

- **Integrated water measurement system**
  - combines flow, pressure, data logging and GSM telemetry in a single unit
- **Built in multi-speed, multichannel, dual-variable logger**
  - high precision, high resolution datalogging
- **Logger database systems**
  - compatible with a variety of logger databases, including ABB LogMaster
- **Logged data transmitted via SMS text message**
  - facilitates automated handling of logged data from a network of flow meters
- **'Flash' programming technology**
  - supports local or remote via radio upgrade to product firmware
- **Meets ISO 4064 Class B & C and CEN pr EN14154 with 1000 : 1 measuring range**
  - complies with the latest regulations
- **Battery operation**
  - 3-year life
  - no external power supply required, facilitates installation in remote locations
- **Automated reporting**
  - using SMS text messaging via internal GSM mobile



**AquaMaster S**  
– the next generation integrated  
measurement system for water  
system management



## The Next Generation Commercial Water Flow Meter

AquaMaster™ S is the next stage in the evolution of the groundbreaking AquaMaster range of flow meters from ABB. An integrated water measurement system with outstanding performance combining flow, pressure measurement and datalogging in a single unit.

AquaMaster S eliminates system interconnection and configuration issues and ensures reliable start-up with reduced overall user costs and improved data resolution for superior water system management.

AquaMaster S is the world's first flowmeter with field upgradeable firmware via GSM. This gives the user full 'future proofing' as it permits future software enhancements to be downloaded to an installed AquaMaster S.

AquaMaster S, available in sizes 15 to 600mm (1/2 to 24 in.), has been designed specifically for the water industry in response to its stringent demands for enhanced metering capability enabling ever more efficient and cost-effective operation and compliance with increasing legislative requirements.

Based on ABB proven technology, AquaMaster S 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 operates national 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.

### No External Power Required for Remote Locations

- No external power supply (2 internal batteries)
- 3-year battery life
- Site-replaceable batteries
- Unique battery management system gives a battery replacement window in excess of 1 year, with no flat battery interruption to measurement

AquaMaster is the ideal solution for locations where there is no external power. Two user-replaceable internal batteries provide a 3-year battery life, thus eliminating the high cost of providing a mains supply to the meter.

AquaMaster'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.

### Typical Applications

- District metering
- Trunk mains
- Treatment works



### Remote Access via Mobile Phone Technology

- Remote access to logger data over GSM network by SMS text message
- Remote configuration, status monitoring and preventive maintenance
- Diagnostics and configuration, via standard GSM mobile phone
- Automated reporting of metering data via SMS text
- SMS data accessible via industry-standard SMS Gateways capable of exporting data using Windows DDE, OLE, XML etc.
- Allows remote software upgrades/enhancements by ABB

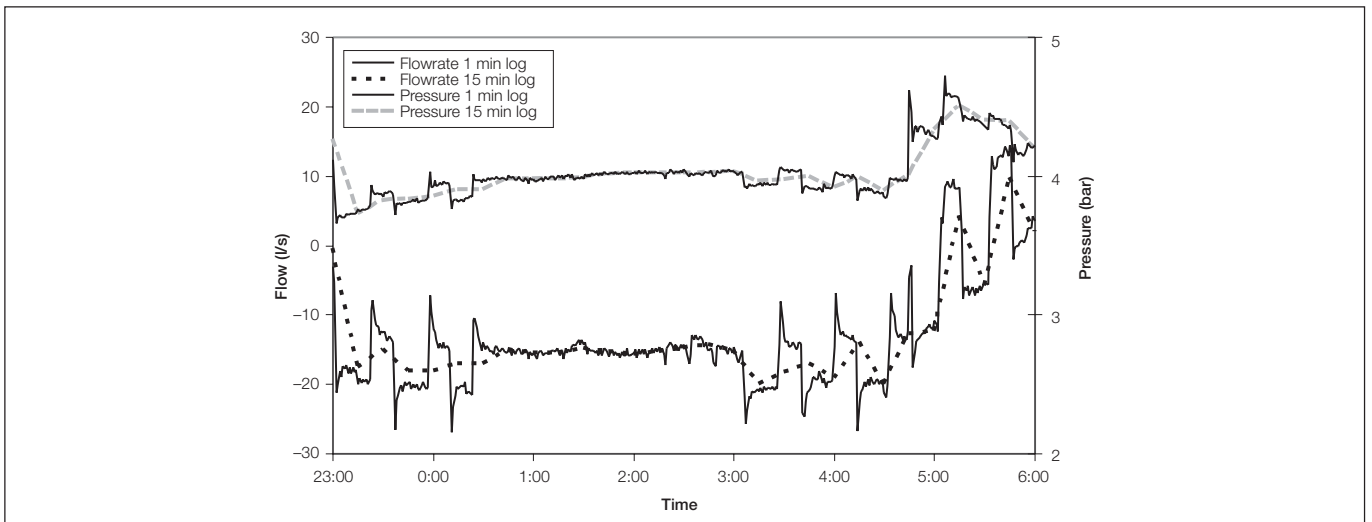
### Logger Facility

The AquaMaster S transmitter also contains 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. This logger logs both flow and pressure via a direct digital transfer of data, thereby ensuring optimum accuracy and resolution of measurement. Graph 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 Graph 2 (below). AquaMaster S eliminates such effects, averaging digitally over the selected logging interval. Such high resolution data facilitates step testing, leak detection and water network analysis.

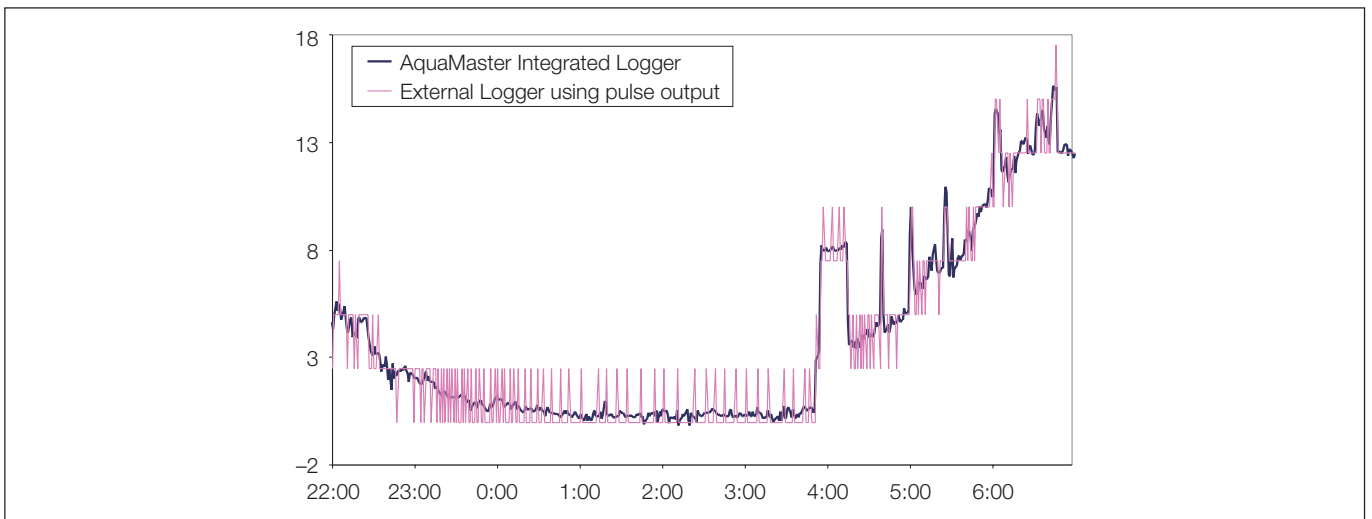
The AquaMaster's internal loggers feature an advanced automatic time synchronization feature which ensure operation on synchronized time boundaries, no matter what logging interval is set. This ensures all flow and pressure data, when combined with data from other meters, is precisely synchronized facilitating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

For revenue application, not only is the flow and pressure logged information available but included is a totalizer and tariff logger, which logs 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.

Security is incorporated where access to the loggers and modifying the configuration of logger setup is protected by user passwords which can be changed by the user.



