The Company

We are an established world force in the design and manufacture of instrumentation for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company’s products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

The UKAS Calibration Laboratory No. 0255 is just one of the ten flow calibration plants operated by the Company and is indicative of our dedication to quality and accuracy.

Electrical Safety

This instrument complies with the requirements of CEI/IEC 61010-1:1993 “Safety requirements for electrical equipment for measurement, control, and laboratory use”. If the instrument is used in a manner NOT specified by the Company, the protection provided by the instrument may be impaired.

Symbols

One or more of the following symbols may appear on the instrument labelling:

- **Warning** – Refer to the manual for instructions
- **Caution** – Risk of electric shock
- Protective earth (ground) terminal
- Earth (ground) terminal
- Direct current supply only
- Alternating current supply only
- Both direct and alternating current supply
- The equipment is protected through double insulation

Information in this manual is intended only to assist our customers in the efficient operation of our equipment. Use of this manual for any other purpose is specifically prohibited and its contents are not to be reproduced in full or part without prior approval of the Technical Publications Department.

Health and Safety

To ensure that our products are safe and without risk to health, the following points must be noted:

1. The relevant sections of these instructions must be read carefully before proceeding.
2. Warning labels on containers and packages must be observed.
3. Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
4. Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.
5. Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
6. When disposing of chemicals ensure that no two chemicals are mixed.

Safety advice concerning the use of the equipment described in this manual or any relevant hazard data sheets (where applicable) may be obtained from the Company address on the back cover, together with servicing and spares information.
1 INTRODUCTION

The Magmaster transmitter, when connected to ABB electromagnetic full bore and insertion type sensor, provides high precision measurement of electrically conductive fluids.

The transmitter can be fitted either integrally to full bore sensors or remotely to insertion and full bore sensors.

This manual provides details to enable the transmitter to be reconfigured from default parameters or from parameters initially set up by the factory to special order.

1.1 Filing Cabinet Analogy

The main menu is accessed similarly to opening the drawers of a filing cabinet, each drawer of the cabinet representing an item of the main menu.

Main Menu items 1 to 3 are generally accessible; the remainder are password protected.

Files in the drawers of the cabinet would represent the groups of parameters provided by the transmitter which, if required, may be viewed or changed as shown in this, and the following pages.
2 CONFIGURING THE TRANSMITTER

The Transmitter is delivered set up either with your chosen units, or set with our standard default values.

If you need to change the transmitter configuration for any reason, this may be done by connecting a terminal device e.g. Personal Computer, Electronic Organiser etc., to the transmitter via the 9-way D-Type connector, found by sliding the movable section of the transmitter cover in the direction of the cable glands.

Special software is not required for configuring the transmitter; any communication program will suffice.

Connect the programming terminal to the transmitter (See APPENDIX A for details of connection and setup of data terminals etc. to the transmitter).

2.1 Getting Started

With connections made and the power switched onto the transmitter and terminal, proceed as shown below:

<table>
<thead>
<tr>
<th>PRESS</th>
<th>Psion Organiser II</th>
<th>Psion Series 3</th>
<th>Personal Computer</th>
<th>Apple Macintosh</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[                ]</td>
<td>[             ]</td>
<td>[                   ]</td>
<td>[            ]</td>
</tr>
</tbody>
</table>

\[ \] = Enter
\[ \] = \[ \] = Enter
\[ \] = Return
\[ \] = \[ \] = \[ \] = \[ \]

Press \[ \] until display shows first item on main menu
i.e. 'Read 1>'
2.2 Looking at the Main Menu

2.3 Choosing a Main Menu Item
'Read Flow' (Item 1 of 'Read' menu) opened and parameter value displayed.

'Disp Mode' (Item 1 of 'Disp' menu) opened and parameter value displayed.

'Login En' (Item 1 of 'Login' menu) opened and parameter value displayed.

'Quit'

Similar to example shown.

Closes any open drawers of filing cabinet.

'Read Net' (Item 5 of 'Read' menu) opened and parameter value displayed.

FILING CABINET ANALOGY
2.4 The Main Menu

SECURITY ACCESS

No security password required (Level '0')

User security password required (Level '1')

Engineer security password required (Level '2')

2.5 Password Access

2.5.1 Gaining access to the user level

From '2.1 Getting Started'

Entering '3' accesses 'Login' item from Main Menu.

Entering '1' accesses Login Enable parameter.

‘?’ shows that you can change the '0' security level value.

Entering password 'user' accesses level 1 security level. Note the use of lower case in this example. All passwords are case sensitive.

‘1’ indicates security access level 1 is now in operation.
2.5.2 Gaining Access to the Engineer Level

From '2.1 Getting Started'.

Entering ‘3’ accesses ‘Login’ item from Main Menu.

‘0’ indicates security access level 0 is in operation.

Entering ‘1’ accesses Login Enable parameter.

‘?’ shows that you can change the ‘0’ level value.

Entering password ‘engineer’ accesses level 2 security level. Note the use of lower case in this example. All passwords are case sensitive.

‘2’ indicates security access level 2 is in operation.

2.6 Changing the Value of a Parameter

2.6.1 Numerical Value Parameters

Note. Many parameters, e.g. the flowrate, are calculated internally, and the new value entered will therefore be ignored.

