

# Making every drop count in water charging applications

## Maximizing revenue using ABB's AquaMaster flowmeters



Improving revenue recovery by reducing unaccounted for water and matching charging against actual consumption

### Measurement made easy

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Maximizing revenue  
using ABB's AquaMaster  
flowmeters

### Introduction

Extracting maximum revenue from water supplied to customers is critical to the profitability of any water supplier. Water that is either lost or 'stolen' from water networks can result in extensive financial losses for water companies, representing a vast fund of unrealized capital that could be used for investment in improving infrastructure.

A World Bank study has estimated that over 32 billion cubic meters of treated water is lost every year through leakage. The study also reveals that operators are missing out on over US\$14 billion of revenue for water that is being delivered to customers but is not being invoiced for due to theft, corruption or inadequate metering. With even a 50 percent reduction in leakage thought to be sufficient to save enough water and money to supply an additional 100 million people, the need for efficient metering, both for leakage and revenue purposes, is clear.

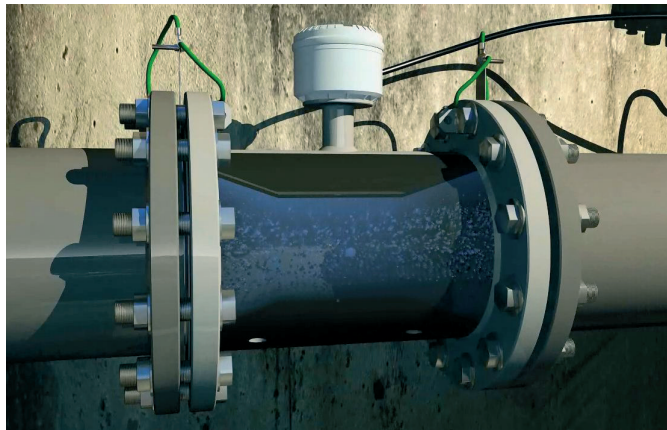
### The application

For water network operators, being able to more closely charge for the water they supply gives an incentive to install the framework needed to measure water consumption. The resulting increase in revenue also provides the funding needed for further improvement of the infrastructure, which in turn increases the amount of water available for supply and generates additional revenues.

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## ...The application

However, particularly in countries where water pricing has either been very low or non-existent, introducing a realistic system of charging for water can be difficult. Factors such as lack of customer co-operation and an unwillingness to accept higher prices can severely impact the progress of revenue management programmes.



Using the principle of electromagnetic induction, electromagnetic flowmeters offer a number of advantages over other flowmeter types for revenue applications. These include greatly enhanced accuracy, reliability and reduced maintenance, with no mechanical parts that can fail.

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## The challenge

As mentioned earlier, some of the biggest obstacles to revenue collection are theft, corruption and inefficient or inaccurate measurement of supplies. Added to these are other factors such as the type of application, the location where the measurement will be made and the price and complexity of the technology involved.

The suitability of the measurement technology selected also must be considered. Various types of measurement techniques can be used for open channel systems, including constriction methods such as weirs or flumes. In closed pipe systems, where a flowmeter can most easily be deployed, there are also various options available, with each measurement technique offering its own set of advantages and drawbacks. These options include orifice, mechanical, ultrasonic and electromagnetic technologies.

Orifice plates fitted on open pump discharges present a relatively inexpensive solution by measuring the amount of water flowing through a specifically sized opening. An orifice plate will deliver a relatively accurate measurement, provided that the orifice opening is accurately machined to the right size, as even a slight variation can have a significant impact on performance.

Mechanical propeller flowmeters are also a popular choice for water measurement applications. However, like any meter with moving parts subject to wear and tear, these and other mechanical-type meters can quickly suffer reduced accuracy, leading to either under or over-registration of flows. Propeller meters also tend to work best with specific pipe sizes and flow ranges. Furthermore, the need for mechanical meters to be periodically tested, recalibrated and repaired means that they have to be removed, requiring users either to replace the meter with a temporary device or cease measurement altogether until the meter is refitted back into the line.