Graph 1. Flowrate/Pressure High Resolution Capability



Graph 2. Pulse Resolution Eliminated with Integral Logger

## Mobile Phone Data Transmission (CSD) and Text Messaging (SMS)

Transmission of data (rather than voice) over mobile telephone networks generally involves a technique called Circuit-Switched Data (CSD). The SIM card used needs to have its 'data' number enabled by the service provider. The advantage of this system is that data can be transmitted in real time, including stored data such as that held in data loggers.

Text messaging, as the name suggests, is used to exchange text characters. AquaMaster, using this method, transfers data and instructions in the form of text. It can also optionally send logged data in the form of encrypted text messages. The added advantage of sending logged data by this method is that it can be sent automatically. A network of meters can be configured such that every day each meter sends the last 24 hours of logged data (for flow and/or pressure) to the user. In addition, the minimum signal levels for Text Messaging are lower than for voice/data transfers and that the text exchange does not have to be synchronized, as the SMS Gateway stores the request until the recipient's system is next active and, likewise, his response is similarly stored until the originator is next on line. In other words, the two parties need not be on line simultaneously. In addition, if Text Messaging is all that is required, there is no need to activate the data number.

### Downloading the Loggers

AquaMaster S enables customers to have full access to the contents of its 3 integral data loggers via either CSD or SMS. This is via a module, integral with the Transmitter, containing a cellphone and a SIM card. It gives standard 15 minute logged data with the availability of extra high resolution data and the Totalizer/Tariff loggers. AquaMaster allows customers to fit their own SIM card into the Transmitter.

Access to the data is possible via a GSM modem and using software that runs on the receiving system. When the Transmitter is powered from an AC mains electrical supply, the GSM module is constantly powered. When, however, the Transmitter is under battery power, the module is powered to a programmable schedule, using the Transmitter's internal clock/calendar and controlled from within the menu structure.

### Remote Access via Text Messaging

Text messaging is ideally suited to requesting specific items of data (such as forward volume totalizer, flowrate, alarm status etc.) or to configure any of the parameters within the AquaMaster S menu system. The data requests and reconfiguration commands are in a simple text format and the AquaMaster S replies to the originator with the requested data or with confirmation of the configuration change.

AquaMaster can create and send a number of reports via SMS text message:

- **Flow and/or Pressure Log Reports**
  - contents of standard data logger
- **Text Auto-Report**
  - auto-reporting of user-selected meter data
- **Totaliser Auto-Report**
  - sends totaliser values
- **Alarm Auto-Report**
  - sent automatically when a critical error is detected

Each of the report types can be sent to any one of three GSM numbers. If required, the information can be routed straight to a PC in the appropriate department rather than to a central number. The Logger Reports are sent daily and the other reports are sent according to a programmable schedules (for example, daily, weekly etc.) which are easily configured via a menu in the AquaMaster S.

Receiving the Log report types into a system requires a GSM modem with a SIM card, a PC/server and ABB Logger Server software. The latter can be configured to process the incoming data and automatically forward it to the user's database.

For further information on the ABB SMS Logger Server software, refer to specification sheet SS/???

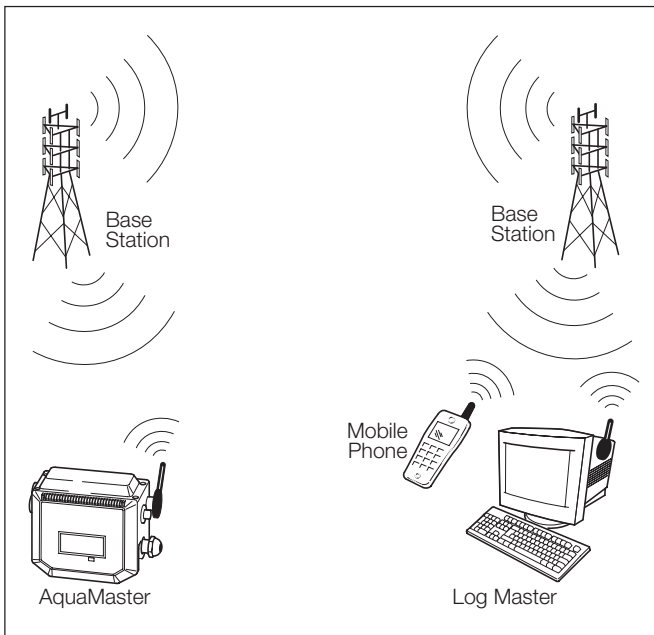
**Antenna**

The AquaMaster is available with either an internal or external antenna. Having the antenna external to the Transmitter cabinet or other field enclosure that may be used to house the Transmitter. The integral antenna version can be used within any plastic enclosure or in outside locations.

To ensure satisfactory signal reception at the time of commissioning, AquaMaster can check the signal strength in its final installed location – with the covers/enclosures etc. fitted – and report on its suitability for data transfer.

**Nightline Flow Logger**

An additional capability of the GSM-equipped AquaMaster S is the capability of configuring a Tariff data logger in higher-resolution units to record night-time flows in a programmable time window. This gives direct tabular data of night flows and is a valuable tool in network and site leakage detection.



**Support Software**

AquaMaster S is compatible with a variety of industry-standard third party software (Technolog™ [PMAC], Hydreka Winfluid, Primayer™, OSI™ PI database and Capula Beaver Valley [WADIS]) for downloading, managing, analysis and display of data, either directly from the RS232 port or remotely.

Software	Direct (RS232)	Vodafone (Radiopad)	GSM (Circuit-switched data)	SMS (Text)
<b>ABB LogMaster</b>	✓	✓	✓	✗
<b>Technolog (PMAC)</b>	✓	✓	✗	✗
<b>Primayer</b>	✓	✓	+	✗
<b>OSI PI Database or Capula Beaver Valley (WADIS)</b>	✓	✓	✓	✗
<b>Hydreka (Winfluid)</b>	✓	✓	+	✗
<b>Automated Meter Reading (via SMS Gateway)</b>	✗	✗	✗	✓
<b>Mobile Phone Text</b>	✗	✗	✗	✓

+ Future compatibility planned, contact the appropriate datalogger supplier.

ABB also supply LogMaster, a simple-to-use PC software program which provides local communication to the AquaMaster S. It enables full control and downloading of the on-board datalogger. A file-save facility enables data to be exported in CSV format for charting in Microsoft™ Excel or similar spreadsheets. It supports GSM and Vodafone Radiopad remote connection, with an address book, for full remote operation. LogMaster is Windows™ 98, NT and Windows 2000 compatible, available in a variety of different languages.

AquaMaster S also has on board remote communication ability such as interfacing to an external Vodafone WADS radiopad, with internal GSM as an option and, of course, RS232 which enables the user to both collect data remotely and service the unit without leaving his office.

## Transmitters

- Comprehensive display
- Submersible for use in flooded chambers IP68 (NEMA6)
- Resettable or secure totals
- 8mm high displays for totals (exceeds ISO 4064 requirements)
- Total security:
  - Two user-security levels
  - Anti-tamper switch and seals
- Three outputs (forward & reverse pulse, or pulses & direction and alarm)

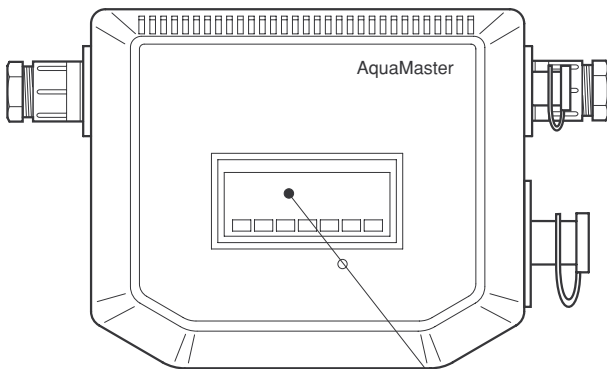
The AquaMaster Transmitter provides the most comprehensive range of flow data and information currently available to the water industry. If all the data is not required, the unit can be configured so that only the required values are displayed, thus ensuring simple reading with no superfluous data. Similarly, the display is available for top or side viewing, depending on the location of the meter, for easy reading in all locations.

