

Flow metering in potable and waste water applications

Improving pumping performance using ABB's WaterMaster electromagnetic flowmeter



Improving pumping performance and reducing energy costs using flowmeters

Measurement made easy

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Introduction

The use of flowmeters in clean and waste water pumping applications can have a significant impact on pump performance. By helping to match pump speed to the flow rate, flowmeters can help operators to save energy through more effective control of the speed of the pump motor.

Using a flowmeter can also provide a useful indication of overall system efficiency, by helping operators to identify whether the flow of water is properly matched to the speed of the pump. For example, if flows are restricted even with the pumps running at full speed, then this may be indicative of a blockage somewhere upstream of the flowmeter.

The application

Whether for waste or clean water applications, flowmeters can help to fulfil several key roles, including:

- calculation of distribution system losses
- monitoring and optimization of pump efficiency
- calculation of bills for water supplied
- in the case of wastewater pumping, to monitor flows of effluent to the environment to satisfy any relevant discharge legislation

Various types of flowmeters can be used in pumping station applications, with the most commonly employed being mechanical, ultrasonic and electromagnetic flowmeters.

The challenge

For the best levels of long term accuracy and performance in pumping station applications, it is important to choose the right type of flowmeter. Selecting the appropriate flowmeter for the application depends on a number of factors, including the desired accuracy and repeatability and also the characteristics of the installation.

Mechanical meters have several drawbacks which can affect their performance in pumping applications, particularly when handling effluent flows that may contain high levels of particulate matter. Wear and tear can affect the moving parts of mechanical meters, affecting their long-term measurement accuracy, which can in turn affect pumping efficiency, which will be based on an incorrect flow measurement.

With no moving parts, ultrasonic flowmeters may present a more preferable alternative. However, they are generally most effective in locations where there is at least 10 pipe diameters of uninterrupted pipe length to minimize the impact of velocity profile distortions that can affect accuracy.

The solution

These problems can be eliminated by using electromagnetic flowmeters. 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 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 means that the amount of piping upstream and downstream of the meter is reduced.

What can ABB offer?

Available in sizes from 10 to 2400 mm ($\frac{3}{8}$ to 96 in), ABB's 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 also minimized 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, involving excavating to the underground pipe, installing the sensor and wiring the factory pre-potted cabling to the transmitter and then backfilling the hole.



Electromagnetic flowmeters such as ABB's WaterMaster offer long term accuracy and high performance in pumping station applications.



ABB's WaterMaster electromagnetic flowmeters are well suited for use in potable and waste water pumping applications.

Operation has been simplified by the use of ABB's universal Human Machine Interface (HMI), which has now been extended across its range of instrumentation products. Based on Windows™ technology, the HMI simplifies operation, maintenance and training, reducing cost of ownership and providing a consistent user experience.

Installation is further simplified by the WaterMaster's 'Fit and Flow' data storage feature. On initial installation, the self-configuration sequence automatically replicates into the transmitter all calibration factors, meter size and serial numbers as well as customer site-specific settings. This eliminates the opportunity for errors and leads to increased speed of start-up.

Measurement integrity is ensured by redundant storage of data in both the sensor and transmitter memory, which is continually updated during all operations. The on-board sensor memory overcomes potential problems associated with pluggable data memory modules.

The 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.

Acknowledgments

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