AquaProbe 2
Insertion-type electromagnetic probe flowmeter

Maximum performance, minimum hassle

Now available for use with CheckMaster, Explorer and MagMaster
— an innovative, portable validation resource

Excellent accuracy over wide operating flow range in both forward and reverse flow directions
— enables accurate measurement of peak daytime flows and minimal night flows

Battery Operation
— 5-year life
— no external power supply required
— facilitates installation in remote location

AC powered with optional battery backup
— continuous measurement even during power-down

Optional built-in multi-speed, multi-channel, dual-variable logger
— high precision, high resolution datalogging

'Hot tap' capability
— enables installation with no interruption to normal water supply

'Fit and Flow™'
— simplifies installation

3-Year warranty
— all AquaProbe sensors come with a factory-standard 3-year material defect warranty

Power and productivity
for a better world™

ABB

AquaProbe 2

AquaProbe 2 extends the capability of the ABB AquaProbe flow meter by bringing together the proven AquaProbe probe with the innovative AquaMaster Electronic Display Unit.

AquaProbe has been designed, in close consultation with the water industry, as an economic and accurate alternative to full bore metering. It comprises an electromagnetic sensing head mounted on the end of a support rod. This assembly can be installed in existing pipelines without the need for the major excavations or alterations to pipework associated with full bore meters. It can be fitted without interrupting the water supply and can be removed easily for periodic calibration or inspection.

Key features include the wide flow range with the minimum measured velocity well below that detected by insertion turbine or DP devices, no moving parts resulting in increased reliability and reduced maintenance.

AquaProbe is ideal for permanent installation to monitor potable or clean water flow. Also through the provision of multiple tappings on the supply pipelines, AquaProbe can be used as a portable survey tool to assist in the building of an accurate network model, locate leaks and check the operation of installed full bore meters.

The high sensitivity of AquaProbe enables it to traverse the pipe to establish the flow profile and so identify hydraulic problems in complex systems or ensure maximum accuracy from an AquaProbe, which has been installed in a non-ideal location.

No External Power Required for Remote Locations

- No external power supply (two internal batteries) or Explorer separate battery pack
- 3-year battery life, 5-year battery life with Explorer
- Site-replaceable batteries, separate battery pack
- Unique battery management system gives a battery replacement window in excess of 1 year, with no flat battery interruption to measurement

AquaProbe 2 is the ideal solution for locations where there is no external power. Two user-replaceable internal batteries provide a $2^1/_2$-year battery life, thus eliminating the high cost of providing a mains supply to the meter. AquaProbe 2's extended battery life is achieved through new technology design.

AC-powered units have optional battery backup to ensure no loss of flow measurement during power-down periods.

Based on ABB proven technology, AquaProbe 2 is supported by the expertise of ABB, the world's leading flow meter manufacturer with many pioneering advances in water flow metering over the last decade. For example, AquaMag™, MagMaster™, AquaProbe™, CalMaster™ etc. ABB operate nationally, and internationally, accredited flow calibration facilities in the UK, Germany, USA, Australia and India. We also offer comprehensive, locally based before- and after-sales service.

Logger Facility

The AquaProbe 2 display unit is available with a multichannel, multivariable logger. The ability of the logger to run at two speeds simultaneously enables the user to investigate, in precise detail, the flow and pressure activity during a period of interest. The logger logs both flow and pressure via a direct digital transfer of data, thereby ensuring optimum accuracy and resolution of measurement. Fig. 1 (below) illustrates actual district network measurements showing extra detail captured utilizing the twin loggers. Traditional techniques of counting pulses over a short logging interval leads to 'quantization' effects corresponding to whole numbers of pulses on logger graphs which is shown on Fig. 2 (below). AquaProbe 2 eliminates such effects, averaging digitally over the selected logging interval. Such high resolution data facilitates step testing, leak detection and water network analysis.

The AquaProbe 2 internal loggers feature an advanced automatic time synchronization function that ensures operation on synchronized time boundaries no matter what logging interval is set. This ensures all flow and pressure data, when combined with data from other meters, is precisely synchronized facilitating precise network balance.

For revenue applications, not only is the flow and pressure logged information available, a totalizer and tariff logger is also available to log all volume totals (forward, reverse, net) and tariff readings totals every midnight. Its memory of 366 days keeps all records for one year. The readings stored are the precise register volumes and are not inferred by integration of pulses or other similar techniques.

Access to the loggers and modifying the configuration of logger setup is security-protected by user passwords, which can be changed by the user.
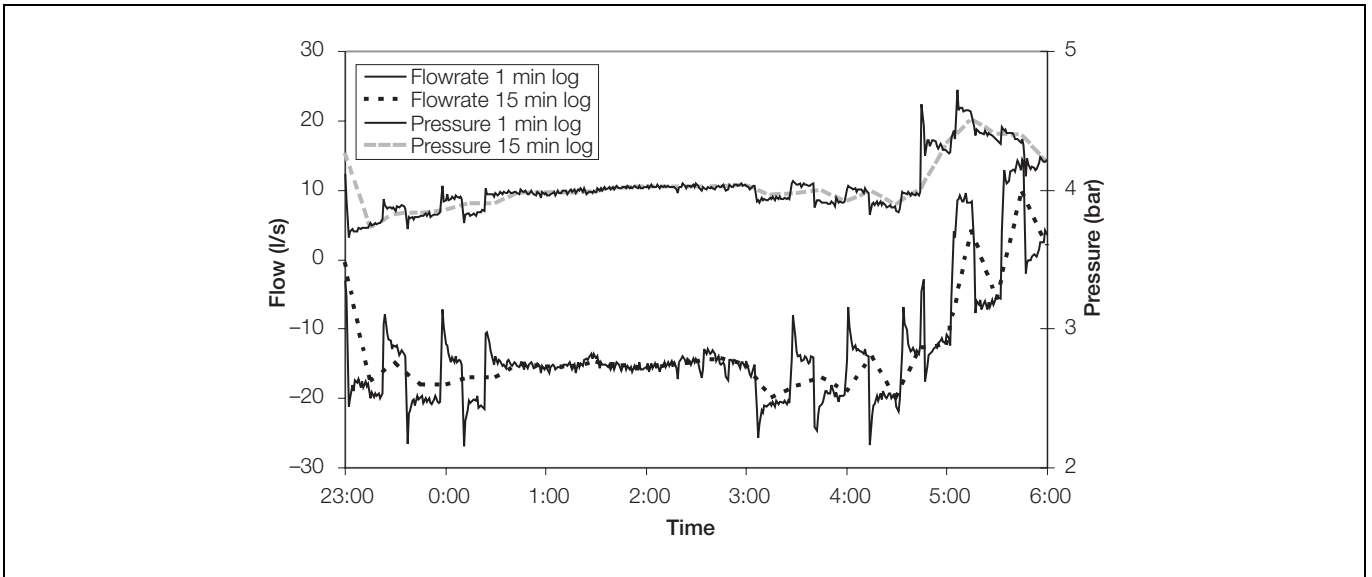