The AquaMaster's program memory or firmware uses reprogrammable Flash memory technology which has been enhanced to allow this firmware to be upgraded in the field, via a local serial port connection or a radio link, if fitted. This future proofs AquaMaster, making enhancements or new features available to installed units.

The Transmitter is available in 2 alternative IP68 rated housings:

- A metal housing designed for battery-only operation (using 2 internal batteries) or AC power (with or without a battery backup). The cable entries are via glands or military-style plug & socket connectors.
- AquaMaster Explorer. This has a stainless steel inner case and a plastic outer case, with the whole assembly encapsulated in resin. This is powered by an external battery pack that offers up to 6 years battery life. The cable entries are all via plug & socket connectors. This Transmitter is ordered under a separate code from the sensor. For more information refer to the AquaMaster Explorer specification sheet SS/AMAS/E.

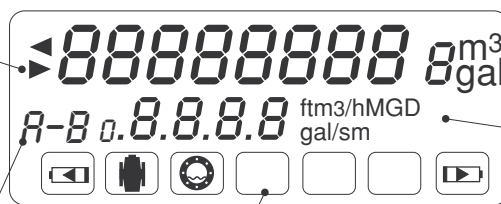
Both Transmitters can be mounted either remotely from or integral with, the sensor. The standard integral mounting system uses a close-coupled design that enables the Transmitter to be easily demounted from the sensor without affecting the integrity of either the Transmitter or the sensor.



### 9-Digit LCD Display

- Cyclic display\*
- 8mm High
  - Forward total
  - Reverse total
  - Net total
  - Date
  - Tariff Total

### Tariff Indicator



### Status Indicators

- Battery A low
- Fault
- Empty pipe
- Battery B low
- Mains off

### Choice of Flow Units

to match user requirements

### 5-Digit LCD Display

- Cyclic display\*
- Flow rate
  - Time
  - Velocity
  - Pressure

\* Can be programmed to display required values only

**Standard Tariff Setting**

AquaMaster incorporates a multiple tariff feature where the accumulated flow volume is routed to one of two 8-digit signed tariffs; tariff A and tariff B, depending on time and date. It is fully programmable by the user for time of day, day of week or date during the year. These user-defined times/dates can be combined in a variety of modes as illustrated in the tables below to produce the following tariff regimes.

**Weekly Cycle Defined**

Mode	Tariff A	Tariff B
1	Day time during weekend	Night time at weekend + day and night during week
2	Day time during week	Night time during week + day and night during weekend
3	All day times	All night times
4	Night time during weekend	Day time during weekend + day and night during week
5	Day and night during weekend	Day and night during week
6	Day time during weekend + night time during weekend	Night time during week + day time during weekend
7	All day times + night time during weekend	Night time during week

**Yearly Cycle Defined**

Mode	Tariff A	Tariff B
1	Day time during summer	Night time during summer + day and night during winter
2	Day time during winter	Night time during winter + day and night during summer
3	All day times	All night times
4	Night time during summer	Day time during summer + day and night during winter
5	Day and night during summer	Day and night during winter
6	Day time during winter + night time during summer	Night time during winter + day time during summer
7	All day times + night time during summer	Night time during winter

**Easy, Low Cost Installation**

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

Both the sensor and the Transmitter can be fully submersible, enabling installation in flooded chambers.

In addition, the sensor is buriable, thus eliminating the need for a chamber. Installation merely involves excavating to the pipeline, fitting the sensor and back filling the hole, to ensure very fast, low cost installation. The associated Transmitter is then located in the most convenient position for the user.

The elimination of bypasses and ancillary items such as strainers, enables the installation cost to be kept to an absolute minimum.

These factors, together with the innovative 'Fit and Flow™' system, ensure foolproof installation with total user confidence.

**Fit & Flow**

- No need to match sensor and Transmitter
- Fast, reliable operation
- Foolproof, no errors
- Sensor stores all calibration factors, site setting numbers etc.
- Volume totalizer and tariff values backed-up every 5 minutes in sensor for total security
- Multiple, programmable password levels stored for measurement security
- Tamper resistant



*Underground Installation of AquaMaster*

## New Performance Standards

### Calibration Characteristics for AquaMaster S

Widest flow range, optimum accuracy and long term, stable calibration means that AquaMaster sets new performance standards in the water industry.

The performance specification for an 80mm (3 in.) AC-powered unit (see Fig. below) demonstrates how AquaMaster significantly exceeds ISO 4064 Class B standards for both accuracy and max./min. flow rates ( $Q_{max}$  and  $Q_{min}$ ).

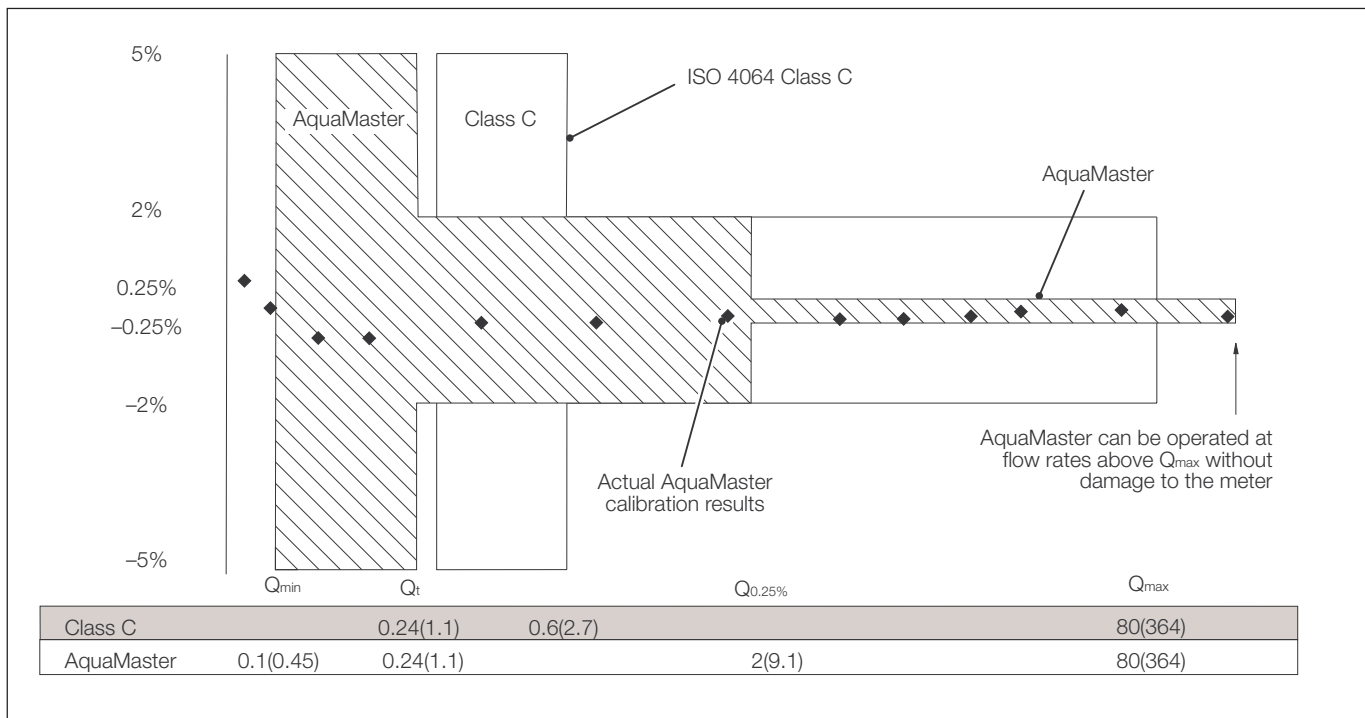
The performance for an AC-powered unit has an exceptional flow rangeability, meeting R1000 of the new CEN pr EN14154.

This unique low flow rate capability enables previously unrecordable minimal night flow rates to be metered; particularly important for district metering applications.

The clear bore of the AquaMaster eliminates the possibility of damage by particulate matter and the absence of moving and wearing components ensures that this unique level of performance is maintained long term.