From 2.5.1 or 2.5.2, after gaining ‘user’ or ‘engineer’ access.

Entering ‘4’ accesses Flow sub-menu from Main Menu: Item 1 (Flow Range) displayed.

‘88.50’ indicates present 100% Flow Range or ‘Upper Range Value’ (‘URV’)
2 CONFIGURING THE TRANSMITTER

Note. When a ‘?’ prompt is showing, press [ ] to leave current value unaltered.

2.6.2 Logic (‘1’ or ‘0’) Value Parameters (excluding Alarm Parameters)

Note. Flow units are mutually exclusive in that only one unit can be selected at any one time. All other units are automatically deselected.

Entering ‘1’ selects this parameter.

‘?’ shows that you can change this value.

Enter a new value of % Flow Range.

New range setting of 234.5 now in use.

Note. When a ‘?’ prompt is showing, press [ ] to leave current value unaltered.

Entering ‘4’ as above in 2.6.1 accesses Flow sub-menu.

Entering ‘2’ accesses item 2 (Flow Units) of the Flow sub-menu.

‘0’ shows that this Flow Unit parameter (Litres) is not selected. 1 = Unit selected; 0 = Unit not selected.

Entering ‘1’ accesses Flow Unit Ltr parameter 1.

‘?’ shows that you can change this logic ‘0’ value.

Entering ‘1’ selects this ‘units’ parameter. (All other parameters in the Flow Unit sub-menu automatically change to ‘0’).

‘1’ indicates that litre flow units have been selected.
2 CONFIGURING THE TRANSMITTER...

2.6.3 Alarm Parameters

Note. Alarm Parameters are selected with a ‘1’ and deselected with a ‘0’ as shown in the previous flow unit types, but any combination of Alarm Parameters may be selected or deselected as required. Automatic deselection of parameters not required does not take place with alarm parameters.

2.7 Advanced Techniques

2.7.1 Fast Selection of Parameters

Refer to the B1.1 Parameter Tree Structure diagram.

To select ‘Flow Unit lGal’ from any parameter (e.g. Tot Mult h):

Pressing the ESCAPE key resets the prompt to the START position. 4 2 3 routes the prompt through the required menus to the Flow Unit Menu. ‘0’ indicates that the gallon units are not selected. ? indicates that it is possible to change the value to a ‘1’ if required.

Any route through the tree structure can be similarly processed if the associated numbers and/or letters for the route is known.

e.g. ESC 8 3 1 followed by ENTER will allow the High Alarm Trip Level to be altered.

2.7.2 Fast Selection plus Data Entry

To select ‘Reverse Analogue Direction’ parameter

Pressing the ESCAPE key resets the prompt to the START position. 5 3 2 routes the prompt through the required menus to the Reverse Analogue Direction parameter.

* simulates the ENTER key without terminating the sequence, which would occur if the normal ENTER key were used. ‘1’ is entered to select the parameter.

Note. Any other necessary data can be entered at this point; e.g. with the correct routing, a password could be entered. (31* user)

The enter key completes the command.
3  FAULT FINDING

Warning.
- Observe all safety measures (See INTRODUCTION).
- Take all precautions to avoid risk to personnel, plant and risk of explosion in hazardous areas.
- Do NOT open the transmitter main casing. There are no user serviceable parts or adjustments inside.
- Service access is restricted to the termination area.

Should the MagMaster fail to operate, first check the power supply, then the power supply connections and fuse located in the termination area. If necessary, replace the fuse with the one of the correct rating as listed in the Table below. Check that all external connections are made correctly.

3.1 Alarms
The transmitter has built in diagnostics with alarm indication which interrupts the transmitter local display. A data terminal connected to the transmitter will display these alarms in ‘Read Alm’ parameter; ‘16’ from Main Menu (see Warning in next column).

The table below shows possible alarm indications and Fig. 2.1 Fault Finding Flow Chart indicates checking procedures to find the problems causing the alarms.

For method of interrogating the local display see the OPERATION section in the MagMaster Installation Manual.

### Table: Possible Alarms

<table>
<thead>
<tr>
<th>Display</th>
<th>Alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>MtSnrs</td>
<td>Empty Sensor</td>
</tr>
<tr>
<td>Hi</td>
<td>High flow</td>
</tr>
<tr>
<td>Lo</td>
<td>Low flow</td>
</tr>
<tr>
<td>Anlg</td>
<td>Analogue over range</td>
</tr>
<tr>
<td>Pls</td>
<td>Pulse frequency limited</td>
</tr>
<tr>
<td>Coil</td>
<td>Sensor Coil open circuit</td>
</tr>
<tr>
<td>19, 20, 21</td>
<td>See Fault Finding Flow Chart</td>
</tr>
</tbody>
</table>

3.2 Test Mode
A very powerful test mode, especially useful during commissioning and plant fault finding, enables all external devices connected to the MagMaster to be tested over the full range of flow rates (see WARNING below).

This mode can be used regardless of flow conditions in the sensor, or even with the sensor disconnected, and does not require the use of additional equipment.

To access the Test Mode, connect a terminal device to the Programming Connector as described in APPENDIX A.