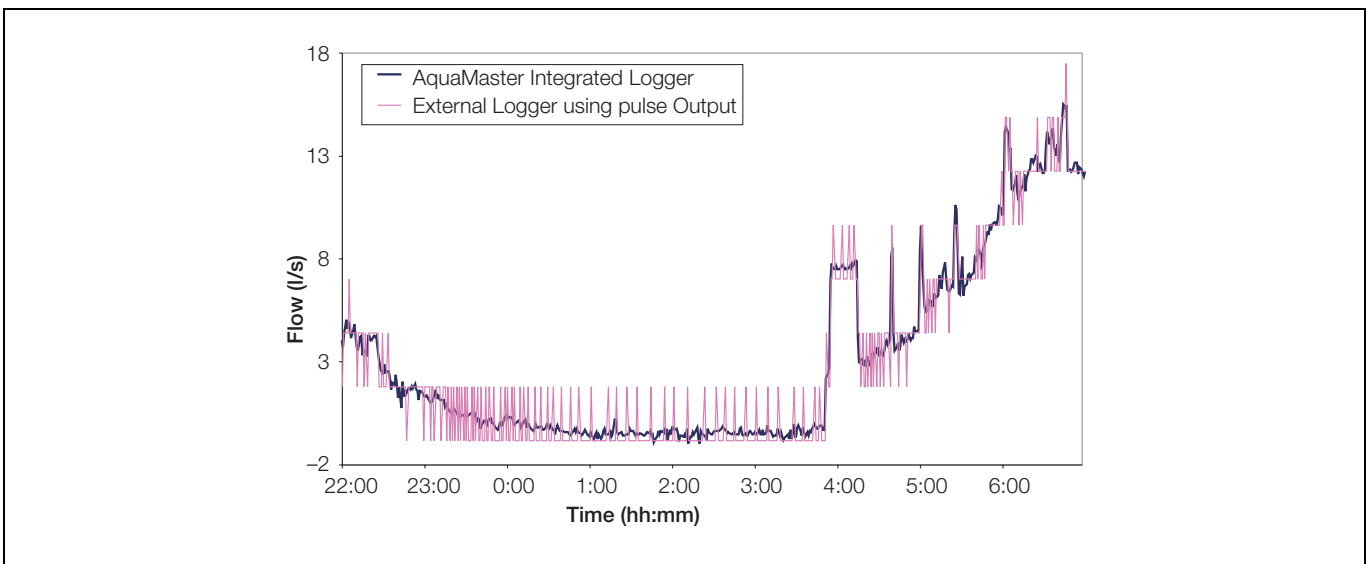Fig. 1 Actual District Network Measurements

Fig. 2 Whole Numbers of Pulses

Support Software

AquaMaster S is available with a variety of industry standard third party software, (Technolog™ [PMAC], Primayer™ [Primeware], OSI™ PI database and IBV™ [WADIS]) for download, management, analysis and display of data, either directly from the RS232 port or via telemetry. Separate data sheets are available describing these systems.

ABB also supply LogMaster, a simple-to-use PC software program, that provides local communication to the AquaProbe 2 and enables full control and downloading of the onboard datalogger. A file-save facility enables data to be exported in CSV format for charting in Microsoft Excel™ or similar spreadsheets. It supports Vodafone Radiopad™ remote connection, with an address book, for full remote operation. LogMaster is Windows 98™ Windows & NT™ compatible and is available in a variety of different languages.

AquaProbe 2 also has on-board remote communication ability such as interfacing to an external Vodafone VVADS radiopad, with internal GSM as a future option and, of course, RS232, which enables the user to collect data remotely and service the unit without leaving the office.
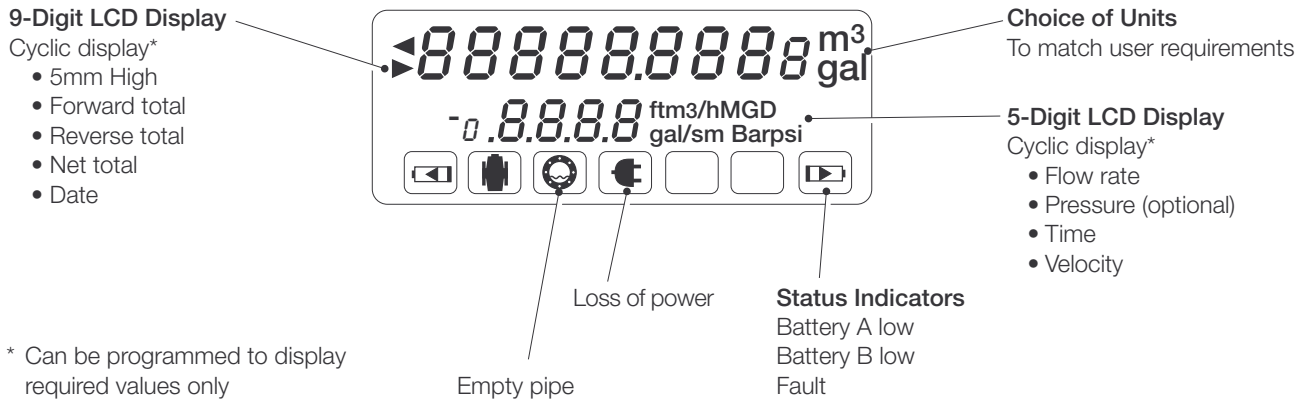
Electronic Display Unit

The AquaProbe 2 Electronic Display Unit provides a comprehensive display of all flow data, including forward and reverse flow totals, flow rate, pressure, time/date etc. If all the data is not required, the transmitter is configured easily to only display the required values, ensuring simple reading with no superfluous data. The two standard pulse outputs (forward and reverse flow direction) are compatible with the wide range of dataloggers used in the water industry, worldwide.