Ultrasonic flowmeters, including portable clamp-on types, are another option. They use ultrasonic beams to assess the velocity of the fluid, which can then be used to derive a flow measurement. Aside from their higher cost, ultrasonic flowmeters suffer various drawbacks. Transit time meters in particular can struggle to handle flows with high levels of particulate matter, requiring a strainer to be fitted. Both transit time and Doppler meters can also be affected by velocity profile distortions, requiring from 10 to 40 upstream diameters, depending on the severity of the disturbance. The turndown of ultrasonic meters is also limited within an ideal range of 20:1 to 40:1. Ultrasonic meters can also be difficult to install and set up, especially where high accuracy is required.

The accuracy of flowmeters can be affected not just by design but also by their susceptibility to tampering. Particularly where metering is conducted at the point of use, users have been known to make adjustments to achieve more favorable readings which enable them to either pay less or use more water.

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## A solution

Electromagnetic flowmeters offer an ideal solution for revenue management applications. Compared to other flowmeter types, electromagnetic flowmeters offer greatly enhanced accuracy and repeatability throughout their operational life, with uncertainty of  $\pm 1\%$  reading or better. With no moving parts, they do not suffer from problems with wear and tear, minimizing maintenance and require no upstream strainers to filter sediment.

The ability of electromagnetic flowmeters to better handle distorted velocity profiles also means that the amount of piping upstream and downstream of the meter is minimized, which can greatly reduce the time and cost of installation.

ABB's AquaMaster 3 electromagnetic flowmeter provides an ideal solution for revenue metering applications. With an accuracy of  $\pm 0.5$  percent, the AquaMaster 3 delivers precise measurement of both high and low flows. Available in sizes from 10 to 600 mm ( $\frac{3}{8}$  to 24 in), the AquaMaster 3 offers improved measurement accuracy for revenue measurement applications, enabling payback on the cost of a meter to be achieved within just one month.

Exchanging a mechanical DN150 (6 in) mechanical meter with an accuracy of  $\pm 2$  percent with an AquaMaster 3, for example, would yield an additional revenue for the operator of over US\$4,700. Further increases in revenue can also be derived from the AquaMaster's extended flow range, which enables a greater range of maximum and minimum flows to be measured. Taking the above example, the AquaMaster's ability to measure previously unrecordable minimal night flow rates means that the operator could almost double their annual revenue to over US\$9,000.



**With renewable, battery and mains power options, plus GSM communications technology, ABB's AquaMaster 3 electromagnetic flowmeter offers the ideal solution for accurate measurement in revenue metering applications.**

Specifically designed to meet the water industry's stringent demands for enhanced metering capability, the AquaMaster enables ever more efficient and cost-effective operation and compliance with increasing legislative requirements.

Prevention against tampering is afforded by the AquaMaster's fully potted design, which enables the operator to easily identify if a meter has been interfered with.

As the latest generation product, the AquaMaster 3 offers a choice of mains and battery power options, plus an all-new renewable power version which can draw power from either solar or wind-powered energy sources.

A simple DC (6 to 21 V) connection can be hooked up to sources as small as a 5 W solar panel or 60 W equivalent wind supply. When coupled with its use of super capacitor (SuperCap) energy storage technology, this feature totally eliminates the need for either mains or battery power, ideal for highly remote locations.

Where the battery is utilized, the SuperCap enables the battery to be replaced without loss of logger contents.

Installing the AquaMaster 3 is made simple by its use of ABB's 'fit and flow' intelligent installation technology.

With this technology, all aspects of an installation are stored within the sensor, including the site settings, calibration factors and any serial numbers usually required during installation, maintenance or replacement. When connected to a transmitter, all of this information is automatically uploaded from the sensor, greatly simplifying the installation and commissioning process.

ABB's AquaMaster 3 electromagnetic flowmeters include GSM-SMS radio technology, enabling up-to-date information to be remotely collected from anywhere around the world. Providing immediate access to a host of flow data, GSM-enabled AquaMasters eliminate the time, cost and potential errors traditionally associated with the manual collection of flowmeter information.

Using the same technology as a mobile telephone, the AquaMaster can be contacted using a PC or laptop or through a mobile telephone via SMS messaging.

As a further assurance of a robust metering regime and lifelong accuracy, ABB also offers users its CalMaster2 in situ verification service for the AquaMaster 3. Performed by an ABB service engineer, this service verifies a meter's current operational status and also predicts any potential future faults. Users are issued with traditional calibration verification certificate complete with an uncertainty statement.

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