

ABB ortho-phosphate analyzers help Severn Trent Water to meet tightening consent limits



ABB Aztec 600 ortho-phosphate analyzers help Severn Trent Water to meet regulatory requirements.

Measurement made easy

ABB's Aztec ortho-phosphate analyzers installed at Severn Trent Water, UK

Overview

The need for accurate measurement of ortho-phosphate levels in wastewater effluent has seen the recent installation of 120 Aztec 600 ortho-phosphate analyzers in wastewater treatment plants throughout Severn Trent Water's operating area. Enabling continuous monitoring, the analyzers are helping to ensure that the company keeps within consent limits set by the UK Environment Agency.

When present in watercourses, phosphate is a major contributor to eutrophication, where an environment becomes enriched with nutrients. In such environments, algae can flourish, consuming dissolved oxygen in the water, which is further depleted as other aquatic plants compete for the remaining oxygen. Known as aquatic hypoxia, this process can quickly result in the death of aquatic life.

A major by-product of wastewater treatment and agricultural processes in particular, phosphate must be closely monitored and controlled. Currently, phosphate consents for sewage effluents are typically set at 1 to 2 mg/l. In AMP6 and 7, this is likely to be further reduced to less than 0.5 mg/l in some instances, which will require closer monitoring and control of phosphate levels.

The emphasis on minimizing phosphate levels means that efforts are now shifting towards further reducing the phosphate load in water being discharged to rivers. In particular, the focus on outcomes rather than outputs encouraged by AMP6 will see greater attention being paid to monitoring and tackling the sources of phosphate within a catchment before it reaches the water treatment plant.

...Overview

As part of its work to comply with effluent discharge standards, Severn Trent Water has installed ABB's Aztec 600 ortho-phosphate analyzers at all of its sewage treatment plants with total phosphate consent limits. Operating as part of a dosing control system alongside ammonia analyzers, iron analyzers and turbidity monitors, the ortho-phosphate analyzers have reduced the company's reliance on manual sampling.

"Before ABB's units were installed, we were totally reliant on manual spot sampling of effluent," says Anthony Kyriacou, Proactive Network Control Manager for Severn Trent Water. "Although this enabled us to comply with Environment Agency requirements, it only gave us an indication of levels for a specific time and set of operating conditions, which was of limited value in helping us to find ways to optimize our effluent treatment processes."

Connected to Severn Trent Water's eSCADA system, the Aztec 600 ortho-phosphate analyzers provide continuous real-time data including any alarms generated by issues such as high ortho-phosphate levels. By combining this data with data from other installed instruments measuring ammonia and turbidity, Severn Trent Water is able to obtain a detailed picture of effluent quality for any given moment.

"The ability to obtain real-time data on ortho-phosphate levels is vital in helping to ensure that we stay within our consented limits," says Paul Duckett, Programme Engineer for Severn Trent Water. "Using this data enables us to better target future investments in our wastewater treatment plants to further optimize our effluent quality."

The availability of real-time data will also enable Severn Trent Water to create a more proactive maintenance schedule matched to the actual needs of its treatment plants.

"Together, the data from our ortho-phosphate analyzers and other instruments give us much greater visibility and knowledge of what's going on at our treatment plants," explains Paul. "We are now able to spot any potential malfunctions or issues before they can escalate, enabling us to be much more effective in the way that we deploy our maintenance teams."

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Optimize your phosphate removal processes with the Aztec 600 Phosphate

On-line monitoring provides plant operators with an early warning of any changes to the treatment process, enabling operational decisions to be made in near real-time. This level of process control is not possible with manual testing alone, where potentially important events that occur between less frequent manual sampling can be missed.

ABB's Aztec 600 Phosphate colorimetric analyzer has been designed specifically for the measurement of ortho-phosphate in both potable water and municipal wastewater effluents. It offers reliable and accurate on-line analysis of phosphate up to 50 ppm PO₄.



As a nutrient, excessive quantities of phosphate in watercourses can cause major damage, leading to the rapid formation of algae.

Key benefits of the Aztec 600 Phosphate analyzer include:

- Improvements in process control – enables operational decisions to be made in near real-time
- Improvements in process reliability – detect process failures before they affect the quality of the water leaving the plant
- Process optimization for water quality – increased plant efficiency
- Potential capital and operating cost reductions – reduction in chemical and energy usage.
- Continual monitoring of remote or un-staffed sites – improved response times and reduced visits saving money and time whilst lowering carbon footprint
- Improved reporting – analyzer audit trail data can be used to assure customers and regulators of process efficiency and consistent product quality

Accurate, reliable and flexible

Part of the Aztec 600 colorimetric series of analyzers, the Aztec 600 Phosphate uses an LED and detector to measure the passage of light through a sample, with a single precisely controlled piston pump providing all the sample and reagent fluid handling for measurement, mixing and disposal.



ABB's Aztec 600 Phosphate analyzer offers accurate, reliable monitoring of phosphate levels up to 50 ppm PO₄.

The analyzer can measure up to four samples per hour. Measurements are taken before and after color reagents are added to compensate for background color and turbidity. These measurements are compared against the calibrated values to calculate the sample being measured. The use of automatic two point calibration enables analyzer performance to be verified against standards of a known concentration.

Accuracy is further enhanced by the inclusion of self-cleaning functions to ensure the optical cell and analyzer tubing remain free of residual particles between each analysis. A patented mechanical cleaning function uses the piston movement to wipe the optical cell with every measurement, particularly important when measuring final effluent or raw waters where optical contamination can be a real issue. The analyzers also include various user-programmable automatic options for cell rinsing and acid and alkali washing.

The Aztec 600 Phosphate is available in both single and multi-stream configurations, with the multi-stream option enabling a single device to be used to monitor up to three streams sequentially, all with current loop, Ethernet or Profibus outputs.

Simple to maintain

The piston and optical sensor use air to mix the sample and reagents, eliminating the cost and maintenance associated with mechanical or electrical stirring systems. This, together with the analyzer's auto-calibration feature, reduces maintenance to just once a year, compared to every three months with some units.

Easy to use

A key benefit of the Aztec 600 Phosphate is its ease of operation. Front-mounted pushbuttons allow easy device interaction in a familiar Windows™ environment. Operation and commissioning is straightforward, with menus presenting options for setting and fine-tuning parameters. Added support is provided by an extensive context-sensitive on-line help feature.

The use of ABB's highly successful common HMI together with a full color graphical display, allows process trends to be easily viewed and analyzed locally. Historical logs provide operators with access to alarm and audit trail data. Process data and historical logs are securely archived to a removable SD card.

A built-in Ethernet communications link with onboard web and FTP servers enables remote monitoring, configuration selection, data and log file access to the analyzer from a web browser.

See also:

- Watch the Aztec 600 animation <http://bit.ly/Aztec600animation>
- Read the Aztec 600 colorimetric analysis white paper <http://bit.ly/Aztec600WhitePaper>

For more information, visit <http://bit.ly/AztecPhosphate> or contact your local sales representative.

Animation



White Paper



Web page



Acknowledgements

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