The Electronic Display Unit is fully submersible, enabling it to be mounted locally in chambers, that are liable to flooding or alternatively, up to 200m (650 ft) remote from the probe to facilitate ease of reading.

- Comprehensive display
- Submersible for use in flooded chambers IP68 (NEMA6P)
- Resettable or secure totals
- 5mm high displays for totals (exceeds ISO 4064 requirements)
- Total security
  Two user-security levels
  Anti-tamper switch and seals
- Three outputs
  (forward & reverse pulse, pulses & direction and alarm)

Two versions of enclosure are available: an IP68 (NEMA6P) rated Explorer version designed for remote mounting where possible submersion can occur, or an IP65 (NEMA4X) metal version, which is best suited to roadside furniture or panel mounting.

9-Digit LCD Display
Cyclic display*
- 5mm High
- Forward total
- Reverse total
- Net total
- Date

Choice of Units
To match user requirements

5-Digit LCD Display
Cyclic display*
- Flow rate
- Pressure (optional)
- Time
- Velocity

Loss of power

Empty pipe

Status Indicators
Battery A low
Battery B low
Fault

* Can be programmed to display required values only

Easy, Low Cost Installation

No matter what the location or installation requirements, AquaProbe 2 provides a cost-effective solution.

Both the probe and the Electronic Display Unit can be fully submersible, enabling installation in flooded chambers.

The AquaProbe is installed by means of a small valve tapping on the water supply pipeline normally with the sensing head on the pipe center line. It may be located at the critical position (the mean velocity position) a distance of $1/8$ of the diameter away from the wall.

AquaProbe 2 provides an accurate local measurement of the water velocity and, provided the installation instructions have been carefully followed a good flow volume measurement.

'Fit and Flow'

- No need to match probe and Electronic Display Unit

- Fast, reliable installation

- Foolproof; no errors

- Probe stores all calibration factors, site settings, serial numbers, totalizer values etc.

- Totalizer volume values backed up in probe for total security

Fit weld-on boss

Fit suitable valve and drill into pipe using 'Hot Tap' technique

Fit AquaProbe II

For full installation instructions refer to AquaProbe installation guide
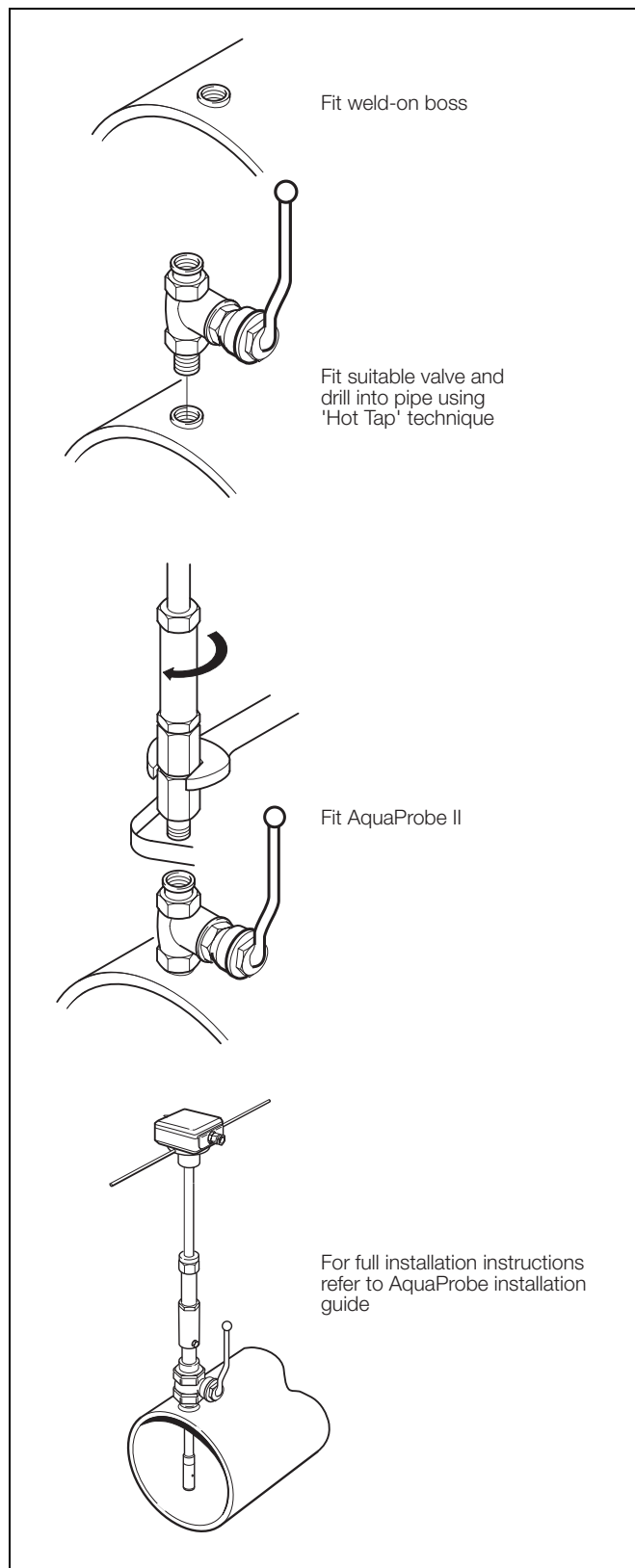
Typical Installation (Metal Pipe)

AquaProbe 2
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Specification
Probe
Maximum insertion length
300mm (12 in.)

