

## Specifications

## AquaProbe Insertion-Type Electromagnetic Probe Flowmeter



■ **'Hot tap' capability.**

Enables installation with no interruption to normal water supply.

■ **Price virtually independent of pipe diameter.**

Low cost alternative to full bore meters.

■ **Bi directional flow with good accuracy over wide operating flow range.**

Enables user to accurately measure peak daytime flows and minimal night flows.

■ **Suitable for permanent or temporary installation.**

Total user flexibility.

■ **Fully repairable.**

Reliable, maintenance free operation in arduous environments.

■ **No moving components and hence no bearing wear problems.**

Stable calibration and reliable operation.

■ **Wide Rangeability of 1000:1, Repeatability of 0.1% and Rate Accuracy of 2%.**

Fully satisfies user application requirements.

■ **Pipe Traverse Capabilities**

Measure velocity profile

## ABB Instrumentation



The AquaProbe is an economic alternative to full bore metering and has been designed for worldwide needs. It comprises an electromagnetic sensing head mounted on the end of a support rod. This whole assembly can be installed in existing pipelines without the need for the major excavations or alterations to pipe work associated with full bore meters. It can also be fitted without interruption to the flow and can be easily removed for periodic calibration or inspection, or inserted at a second location through the provision of tappings and valves on the supply pipelines.

Key features are the wide flow range, with minimum velocities well below insertion turbine or DP devices and no moving parts, resulting in increased reliability and reduced maintenance. The AquaProbe meets the widest variety of site requirements and applications, from permanent monitoring through to site surveying.

AquaProbe offers both digital and analog outputs proportional to flow and is compatible with the wide range of data loggers used in the water and clean fluids industry worldwide.

## Basic Applications

The AquaProbe is designed for installation in existing pipelines by means of a small valved tapping. It is normally installed with the sensing head on the pipe centre-line, but may be located at the critical position (the mean velocity position) a distance of  $\frac{1}{8}$  of the diameter away from the wall.

It provides an accurate local measurement of the water velocity and, provided the flow profile is fully developed, a good flow volume measurement.

If the profile is not fully developed a traverse of the pipe can be carried out which will enable an accurate flow volume measurement to be obtained in non-ideal networks.

The AquaProbe supplied as standard with the MagMaster transmitter which, being a high precision device, gives excellent performance, whether in temporary or permanent installations, in profiling or pipelines. It offers a wide range of options on terms of output, diagnostics, communications and user facilities.



However, for permanent installations in remote locations with no site power available, it can be supplied with the specially designed AquaProbe transmitter.

## SPECIFICATION

### Sensor

#### Maximum Insertion Length

300mm (12in), 500mm (20in), 700mm (25in) and 1000mm (40in).

#### Pipe Sizes

Greater than 200mm (>8in) nominal bore.

#### Materials of Construction

Wetted parts: stainless steel, PVC (UKWFBs listed).

#### Seals

Nitrile rubber (WRc approved).

#### Terminal Box

Aluminium alloy.

#### Max. Pressure

120psi

#### Pressure Tapping Provision

$\frac{1}{8}$  in NPT

#### Weight

< 3.5kg (6lb).

#### Temperature

##### Storage

-20° to +70°C (-4° to 158°F).

##### Operation (Ambient)

-20°C to +60°C (-4° to 140°F).

##### Fluid (water) - Clean Fluid

0° to +60°C (32° to 140°F).

##### Protection

NEMA6 [for submersion to 10m (30ft) indefinitely].

##### Conductivity

>50µS/cm.

##### Connection

1in NPT

##### Mounting

Directly into the pipeline through a fitting or valve with 25mm (1in) minimum clearance.

##### Flow Condition

Fully developed profile in accordance with ISO 7145-1982 (BS1042 section 2.2.)

##### Temperature Effects

< 0.02% per °C (< 0.01% per °F).

