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FLUID CONTROL SYSTEMS

Rapid gas pressure control crucial in hygienic manufacturing

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Hygienic manufacturing lines creating products such as biologic drugs, vaccines, specialist pharmaceuticals or carbonated beverages are under constant pressure to deliver repeatable quality while maintaining efficiency and regulatory compliance. While great attention is often paid to ingredients, formulations and production equipment, one often-overlooked process variable frequently has a significant influence on product quality – gas pressure control.

Maintaining stable pressure within process and storage vessels is essential across food, beverage, pharmaceutical and biopharmaceutical manufacturing. Even small fluctuations can affect filling accuracy, fermentation performance, product characteristics and overall process stability. As production targets become more demanding and quality standards continue to tighten, the ability to control pressure rapidly and precisely is emerging as a key differentiator.

The hidden impact of pressure drift

Many hygienic manufacturing processes rely on maintaining a carefully controlled overpressure inside tanks and vessels. In beverage production, for example, accurate carbon dioxide management is vital for preserving taste, carbonation levels and shelf life.

In pharmaceutical and biopharmaceutical applications, fermentation processes often generate gases such as CO_2 while requiring controlled additions of nitrogen or oxygen to support biological activity. Throughout these often-lengthy production cycles, maintaining stable pressure conditions is essential for ensuring product consistency and maximising yield.

The challenge is that pressure conditions are rarely static. Filling, emptying and fermentation activities continuously alter the gas dynamics within a vessel. When pressure deviates from its target value, manufacturers depend on control systems to detect the change and respond accordingly.

However, conventional pressure control systems typically rely on multiple components, including separate sensors, valves and controllers. The communication delays between these devices can slow the control loop significantly, sometimes taking several seconds to identify and correct a pressure deviation. During this period, pressure drift can occur, potentially affecting product quality and process performance.

Why faster control delivers better results

The relationship between pressure stability and product quality becomes particularly important during dynamic production phases. Any delay in correction can influence flow rates and dosing accuracy, creating variation in fill volumes or product characteristics. This is where next-generation pressure control technology is driving improvement.

Bürkert's Type 8880 pressure control system demonstrates how advances in integrated control design can help manufacturers achieve tighter process control and more consistent production outcomes. Developed specifically for hygienic applications, the system combines two control valves and an integrated pressure

transmitter within a closed-loop design, enabling response times of less than 200 milliseconds, up to ten times faster than many conventional solutions.

By reducing the time between detecting a pressure change and taking corrective action, the system minimises pressure drift and maintains much tighter control of vessel conditions throughout production. The practical result is greater process stability, improved product consistency and more reliable operating performance.

Precision filling depends on pressure precision

A good illustration of the importance of pressure control can be seen in net-weight filling applications. Italian filling equipment specialist WEIGHTPACK required a pressure control solution capable of maintaining highly stable tank pressure while meeting the stringent hygiene requirements of food and beverage production. In this process, the company uses overpressure within its filler tanks to increase product flow and reduce filling times, meaning pressure stability directly affects filling accuracy.

Previously, pressure regulation relied on a complex arrangement of multiple shut-off valves. While functional, the system lacked the ability to finely modulate pressure and struggled to provide the level of precision required during start-up and shutdown phases, when process conditions change most rapidly.

Following trials of Bürkert's Type 8880 system, WEIGHTPACK adopted the technology across its food and beverage filling platforms. The rapid response capabilities of the integrated pressure controller enable the company to maintain constant pressure even during transient operating conditions, helping to ensure accurate fill weights and repeatable production quality.

Hygiene, reliability and reduced maintenance

For hygienic industries, control performance is only part of the equation. Equipment must also withstand demanding cleaning procedures, including Clean-In-Place (CIP) and Steam-In-Place (SIP) cycles. These processes are essential for preventing contamination but can place considerable stress on conventional valve technologies, particularly where lubrication degradation leads to wear and performance deterioration.

The Type 8880 has been engineered specifically to operate reliably within these environments. Its hygienic design supports repeated CIP and SIP cycles while maintaining consistent valve performance. This helps reduce maintenance requirements, minimise downtime and improve overall equipment availability.

The system is also available in a range of reconfigurations, including self-draining designs, electropolished surfaces, FDA-compliant materials and dead-space reduced variants, enabling manufacturers to align equipment selection with both regulatory requirements and process-specific standards.

A new standard for process consistency

As manufacturing industries continue to focus on quality, efficiency and operational resilience, pressure control is being seen as an important process variable that requires greater attention.

Faster response times, integrated control architectures and hygienic design are enabling manufacturers to maintain tighter process conditions, improve product consistency and reduce operational costs.

The Bürkert Type 8880 illustrates how modern pressure control technology can support these objectives. By combining rapid pressure regulation with a robust

design, it provides manufacturers with a practical route to achieving the high levels of consistency, reliability and product quality increasingly demanded across today's hygienic processing industries.

Images & Captions:



Image 1: Modern pressure control technology can improve product consistency and reduce operational costs.

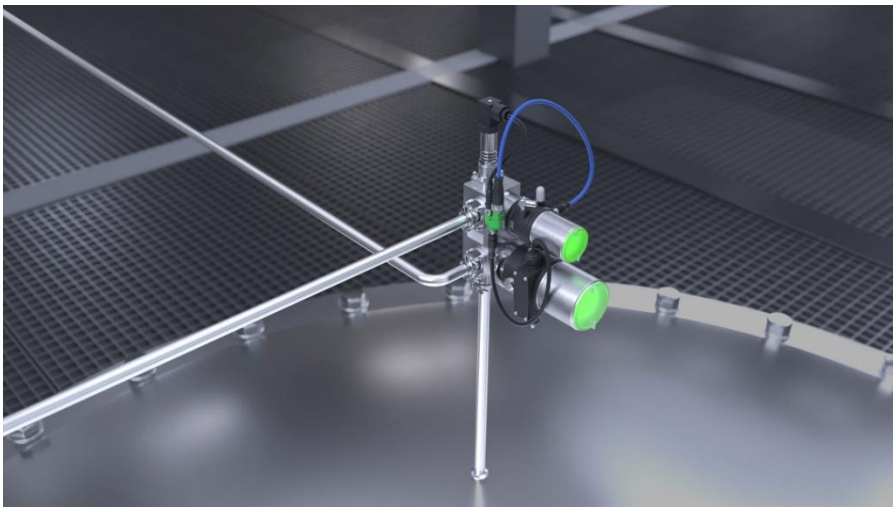


Image 2: By maintaining highly stable tank pressure while meeting stringent hygiene requirements filling accuracy was improved.

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About Bürkert

Bürkert Fluid Control Systems is one of the leading manufacturers of control and measuring systems for fluids and gases. The products have a wide variety of applications and are used within food & beverage, pharmaceutical and water industries as well as in medical engineering and space technology. The company employs over 3,700 people and has a comprehensive network of branches in 36 countries world-wide.

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