500mm (20 in.)

700mm (25 in.)

1000mm (40 in.)

Pipe sizes
200mm to 8000mm (8 in. to 320 in.) nominal bore

Protection
IP68/NEMA6 (Indefinite submersion down to 10m [30 ft])

Weight
<3.5kg (7.7 lb)

Accuracy
Velocity

±2% of Rate or ±2mm/s (±0.08 in./s) whichever is the greater

Volume

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

Flow condition

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

Pressure limitations
20bar (295 psi)

Max. Pressure
20bar (295 PSI)

Pressure equipment Directive 97/23/EC
This product is applicable in networks for the supply, distribution and discharge of water and associated equipment and is therefore exempt

Conductivity
>50µS/cm

Connections
1 in. BSP

1 in. NPT

1.5 in. BSP

Maximum Flow
The maximum velocity depends upon the actual insertion length. Typical insertion lengths are 0.125 and 0.5 x pipe diameter.

The graph is a guide* to the maximum allowable velocity for different insertion lengths.

 *The graph is intended as a guide only, factors that influence the maximum insertion length into the pipe include: probe mounting components, e.g. standoffs, bushes and valves; other influences include pipeline vibration, fluid vibration, pump noise etc.
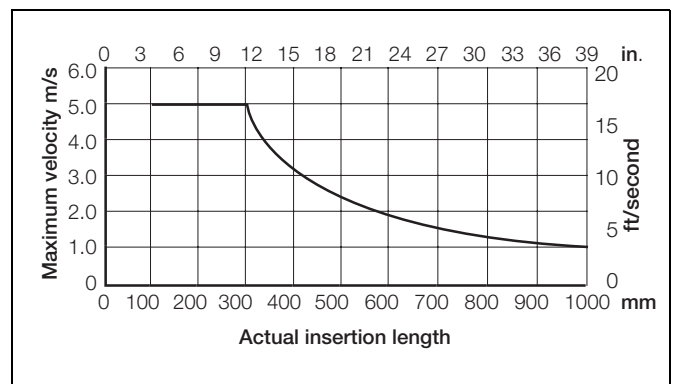
Warranty
The AquaProbe sensor tip material is warranted for a period of 3 years as standard against material and manufacturing defects, this warranty can be extended for a further 2 years upon request. The AquaProbe shaft and mechanical components along with the transmitter have a standard 12 month warranty period.

Wetted Materials
Body
Stainless steel
Probe
Suitable for potable water (UKWFBS listed)

Electrodes – stainless steel 316L
Seals
Suitable for potable water (UFWFBS listed)

Temperature Ranges

AquaProbe 2
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Electronic Display Unit

Mounting
Remote up to 200m (650 ft)

Housing
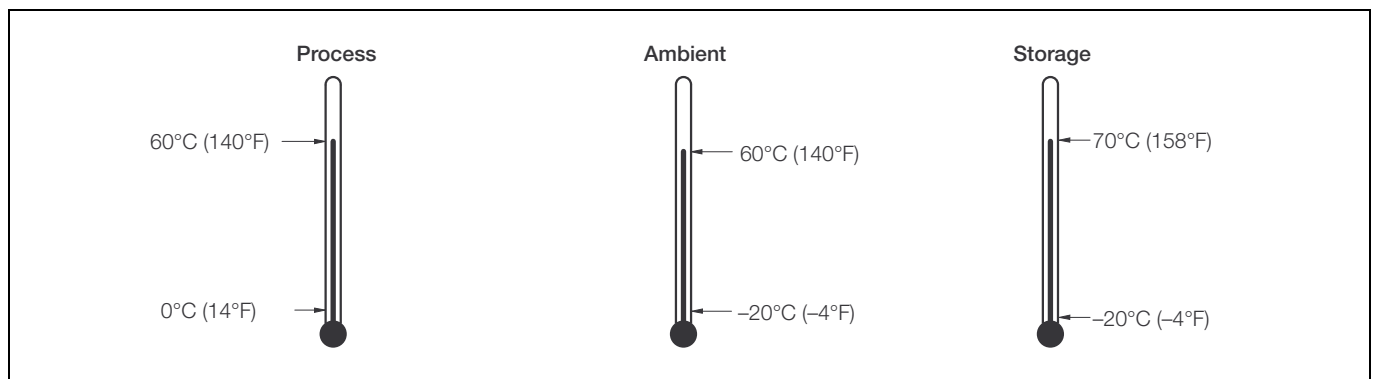IP65 aluminum alloy with glass window

or

IP68 (NEMA 6P) Explorer

Electrical connections
20/16mm plastic glands, 20mm armored or accepts $\frac{1}{2}$ in. NPT threaded or military style plug & socket

Probe cable
ABB cable supplied as standard

SWA cable available on application

Power supply
Battery life @ 0 to 50°C (32 to 122°F)

1 battery	typically 1 year*
2 batteries	typically 2.5 years*
External battery pack	typically 5 years**

Notes.

*Stated battery life assumes normal use. Extended use for flow profiling reduces battery life.

**Extended life is possible to give, say 6 years with small degradation in response time and slightly increased measurement uncertainty (contact ABB for details).

Battery life is shorter with GSM, depending on how frequently it is used and for what period. For example, used once per day for SMS automated reporting of data logged at 15 minute intervals, the life of a battery pack would typically be reduced to approximately 4 years.