Select ‘Engineer’ security level (see Configuration Section). Set ‘Test Mode’ parameter to ‘1’ and enter an appropriate flow rate in the ‘Test Flow’ parameter.

Output responses may now be viewed from the various ‘Test’ parameters. (See Configuration Section for full details of operation.)

**Warning.** Refer to Safety Measures if a data terminal is to be used to diagnose faults in hazardous locations.

<table>
<thead>
<tr>
<th>Component Ref.</th>
<th>Part No.</th>
<th>Description</th>
<th>Supplier</th>
<th>Approvals</th>
<th>IEC</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1 - DC</td>
<td>B6490</td>
<td>FUSE 3.15A AS.T 20mm</td>
<td>SHURTER 034-3122</td>
<td>IEC 127/111</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BUSSMAN S506/3.15A</td>
<td>IEC 127/111</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1 - AC</td>
<td>B7721</td>
<td>FUSE 500mA AS.T 20mm</td>
<td>SHURTER 034-3114</td>
<td>IEC 127/111</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BUSSMAN S504/500MA</td>
<td>IEC 127/111</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BUSSMAN S506/500MA</td>
<td>IEC 127/111</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MagMaster has a Test Mode which exercises all the outputs and alarms for a given flowrate.

To use this facility:
- Log in as ‘engineer’ [31* engineer]
- Enable Test Mode [C1 *1]
- Enter Test Flowrate [C2 * 'value']

All functions will now operate as if the flowrate in the pipe is the same as that set.

**NOTE**
For clarity, menu shortcodes are used. Commands are shown - [ ]. Some menu items will require Login to engineer level [31* engineer]

---

**Fault Finding**

- **START**
  - Check power switch ON
  - Alarms indicated ?

  (Use Terminal for blind unit) [16]

- **Pipe full !**
  - Connect terminal and modify Pls Fact [41]
  - Connect terminal and modify Flow Rng [41]
  - Check sensor cable CD1/CD2
  - Possible totaliser error
  - Possible memory error
  - Possible configuration error
  - Reset totaliser
  - Check configuration

- **Display blank**
  - Fuse blown ?
    - YES
    - Replace fuse
    - Replace transmitter
  - NO
  - Measure resistance between SIG1 & SIG2

- **No alarms. Flow reading zero**
  - Check that flow is present

- **Value > 1000 ?**
  - YES
  - Check trip value [A1]

- **Value > 50 ?**
  - YES
  - Measure d.c. voltage on DS1 & DS2 w.r.t. SIG GND
  - > 1 V ?
    - YES
    - Investigate electrode signal voltages
    - AM layers removed
      - Yes
      - Replace transmitter
      - Remove AM layer
      - NO
      - Anti-Microphonic
    - NO
  - END

- **NO**
  - Short circuit SIG1 & SIG2 to SIG GND at sensor
  - Open circuit in cable. Replace cable
  - Fault in sensor. Replace sensor
  - END

- **Does alarm clear ?**
  - YES
  - END
  - NO
  - Test [16] ?
    - YES
    - If alarm persists, return to ABB
  - NO
    - Measure resistance between SIG1 & SIG2

- **< 100R ?**
  - YES
    - END
  - NO
    - Locate and clear short circuit
    - END

- **Does alarm clear ?**
  - YES
    - END
  - NO
    - Open circuit in cable or loose connection
    - Clean electrodes
    - Replace transmitter
    - NO
    - Anti-Microphonic
    - YES
    - Replace AM + layer
  - END

---

**NOTE**
For clarity, menu shortcodes are used. Commands are shown - [ ]. Some menu items will require Login to engineer level [31* engineer]
A1.1 Programming The Transmitter with a Data Terminal

The nine-pin transmitter front panel connector is compatible with most serial devices, e.g. PSION Organiser, IBM PC, using proprietary adaptors where required. This connection is for ‘local’ use only, i.e. for up to approximately 5 metres between transmitter and data terminal.

The optional RS422/423 interface may be used for considerably greater distances (see Installation Manual for connections).

Most serial data terminals may be connected to the transmitter providing that the following three requirements are met:

1. The data rate (transmit and receive) is 4800 Baud.
2. The data format is:

   1 start bit
   8 data bits, no parity (ASCII code)
   1 stop bit

3. Format for computer entry is as above plus the control codes to alter response are typically as follows:

   X OFF   ESC   X OFF   Parameter Number   *   Optional New Value

Where ‘X OFF’ suppresses character echo and the reply consists of the value only.

‘ESC’ forces the parameter number to start from the top of the Menu Tree.

‘*’ Separates the Parameter Number from the New Value.

N.B. If no value is entered before pressing ENTER, RETURN etc, the current value is retained.

   X ON and/or ENTER will cancel the X OFF control.

Consult the Handbook for your particular terminal device.

A1.2 Using Personal Computers with MagMaster

Many communications software packages are available and in use, and can be used to interface with the MagMaster™.

The following is a sample of typical communications programmes and setup details for interfacing with the MagMaster™.