The unique design of the AquaMaster sensor conditions the flow profile in the measuring section so that distortions in the flow profile, either upstream or downstream, are flattened, resulting in excellent in situ meter performance, even with very bad hydraulic installation conditions. Tests have shown that with a gate valve bolted directly on the upstream flange of the meter, performance is still within ISO 4064 Class C even with the gate virtually shut.

AquaMaster S is also available with a special revenue calibration for bulk revenue applications which also require the built-in logging capability and other features of AquaMaster S.



Comparison of 80mm (3 in.) AC Performance Specification  $m^3/h$  (gal/min.) with ISO 4064 Class C

## Specification

### Battery-powered Meters – Flow Requirements per ISO 4064 (Standard Version)

Size		Q <sub>max.</sub>	N	Q (0.5%)	Q <sub>t</sub>	Q <sub>min.</sub>
mm	in.	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)
15	1/2	3 (13)	1.5 (7)	0.23 (1.0)	0.023 (0.099)	0.009 (0.040)
20	3/4	5 (22)	2.5 (11)	0.38 (1.7)	0.038 (0.165)	0.015 (0.066)
25	1	7 (31)	3.5 (15)	0.53 (2.3)	0.053 (0.23)	0.021 (0.09)
40	1 1/2	20 (88)	10 (44)	1.5 (6.6)	0.150 (0.66)	0.06 (0.26)
50	2	30 (132)	15 (66)	2.3 (9.9)	0.23 (1.0)	0.09 (0.40)
65	2 1/2	50 (220)	25 (110)	3.8 (16.5)	0.38 (1.7)	0.15 (0.66)
80	3	80 (352)	40 (176)	6 (26)	0.6 (2.6)	0.24 (1.06)
100	4	120 (528)	60 (264)	9 (40)	0.9 (4.0)	0.36 (1.59)
150	6	300 (1320)	150 (660)	23 (99)	2.3 (10)	0.9 (4.0)
200	8	500 (2200)	250 (1100)	38 (165)	3.8 (17)	1.5 (6.6)
250	10	800 (3520)	400 (1760)	60 (264)	6 (26)	2.4 (11)
300	12	1200 (5280)	600 (2640)	90 (400)	9 (40)	3.6 (16)
350	14	1600 (7040)	800 (3520)	120 (530)	25 (110)	10 (44)
400	16	2000 (8810)	1000 (4400)	150 (660)	31 (138)	13 (55)
450	18	2600 (11450)	1300 (5720)	195 (860)	44 (193)	18 (77)
500	20	3000 (13210)	1500 (6600)	225 (990)	63 (275)	25 (110)
600	24	5000 (22010)	2500 (11010)	375 (1650)	79 (347)	32 (139)

### AC-powered Meters – Flow Requirements per ISO 4064 (Standard Version)

Size		Q <sub>max.</sub>	N	Q (0.25%)	Q <sub>t</sub>	Q <sub>min.</sub>
mm	in.	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)
15	1/2	3 (13)	1.5 (7)	0.075 (0.33)	0.010 (0.044)	0.004 (0.018)
20	3/4	5 (22)	2.5 (11)	0.125 (0.55)	0.016 (0.069)	0.006 (0.028)
25	1	7 (31)	3.5 (15)	0.175 (0.77)	0.025 (0.11)	0.01 (0.04)
40	1 1/2	20 (88)	10 (44)	1.5 (6.6)	0.063 (0.28)	0.025 (0.11)
50	2	30 (132)	15 (66)	1.5 (6.6)	0.1 (0.4)	0.04 (0.18)
65	2 1/2	50 (220)	25 (110)	1.5 (6.6)	0.16 (0.7)	0.063 (0.28)
80	3	80 (352)	40 (176)	2 (8.8)	0.3 (1.1)	0.1 (0.44)
100	4	120 (528)	60 (264)	3 (13)	0.4 (1.8)	0.16 (0.70)
150	6	300 (1320)	150 (660)	7.5 (33)	1 (4)	0.4 (1.8)
200	8	500 (2200)	250 (1100)	12.5 (55)	1.6 (7)	0.63 (2.8)
250	10	800 (3520)	400 (1760)	20 (88)	2.5 (11)	1 (4)
300	12	1200 (5280)	600 (2640)	30 (132)	4 (18)	1.6 (7)
350	14	1600 (7040)	800 (3520)	80 (352)	8 (35)	3.2 (14)
400	16	2000 (8810)	1000 (4400)	100 (440)	13 (55)	5 (22)
450	18	2600 (11450)	1300 (5720)	130 (572)	18 (77)	7 (31)
500	20	3000 (13210)	1500 (6600)	150 (660)	20 (88)	8 (35)
600	24	5000 (22010)	2500 (11010)	250 (1101)	32 (139)	13 (55)

**Battery-powered Meters – Flow Requirements per CEN pr 14154 and latest ISO4064 (Standard Version)**

Size		Q <sub>4</sub>	Q <sub>3</sub>	Q <sub>0.5%</sub>	Q <sub>2</sub>	Q <sub>1</sub>	R
mm	in.	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	
15	1/2	5 (22)	4 (18)	0.23 (1.0)	0.025 (0.110)	0.010 (0.044)	400
20	3/4	8 (35)	6.3 (28)	0.38 (1.7)	0.039 (0.173)	0.016 (0.069)	400
25	1	12.5 (55)	10 (44)	0.5 (2.3)	0.063 (0.28)	0.025 (0.11)	400
40	1 1/2	31 (138)	25 (110)	1.5 (6.6)	0.156 (0.69)	0.063 (0.28)	400
50	2	50 (220)	40 (176)	2.3 (9.9)	0.3 (1.1)	0.1 (0.44)	400
65	2 1/2	79 (347)	63 (277)	3.8 (16.5)	0.39 (1.7)	0.16 (0.69)	400
80	3	125 (550)	100 (440)	6 (26)	0.6 (2.8)	0.25 (1.10)	400
100	4	200 (880)	160 (700)	9 (40)	1 (4.4)	0.4 (1.76)	400
150	6	500 (2200)	400 (1760)	23 (100)	3 (11)	1 (4.4)	400
200	8	788 (3470)	630 (2770)	38 (170)	3.9 (17)	1.6 (6.9)	400
250	10	1250 (5500)	1000 (4400)	60 (260)	6.3 (28)	2.5 (11)	400
300	12	2000 (8810)	1600 (7040)	90 (400)	10 (44)	4 (18)	400
350	14	2000 (8810)	1600 (7040)*	120 (530)	25 (110)	10 (44)	160
400	16	3125 (13760)	2500 (11010)*	150 (660)	31 (138)	13 (55)	200
450	18	4375 (19260)	3500 (15410)*	195 (860)	44 (193)	18 (77)	200
500	20	5000 (22010)	4000 (17610)*	225 (990)	63 (275)	25 (110)	160
600	24	7875 (34670)	6300 (27740)*	375 (1650)	79 (347)	32 (139)	200

**AC-powered Meters – Flow Requirements per CEN pr 14154 and latest ISO4064 (Standard Version)**

Size		Q <sub>4</sub>	Q <sub>3</sub>	Q <sub>0.25%</sub>	Q <sub>2</sub>	Q <sub>1</sub>	R
mm	in.	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	
15	1/2	5 (22)	4 (18)	0.075 (0.33)	0.010 (0.044)	0.004 (0.018)	1000
20	3/4	7.9 (35)	6.3 (28)	0.13 (0.55)	0.016 (0.069)	0.006 (0.028)	1000
25	1	12.5 (55)	10 (44)	0.18 (0.77)	0.025 (0.11)	0.01 (0.04)	1000
40	1 1/2	31 (138)	25 (110)	1.5 (6.6)	0.063 (0.28)	0.025 (0.11)	1000
50	2	50 (220)	40 (176)	1.5 (6.6)	0.1 (0.4)	0.04 (0.18)	1000
65	2 1/2	79 (247)	63 (277)	1.5 (6.6)	0.16 (0.7)	0.063 (0.28)	1000
80	3	125 (550)	100 (440)	2 (8.8)	0.3 (1.1)	0.1 (0.44)	1000
100	4	200 (880)	160 (700)	3 (10)	0.4 (1.8)	0.16 (0.70)	1000
150	6	500 (2200)	400 (1760)	8 (30)	1 (4)	0.4 (1.8)	1000
200	8	788 (3470)	630 (2770)	13 (60)	1.6 (7)	0.63 (2.8)	1000
250	10	1250 (5500)	1000 (4400)	20 (90)	2.5 (11)	1 (4)	1000
300	12	2000 (8810)	1600 (7040)	30 (132)	4 (18)	1.6 (7)	1000
350	14	2000 (8810)	1600 (7040)*	80 (352)	8 (35)	3.21 (14)	500
400	16	3125 (13760)	2500 (11010)*	100 (440)	13 (55)	5 (22)	500
450	18	4375 (19260)	3500 (15410)*	130 (570)	18 (77)	7 (31)	500
500	20	5000 (22010)	4000 (17610)*	150 (660)	20 (88)	8 (35)	500
600	24	7875 (34760)	6300 (27740)*	250 (1100)	32 (139)	13 (55)	500