Type	Voltage Range (V) Absolute Rating	Frequency (Hz)	VA
AC	85 to 265	47 to 440	<10
Battery	3.6 (Lithium)	–	–

Outputs

Pulse and alarm outputs
Three bi-directional solid state switches with common isolation ±35V DC 50mA

Output 1 Forward only or forward plus reverse pulses

Output 2 Reverse pulses or direction indicator

Output 3 Alarm indicates any problem with measurement or with power

Pulse output 50Hz maximum, 50% nominal duty cycle

Serial data communications
Local Port RS232 compatible via ABB lead (Option)

Remote Port (Option) RS232 with RI, RTS and CTS handshaking for connection to a modem or computer

Telemetry applications using remote serial data communications
External Vodafone VVADS Radio Pad

X25 compatible network interface via RP5, 6, 7 or similar radiopad

External PSTN modem Modern

PSTN modems which store configuration setup on non-volatile memory (for configuration information contact ABB)

External GSM modem

Siemens M20T, TC35 or similar compatible modems (for configuration information contact ABB)

Internal GSM modem

Future option

Logger Details

	Logger		
	1	2	3
Logger Function	Flow & Pressure	Flow & Pressure	Forward, Reverse & Net Flow Totals
No. of Records	8831	11361	366
Logging Interval	15 to 65500s (adjustable)		24 hours (fixed)
Typical Capacity	3 months @ 15 mins.	~7 days @ 1 min.	1 year
Mode	Cyclic	Cyclic	Cyclic
Using ABB LogMaster	✓	✓	✓
Using Technolog (PMAC)	✓	✓	✗
Using Primayer Primeware	✓	✓	✗
Using OSI PI Database/IBV (WADIS) System	✓	✓	✗

AquaProbe 2
Insertion-type electromagnetic probe flowmeter

Pressure System – External Transducer

Pressure range absolute
10bar, 16bar or 300 psi

Connection
Standard quick-fit male probe
MIL style connector

Operating temperature range
–20 to 70°C (–4 to 158°F)

Accuracy (typical)
±0.4% of range

Thermal error band (typically 100°C [212°F])
±1.5% span

Cable length
1, 5, 10 or 20m (3, 16, 32 or 65 ft)

Response Time (Programmable)

Minimum
1s (mains-powered)
15s (battery-powered) – normal use
3s – for profiling use

Languages
English
French
German
Spanish
Italian
Dutch
Languages can be changed via Windows download program (contact ABB)

Limits of Upstream Disturbance
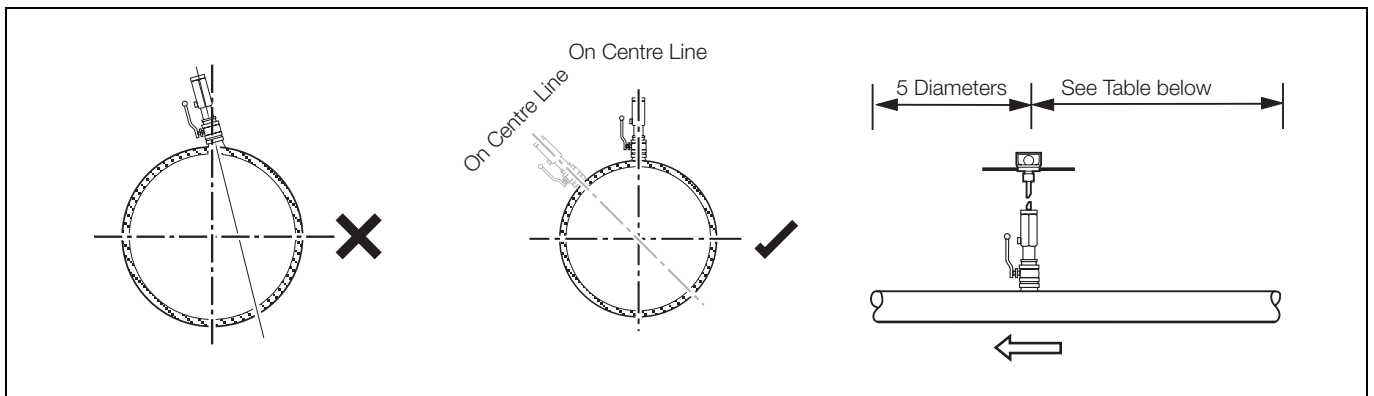
Type of Disturbance Upstream from the Measuring Cross-Section	Minimum Upstream Straight Length*	
	For a measurement at the point of mean axial velocity	For a measurement on the axis of the conduit
90° Elbow or a T-bend	50	25
Several 90° Coplanar Bends	50	25
Several 90° Non-coplanar Bends	80	50
Total Angle Convergent 18 to 36°	30	10
Total Angle Divergent 14 to 28°	55	25
Fully Opened Butterfly Valve	45	25
Fully Opened Plug Valve	30	15

*Expressed in multiples of the diameter of the conduit.

Downstream from the measurement cross-section, the straight length must be at least equal to five duct diameters whatever the type of disturbance.

Note. The Table is an extract from ISO7145 (BS 1042): Section 2.2: 1982 and is reproduced with the permission of BSI. Complete copies of the standard can be obtained by post from BSI Publications, Linford Wood, Milton Keynes, MK14 6LE.

AquaProbe 2
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Default Settings Table

Configuration Parameter	Default European	Default North American
Pulse Factor	1	1
Pulse Units	m^3	Ugal
Totalizer Units	m^3	Ugal
Flow Units	m^3/h	MUGD
Velocity Units	m/s	ft/s
Date Format from Country Code	DDMMYY	MMDDYY
Flow Response Time(s)	3	3
Display Flow Rate	Yes	Yes
Display Forward Total	Yes	Yes
Display Reverse Total	Yes	Yes
Display Net Total	No	No
Display Date	No	No
Display Velocity	No	No
Output Option Pulse Forward	Pulses Forward	Pulses Forward
Output Option Pulse Reverse	Pulses Reverse	Pulses Reverse
Profile Factor	1	1
Probe Insertion Factor	1	1

AquaProbe 2
Insertion-type electromagnetic probe flowmeter

Overall Dimensions
Probe

Dimension in mm (in.)