A personal computer can be used to communicate with MagMaster to set up its operating parameters. The only requirements are:

1) The computer can be any make or type (eg. Apple, BBC, Atari, Amiga, PC etc.) but it must be equipped with a serial communications port capable of operation at 4800 baud. (RS232C is the most common type). Most computers are fitted with this as standard. It is not possible to give specific instructions for all types of computer, because of the large number of computers available, but reference to the instructions of the machine to be used will provide the necessary information. A “dumb terminal”, usually found connected to a mainframe computer, can also be used for configuring MagMaster.

2) The computer must be equipped with Terminal emulation software. In many machines (for example the BBC computer) this is built in, in others (IBM PC and AT for example) this has to be added. The software is not special in any way and there are many programmes on the market which provide or include this function, all of which are suitable for MagMaster use. Typical examples for the IBM PC/AT are:

   Central Point’s PC Tools   (Desktop Telecommunications)
   Microsoft Windows   (Built in Terminal Emulator )
   Odyssey   (Shareware programme )
   Procomm Plus   (Shareware programme)
   VBC.EXE   (ABB Kent-Taylor)
   AQUAMAG.EXE   (VBC.EXE upgrade)
In all cases the Comms port parameters need to be set up as below; this function is normally provided as part of the software package being used.

### Settings
- **Baud rate**: 4800
- **Data bits**: 8
- **Stop bits**: 1
- **Parity**: NONE
- **Handshaking**: NONE (OR RTS/CTS)
- **COMMS PORT**: As appropriate (COM1, COM2 etc.)

### Interconnection details

<table>
<thead>
<tr>
<th>9-pin to 9-pin</th>
<th>9-pin to 25-pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

The most common reason for lack of communication between a MagMaster and a computer or terminal, assuming that everything is set up as above, is the interconnecting lead. The correct lead to use is a LAPLINK lead, also known as a NULL MODEM. This is a lead which is designed to connect the communication ports of two computers together, and therefore the internal wiring “crosses over” (see Interconnection Details above). A serial printer lead will therefore not be suitable.

However, where the incorrect lead has been fitted, correct operation will normally result if the wires on pins 2 and 3 of one of the connectors are swapped over. **N.B.** A suitable lead (which also permits operation with certain Toshiba Laptop PCs) is available from ABB.

### A1.2.1 PC Tools
From the ‘Desktop : Telecommunications’ utility, use ‘Edit: Create new entry’ to enter the serial settings as required above and use ‘Modem : Setup’ to select the COMMS Port.

Use F8 or select ‘Manual’ to run the utility as a terminal emulator. Press ALT and ESC together once (the MENU bar will show ‘ALT-ESC On’). This will allow the ESC key to be used with MagMaster.

### A1.2.2 Windows ‘TERMINAL’
Use ‘Settings : Communications’ to set up terminal settings as above.

**Note.** Avoid using the backspace key for editing, as this produces misleading results with the Windows Terminal display. Use the Delete key instead for this function.

### A1.2.3 Odyssey and Procomm Plus
Use the Port and Setup menus to configure the settings as above.

### A1.2.4 ‘VBC’ and ‘Aquamag’
These two programmes are very similar and provide a basic, but totally adequate, communication facility for MagMaster. The programmes are configured ready to use with COM1. They will also terminate if the serial port is not connected.

### A1.3 Quick Set-up for Psion Series 3
The following instructions are a quick guide to setting up a Psion Series-3 for use with a MagMaster. Refer to the Psion Series-3 Instruction Manuals for full information. These steps are only necessary the first time that the Series 3 is used. If your Psion Series 3 was supplied by ABB Kent-Taylor, the Comms Application will have been installed. Locate ‘MagMastr’ under the COMMS icon and press **Enter**; otherwise proceed as follows:
1) Fit batteries to Organiser as described in Series 3 User guide page 3. Note ERRATUM sheet, if any, packed with unit.

2) Use the key to turn it on and then use and keys, followed by to select the language required (most models have this facility).

3) There may be a warning that the Backup battery is low, if so this can be ignored at this stage. (a new backup battery should be fitted later – see manual). If this happens press the key.

4) To ensure sufficient memory is available (128k Model), close down the applications ‘Data’, ‘Word’, ‘World’, ‘Calc’ and ‘Agenda’ as follows:

   Move the highlight block with or to application, press followed by .

   Switch off by holding down and together.

5) Assemble the Psion 3-link cable as described in the 3-link manual page 2 onwards and plug it into the connector on the left side of the Series 3.

6) Press to switch on again, this will give the system screen, showing the applications available. Press the Menu key, and use the and keys to select the “Apps” menu (the centre menu). Select “Install application” by using the and keys then press .

   Short cut: from the system screen, hold down and press .

7) Press key to select disk and then and to select “C”. The top line should now show “Comms.app”. If so press . (If not press the and then use the and keys to select it, then press ). A new icon will appear, a picture of the organiser connected to a computer.

8) If necessary, use the cursor keys to highlight “Comms[C]” and press to run the communications application. One of two possibilities will occur:

   a) The screen will blank briefly and then a box containing a flashing cursor will appear, together with a message “Online...” Proceed to step 9.

   b) A message “No system memory” appears. See step 4 above.

   Move the highlight back to “Comms[C]” and repeat step 8.

