

pH monitors provide accurate final discharge monitoring for dairy



This example is based on a real-life application where the pH of process discharge water is monitored to check the level of acidity prior to discharge. If the pH is not tightly controlled, the dairy could be penalised for any subsequent pollution to the surrounding environment.

The Application

Monitoring adjusted mixed sewage water is a common application for pH measurement equipment in the dairy industry. In this example, ABB's pH equipment is used to monitor the discharge from the dairy processing plant. This discharge is a mixture of the sewage water from the process and wastewater. It is a combination of milkreasts, lyerests, wastewater and flushwater, which is held in a large storage tank.

The contents of this storage tank are then pumped into treatment tanks prior to final discharge. One tank is used to measure and adjust the pH to between 6.5 and 8.5, whilst the other tank is being filled. There is a final measurement taken just before discharge, which triggers an alarm if the pH is outside the acceptable levels.

The Challenge

Accurate pH measurement in this application is critical to wastewater control. The high volumes of waste discharged cannot be handled by the local Sewage Treatment Works if it is too acidic or alkaline. If the quality of the water falls outside the required limits, this can lead to large fines for the dairy.

Dairy products can be difficult to monitor, because when they pass the sensor they coat the equipment and impede measurement. Conventional meters in this kind of application can require manual cleaning two to three times a day. In this example, the end user was cleaning the sensor with a toothbrush using soap and water. This took up valuable man-hours and made the process both time intensive and expensive.



The sensor is linked to an ABB AX460 pH analyser, which controls the autoclean frequency and provides an outgoing final high- and low-level alarm.

Using ABB's system, the daily maintenance routine has been reduced to just checking the electrode.

The solution

The problem has been solved by using ABB's AP200 pH sensor, which includes an autoclean-function. These sensors use a jet wash system comprised of a cleaning solution, which is controlled by the pH transmitter. This self cleaning function can significantly reduce the amount of checks required. Also, as it does not rely on manual cleaning, it minimises the chance of fouling which can cause reduced accuracy and a shortened service life.

Did you know?

- Up to half of industrial pH applications benefit from some sort of cleaning regime. Failure to regularly clean a sensor can result in excessive fouling, reduced accuracy and a shortened service life.
- Using a flat glass sensor in a flow through installation rather than a bulb glass sensor can significantly improve performance. For example, in some applications it has extended cleaning periods from every three days to every third week.

Next Step

Get the best from your pH equipment with ABB's new *Easy Guide to pH Measurement*.

With top tips on everything from selection through to maintenance, the guide will help you to optimise your pH system for consistent product quality and regulation of wastewater discharge.

For your FREE copy of ABB's Easy Guide to pH Measurement, email moreinstrumentation@gb.abb.com or call 0870 600 6122 ref. 'Easy pH Guide'



Technical data



This application uses ABB's AP200 pH sensor and AX460 pH analyser, which together can provide accurate measurement of pH levels in demanding environments. For more information about either of these products, email moreinstrumentation@gb.abb.com or call 0870 600 6122 ref. 'ABB pH products'. Alternatively, visit the Analytical Instruments section at www.abb.com/instrumentation.

At a glance - AX460 analysers

AX460 analysers enable continuous measurements of one or two pH or Redox (ORP) points with simultaneous local display and retransmission. They can be used with glass, enamel and antimony pH electrodes and metal redox sensors to provide exceptional accuracy and performance. The analysers incorporate the latest technology to provide a highly reliable, flexible, feature-packed device for a diverse range of processing applications.

Features

- Wall, pipe and panel-mount versions rated to IP66/NEMA 4X ingress protection
- Continuous in-line diagnostics providing reduction in operating costs
- Auto-Water wash/chemical clean - significantly reduces maintenance
- Integral P, PI, PID Control: pulse frequency, pulse-length and analog
- Real-time clock and log book records alarm events and electrode status
- 2 to 4 current outputs and 3 to 5 relay contacts
- Versatile power supply options - 85 to 265V AC or 12 to 30V DC
- High visibility, multi-language display



At a glance - AP200 pH/Redox (ORP) Sensor Systems

The AP200 is built to withstand the toughest process environments. Parts in contact with the process comprise chemically-resistant PPS Ryton™ and stainless steel, or PPS Ryton™ and Hastelloy C. Flow-through holders are available in polypropylene, while the PPS Ryton™ insertion adapter enables installation in alternative material pipelines. Insertion and Flow-through systems tolerate temperatures up to 130°C (266°F) and pressures up to 6 bar (90 psi). The inner electrode connections are ingress-protected to IP67/NEMA 6P exceeds (NEMA 4X).

Features

- Safe operation and high process resistance
- Empowers just-in-time maintenance by enabling diagnostics
- Reduced maintenance costs with jet-wash capability
- Reduced running costs through solid electrolyte
- High assurance of operation and calibration
- Increased user-flexibility with VP sensor connector
- Suitable for a wide range of applications

The easy guide to pH measurement



These easy to follow guidelines should help you measure pH accurately and keep your sensors in good working order, thereby reducing costs while increasing yields, maintaining product quality and reducing emissions.

1. Choose the right equipment

There's no such thing as a 'universal' sensor suitable for measuring everything, a range pH sensors are available, according to the applications concerned. For example:

- High temperature glass for high temperature applications - 90°C or higher
- Low temperature glass in low temperature applications - from 15°C down to below zero
- Flat profile glass - self-cleansing where high levels of particles could foul the sensor
- Bulb glass - any application up to 140°C and 10 bar g

2. Install for easy access

Installing your pH sensor where it can be easily accessed will reduce the effort required whenever calibration, checking or occasional replacement is needed.

3. Watch out for air

Exposure to air can dry out pH glass and form crystalline deposits at the reference junction, dramatically reducing the sensor's service life. Mount the sensor where it is constantly wetted e.g. in a u-bend to ensure a sample is always captured even if the line goes dry.

4. Do you really need to calibrate?

The frequency of calibration really depends on whether you think there is any need for adjustments. In many cases, adjustments are unnecessary if there is a difference of less than 0.2 pH between a sample measurement and the process pH meter.

5. Configure buffer tables for accurate calibration

6. Be wary of lab measurements

Beware of variations in laboratory samples when comparing with the process.

7. Make sure the sensor is adjusted for temperature

In-line sensors measure at up to 140°C so may need time to cool to calibration temperature. This could take quite a while, so it is always advisable to wait before attempting a calibration.

8. Consider a grab sample calibration as well as buffers for accuracy

9. Make a sample and process log sheet to trace the cause of discrepancies in pH values from the real process compared to laboratory and historic sample values

10. Clean the sensor regularly

Use a flat glass sensor as this type of sensor needs cleaning much less often. Using sensors with an automatic cleaning capability can further reduce the requirement for manual cleaning.

Failure to regularly clean a sensor can result in excessive fouling, reduced accuracy and a shortened service life.

For our full guide to pH measurement, email moreinstrumentation@gb.abb.com



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