320 (12.6)

800, 1000, 1200 or 1400 (31.5, 39.4, 47.25 or 55)

1 in. BSP
1¹/₂ in. BSP
1 in. NPT
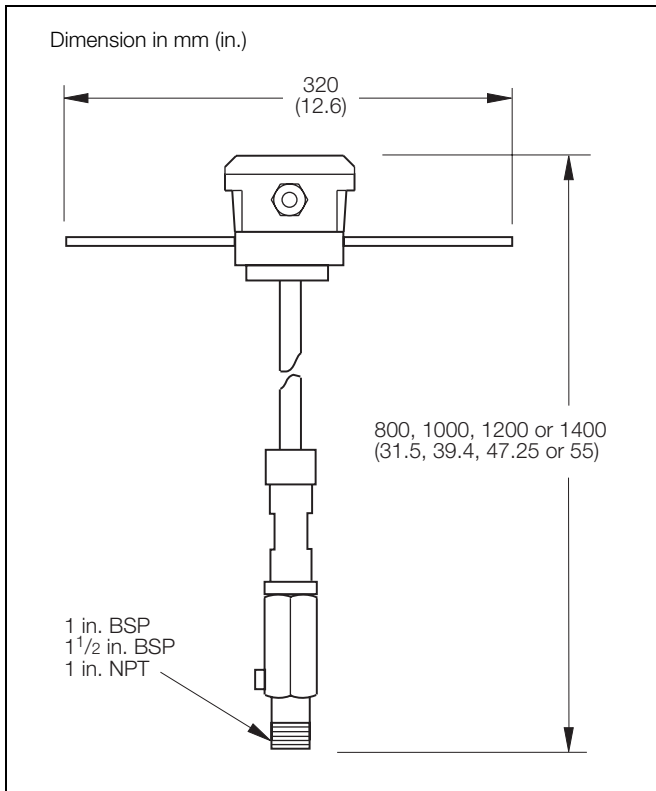
Terminal Box – Probe Mounted

Dimensions in mm (in.)

95 (3.75)

80 (3.15)

M20 Cable Gland shown

61 (2.4)

30 (1.2)
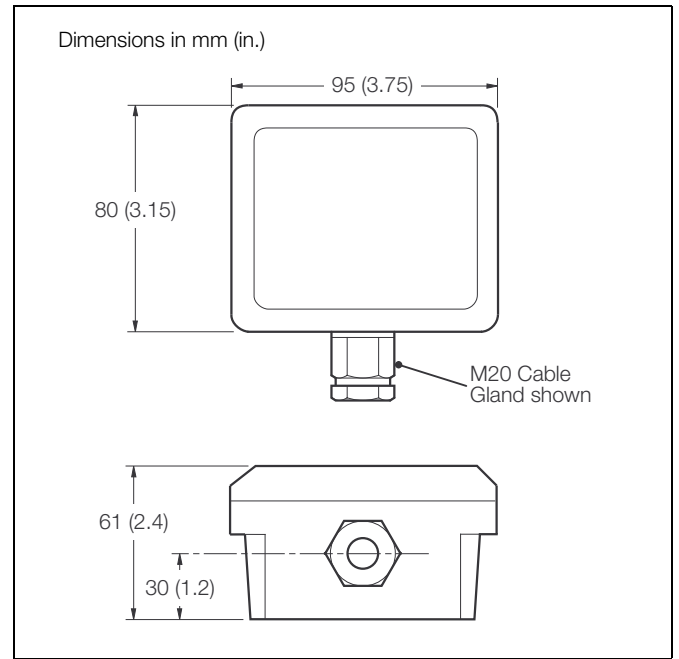
AquaProbe 2
Insertion-type electromagnetic probe flowmeter

IP68/NEMA6P Explorer Display Unit

Dimensions in mm (in.)

50 (2.0)
21 (0.8)
168 (6.6)
Ø6.5 (0.3)
Ø13 (0.5)
115 (4.5)
AquaMaster
136 (5.4)
177 (7.0)
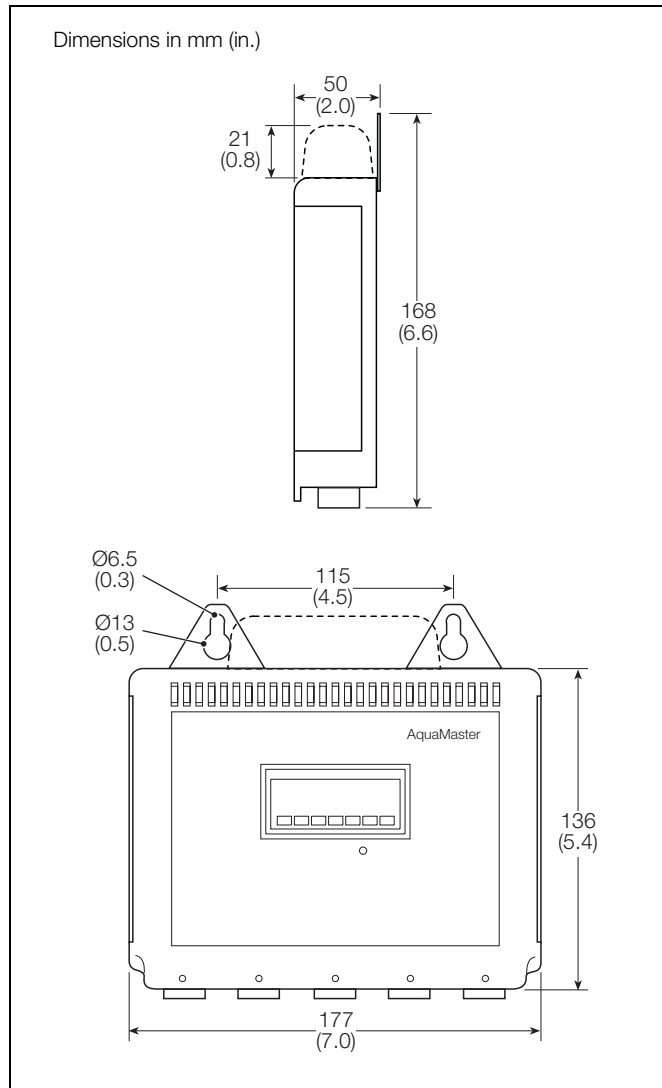
IP65/NEMA4X Electronic Display Unit

Dimensions in mm (in.)