##### Accuracy

###### Velocity

±2% of Rate or ±2mm/sec. (±.08 in/sec.) whichever is greater

###### Volume

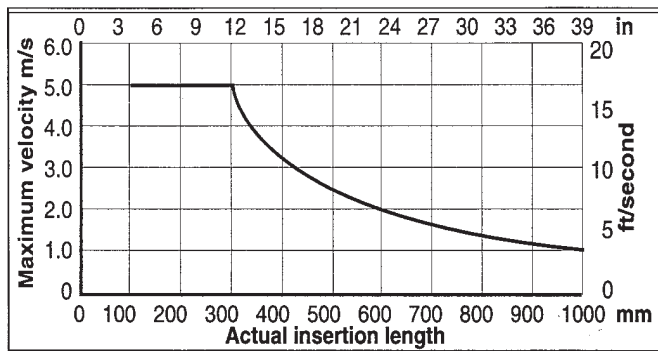
Refer to ISO 7145-1982 (BS 1042 section 2.2) for details.

###### Repeatability

±0.17% of rate (MagMaster), ±0.2% of rate (AquaProbe)

##### Maximum Flow

The maximum velocity depends upon the actual insertion length, typical insertion lengths are  $\frac{1}{8}$  and  $\frac{1}{2}$  pipe diameter. The graph shows the maximum allowable velocity for different insertion lengths.



## AquaProbe Transmitter

### Housing

Polycarbonate.

### Protection

IP68/NEMA 6 [1.5m (5ft) for 12 months].

### Supply

12V battery

8 to 15V d.c. external supply.

### Connectors

#### AquaProbe & Customer Interface

Metal bodied bayonet locking (mating cable assembly available).

#### Transmitter Supply

Screw locking metal body socket (mating cable assembly available).

### Programming

To operate with most RS232C/423 terminals (e.g. Psion Organizer, IBM PC etc.) 4800 Baud at 10m (30ft) maximum.

### Display

4 digit Flow rate.

8 digit Totalizer, with/without reset facility.

### Operation

Continuous or intermittent modes.

### Outputs

Four open drain MOSFETS – 100 and 1000Hz max. for both forward and reverse flows.

### Output Rating

30V d.c. max. (off State)

50mA max. (on State).

10Ω max. on resistance.

### Weight

0.5kg (1lb).

### Temperature

-20° to +50°C (-4° to 120°F).

### Temperature Effects

±0.02%/°C (±0.01%/°F).

### EMC Spec.

BS6667 Part 3, and BS6572 to 10V/m (3V/ft).

### Isolation

All connections referenced to pipe earth.

## MagMaster Transmitter

The MAGMASTER universal transmitter is available for use with the AquaProbe sensor.

### Configuration Methods:

All configurations are user defined and password protected. The configuration is stored in non-volatile memory with a 10 year retention. The transmitter is fully programmed before shipping. Reprogramming can be easily done on site using the following methods:

**Keypad** - can be used to access and change all menu parameters using four membrane keys and 3-line display.

**RS232** - with a 9-pin data connection for local hand-held terminal or computer (null modem/Lap Link cable required). Software such as ProComm Plus, Windows, PC Tools, or ABB Kent-Taylor communications is required. See options section.

**RS423/RS422** - for remote serial communication.

**Keypad:** 3-Line, 16 character, backlit display with large 1/2" numerals for flowrate and two lines for engineering units, totalizers, alarm status, velocity and percent of range.

**2-Line:** 16-character, read only display for flowrate (in a choice of engineering units and % of range), totalized flow, forward, reverse and net totals, alarm conditions, flow velocity, and percent of range. Display is scrolled and reset by magnetic reed switches actuated by a magnetic wand.

**Blind:** no display, but data can be read through serial communications or HART.

### Internal Totalizer:

Resettable 9-digit for forward, reverse and net totals. Can be programmed to reset via external input.

### Test Mode and Output Circuit Loop Verification:

After transmitter has been programmed, operation of the test mode will drive all outputs to programmed value to provide total system test.

### Power Supply:

Universal switch mode.

AC: 85 to 265V 45 to 400 Hz at 20VA max. *or*

DC: 11 to 40V at 20VA max.

