



# AquaMaster™ flowmeter

Maintaining groundwater levels and detecting water leakage are but two important applications of the latest model of ABB's flowmeter the AquaMaster™ equipped with remote signal transmission.

## AquaMaster™ helps mining giant protect wetlands

Maintaining groundwater levels in the marshes surrounding the open-cast lignite mines in Germany is a responsibility the power company RWE takes seriously.

The mining company RWE Power uses ABB's electromagnetic water meters to help preserve groundwater-based marshes and wetlands around its German coal mines. The meters monitor the amount of water being pumped back into the nature reserves from RWE's open-cast lignite mines, where constant pumping is needed to control groundwater levels in three large mines. Recently RWE ordered 25 AquaMaster™ instruments for this purpose.

In the past, RWE used mechanical flowmeters to measure the amount of

water pumped back into the marshes. The need for more accurate measurements and automatic data monitoring made electronic flowmeters an attractive proposition. However, with many of the meters located beyond the reach of mains electricity, it was difficult for RWE to find a suitable electronic alternative for the sites.

AquaMaster™ meters from ABB provided the solution. Fitted with their own battery power supply, the flowmeters can be installed in locations where no mains supply is available.

## Ingenuity in analytics

Whenever RWE maintenance engineers find that a mechanical meter has failed, they now replace it with an AquaMaster™ meter. With a measurement accuracy of  $\pm 0.5\%$  over a turn-down range of 1000:1, the meters can deliver precise measurements, even at extremely low flow rates, compared with their mechanical counterparts, which can offer an accuracy of only  $\pm 2\%$ .



In addition, ABB has now become RWE Power's preferred supplier of meters to monitor pumping stations in the mines. Here, since the availability of mains power is not an issue, RWE has opted for ABB's COPA XE, compact electromagnetic flowmeters.

Erosive particles in the untreated mine water attack and wear the mechanical meters, so the company decided to

test 11 such units in its mines over a period of nine months. The units proved so successful that RWE has already ordered a further 35 instruments, ranging in size from DN50 to DN300.

Whenever RWE maintenance engineers find that a mechanical meter has failed, they now replace it with an AquaMaster™ meter.

The AquaMaster™ and COPA XE are just two examples of ABB's wide choice of electromagnetic flowmeters for conductive fluids such as water, pastes, acids, dyes, juices and emulsions, including fluids with a conductivity as low as  $0.5 \mu\text{S}/\text{cm}$ . For more information, please visit [www.abb.com/instrumentation](http://www.abb.com/instrumentation).

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## Tracing water leaks

**In the past several years much of the world's attention has been focused on global warming, greenhouse effects and the conservation of precious natural resources. Clean water is part of this latter group and the significant losses seen in most water networks represent a major concern.**

In direct response to this challenge and customers' requirements to conserve drinking water, ABB has developed and commercialized a revolutionary new product for the water industry. The new enhanced flow meter, AquaMaster™ SMS that delivers measurement data from remote locations direct to customers via the Inter-

net, heralds a new era in water leakage management.

The AquaMaster™ is a product that is on the cutting edge of technology with features and applications that are unique within the water conservation and distribution market.

The latest models of AquaMaster™ have built in options such as an integrated pressure sensor but also data logging capability and GSM SMS radio technology. The data logging capability is significant in that it allows recording of flow and pressure at a normal rate of every 15 minutes, saving three months of data locally. But in addition, and by virtue of the digital connection between the flow measurement and the data logger, high resolution data can be logged at rates

not possible with traditional solutions. This is much more significant than it first appears.

### Measuring transient flows

With a traditional external data-logging solution, pulses are captured over the logging interval, but, due to upper frequency limitations by the flowmeter, only a limited number of pulses can be counted in the log interval. So for a meter with a large turndown ratio, it is not uncommon to get measurement or "quantization" errors of around 10 percent or more, the data being very stepped or "quantized" as a consequence. AquaMaster™, with its direct digital connection to the data logger, reduces quantization associated errors to insignificant levels. In addition, in a second channel, it offers high speed,

high resolution logging at an interval of up to 15 seconds. This is invaluable for capturing transients during network step testing. Within water networks, step testing is a well established technique for localizing water loss in a zoned distribution system. It requires the establishment of zones, where water can be supplied through a single meter after all boundaries and circulation valves have been closed.

### Water leakage management

Closure of a valve isolates a specific section of the zone. A large drop in flow indicates a leak within that section. The benefit of AquaMaster™ in such step testing is best illustrated by comparison of **1a**, on a traditional 15 minute log interval with **1b**, captured in great detail from the second channel's one minute log.

In this step test, one zone valve was closed at 02:30, with a further zone valve closed at around 02:40. From the one minute log, the zone with a significant leak was clearly identifiable from the sudden drop in flow, with a second smaller leak within the second zone. The magnitude of the leak in the two zones is substantial – at around 2 m<sup>3</sup>/hr.

Step testing with AquaMaster™ is far simpler, cheaper and faster than established practises. It no longer requires a skilled technician with an external step-test data logger. All that is necessary is a simple procedure and a person to close a valve at specific pre-agreed times. Also, any disruption to water consumers is minimised by restricting the time a valve needs to be closed to only a few minutes. Within the following week, the high resolution logger can be downloaded and analysed to identify the source of the water leak. This step testing process is significantly enhanced by the use of radio communication to obtain meter data.

Traditionally, data is logged externally from the flow measurement and recovered manually by sending someone on site to download the data, or sometimes by retrieving the entire data logger and exchanging it with a second one. More recently, customers have switched to using radio for meter reading.

### Radio equipped AquaMaster™

ABB's innovation is to equip AquaMaster™ meters with the option of GSM SMS radio technology. In 2005 this feature was upgraded to use SMS

text messaging to convey flow and pressure data. SMS text messages are automatically sent, typically once per day to conserve power in the case of a battery powered device. In the event of a fault, an SMS message is sent as an alarm, eg if the meter is being tampered with.

The AquaMaster™ also responds to SMS text messages sent to it, such as configuration changes or requests for specific data. Up to three months of data can be stored internally.

**AquaMaster™ offers high resolution logging at an interval of up to 15 seconds. This is invaluable for capturing transients.**

Measuring and logging the flow and, optionally, pressure are only part of the equation. Getting the collected data onto the customer's computer, management information or leakage-management system is the other part. Discussions with key global customers showed that they could be partitioned into two groups with different requirements:

- 1) Customers with an existing infrastructure and established water management system.
- 2) Greenfield customers who have measurement requirements but no back office system to handle the measured data.

To address both customer needs, ABB devised a solution based on delivering remote meter data via SMS text messages to virtually any database, using industry-standard programming mechanisms.

AquaMaster™ SMS is unique in that the volume totals from the instrument index register are also sent by SMS text message.

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**1** Leak detection: Step testing – 15 min **a** and 1 min **b** data logging