9) Hold down and press . Use the cursor ( and ) keys to make Serial Port settings as below:

    Set Serial Port
    * Baud rate 4800
    * Data bits 8
    * Stop bits 1
    * Parity none
    * Ignore parity yes

    Press when finished.

10) Hold down and press to set up handshakes as below.

    Set Serial Handshake
    * Xon/Xoff off
    * Rts/Cts off
    * Dsr/Dtr off
    * Dcd off

11) Press the and keys, followed by , , to select drive ‘Internal’ and then press .

    Type in a suitable name, eg. ‘MagMastr’ (8 characters max.) and press , to save the settings for future use.

The Series 3 is now ready for use with the MagMaster transmitter, as described in this Configuration Manual.
A1.4 Setup for Psion Organiser II (CM, XP, LZ, LZ64)

Note. It is recommended that the mains adapter is used to power the 'Organiser' where possible.

1. Connect the Psion Organiser Communications Link Adapter to the MagMaster Transmitter using a suitable adapter lead consisting of a 25-pin D-Type plug to 9-pin D-Type socket (available as a Psion accessory).

2. Scroll through the following list of items which will be shown on the 'screen' in the Comms 'SETUP' mode.

| BAUD   | 4800 |
| PARITY | NONE |
| BITS   | 8    |
| STOP   | 1    |
| HAND   | NONE |
| PROTOCOL | NONE |
| ECHO   | HOST |
| WIDTH  | NONE |
| TIMEOUT | NONE |
| REOL   | <CR><LF> |
| REOF   | NONE |
| RTRN   | NONE |
| TEOL   | <CR> |
| TEOF   | NONE |
| TTRN   | NONE |

Enter the following numbers to give the operations shown in the above:

13,10 <CR><LF>
13 <CR>

Select 'TERM' from the 'Comms' menu to allow communication with the MagMaster Transmitter.
Set COMMS to 'No Handshaking', 'No translations'.

Set the MagMaster Display Mode (Parameter '21') to '1'. (Refer to 3.6 Changing the Value of a Parameter in this manual).

A1.4.1 Keyboard Designations (Psion Organiser II)

<table>
<thead>
<tr>
<th>Function</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EXE</td>
</tr>
<tr>
<td>DEL</td>
<td>DEL</td>
</tr>
<tr>
<td>ESC</td>
<td>← + A</td>
</tr>
</tbody>
</table>

Note. The ↑ and ↓ keys cannot be used, as these enable and disable the Organiser data output. Consult the Psion Organiser handbook for further information.
B1.2 Description of Parameters
Select the access number or letter, of any of the items in the Main Menu, followed by a CR (RETURN etc), to access its associated sub-menu. It is not necessary for the parameter to be displayed to select it by number.

**Note.** The correct security level must be selected in **Login** parameter below to access certain parameters. See headings in this description or access notes against individual parameters.

Select the access number or letter of any item in a sub-menu, followed by a CR, to read the value or to change it as necessary. (CR)s without an access code cycles through a menu continuously without accessing a parameter. All ‘live’ data displayed is updated each second.

### Main Menu Sub-menus Remarks

<table>
<thead>
<tr>
<th>Read 1 &gt;</th>
<th>1 [J]</th>
<th>1 [J]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Read Flow 1 &gt;</strong></td>
<td>Flowrate in chosen units.</td>
<td></td>
</tr>
<tr>
<td><strong>Read % 2 &gt;</strong></td>
<td>Flowrate as a percentage of range</td>
<td></td>
</tr>
<tr>
<td><strong>Read Fwd 3 &gt;</strong></td>
<td>Accumulated total in forward totaliser *</td>
<td></td>
</tr>
<tr>
<td><strong>Read Rev 4 &gt;</strong></td>
<td>Accumulated total in reverse totaliser *</td>
<td></td>
</tr>
<tr>
<td><strong>Read Net 5 &gt;</strong></td>
<td>Net Total (= Forward minus Reverse) *</td>
<td></td>
</tr>
<tr>
<td><strong>Read Alm 6 &gt;</strong></td>
<td>Cyclic display of active alarms.</td>
<td></td>
</tr>
<tr>
<td><strong>Requires Level 2 access &gt;</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Read Vel 7 &gt;</strong></td>
<td>True flow velocity in m/s, or ft/s if flow units are in Ugal or ft^3.</td>
<td></td>
</tr>
<tr>
<td><strong>Read Quit Q &gt;</strong></td>
<td>Enter Q (CR) to return to Main Menu or (CR) to cycle around this menu.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disp 2 &gt;</th>
<th>2 [J]</th>
</tr>
</thead>
</table>
| **Disp Mode 1 > 1** | Set single, double or multi-line display on terminal.  
0 = Single line display.  
1 = 2 line display for small displays (default).  
2 = New line for each display update (e.g. for printers, data logging, etc.). |
| **Disp Res 2 > 3** | Set resolution of flow display. Enter number of decimal places required. |
| **Disp Quit Q >** | Enter Q (CR) to return to Main Menu, or (CR) to cycle around this menu. |

<table>
<thead>
<tr>
<th>Login 3 &gt;</th>
<th>3 [J]</th>
</tr>
</thead>
</table>
| **Login En 1 > 0** | Shows current security level (0 = default). Enter password for level required.  
‘usee’ = Default for Level 1  
‘engineer’ = Default for Level 2 |
| **Requires Level 2 access >** | Login Key 2 > Enter new password to replace existing level 1 word |
| **Requires Level 2 access >** | Login Key 3 > Enter new password to replace existing level 2 word |
| **Login Quit Q >** | Enter Q (CR) to return to Main Menu or (CR) to cycle around this menu. |

**Note.** Access level selected is reset to Level 0 after a ‘Quit’ from Main Menu.

* Resettable to zero if Tot ClrEn is set (‘73’ from Main Menu)
...B1.2 Description of Parameters

Information. THE FOLLOWING PARAMETERS REQUIRE ‘LEVEL 1’ OR ‘LEVEL 2’ ACCESS. (Enter passwords in ‘Login En’ parameter above).