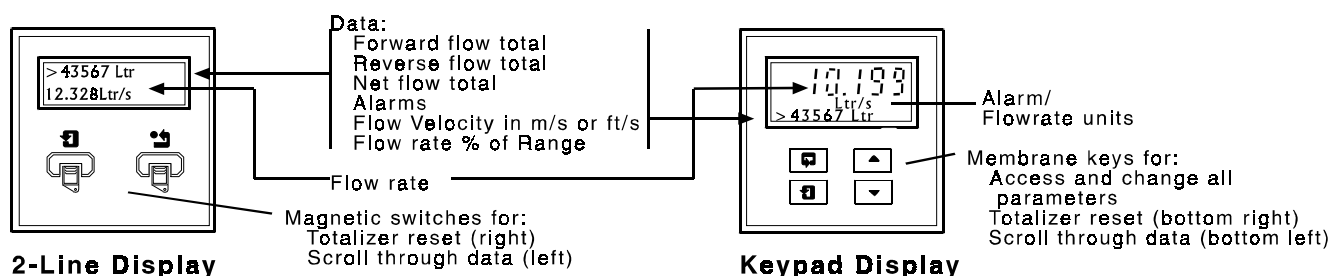
### Outputs:

#### Standard

- Analog:** Fully programmable for zero, full scale, up to 21mA and flow direction. Fully isolated. Output capability ≤16V (800 ohm, 4-20mA). Secondary range enabled by external input or programmed alarm condition as a percent of full scale.
- Pulse/Frequency:** One frequency/puls output for forward and one for reverse flow. Forward and reverse flows 0 to 800Hz squarewave or fixed pulse width up to 2.5 sec. Fully programmable for pulse rate, pulse factor, low flow cutoff, pulse width, etc. Minimum frequency/resolution <0.1 pulse/day. Frequency limit settable 1Hz-800Hz in 1Hz steps. Isolated protected transistor switch capable of sinking >250mA. Voltage <35V.
- Dual Alarms** (2 separate outputs): Isolated protected transistor switch capable of sinking <250mA. Voltage <35V. *Note: Not isolated from frequency output.* Fully programmable for high/low flow rates, % of range, liquid sensing, fault conditions, forward/reverse, polarity (normally open/close), analog over-range, pulse over-range, pulse cutoff, etc.
- RS232C:** 9-pin data connector for local hand held configurator or any computer with serial communications.

#### Optional

- Dual Analog** (optional): Additional analog outputs for reranging (provides two separate inputs to a recorder/controller). Only one output is active at a time. Non-active output is 4mA.
- Serial communication** RS423/RS422. Compatible data link (via terminal block).
- HART Communications.** Supports multi-drop system and permits up to 15 MagMasters on a single pair of wires without losing the 4-20mA signals on the individual meters. Universal HART (V6 or higher) and burst mode supported.



An external input such as contact closure, open collector, voltage or logic signal can be used to:

1. reset totalizer
2. change range (span)
3. hold the output constant
4. drive the output to zero (i.e., empty pipe or partial filled pipe conditions)

Note: Not isolated from pulse and alarm outputs.

#### Isolation:

Galvanic separation to 50V dc between analog, pulse/alarm, and earth/ground.

#### Temperature:

Operating: -35 to +60°C (-31 to 140°F)  
Storage: -15 to +75° (5 to 167°F)

#### Environmental Protection:

NEMA 4X/IP65. Separate termination and electronics compartments.

#### Meets:

Electrical safety: BS4743 Class 1. (IEC 348).

Vibration specification: BS2011 : Part 2.1Fc : 1983.

#### EMC Specification:

1. Conforms to BS6667 Part 3 "Radiated susceptibility to 10V/m."
2. Conforms to BS6527 "Terminal voltage and radiated emissions."
3. Conforms to BS800 "Interference Power."

#### Configuration:

Configuration stored in a non-volatile memory (typically 10-year retention). User preset values may be altered.

#### Enclosure:

Glass filled polypropylene, polycarbonate window.

#### Self Diagnostic:

Transmitter confirms correct operation of hardware with fault diagnosis, eg. coil drive problems.

