

Recording control in water dosing processes

Achieving accurate, flow-paced dosing

- Accurate, stable control by matching dosing to flow
- Enables compliance with regulatory requirements for dosing limits
- Minimizes risk of excessive dosing to health and environment



Introduction

Water dosing accuracy and stability are an important part of the treatment of water, whether clean or waste. Various chemicals are added throughout these treatment processes that need to be carefully regulated in order to eliminate potentially adverse effects, either to health or to the environment.

The application

Flow-paced dosing involves adjusting the levels of chemicals added to a batch or process stream to maintain a set concentration. This is best achieved by continuously monitoring the process stream using on-line instrumentation, which automatically regulates chemical dosing to ensure levels are maintained with the minimal amount of chemical introduction, without over or under dosing.

One example of a dosing process that needs to be carefully controlled is fluoridation. There are many different international standards for fluoridation, for example in the U.S. the decision to fluoridate is made by the state or local municipality. In some parts of the world, fluoride is added to public water supplies to help improve dental health. Studies have shown that the addition of low concentrations of fluoride of 1mg/l can assist in reducing the incidence of tooth decay. However, the addition of fluoride to water is a controversial subject, with

doses much above 1.5mg/l being linked to medical disorders such as dental and skeletal fluorosis and osteoporosis.

In the UK, the addition of fluoride to drinking water is governed by the Code of Practice on the Technical Aspects of Fluoridation of Water Supplies 2005. Responsibility for ensuring compliance with the Code rests with the Drinking Water Inspectorate, which has the power to take action against any water company that is found to exceed the permitted maximum fluoridation dose of 1.5mg/l. This upper limit is set down by the Water Supply (Water Quality) Regulations 2000.

It is therefore essential that water companies are able to accurately monitor and regulate fluoride doses within the prescribed limits.

The challenge

Stability of the dosing control, to achieve a final product that is both safe and consistent, can be tricky. This is especially the case when flow rates vary rapidly and there is a significant delay between the moment of dosing and seeing the results. These conditions can often leave the control system struggling to achieve an acceptable end product quality.

ABB ControlMaster PID controllers

The solution

ABB's ControlMaster range of PID controllers are widely deployed in dosing applications. Using the in-built, easily configured, feed forward strategy, accurate and stable control can be achieved by changing the dosage control according to the measured flow. This enables the dosing of variable flows to be effectively controlled.

The use of a feed forward application template simplifies and speeds up the configuration.

The full colour TFT LCD display ensures that process parameters are clearly displayed, whilst the alarms, math and logic functions allow a full range of control strategies to be implemented.



ABB's ControlMaster range

Additionally, by using ABB's ScreenMaster range of paperless recorders, operators can obtain a secure record of the process that can be easily stored and retrieved for future reference to prove that quality and legal requirements have been met. ABB recorders can collect the process variable and set point values from the ControlMaster controller using Modbus communications, without the need of an analogue input.

When used together, ABB's ControlMaster and ScreenMaster devices can deliver the following key benefits:

- Accurate process control
- Secure data recording
- Process alarming
- Remote web monitoring
- Full integration with telemetry
- Quality reporting

What does ABB offer?

ABB offers a full range of products and expertise that can help operators achieve accurate dosing of water and waste water supplies.

ControlMaster

ABB's ControlMaster range offers a comprehensive set of control and indicator functions in just four easy to specify versions.

Featuring full colour TFT displays, all devices in the ControlMaster range provide operators with a clear overview of process status and key information. These displays can be tailored to show specific process data, while a chart display provides short term trending information. This is ideal for commissioning and unmanned stations.

Configuration is also straightforward. Menus are displayed in clear text, with no complex codes or abbreviations, whilst built-in application templates permit engineers to select the best template for their requirements, with the ControlMaster automatically configuring its I/O, display and control strategy to suit. Configuration can also be performed via DTM-based PC configuration software, allowing save and restore configuration data.

The ControlMaster range offers a choice of communications options. Ethernet communications provide the ability for users to be automatically notified of critical process events via email or remotely monitor the controller and process via the ControlMaster's integrated webserver by simply using a standard web browser. For integration with larger control systems, the Modbus (RTU and TCP) and Profibus options enable access to real time data on process values and device status.

Other features include additional control options alongside the standard cascade, ratio and feedforward control functions to help bring even the trickiest processes under control. Predictive control algorithms including dead time compensation, makes the ControlMaster ideal for applications with long dead-times such as pH dosing applications. Added control efficiency is enabled by the inclusion of adaptive control, which allows the ControlMaster to automatically adjust its control response to suit variations in process response. Dual loop control makes it possible to use one ControlMaster to control two processes, reducing the total cost of the system. The inclusion of additional auto tuner, math, logic, gain scheduling, totalizer, custom lineariser and delay timer functions provides powerful problem-solving functionality.

SM500F Field mountable paperless recorder

The world's first field mountable paperless recorder, the SM500F takes recording out of the control room, giving users localized access to operational data. Highly versatile and simple to use, the SM500F is a 12 channel recorder

ABB ScreenMaster paperless recorders

with seven analogue inputs that can be used anywhere, anyhow and by anyone. A choice of panel, wall and pipe mounting options means that the SM500F can be installed in virtually any location. Featuring a fully sealed IP66 and NEMA 4X enclosure, it's ideal for use in even the most hostile environments, including hosedown and dusty applications.

An ideal replacement for paper recorders, the SM500F provides secure, powerful recording, while delivering reduced costs of ownership compared to those of paper chart recorders.



SM500F Videographic Recorder

SM1000 paperless recorder

The SM1000 couples the ScreenMaster range's state-of-the-art technology with simplicity of operation. Capable of recording up to 12 channels and offering additional I/O such as relays and transmitter power supplies, the SM1000 can be specified to meet the requirements of demanding recording applications.



SM1000 Videographic Recorder

SM2000 Advanced paperless recorder

The SM2000 Advanced paperless recorder provides advanced functionality, recording and high specification hardware features, making it suitable for almost any recording application. The Windows™ style touch sensitive operator interface effortlessly guides the operator through the configuration process and enables the rapid entry of text information via an on-screen keyboard.

SM3000 Multi-point paperless recorder

The SM3000 enables up to 36 channels to be recorded. A total of six process groups are provided, allowing channels to be grouped together and individual displays created for different processes.

Process data can be easily viewed on the SM3000's large 31cm (12.1in) display in a wide variety of formats, including a circular chart and a combined overview format showing all six process groups.

DataManager Pro

ABB's new DataManager Pro analysis software offers a powerful tool for reviewing recorded data. Using the software, operators can review data from multiple recorders. Functions include the ability to compile graphical charts comparing multiple parameters, plus a dual cursor function enabling operators to review data for specific periods of time and specific recorders.

Analysis functions between the cursors shows the minimum, maximum and average values for the extra parameters. As well as determining for the maximum and minimum time and date.

ABB's ScreenMaster series paperless recorders feature Ethernet communications, allowing users to access the recorders from any web browser. Information can be automatically retrieved and placed in DataManager Pro for further analysis.

DataManager Pro also offers a range of presentation possibilities, including the ability to annotate specific alarms and present recorded data as a combined graph accompanied by tables and statistics.

Find out more

For more information about ABB's products for dosing control applications, including its range of ScreenMaster paperless recorders, please email: moreinstrumentation@gb.abb.com ref 'dosing control'.

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