



APPLICATION REPORT

Food & Beverage

pH monitoring in alcoholic fermentation

- Distilling traditional alcohols from sugar beet syrups
- Inline pH measurement for process control
- Cost saving installation of sensor with integrated transmitter technology



1. Background

Tereos France is a world leading producer of sugar and one of Europe's main manufacturers of starch-based products and alcohols. Among others, the company operates several distilleries of which one is located in Val des Marais, in Northern France, where agricultural raw materials are turned into traditional alcohols.

Prior to the main distillery processes, low-purity syrups with a sugar content of 55...65% are extracted from sugar beet and subsequently transformed into alcohol ("wine") of 5...13 Vol.-% for further processing. The fermentation process is carried out in 7 tanks. For the desired degree of alcohol, these tanks are kept at 32...37 °C / 90...99 °F. This way, the distillery produces about 200m³ of "wine" per day.

2. Measurement requirements

The best fermentation condition is maintained at a pH value of between 2.5 and 4. For this reason it is very important that the pH value of the low-purity syrups in the tanks is monitored on a regular basis. The customer therefore established a pH measurement cycle (7 samples, 1 cleaning; cycle time: approx. 1 hour). Samples taken manually also get checked in a lab every two hours. If the pH value rises above 4.5, sulfuric acid and phosphoric acid (nutrient) have to be added to prevent the growth of bacteria, which can contaminate the alcohol solution. Tereos previously used a pH sensor from an alternative supplier for this application, however the sensor and external transmitter were affected by hydraulic shocks caused by the medium. The liquid entered the transmitter via the cable gland and damaged the device. This interrupted process monitoring which also had an impact on the acid dosage as the dosing pump stopped working. The rise of the pH value could not be prevented effectively and the performance of the dosing pump could not be controlled. Therefore the customer looked for a new solution capable of measuring pH reliably at high pressure conditions of around 5 barg / 72.5 psig.

KROHNE

3. KROHNE solution

KROHNE offered SMARTPAT PH 2390. The pH sensor was installed directly into the pipe. The rugged sensor design makes this sensor type suitable for this application because of the high pressure resistance of up to 6.9 bar / 100 psi. It can be easily adapted to such harsh applications with alcoholic solutions.

The 2-wire loop powered SMARTPAT PH sensor features integrated transmitter technology. The entire transmitter technology is miniaturised and fits into the sensor head, eliminating the need for an external transmitter. The SMARTPAT PH sensor stores all data and sends these as bidirectional digital signals with 4...20 mA / HART® directly to a PLC that controls the dosing pump.

4. Customer benefits

Tereos now benefits from a stable pH value that helps them maintain the best fermentation conditions for their alcohol production. An accurate dosing of nutrients is guaranteed in case the pH value rises above 4.5. The dosing pump no longer stops due to a damaged pH sensor and its performance can now be reliably monitored. The mechanical protection of the sensor prevents product entry and guarantees operational safety.

Given that the SMARTPAT PH 2390 features integrated transmitter technology, the investment costs of the complete measuring loop is significantly reduced in comparison to the previous measuring system that needed a separate transmitter. Maintenance and costs are also reduced because the sensor can be configured and calibrated offline in the laboratory under controlled conditions. Calibration errors and cumbersome sensor handling on-site are no longer an issue. The sensor can be cleaned and regenerated to extend the lifetime.

Tereos stands to gain from the single source supplier KROHNE that does not only provide the sensors but the whole range of professional equipment (e.g. buffer solutions) as well as consulting services.



SMARTPAT PH 2390 installed between a hydrometer (left) and a redundant probe (right)

5. Product used

SMARTPAT PH 2390

- 2-wire loop powered sensor with integrated transmitter technology
- Special sensor design for harsh applications
- Low maintenance cost and long service cycle
- Large PTFE diaphragm for reliable pH measurement
- Double junction for extended life time and a wide application range
- With integrated Pt1000 and standard VP2 connector



Contact

Would you like further information about these or other applications?
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