#### Flow Velocity Setting:

Rangeable for flows corresponding to a maximum velocity as shown in figure.

#### Empty Pipe Detection:

Liquid level sensing results in drive to zero (i.e., empty pipe zero when electrodes are uncovered).

#### Interchangeability:

Transmitters are fully interchangeable with all sizes of MAGMASTER sensors and configurable on site. System specification not affected by transmitter change.

#### Electrical Connections:

0.5 inch NPT with gasket seal

#### Time Constant:

Fully programmable from 1 to greater than 100 secs.

#### Test Equipment:

Flow signal simulators for testing and checking the electronic calibration of the MAGMASTER transmitter are available.

#### Dual Alarms

Isolated protected transistor switch capable of sinking >250mA. Voltage <35V. Fully programmable. Not isolated from dual pulse output.

#### Comms.

RS232C local data connector for hand held configurator set up via 9 pin D connector.

Serial comms. RS432/422 compatible data link.

**Weight:** 0.5kg (1lb).

#### Temperature

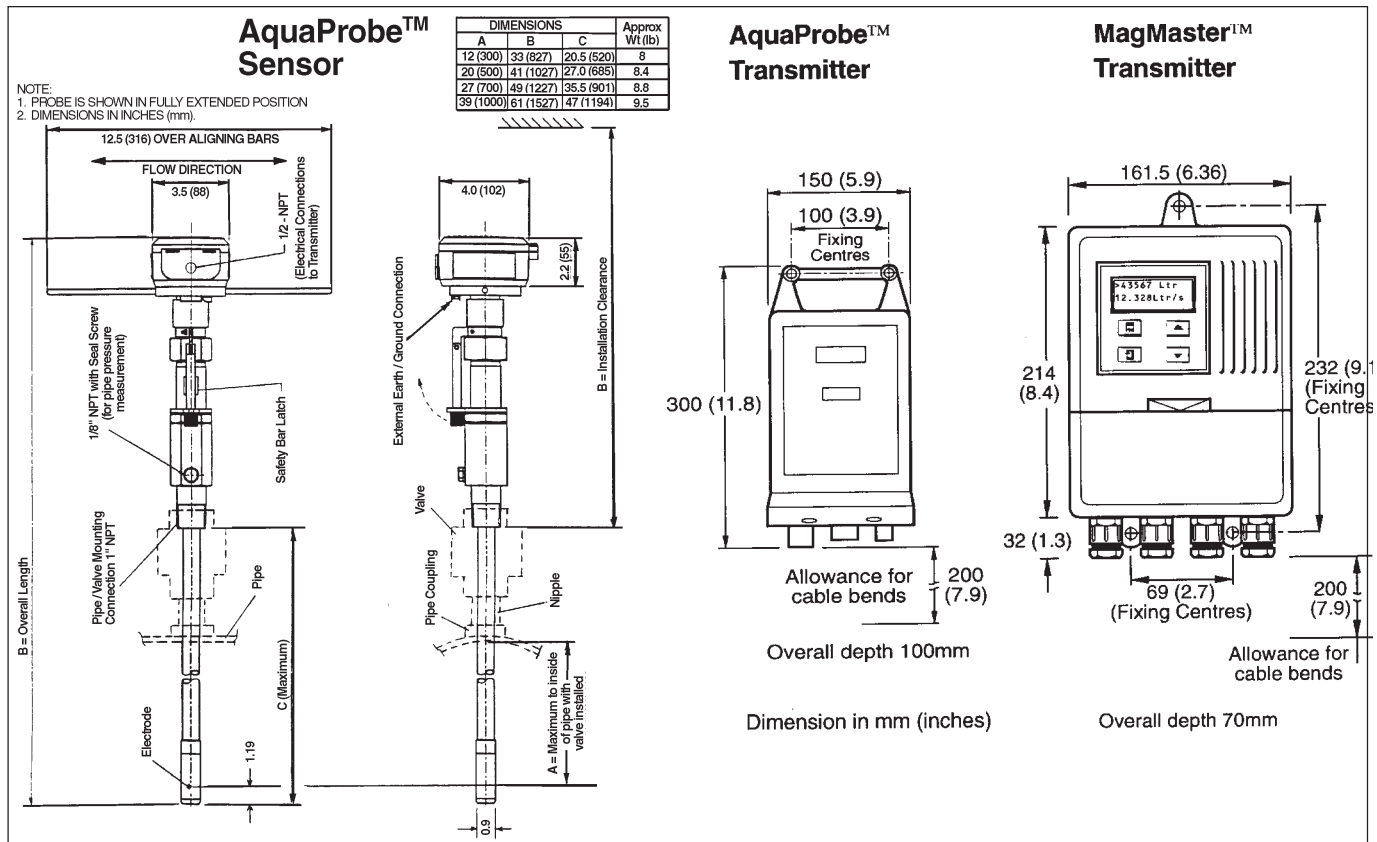
**Operating:** -20° to +60°C (-4° to 140°F).