Main Menu \[\text{Flow} \text{ 4}>\] Sub-menues \[\text{Flow Unit} \text{ 2}>\]

Enter main full scale (100%) flow range (Upper Range Value) in selected flow units (see below)

Information. ONLY one unit at a time can be selected.

Remarks

<table>
<thead>
<tr>
<th>Flow Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ltr</td>
<td>Litres</td>
</tr>
<tr>
<td>m³</td>
<td>Cubic metres</td>
</tr>
<tr>
<td>Ugal</td>
<td>Imperial gallons</td>
</tr>
<tr>
<td>Ugal</td>
<td>U.S. gallons</td>
</tr>
<tr>
<td>Cuft</td>
<td>Cubic feet</td>
</tr>
</tbody>
</table>

Flow unit ‘multiplier’ selection

<table>
<thead>
<tr>
<th>Flow Mult</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>m</td>
<td>Milli (0.001)</td>
</tr>
<tr>
<td>c</td>
<td>Centi (0.01)</td>
</tr>
<tr>
<td></td>
<td>Unity (1)</td>
</tr>
<tr>
<td>h</td>
<td>Hundreds (100)</td>
</tr>
<tr>
<td>k</td>
<td>Thousands (1000)</td>
</tr>
<tr>
<td>M</td>
<td>Millions (1000000)</td>
</tr>
</tbody>
</table>

Flow ‘time unit’ selection

<table>
<thead>
<tr>
<th>Flow Time</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>s</td>
<td>Seconds</td>
</tr>
<tr>
<td>Min</td>
<td>Minutes</td>
</tr>
<tr>
<td>Hr</td>
<td>Hours</td>
</tr>
<tr>
<td>Dy</td>
<td>Days</td>
</tr>
<tr>
<td>Wk</td>
<td>Weeks</td>
</tr>
</tbody>
</table>

Information. ONLY one unit at a time can be selected.

Display Setting

<table>
<thead>
<tr>
<th>Display Setting</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td>8</td>
<td>60</td>
</tr>
<tr>
<td>9</td>
<td>120</td>
</tr>
</tbody>
</table>

Nominal Time Constant (seconds) for output.

Enter Display Setting value from table for time constant required.
### B1.2 Description of Parameters

<table>
<thead>
<tr>
<th>Main Menu</th>
<th>Sub-menus</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Probe</td>
<td>6 &gt; 1.000</td>
<td>Set additional parameters for insertion probes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td># Flow Probe Ins 1 &gt; 1.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td># Flow Probe Prof 2 &gt; 1.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flow Probe Quit Q &gt;</td>
</tr>
</tbody>
</table>

**Requires Level 2 access**

<table>
<thead>
<tr>
<th>Flow %</th>
<th>7 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displays current flow as percentage of range.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow Cutoff</th>
<th>8 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow velocity in mm/s below which all outputs are set to zero. (default = 5)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow Quit</th>
<th>Q &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Q (CR) to return to Flow Menu or (CR) to cycle around this menu.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anlg</th>
<th>5 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter required output pulses per flow volume unit.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anlg Fsd</th>
<th>1 &gt; 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter output current in mA for 100% flow (0 ≤ FSD ≤ 21).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anlg Zero</th>
<th>2 &gt; 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter output current in mA for 0% flow (0 ≤ ZERO ≤ 21).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anlg Dir</th>
<th>3 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select direction(s) of operation for analogue output.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anlg Dir Fwd</th>
<th>1 &gt; 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analogue output responds to forward flow.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anlg Dir Rev</th>
<th>2 &gt; 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analogue output responds to reverse flow.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anlg Dir Quit</th>
<th>Q &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Q (CR) to return to Anlg Menu or (CR) to cycle around this menu.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anlg No 2</th>
<th>4 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full scale flow range for second analogue range, as percentage of main flow range (default = 100%).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anlg mA</th>
<th>5 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displays present output current in mA.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anlg Quit</th>
<th>Q &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Q (CR) to return to Main Menu or (CR) to cycle around this menu.</td>
<td></td>
</tr>
</tbody>
</table>

* Select both parameters for bidirectional operation (e.g. when dual current output is fitted). If both are zero, then |out is also 0%.