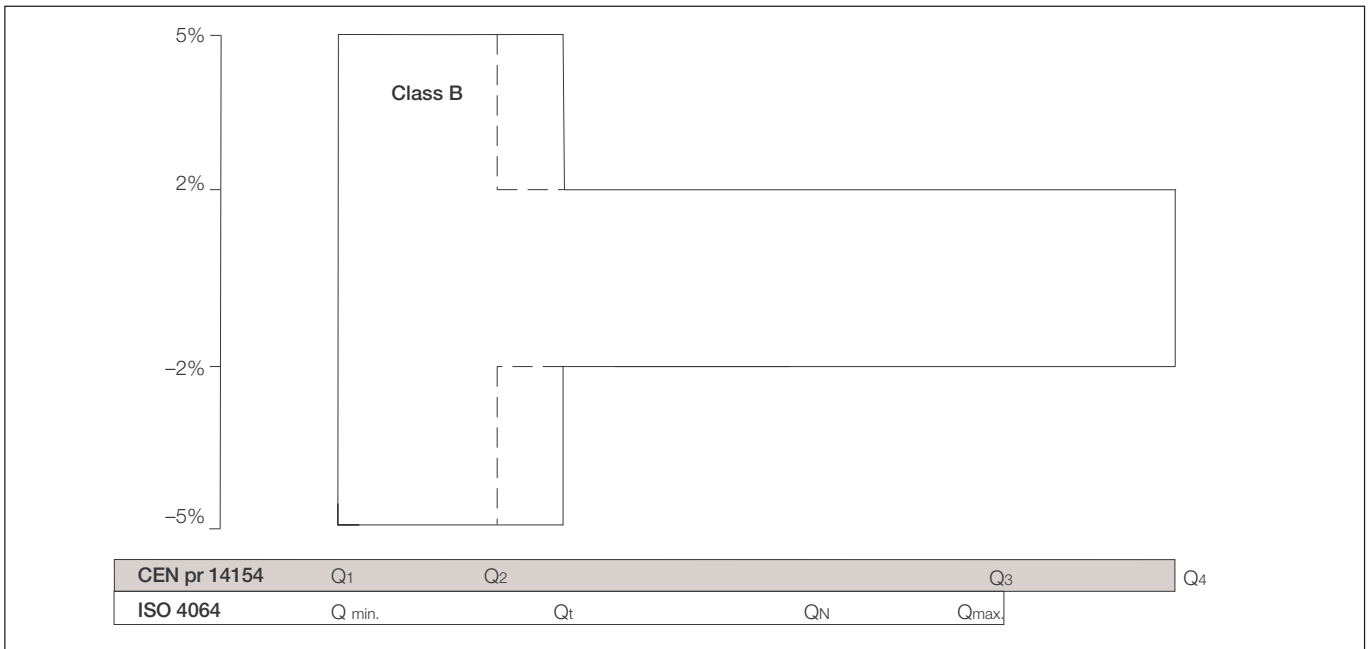
**...Specification**

**Flow Requirements per CEN pr 14154 (Bulk Revenue Version)**

Size		Q <sub>4</sub>	Q <sub>3</sub>	Q <sub>2</sub>	Q <sub>1</sub>	R
mm	in.	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	
50	2	50 (220)	40 (176)	1 (4.4)	0.4 (1.8)	100
65	2½	79 (347)	63 (277)	1.6 (7)	0.63 (2.8)	100
80	3	125 (550)	100 (440)	2.5 (11)	1 (4.4)	100
100	4	200 (881)	160 (704)	4 (18)	1.6 (7.0)	100
150	6	500 (2200)	400 (1760)	10 (44)	4 (18)	100
200	8	788 (3470)	630 (2770)	16 (69)	6.3 (28)	100
250	10	1250 (5500)	1000 (4400)	25 (110)	10 (44)	100
300	12	2000 (8810)	1600 (7040)	40 (176)	16 (70)	100

**Flow Requirements per ISO 4064 Class B (Bulk Revenue Version)**

Size		Q <sub>max.</sub>	N	Q <sub>t</sub>	Q <sub>min.</sub>
mm	in.	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)	m <sup>3</sup> /h (Ugal/min)
50	2	30 (132)	15 (66)	3 (13.2)	0.45 (2.0)
65	2½	50 (220)	25 (110)	5 (22)	0.75 (3.3)
80	3	80 (358)	40 (176)	8 (35)	1.2 (5.3)
100	4	120 (528)	60 (264)	12 (53)	1.8 (7.9)
150	6	300 (1320)	150 (660)	30 (132)	4.5 (20)
200	8	500 (2200)	250 (1100)	50 (220)	7.5 (33)
250	10	800 (3520)	400 (1760)	80 (350)	12 (53)
300	12	1200 (5280)	600 (2640)	120 (530)	18 (79)



Performance Specification with CEN pr 14154 and ISO 4064

## ...Specification

### Wetted Materials

#### Screw end meters

Brass

#### Flanged meters

Electrodes – stainless steel 316L

#### Lining

Suitable for potable water (UKWFBS listed)

#### Pressure limitations

As flange rating

#### Conductivity

>50µS/cm

### End Connections

#### Thread end connections

15mm – G 3/4 in. B      3/4 in. NPSM  
20mm – G 1 in. B      1 in. NPSM  
25mm – G 1 1/4 in. B    1 1/4 in. NPSM

#### 40 to 300mm (1.5 to 12 in.) flanged

BS4504/ISO 7005 – PN16, PN10  
ANSI B16.5 1.5 Class 150  
AS 2129 Tables C, D and E  
AS 4087/14, AS4087/16  
JIS to BS2210, 5k, 10k and 30k  
BS10 Tables D and E

#### 350 to 600mm (14 to 24 in.) flanged

BS4504/ISO 7005 – PN10, PN16  
BS10 Table D & E  
AS 2129 Tables D and E  
AWWA C207 Class B and D  
ANSI B16.5 1.5 Class 150 ( 24 in.)  
AS4087/14, AS4087/16

### Pressure Loss

Flowrate	Pressure Loss (Bar)
Q 3 (GEN)	< 0.63
ISO 4064 Q <sub>max</sub>	< 0.3
ISO 4064 Q <sub>n</sub>	< 0.075
ISO 4064 Q <sub>n/2</sub>	< .019

### Transmitter

#### Mounting

Integral with sensor

or

Remote up to 200m (650 ft)

#### Housing

IP68 (NEMA 6P) Aluminum Alloy with Glass Window

#### Electrical connections

20/16mm plastic glands, 20mm armored or accepts 1/2 in. NPT threaded or military style plug & socket