105 (4.13)

Installation and wiring access
300 (11.8) minimum
450 (17.7) preferred

176 (7)
170 (6.7)
140 (5.5)

Transmitter
Mounting Plate

Allowance for cable bend
130 (5.1) (Standard)
230 (9.1) (Armored)

AquaProbe 2
Insertion-type electromagnetic probe flowmeter
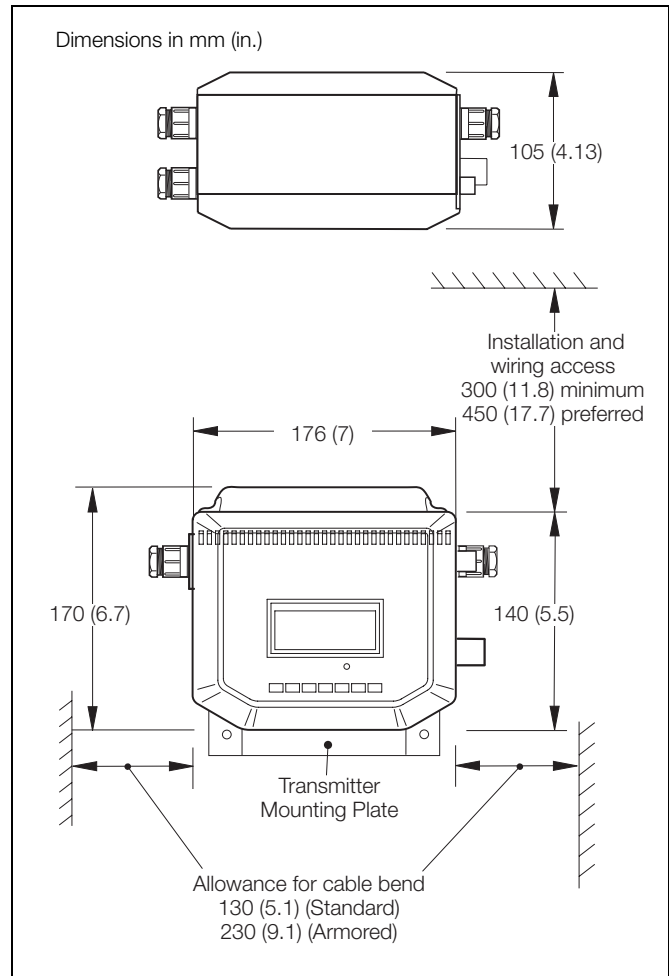
Electrical Connections
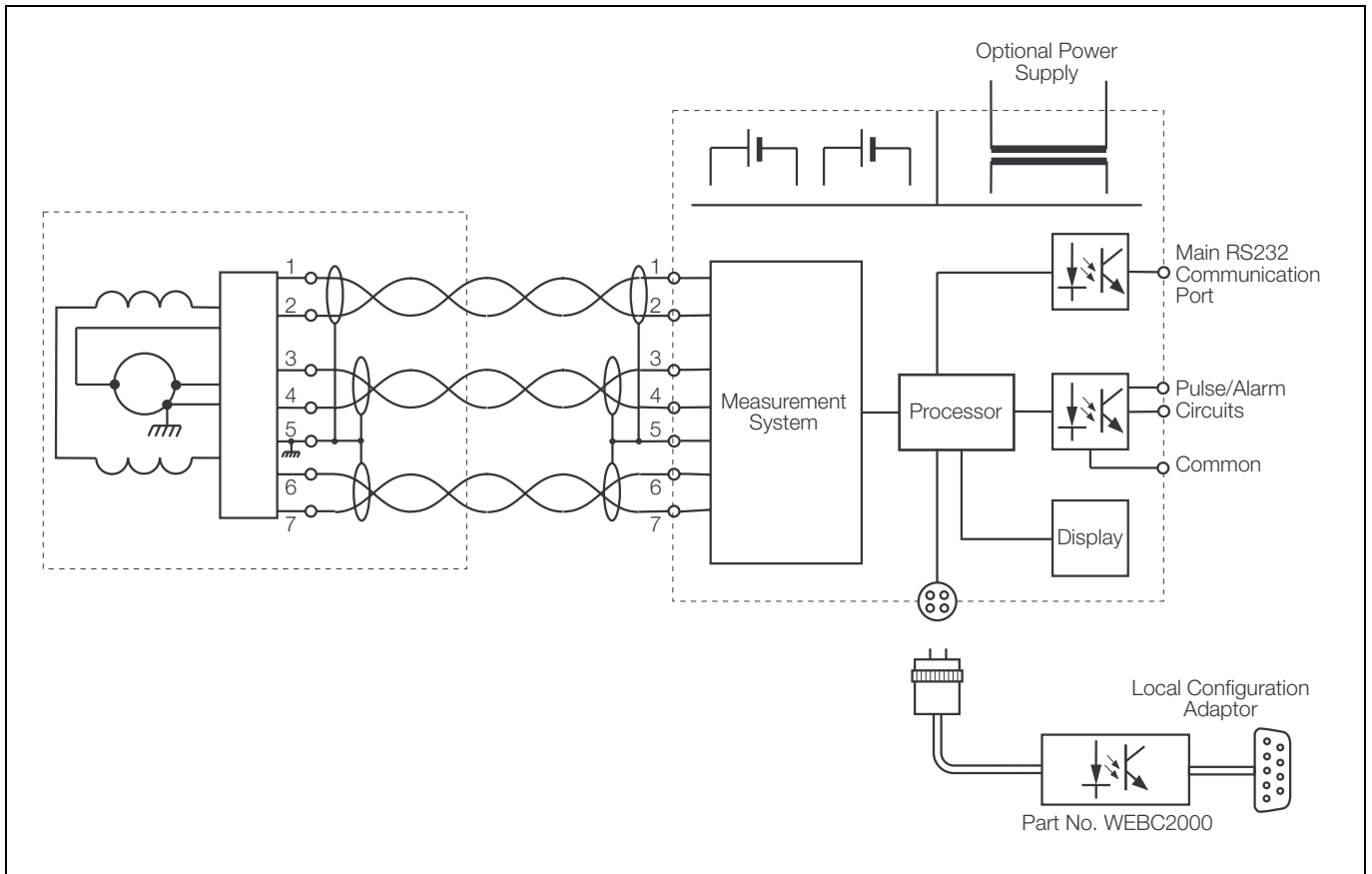
Order Information