**Storage:** -20° to +75°C (-4° to 170°F).

**Temperature Effect:** ±0.008%/°C (±0.004%/°F).

#### EMC Spec.

EN 50081-1 (BS6667) to 10V/m (3V/ft).



Outline dimensions

# ORDERING INFORMATION

## AQUAPROBE INSERTION-TYPE ELECTROMAGNETIC PROBE FLOWMETER

Select one character or set of characters from each category and specify complete catalog number as per sample below. Refer to options section for cable.

Code No.	Description
	<b>AquaProbe Insertion-Type Electromagnetic Probe Flowmeter with Transmitter</b>
	<b>BASE NUMBER - 1st character</b>
<b>A</b>	AquaProbe Insertion-Type Electromagnetic Probe Flowmeter with Keypad Transmitter
	<b>PROBE INSERTION LENGTH - 2nd and 3rd characters</b>
<b>00</b>	Transmitter Only
<b>12</b>	12 in. (300 mm)
<b>20</b>	20 in. (500 mm)
<b>27</b>	27 in. (700 mm)
<b>39</b>	39 in. (1000 mm)
	<b>SLIDING JOINT - 4th character</b>
<b>0</b>	Transmitter Only
<b>1</b>	1 inch NPT
	<b>CALIBRATION - 5th character</b>
<b>0</b>	Transmitter Only
<b>1</b>	Standard
	<b>PROBE CABLE POTTING - 6th character</b>
<b>0</b>	No Potting or Transmitter Only
<b>1</b>	Cable fitted to probe and potted (order cable from options section)
	<b>UNUSED CHARACTERS - 7th and 8th characters</b>
<b>00</b>	Unused or Transmitter Only
	<b>PROBE CONSTRUCTION OPTIONS - 9th character</b>
<b>0</b>	None - Transmitter Only
<b>1</b>	Standard
	<b>TRANSMITTER - 10th character</b>
<b>R</b>	MagMaster Keypad Transmitter
<b>A</b>	AquaMag Remote Transmitter with 2-line display
	<b>POWER SUPPLY - 11th character</b>
<b>0</b>	None - Probe Only
<b>1</b>	95 to 240 Vac - MagMaster Transmitter Only
<b>3</b>	11 to 40 Max. Vdc - MagMaster Transmitter Only
<b>4</b>	12 Vdc Battery Pack - AquaMag Transmitter Only
<b>6</b>	Power Supply Cable - AquaMag Transmitter Only
	<b>Display, Language and Programming Keypad - 12th Character</b>
<b>0</b>	No display, English language software or sensor only
<b>3</b>	Display - standard orientation, English language software
<b>K</b>	Keypad w/display-standard orientation w/English language
	Other orientations and languages



Notes:

1. Use a "9" in the catalog number to signify a special feature in that particular character position.
2. If a cable that is attached to the probe is potted, a cable seal strain relief bushing is supplied as standard.
3. Default transmitter parameters are for an 8-inch pipe and the probe placed at the centerline.



The Company's policy is one of continuous product improvement and the right is reserved to modify specifications contained herein without notice.  
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SS-AquaProbe 98.3

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