<table>
<thead>
<tr>
<th>Pls</th>
<th>6 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires Level 2 access</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pls Fact</th>
<th>1 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter required output pulses per flow volume unit.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pls Cutoff</th>
<th>2 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate (%) below which pulse output and totaliser cease to operate.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pls Max</th>
<th>3 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum output frequency in Hz.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pls Hz</th>
<th>4 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display of present value of output frequency in Hz.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pls Idle</th>
<th>5 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse output level in idle (off) state.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pls Size</th>
<th>6 &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires Level 2 access</td>
<td></td>
</tr>
<tr>
<td>Enter output pulse width in msecs. (Value will be rounded up to nearest 10msec.) - Set to '0' for square wave output.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pls Quit</th>
<th>Q &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Q (CR) to return to Main Menu or (CR) to cycle around this menu.</td>
<td></td>
</tr>
</tbody>
</table>
Select totaliser measurement units
Enter a ‘1’ in ONE parameter ONLY to select required units:

- **Tot Unit Ltr** 1> 1
  - Litres
- **Tot Unit m^3** 2> 0
  - Cubic metres
- **Tot Unit Igal** 3> 0
  - Imperial gallons
- **Tot Unit Ugal** 4> 0
  - U.S. gallons
- **Tot Unit Cuft** 5> 0
  - Cubic feet

Enter Q (CR) to return to Flow Menu or (CR) to cycle around this menu.

Select multiplier units required.
Enter a ‘1’ in ONE parameter ONLY to select required units:

- **Tot Mult m** 1> 0
  - Milli (0.001)
- **Tot Mult c** 2> 0
  - Centi (0.01)
- **Tot Mult** 3> 1
  - Unity (1)
- **Tot Mult h** 4> 0
  - Hundreds (100)
- **Tot Mult k** 5> 0
  - Thousands (1000)
- **Tot Mult M** 6> 0
  - Millions (1000000)

Enter Q (CR) to return to Tot Menu or (CR) to cycle around this menu.

Enter ‘1’ (CR) to enable totaliser reset function to be used from terminal or transmitter display.

Enter Q (CR) to return to Main Menu or (CR) to cycle around this menu.
...B1.2 Description of Parameters

Main Menu  
Sub-menus  
Remarks

Select Alarm 1 output functions.
‘1’ = selected. ‘0’ = deselected

Idle state for alarm output.  
With no alarm active:
0 = Low (O/P transistor ON)  
1 = High (O/P transistor OFF)

0 = Alarm output disabled (set to idle state).  
1 = Alarm output enabled.

Alarm occurs for Measurement fault.
Alarm occurs for forward flow.
Alarm occurs for reverse flow.
Alarm occurs for Pulse Output Cutoff.
Alarm occurs for empty sensor.
Alarm occurs for Flow ≥ ‘Alm Trip Hi’.
Alarm occurs for Flow ≤ ‘Alm Trip Lo’.
Alarm occurs for Analogue Output Overrange.
Alarm occurs for Pulse Output Overrange.

Enter Q (CR) to return to Alm Menu or (CR) to cycle around this menu.

Select Alarm 2 output functions.

Information. Alarm 2 is identical to, but independent of, Alarm 1.

Select high and low flow alarm trip points.

High flow alarm trip point as % of range.
Low flow alarm trip point as % of range.
Enter hysteresis for alarms as % of range.
Set to ‘1’ if Hi/Lo Alarms are to be displayed (default = 0)

Enter Q (CR) to return to Alm Menu or (CR) to cycle around this menu.
### APPENDIX B...

#### B.1.2 Description of Parameters

<table>
<thead>
<tr>
<th>Main Menu</th>
<th>Sub-menus</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input 9 &gt;</td>
<td>Input Anlg 1 &gt; 0</td>
<td>Active level on contact input selects Analogue Range 2</td>
</tr>
<tr>
<td></td>
<td>Input Clr 2 &gt; 1</td>
<td>Active level on contact input will reset totaliser.</td>
</tr>
<tr>
<td></td>
<td>Input Hld 3 &gt; 0</td>
<td>Active level on contact input will hold flowmeter output value.</td>
</tr>
<tr>
<td></td>
<td>Input Zero 4 &gt; 0</td>
<td>Active level on contact input will set flowrate output to zero.</td>
</tr>
<tr>
<td></td>
<td>Input Idle 5 &gt; 0</td>
<td>Enter inactive state of input contact (‘1’ for Hi normal: ‘0’ for Lo normal).</td>
</tr>
<tr>
<td>Requires Level 2 access&gt;</td>
<td>Input Quit Q &gt;</td>
<td>Enter Q (CR) to return to Main Menu or (CR) to cycle around this menu.</td>
</tr>
</tbody>
</table>

**Information.** The following parameters require ‘Level 2’ access. Enter password in ‘Login En’ parameter above (‘31’ from Main Menu).