					Main Code						
Insertion-Type Electromagnetic Probe Flowmeter			MM/A (PCV)	X	X	XXXX	X	X	X	X	X

System

AquaProbe Sensor/AquaMaster Transmitter	A

Country/Language

Country	Language	Sliding Joint Connection	Default Cable Entry	Code
Australia	English	1 in. BSP with $^1/_8$ in. BSP pressure tapping	20mm Plastic Glands	A
Germany	German	1 in. BSP with $^1/_8$ in. BSP pressure tapping	20mm Plastic Glands	D
Spain	Spanish	1 in. BSP with $^1/_8$ in. BSP pressure tapping	20mm Plastic Glands	E
France	French	1 in. BSP with $^1/_8$ in. BSP pressure tapping	20mm Plastic Glands	F
Holland	Dutch	1 in. BSP with $^1/_8$ in. BSP pressure tapping	20mm Plastic Glands	H
Italy	Italian	1 in. BSP with $^1/_8$ in. BSP pressure tapping	20mm Plastic Glands	I
UK	English	1 in. BSP with $^1/_8$ in. BSP pressure tapping	20mm Plastic Glands	G
USA	English	1 in. NPT with $^1/_8$ in. NPT pressure tapping	$^1/_2$ in. NPT plugged	U

Probe Length mm (in.)

	Code
Not Required	0000
300 (12)	0300
500 (20)	0500
700 (27)	0700
1000 (39)	1000
300 (12) With 2-year extended warranty	30EW
500 (20) With 2-year extended warranty	50EW
700 (27) With 2-year extended warranty	70EW
1000 (39) With 2-year extended warranty	10EW

AquaMaster Transmitter Mounting/Probe Construction

Mounting	Construction of AquaMaster Transmitter	Code
Remote	Sensor & Metal Transmitter	3
Remote	Sensor only	5
Remote	Metal Transmitter	8
Remote	Sensor & Plastic Transmitter	A
Remote	Plastic Transmitter only	C

Power Supply

Power	No. of Batteries	Code
None (Probe only)	None (Probe only)	0
95 to 240V AC + battery backup	1	A
Battery	2	B
95 to 240V AC	0	L

Options

AquaMaster Display	AquaMaster Metal Transmitter IP Rating	Code
Standard	IP68 (NEMA46P)	0
Standard	IP68 (NEMA46P) with extra protection	A

Cable Length m (ft)*

Remote Probes only	Lengths Supported with MIL connectors	Code
Not required	N/A	0
10 (30)	Yes	1
20 (65)	N/A	2
30 (95)	Yes	3
40 (130)	N/A	4
50 (160)	N/A	5
60 (195)	N/A	6
70 (225)	N/A	7
80 (260)	N/A	8
100 (325)	N/A	A
125 (410)	N/A	B
150 (490)	N/A	C
175 (570)	N/A	D
200 (655)	N/A	E

Labelling/Construction

Company	Code
ABB UK	0
ABB USA	1

* Note. Cable type is dependent on Product family and gland type.

AquaProbe 2
Insertion-type electromagnetic probe flowmeter

	Main Code											Additional Code							
Insertion-Type Electromagnetic Probe Flowmeter	MM/A (PCV)	X	X	XXXX	X	X	X	X	X	X		X	X	X	X	X	X	X	X

Seal Carrier/Body Material

Brass	0
Stainless steel	1

Cable Entries

Probe	Cable Fitting and Potting to Probe	Output	Power	
20mm Plastic or $1/2$ in. NPT*	No	16mm Plastic or $1/2$ in. NPT*	20mm Plastic or $1/2$ in. NPT*	0
20mm Plastic	No	16mm Plastic	20mm Plastic	1
20mm Armored	No	20mm Armored	20mm Armored	2
$1/2$ in. NPT	No	$1/2$ in. NPT	$1/2$ in. NPT	3
7W MIL Connector	Yes (AM only)	16mm Plastic	20mm Plastic	5
7W MIL Connector	Yes (AM only)	19W MIL Connector	20mm Plastic	6
20mm Plastic or $1/2$ in. NPT*	Yes	16mm Plastic or $1/2$ in. NPT*	20mm Plastic or $1/2$ in. NPT*	A
20mm Plastic	Yes	16mm Plastic	20mm Plastic	B
20mm Armored	Yes	20mm Armored	20mm Armored	C

Calibration

Standard (3-point)	0
Uncalibrated	8
8-point	B
Witnessed 8-point	C

Sliding Joint Connection

Standard, type depending on country digit/Not required	0
1 in. BSP with $1/8$ in. BSP pressure tapping	1
$1 1/2$ in. BSP with $1/8$ in. BSP pressure tapping	2
1 in. NPT with $1/8$ in. NPT pressure tapping	3
Standard, type depending on country digit/Not required – with $1 1/2$ in. ball valve	4
1 in. BSP with $1/8$ in. BSP pressure tapping – with $1 1/2$ in. ball valve	5
$1 1/2$ in. BSP with $1/8$ in. BSP pressure tapping – with $1 1/2$ in. ball valve	6
1 in. NPT with $1/8$ in. NPT pressure tapping – with $1 1/2$ in. ball valve	7

Communications Option

Not required	0
Remote Port RS232C	1
Scan Reader	2

Logger Protocol

Not required	0
ABB Logger enabled for ABB software	1
ABB Logger enabled for IBV software	2
ABB Logger enabled for Technolog software	3
ABB Logger enabled for Primayer software	4

Pressure Transducer/Cable Length**

Mounting	Cable Length m (ft)	
None	None	0
Remote	1 (3)	1
Remote	5 (15)	2
Remote	10 (30)	3
Remote, not Transducer	N/A	Y

Pressure Span

Not required	0
10 bar (147 psi)	1
16 bar (235.2 psi)	2
300 psi (20.42 bar)	3

Notes.

*USA only, dependent on Country/Language digit.

**For AquaMaster Transmitter in plastic enclosure with Pressure options the second output gland entry is fitted with a MIL pressure connector.

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