#### Sensor cable

ABB cable supplied as standard

SWA cable available on application

#### Power supply

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

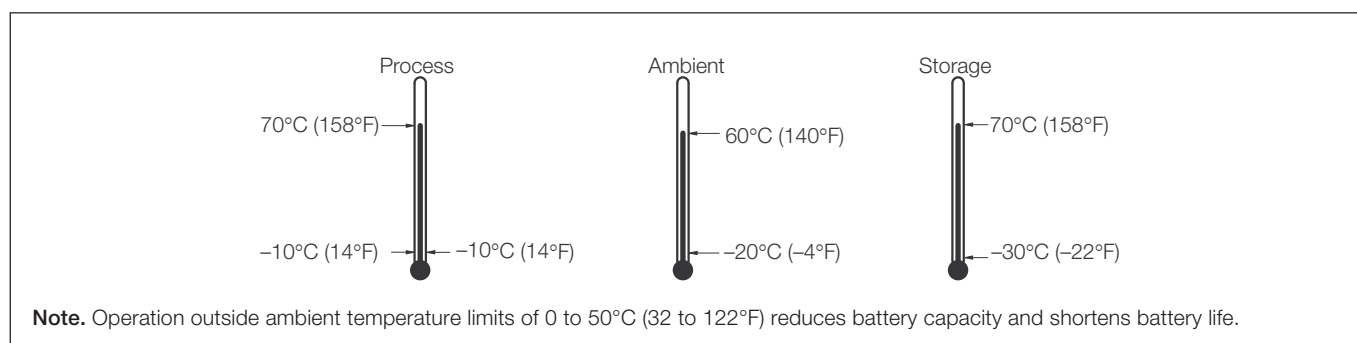
1 battery – typically 1.2 years

2 batteries – typically 3 years, extended life is possible to give, say, 5 years for two cells with a 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 total life of 2 batteries would be typically reduced to approximately 2 years.

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

### Temperature Ranges



### ...Transmitter

#### Pulse and alarm outputs

Three bidirectional 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 Vodaphone 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** Dual Band GSM; fully programmable schedule for battery operation and Automated Meter Reading. Logged data transmission via SMS Text.

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### Pressure System – External Transducer

#### Pressure range absolute

10, 16bar or 300 lb/in<sup>2</sup>

#### 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)

#### Logger details

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

#### Response Time (Programmable)

##### Minimum

1s (mains-powered)

15s (battery-powered)

##### Languages

English

French

German

Spanish

Italian

Dutch

Other languages can be added via Windows download Program (contact ABB)

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#### GSM Antenna

##### Mounting

Integral with transmitter

or

Remote (1m cable)

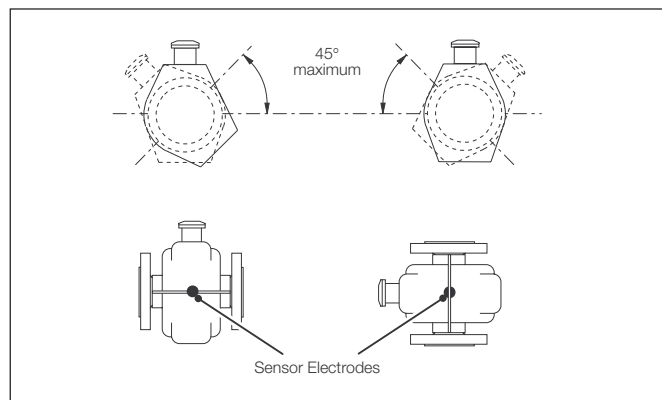
##### Antenna environmental

IP66 (NEMA4) waterproof for accidental submersion  
(**Note.** The GSM does not operate with integral antenna under water)

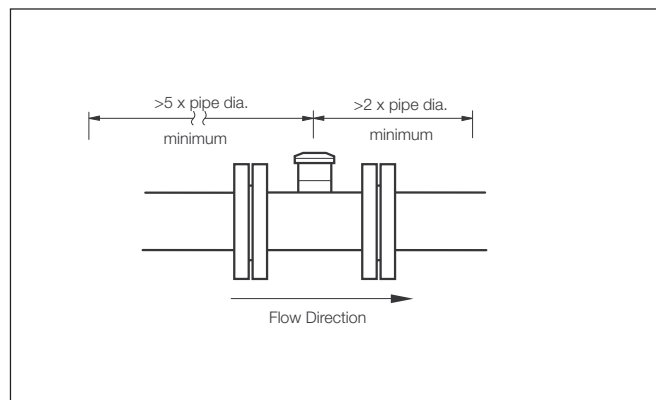
General advice is to mount the antenna as high as possible, always outside of any metal enclosure and not under the surface of the ground

## ...Specification

### Mounting



### Pipe Conditions



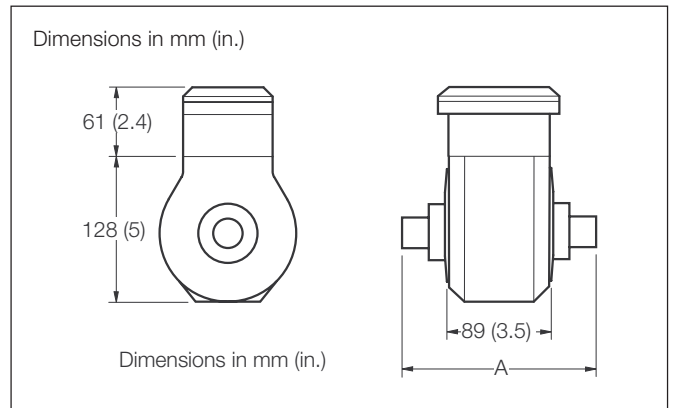
### Default Settings Table

Configuration Parameter	Default European	Default North American
Pulse Factor	1	1
Pulse Units	m <sup>3</sup>	Ugal
Totalizer Units	m <sup>3</sup>	Ugal
Full Scale Flow	ISO 4064 Qn	ISO 4064 Qn
Flow Units	m <sup>3</sup> /h	MUGD
Velocity Units	m/s	ft/s
Date Format from Country Code	DDMMYY	MMDDYY
Flow Response Time (s)	3	3
Pressure Display Type	Gauge	Gauge
Display Flow Rate	Yes	Yes
Display Forward Total	Yes	Yes
Display Reverse Total	Yes	Yes
Display Net Total	No	No
Display Pressure	Yes (if ordered with Pressure Tx)	Yes (if ordered with Pressure Tx)
Display Date	No	No
Display Velocity	No	No
Pressure Upper Range (bar)	16	16
Logger 1 Interval (s)	900	900
Logger 2 Interval (s)	60	20
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

### Sensor Specification (nominal dimensions)

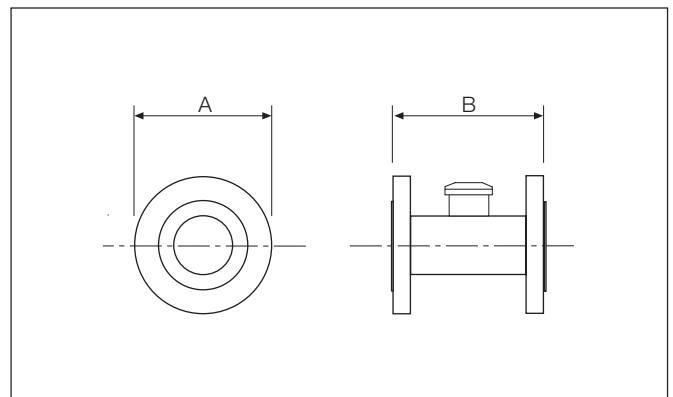
#### 15 to 25mm (1/2 to 1 in.) – Screw Ends

Meter Size		Dimensions mm (in.)	Connection	Approx. Weight	
mm	in.	A		kg	lb
15	1/2	119 (4.7)	G 3/4 in. B or 3/4 in. NPSM	2.5	5
20	3/4	127 (5)	G 1 in. B or 1 in. NPSM	2.5	5
25	1	127 (5)	G 1 1/4 in. B or 1 1/4 in. NPSM	2.5	5



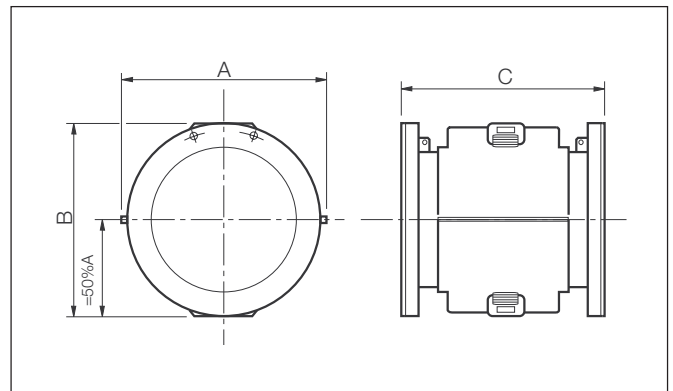
#### 40 to 300mm (1 1/2 to 12 in.) – Flanged