<table>
<thead>
<tr>
<th>Mtsnr A &gt;</th>
<th>Mtsnr Trip 1 &gt;</th>
<th>Set up empty pipe detection.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mtsnr mv 2 &gt;</td>
<td>Set empty pipe detector trip threshold.</td>
</tr>
<tr>
<td></td>
<td>Mtsnr Quit Q</td>
<td>Actual measured value related to fluid conductivity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enter Q (CR) to return to Main Menu or (CR) to cycle around this menu.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Snr B &gt;</th>
<th>Snr No 1 &gt;</th>
<th>Sensor calibration details etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Snr Tag 2 &gt;</td>
<td>Descriptor (up to 13 characters).</td>
</tr>
</tbody>
</table>

| Snr Size 3 > | Sensor calibrated bore, in millimetres. |
| Snr Vel 4 > | Displays the current velocity in the sensor. |
| Snr Fact 5 > | Sensor calibration data - should agree with sensor data label. |
| # Snr Fact 1 > | |
|            | Snr Fact 2 > |
|            | Snr Fact 3 > |
|            | Snr Fact 4 > |
| Snr Quit Q | Enter Q (CR) to return to Main Menu or (CR) to cycle around this menu. |
### B1.2 Description of Parameters

<table>
<thead>
<tr>
<th>Main Menu</th>
<th>Sub-menus</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test</td>
<td><strong>System Test:</strong> Exercises all outputs (as programmed) from manually entered flowrate.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Test Mode</strong> 1 &gt;</td>
<td>If set to '1', transmitter is in 'Test Mode'</td>
</tr>
<tr>
<td></td>
<td><strong>Test Flow</strong> 2 &gt;</td>
<td>Displays current flowrate: if in 'Test Mode', then any value may be entered manually</td>
</tr>
<tr>
<td></td>
<td><strong>Test %</strong> 3 &gt;</td>
<td>Flowrate as a percentage.</td>
</tr>
<tr>
<td></td>
<td><strong>Test Hz</strong> 4 &gt;</td>
<td>Output Frequency.</td>
</tr>
<tr>
<td></td>
<td><strong>Test mA</strong> 5 &gt;</td>
<td>Output Current.</td>
</tr>
<tr>
<td></td>
<td><strong>Test Vel</strong> 6 &gt;</td>
<td>Flow velocity in sensor (for the flowrate above).</td>
</tr>
<tr>
<td></td>
<td><strong>Test Alm</strong> 7 &gt;</td>
<td>Shows currently active alarms, sequentially ('Clr' indicates no alarms active).</td>
</tr>
<tr>
<td></td>
<td><strong>Test Txv</strong> 8 &gt;</td>
<td>Live flow velocity (uncorrected for sensor calibration).</td>
</tr>
<tr>
<td></td>
<td><strong>Test Quit</strong> Q</td>
<td>Enter Q (CR) to return to Main Menu or (CR) to cycle around this menu.</td>
</tr>
</tbody>
</table>

**Information.** 'Test Mode' self-cancels after 30 minutes, if no further entries are made.

* If the sensor is empty or disconnected, the alarms 'MtSnsr' and Coil will be displayed as appropriate.

# The maximum which can be entered must not exceed 21000. The value entered may be displayed with a small error in the decimal digits e.g. 1.900 may be displayed as 1.899. This is a display characteristic and the value 1.900 will be used by the MagMaster.

**END OF PARAMETERS**
PRODUCTS & CUSTOMER SUPPORT

Products

Automation Systems
- for the following industries:
  - Chemical & Pharmaceutical
  - Food & Beverage
  - Manufacturing
  - Metals and Minerals
  - Oil, Gas & Petrochemical
  - Pulp and Paper

Drives and Motors
- AC and DC Drives, AC and DC Machines, AC motors to 1kV
- Drive systems
- Force Measurement
- Servo Drives

Controllers & Recorders
- Single and Multi-loop Controllers
- Circular Chart, Strip Chart and Paperless Recorders
- Paperless Recorders
- Process Indicators

Flexible Automation
- Industrial Robots and Robot Systems

Flow Measurement
- Electromagnetic Flowmeters
- Mass Flow Meters
- Turbine Flowmeters
- Flow Elements

Marine Systems & Turbochargers
- Electrical Systems
- Marine Equipment
- Offshore Retrofit and Refurbishment

Process Analytics
- Process Gas Analysis
- Systems Integration

Transmitters
- Pressure
- Temperature
- Level
- Interface Modules

Valves, Actuators and Positioners
- Control Valves
- Actuators
- Positioners

Water, Gas & Industrial Analytics Instrumentation
- pH, conductivity, and dissolved oxygen transmitters and sensors
- ammonia, nitrate, phosphate, silica, sodium, chloride, fluoride, dissolved oxygen and hydrazine analyzers.
- Zirconia oxygen analyzers, katharometers, hydrogen purity and purge-gas monitors, thermal conductivity.

Customer Support

We provide a comprehensive after sales service via a Worldwide Service Organization. Contact one of the following offices for details on your nearest Service and Repair Centre.

United Kingdom
ABB Limited
Tel: +44 (0)1453 826661
Fax: +44 (0)1453 829671

United States of America
ABB Inc.
Tel: +1 215 674 6000
Fax: +1 215 674 7183

Client Warranty

Prior to installation, the equipment referred to in this manual must be stored in a clean, dry environment, in accordance with the Company’s published specification.

Periodic checks must be made on the equipment’s condition. In the event of a failure under warranty, the following documentation must be provided as substantiation:

1. A listing evidencing process operation and alarm logs at time of failure.
2. Copies of all storage, installation, operating and maintenance records relating to the alleged faulty unit.
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The Company’s policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

Printed in UK (08.04)
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