 m/s.
3. The maximum velocity the flowmeter will measure is 8 m/s
4. The conductivity of the liquid should be greater than 20µs/cm.

Wiring Diagram



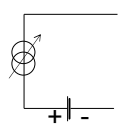
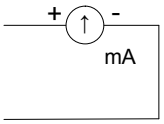
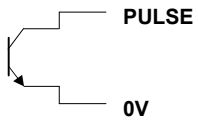
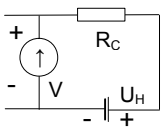
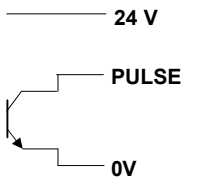
* Empty Pipe Detection link

Empty Pipe Detection (EPD)

The β – meter incorporates an EPD circuit. The EPD is activated with the EPD link inserted, and de-activated with the link removed. For successful EPD it is recommended that the length of interconnecting cable is limited to 15 metres.

Output Connections

TERMINAL	CONNECTION
1,2	Current Loop
3	Ground
4,5	Binary output
6	24V

OUTPUT	BETA METER	CIRCUIT	
Current Loop (Active)			**$R_{LOAD < 700\Omega}$**
Binary Output (Open-Collector)			**U_H = (5 to 24)V** **$R_C[k\Omega] = U_H/I_C$ [mA]** **IC = (1 to 50)mA**
			**V_{RELAY} = 24V** **$V_{TOTALISER}$ = 24V**

- The 4 – 20mA output signal is proportional to the flow rate. The full-scale value (ie. 20mA) is the flow rate figure programmed into menu item M1_2.
- The pulse output signal is either a 24V pulse available between the '24V' terminal and the 'PULSE' terminal, or an open collector output between '0V' terminal and the 'PULSE' terminal.

  N.B. The width of the pulse is selectable in menu item M2_6, however, if the pulse rate exceeds 3 pps the pulse output will change to an output with equal mark-space ratio.
  As the maximum count rate for the totaliser is 100 /sec, the maximum output pulse rate will be 100 pps.
- The pulse – factor setting in menu item M2_5 determines the number of output pulses / totaliser unit.

eg: **Totaliser counts**	**Pulse-factor**	**Output pulse**
1	**1.00**	**1**
10	**0.10**	**1**
100	**0.01**	**1**

Keypad System

The β-meter 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 save entered changes to the flowmeter programme.
- The ► and ▲ buttons are used to change numbers and scroll through options.

Menu System

The β-meter menu system is easy to use and designed for programming simplicity.

With the β-meter powered up the β-meter will test the flowtube sensor wiring and that liquid is present. If correct, the flow total and flow rate are displayed, if not an error message is displayed.

```
00000000 l
3.9768   l/s
```

All set-up requirements are contained in the menus, and each item is stepped to by pressing the **M** button. **N.B.** The new data is only accepted if the 'save & exit' instruction is executed.

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 flowmeter is shipped with the password 1000. (Default password = 1942). 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 ?
1000
```

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 English 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

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 max flow
100 l/s

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

M1_3 total units
m^3

Select the unit you wish to totalise.
Press ▲ to select the option required and **M** to continue

M1_4 clr total?
save tot

Select to clear the existing flow total or to keep existing flow total
Press ▲ to select option required and **M** to continue

M1_5 damping minimum

Minimum, Medium, Maximum damping settings are available
Press ▲ to select the required setting and **M** to continue

M1_6 cutoff 2%

1%, 2%, 3%, 5% & 10% cutoff settings available
Select the level below which the β-meter will output no flow
Press ▲ to select the required value and **M** to continue to **Main Menu**

Menu- 2 Setup Data

M2_1 50 / 60 Hz ? 50Hz operation

Select the appropriate mains frequency.
Press ▲ to select the option required and **M** to continue

M2_2 dia mm 100.

Enter the I.D. of the pipe.
Press ► repeatedly until cursor is under digit to be edited
Press ▲ repeatedly until desired value is displayed and **M** to continue

M2_3 K - value 1.002

Enter the calibration coefficient stamped on 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 sim % o/p 100.

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

M2_5 puls-factor 1.00 pulse/unit

0.01, 0.10 & 1.00 pulse/unit options are available where the units are those selected in **Menu 1_3.**
Press ▲ to select and **M** to continue
N.B. The count rate of the totaliser is limited to 100 counts/second. Above this count rate an error message is displayed.

M2_6 puls-width 20ms

The output pulse width can be varied.
Press ▲ repeatedly until the desired value is displayed and **M** to continue
N.B. the pulse output will change to a frequency with equal on-off period for a pulse rate >2Hz

Error/Warning Messages

ERROR MESSAGE	ERROR	POSSIBLE SOLUTION
• empty pipe	• No liquid in flowtube • Faulty electrode / coil cable	• Fill pipe • Repair / replace cable
• no coil current	• Faulty electrode / coil cable • Faulty flowtube	• Repair / replace cable • Check coil resistance (approx. 40 ohms)
• total error counts > 100/s	• Totaliser count-rate too high	• Select more suitable total units
• rate overflow	• Rate > 999 999	• Select more suitable rate units
• rate underflow	• Rate < 0.01	• Select more suitable rate units
• low voltage	• Supply voltage too low	• Rectify voltage problem

PROBLEM	POSSIBLE SOLUTION
Meter not reading	
• Reverse flow • No flow • Contaminated electrodes • Leaking electrodes	• Turn meter around or reverse coil wires • Establish a flow. • Remove flowtube and clean electrodes • Replace flowtube
Meter reading lower/higher than expected	
• Incorrect data programmed • Faulty display unit • Leaking electrodes	• Program correct data • Replace display unit • Replace flowtube

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 warranty is 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 has 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