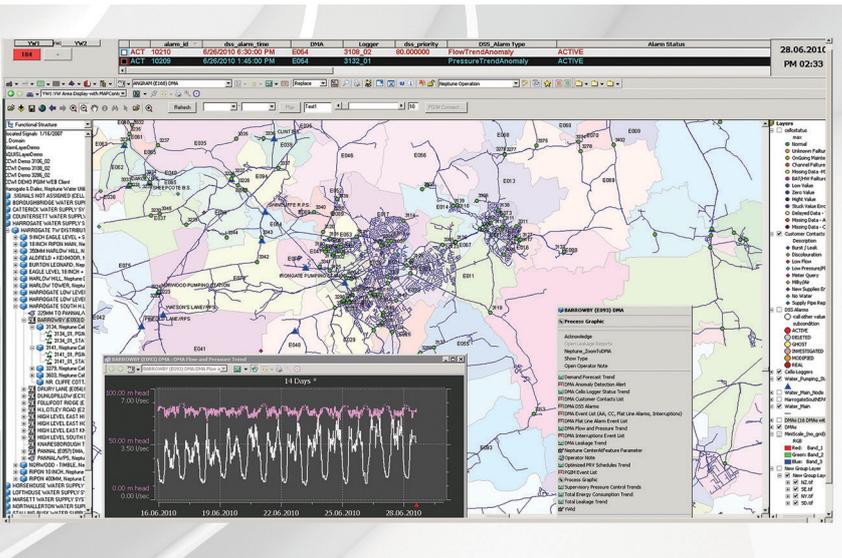


Accurate measurement in water distribution systems

Improving network efficiency using ABB's WaterMaster electromagnetic flowmeter



Accurate flowmetering for enhanced water network performance

Measurement made easy

Improving network efficiency using ABB's WaterMaster electromagnetic flowmeter

Introduction

Being able to accurately measure both the quantity and rate of water passing through a water distribution system is crucial to gaining an informed understanding of overall efficiency. As such, achieving a measurement that is exact as possible can have a significant impact on key areas including supply planning, maintenance and resource deployment, leakage detection and rectification and the overall environment, in terms of controlling abstraction and reducing unnecessary draw on natural resources.

The application

The need to achieve a complete overview of water supply and demand means that water meters should be deployed as widely as possible throughout a distribution system. In the main distribution system up to the point of use, key areas where measurements need to be made include:

- between the abstraction point and the potable water treatment works
- within the water treatment works
- throughout the transmission and distribution piping network, including to and from storage and reservoir facilities
- the local distribution supply mains

The need to use data for the purposes outlined above means that any flow meters used should be capable of providing accurate, reliable measurement under the widest range of operating conditions.

Various flowmeter types are used in water distribution networks. These include mechanical meters such as turbine and positive displacement (PD) meters, ultrasonic meters and magnetic meters.

The challenge

Given both the extent and age of water distribution networks, it is inevitable that losses will occur during transit. These have to be accurately accounted for to achieve the best possible balance between demand and supply. The age, condition and type of flowmeters used to measure flow in water distribution networks can vary greatly, which can affect the accuracy of the measurement. Deposits accumulating in the pipeline and the meters themselves, for example, can lead to reduced accuracy and an increased risk of under-reading.

Where mechanical meters are used, there is also the added likelihood of deteriorating accuracy caused by wear and tear. This will affect not only the water balance but also the estimation of leakage within the distribution system.

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 abstraction until the meter is refitted back into the line.

Ultrasonic flowmeters, which use ultrasonic sound waves to help ascertain the velocity and volume of water passing through the pipe, also 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.

Whichever meter type is used, regular verification of accuracy will be needed to help minimise the impact of any errors.



Accurate measurement of flow is critical to the smooth running of water distribution networks.

The solution

Electromagnetic flowmeters offer the ideal alternative for water distribution 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. A choice of flow primary linings affords further protection against coating and high sediment flows, with users able to choose from a variety of materials, including ceramic linings for particularly abrasive flows.

The ability of electromagnetic flowmeters to better handle distorted velocity profiles also reduces the amount of piping upstream and downstream of the meter.

Modern electromagnetic flowmeters are also capable of being buried, eliminating the need for the construction of costly installation chambers.

What can ABB offer?

ABB's WaterMaster electromagnetic flowmeter offers the ideal solution for water distribution applications. Available in sizes from 10 to 2400 mm ($\frac{3}{8}$ to 96 in), the WaterMaster flowmeter range brings a host of advanced features and functionality for water measurement. A key feature is the WaterMaster's revolutionary octagonal sensor design. By improving the flow profile, the octagonal design minimizes the upstream and downstream pipe lengths required from the point of installation, greatly reducing the cost of fitting the meters into new or existing pipelines.

The WaterMaster also features onboard verification capability. Called VeriMaster, it assures operators of the performance of the meter through constant self-checking. When coupled with ABB's VeriMaster software tool, it enables operators to produce a printed verification certificate for regulatory compliance.

The effects of signal noise are reduced by the WaterMaster's use of advanced Digital Signal Processing (DSP) technology. This enables the WaterMaster's transmitter to separate the real signal from the noise, thereby providing high quality outputs especially in harsh environments involving vibration, hydraulic noise and temperature fluctuation.

All WaterMaster sensors have a rugged, robust construction to ensure a long, maintenance-free life even under the most difficult conditions experienced in water and waste water applications. The sensors are inherently submersible (IP68, NEMA 6P) as standard, ensuring suitability for installation in chambers and metering pits which are liable to flooding.

All sizes of the WaterMaster are buriable and are straightforward to install, with installation merely involving excavating to the underground pipe, installing the sensor and wiring the factory pre-potted cabling to the transmitter and then backfilling the hole.

WaterMaster is proven to be robust and reliable, with unmatched diagnostic capabilities providing the right information to keep the process up and running. Alarms and warnings are classified in accordance with NAMUR NE107.

The meter is also verified to OIML R49 type 'P' requirements to ensure the highest accuracy and long term performance of the system by continuously self-checking the sensor and transmitter in the field.

All ABB flow meters are designed and manufactured in accordance with international quality procedures (ISO 9001) and are calibrated on nationally-traceable calibration rigs to provide the end-user with complete assurance of both quality and performance.



ABB's WaterMaster electromagnetic flowmeter offers accurate and reliable measurement for water supply network management applications.

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