

BEST PRACTICE | DSM FOOD SPECIALTIES

Critical pH monitoring for cultures

Fermentation is the nucleus of the production process
and is performed under a controlled environment



DSM Food Specialties (DFS) provides cultures, probiotics, bio-preservation, sugar reduction and savoury taste solutions to the food and beverage industry globally.

The company's ingredients and solutions enable its customers to make healthier and more sustainable consumer products. It is a global leader in the manufacturing of products used in the dairy industry, with nearly 150 years expertise in microbiology and fermentation technologies. These include the production of cultures and bio-preservation solutions for use in applications such as cheese ripening, yoghurt production, beverage brewing, and lactose-free milk production.

Due to the nature of the products manufactured, there is a strong emphasis on system cleanliness – unwanted microbes can seriously compromise or destroy the finished product. Both CIP and SIP processes are utilised, in addition to inline process equipment having zero deadlegs, maintaining a sterile manufacturing process.



CIP and SIP process

Fermentation is the core process

Fermentation is the nucleus of the production process and is performed under a controlled environment. The void between the product interface and the internal top of vessel surface is gas blanketed with either carbon dioxide or nitrogen, depending upon the characteristics of the culture or enzyme.

The most critical process parameters during fermentation are pH and temperature, with typical pH ranges for all products being between 5.6 and 6.4. Whatever the target pH, the value must be maintained with minimal deviation. For example, some cultures may only have a pH tolerance of ± 0.1 .

Fluctuations in pH can cause a number of undesirable results, such as reduced growth rate or reduced product effectiveness and variations in quality. Where the culture consists of multiple strains, changes in pH can promote the growth of one strain over another, resulting in an out-of-specification product.

In the worst case, product can be destroyed, so the accurate monitoring and control of pH is fundamental to the success of the production process.



DFS Fermentation tank with pH and temperature monitoring



pH monitoring on fermentation tank

Enter the Burkert 8201 solution

The pH monitoring technology previously used by DSM had a number of drawbacks, which set the company to looking for a more up-to-date and effective solution.

With the previous system, pH probes needed to be replaced every three months, and they were not tolerant to clean-in-place (CIP) and sterilisation-in-place (SIP) processes, so cleaning required removal of the probes from the lines.

If the system was not operating for a time – for example over a weekend – then the probes needed to be removed from the line and immersed in distilled water to prevent measurement drift on start-up of the system when re-installed.

DSM Food Specialties had an existing relationship with Bürkert, and chose to replace their pH probes with Bürkert's Type 8201 hygienic pH measuring system, which provided an effective solution to the drawbacks of the previous system.

The Type 8201 glass-free probe offers a robust and unbreakable construction, and a long service life with long calibration intervals. The extremely smooth enamel surface of the probe inhibits the medium

from sticking and is easy to clean in-line. Due to its robust design and high temperature and chemical tolerance, the electrode can stay in the process even during a CIP or SIP purification. This meant that DSM could dispense with expensive retractable fittings and would no longer need to remove the probe over the weekend or maintain a special probe storage environment.

External components of the Type 8201 system also offer an IP68 ingress protection rating, making them resistant to washdown processes.

Fewer intrusions and greater accuracy

With the Type 8201, temperature sensing is also included in the same probe. A PT100 output is provided, removing the need for a separate temperature sensor, and thereby reducing the number of intrusions into the process. Fewer intrusions into the piping reduces the risk of either ingress of contaminants into the process or of egress of process fluids.

As well as integral temperature measurement, greater accuracy is also maintained via a constant supply of potassium chloride electrolyte. Electrolyte level monitoring in the system's pressure container prevents operation without an electrolyte, and when a minimum level has been reached, the electrolyte supply bottle in the pressure container is simply changed.



**Type 8201
pH measuring system
for hygienic applications**



Solving a problem with a future-proofed solution

Combined with Bürkert's Type 8691 multifunction controller, full support of the Modbus TCP, PROFINET or EtherNet/IP protocols means that unlike the previous system, DSM will be able to integrate the new pH measuring system into an industrial Ethernet infrastructure in the future.

Type 8691 Control head for decentralised automation of ELEMENT process valves

“Accuracy and stability of pH measurement is critical for optimisation of both product quality and yield,” said a representative of DSM. “Previously the reliability of pH measurement was a constant issue, but now the Burkert solution provides the reliability we seek.”



We learn from you every day Including when we think outside the box

When it comes to dealing with liquids and gases, Bürkert is a sought-after partner all over the world. Why? Probably because we have been learning for, and from, our customers for more than 70 years. This enables us to always think that crucial step ahead – or even sideways.

We make ideas flow.



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