Meter Size		Dimensions mm (in.)		Approx. Weight	
mm	in.	A	B	kg	lb
40	1 1/2	176 (7)	200 (7.9)	11	24
50	2	176 (7)	200 (7.9)	12	27
65	2 1/2	219 (8.6)	200 (7.9)	13	29
80	3	219 (8.6)	200 (7.9)	18	40
100	4	230.5 (9.8)	250 (9.8)	15	33
150	6	281 (11.8)	300 (11.8)	31	68
200	8	402 (15.8)	350 (13.8)	48	106
250	10	440 (17.3)	450 (17.7)	75	165
300	12	480 (18.9)	500 (19.7)	112	247



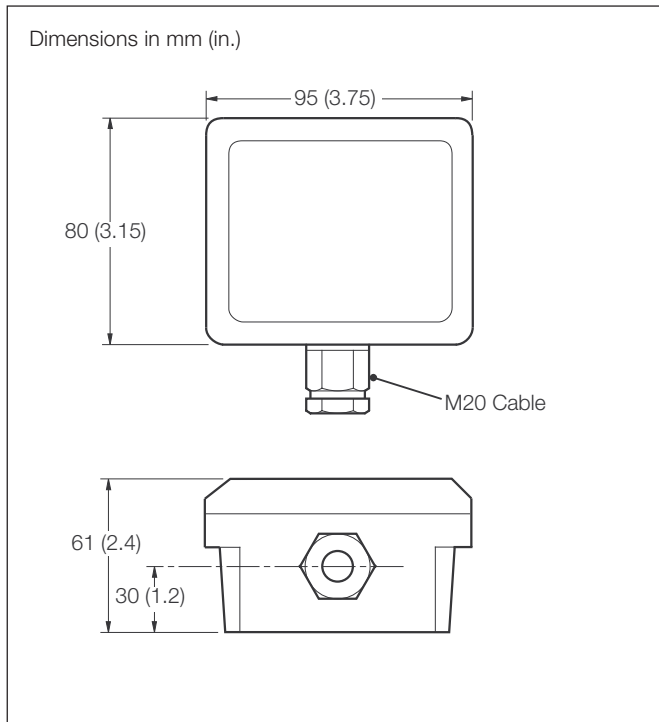
#### 350 to 600mm (14 to 24 in.) – Flanged

Meter Size		Dimensions mm (in.)			Approx. Weight	
mm	in.	A	B	C	kg	lb
350	14	513 (20.2)	520 (20.5)	550 (21.7)	100	220
400	16	570 (22.4)	576 (22.7)	600 (23.6)	115	253
450	18	632 (24.9)	627 (24.7)	698 (27.5)	160	352
500	20	686 (27.0)	679 (26.7)	768 (30.2)	217	455
600	24	772 (30.4)	770 (30.3)	918 (36.1)	315	693

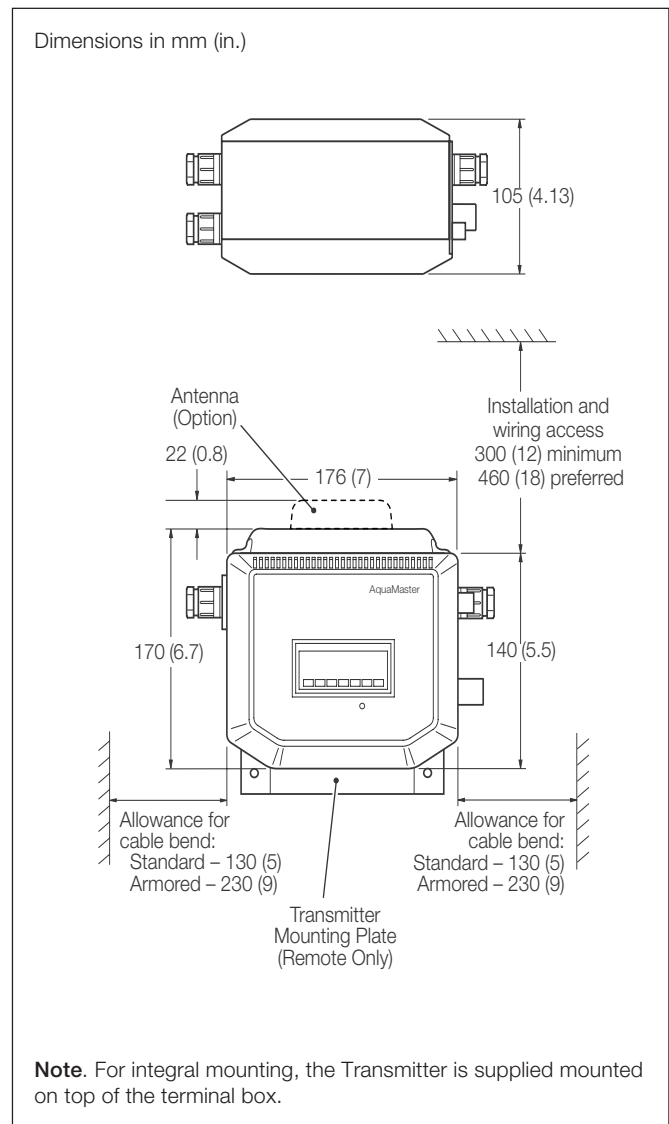


## Overall Dimensions

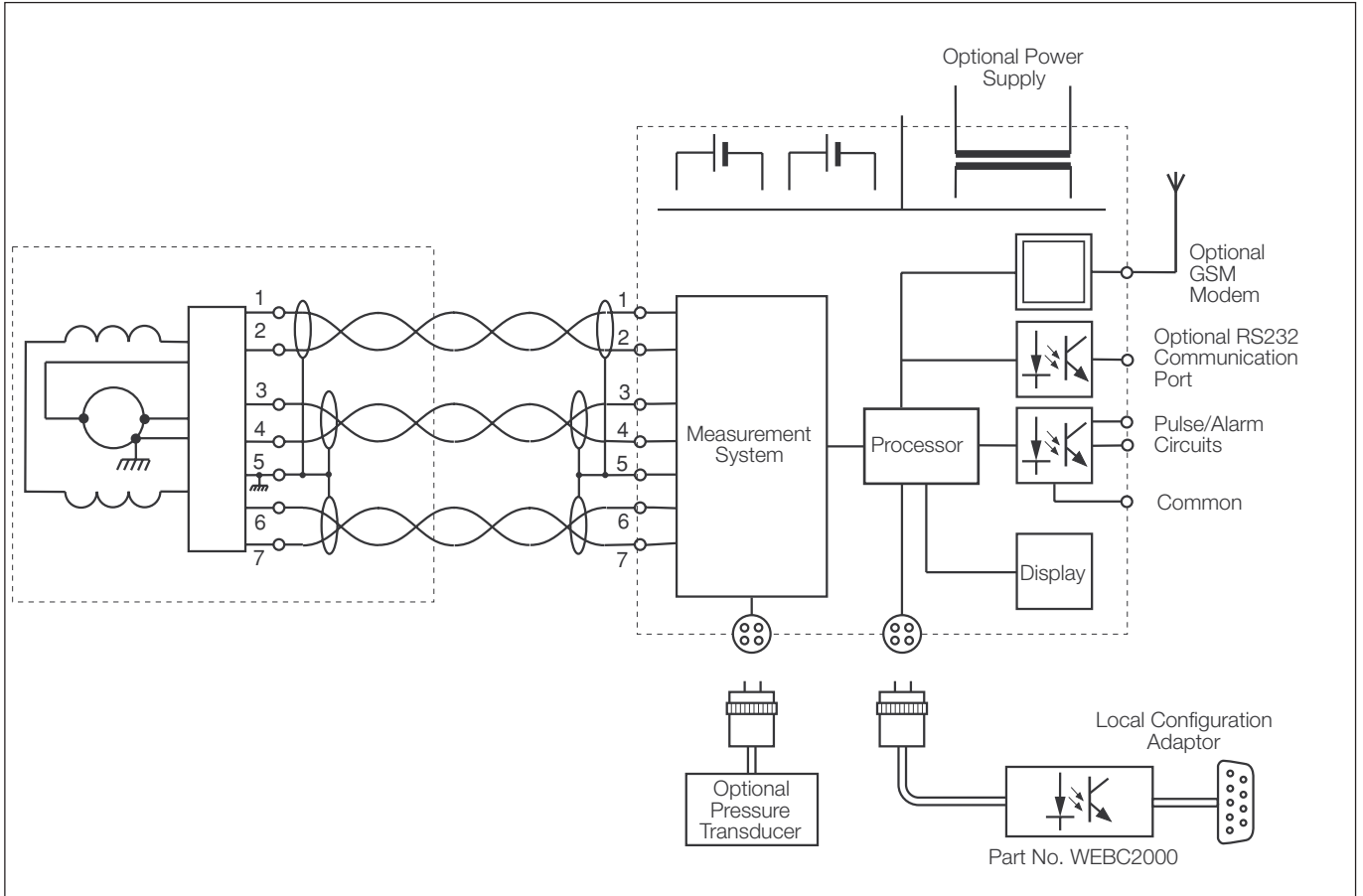
### Terminal Box – Sensor Mounted



### Transmitter



### Electrical Connections



**Ordering Information**

**Main Code**

**Additional Code**

AquaMaster Electronic Water Meter				MM/G A	X	XXXX	X	X	X	X
<b>Country</b>	<b>Default Flange Type 40 to 300mm</b>	<b>Default Flange Type 3 to 25mm</b>	<b>Default Cable Entry</b>							
Australia	AS4087 Class 16	Threaded ISO 228	20/16mm	A						
Germany	ISO7005 PN16	Threaded ISO 228	20/16mm	D						
Spain	ISO7005 PN16	Threaded ISO 228	20/16mm	E						
France	ISO7005 PN16	Threaded ISO 228	20/16mm	F						
UK	ISO7005 PN16	Threaded ISO 228	20/16mm	G						
Holland	ISO7005 PN16	Threaded ISO 228	20/16mm	H						
Italy	ISO7005 PN16	Threaded ISO 228	20/16mm	I						
USA	ANSI B 16.5 Class 150	Threaded NPSM	1/2 in. NPT	U						
<b>Calibrated Bore</b>										
<b>mm</b>	<b>in.</b>									
15	5/8					0015				
20	3/4					0020				
25	1					0025				
40	1 1/2					0040				
50	2					0050				
65	2 1/2					0065				
80	3					0080				
100	4					0100				
150	6					0150				
200	8					0200				
250	10					0250				
300	12					0300				
350	14					0350				
400	16					0400				
450	18					0450				
500	20					0500				
600	24					0600				
<b>Transmitter Version and Mounting</b>										
Integral with sensor, horizontal display, metal transmitter (DN40 to 600)										1
Integral with sensor, vertical display, metal transmitter (DN40 to 600)										2
Remote from sensor, metal transmitter										3
Integral close coupled sensor & metal transmitter – horizontal display										A
Integral close coupled sensor & metal transmitter – vertical display										B
Integral close coupled sensor only (to suit Explorer Tx – order transmitter separately under code AM/E)										D
<b>Power Supply</b>										
AC										L
AC (with Battery Backup)										A
Battery										B
<b>Options</b>										
With Earthing Rings (≥DN100)										2
With Earthing Rings (≥DN100) & Potting for Transmitter termination wiring										C
<b>Cable Length</b>										
Not Required										0
10m										1
20m										2
30m										3
40m										4
50m										5
60m										6
70m										7
80m										8
100m										A
125m										B
150m										C
175m										D
200m										E

X	X	X	0	X	0	0	X	0	0	0
---	---	---	---	---	---	---	---	---	---	---

	Main Code							Additional Code													
	MM/G	A	X	XXX	X	X	X	X	X	X	0	X	0	0	X	X	X	X			
<b>Labelling/Construction</b>																					
ABB UK								0													
ABB USA								1													
<b>Flange Style/End Connections</b>																					
As defined by Country digit (see page 18)									0												
AS4087 Class 14 Flanges (50 to 600mm [2 to 24 in.] only)									A												
AS4087 Class 16 Flanges (50 to 600mm [2 to 24 in.] only)									Z												
AS2129 Table C Flanges (40 to 600mm [1.5 to 24 in.] only)									C												
AS2129 Table D Flanges (40 to 600mm [1.5 to 24 in.] only)									D												
AS2129 Table E Flanges (40 to 80mm [1.5 to 3 in.] only)									H												
ISO7005 PN10 Flanged (40 to 600mm [1.5 to 24 in.] only)									M												
ISO7005 PN16 Flanged (40 to 600mm [1.5 to 24 in.] only)									E												
ANSI B16.5 Class 150 Flanged (1.5 to 12 in. only)									U												
BS10 Table D Flanged (40 to 600mm [1.5 to 24 in.] only)									F												
BS10 Table E Flanged (40 to 600mm [1.5 to 24 in.] only)									G												
JIS B2210, 5k Flanged (40 to 600mm [1.5 to 24 in.] only)									L												
JIS B2210, 10k Flanged (40 to 600mm [1.5 to 24 in.] only)									J												
Parallel thread to ISO228-1 Class B (15 to 25mm [5/8 to 1 in.] only)									T												
Threaded to NPSM (5/8 to 1 in. only)									Y												
<b>Cable Entries</b>																					
As defined by Country digit (see page 18). Cable not fitted/potted to sensor										0											
20/16mm plastic glands. Cable not fitted/potted to sensor										1											
20/16mm plastic glands. Cable fitted/potted to sensor										B											
1/2 in. NPT (USA only). Cable not fitted/potted to sensor										3											
20mm armored. Cable not fitted/potted to sensor										2											
20mm armored. Cable fitted/potted to sensor										C											
MIL connector (sensor) + 16mm plastic glands. Cable fitted/potted to remote sensor										5											
MIL connector (sensor) + 19 way MIL connector + 16mm plastic gland. Cable fitted/potted to remote sensor										6											
20mm armored (sensor) + 16mm plastic glands. Cable not fitted to sensor										7											
20mm armored (sensor) + 16mm plastic glands. Cable fitted/potted to sensor										D											
Not Used											0										
<b>Calibration</b>																					
1 Point (with Pressure Test)												1									
3 Point (with Pressure Test)												3									
NAMAS with Pressure Test (≥250mm [10 in.] only)												4									
Bulk Revenue Version, 1 Point (with Pressure Test)												7									
Bulk Revenue Version, 3 Point (with Pressure Test)												8									
Not Used													0	0							
<b>Communications Option</b>																					
Not Required																			0		
Remote Port RS232 C																			1		
ScanReader – no cable fitted																			2		
ScanReader – 5m cable fitted																			3		
GSM Modem, with internal antenna																			6		
GSM Modem, 1m remote antenna (not fitted)																			7		
<b>Logger</b>																					
Not required																				0	
ABB Logger enabled for ABB Software																				1	
ABB Logger enabled for CBV Software																				2	
ABB Logger enabled for Technolog Software																				3	
ABB Logger enabled for Primayer Software																				4	
ABB Logger enabled for Hydreka Software																				5	
SMS Logger enabled for ABB																				7	
SMS Logger enabled for Primayer																				8	
<b>Pressure Transducer/Cable Length</b>																					
Not required																				0	
Remote 1m cable																				1	
Remote 5m cable																				2	
Remote 10m cable																				3	
Remote 20m cable																				4	
Remote, no transducer																				Y	
<b>Pressure Transducer Span/Type</b>																					
Not required																					0
10bar Absolute Transducer																					1
16bar Absolute Transducer																					2
300 lb/in <sup>2</sup> Absolute Transducer																					3

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