

Application report: Differential pressure measurement in a brewery**FOOD**

Differential pressure measurement with the D3 assures product quality and efficiency

Glückauf Brewery has over 140 years of brewing tradition, a commitment to innovation, and the highest quality standards. This has resulted in numerous national and international awards in recent years, including the "European Beer Star," "International Craft Beer Award," "Beer of the Decade," and various Gold Awards. To ensure continued economic success, the company is constantly developing its product range and optimizing its plant equipment. With 17 types of beer and a range of soft drinks, efficient production technology and instrumentation are essential for maintaining consistently high product quality.

Glückauf has recently switched to hydrostatic content monitoring with the D3 differential pressure sensor to ensure precise level monitoring in its five storage pressure tanks.

The application

Once the manufacturing process is complete, the freshly brewed beer is transferred to pressure storage vessels for final maturation.

In the pressure tanks used for this purpose, the beer is temporarily stored at over 1 bar, carbonated, and kept at this pressure until bottling.

Due to these requirements, only a hydrostatic measuring principle with differential pressure measurement can achieve high-precision level monitoring.

After pressure gauges in several tanks failed, the production management decided to replace the sensor technology. They ultimately chose the D3 sensor from Anderson-Negele. With integrated tank linearization, the five D3 sensors could be preset for the three different tank configurations before installation. They were then easily programmed and put into operation through simple calibration.

Advantages in the application

- » The D3 differential pressure sensor uses electronic technology, without a capillary, and outputs the level with a measurement accuracy of $\pm 0.15\%$ and a response time of < 0.2 seconds.
- » Individual sensor calibration can be swiftly and effortlessly performed through metering.
- » Due to suitable process connections for the sensor and the digital display, the installation was possible without any technical modifications.

The Anderson-Negele solution: High-precision differential pressure measurement with „plug-and-play“ technology

The D3 differential pressure sensor features state-of-the-art technology for precise level detection. It registers the values from the pressure transducer mounted in the tank bottom and another pressure transducer mounted in the head area.

The sensor instantly converts this data into output values in volume or mass. Data collection and transmission occur entirely electronically, eliminating the need for complicated installation and adjustment typically associated with capillary systems.

In addition, the D3 is already equipped with integrated tank linearization. In the case of Glückauf, the brewery provided drawings of the three vessel formats in advance, allowing the

sensors to be programmed prior to installation. The D3 sensors are available with various process connections, enabling seamless integration without requiring vessel modifications. Even for direct display in the adjacent control cabinet, the DPM (Differential Pressure Measurement) proved to be a suitable solution. Consequently, the entire installation and setup of the instrumentation technology were simplified to a straightforward process of "screw it in, connect it, done."



The high measuring accuracy of $\pm 0.15\%$, a response time of < 0.2 seconds and the integrated density compensation make the D3 ideal for high-precision level control in brewery pressure tanks, even with temperature changes or rapid volume changes such as during filling.

Preset parameters and intuitive operation ensure quick and easy installation and commissioning for a true „plug-and-play“ experience.



The digital local display DPM could be installed in the existing openings of the predecessor equipment.

Sensors used in the application

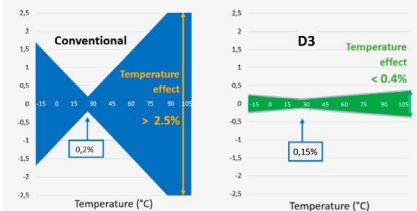
Level control by differential pressure measurement D3



Advantages

- High-precision hydrostatic level measurement in pressurized tanks.
- Differential pressure measurement with media up to $110\text{ }^{\circ}\text{C}$ ($230\text{ }^{\circ}\text{F}$); CIP / SIP cleaning up to $135\text{ }^{\circ}\text{C}$ ($275\text{ }^{\circ}\text{F}$) for max. 60 min.
- Measuring range $-1\ldots 35\text{ bar}$ ($-14.7\ldots 500\text{ PSI}$)
- Two analog outputs for parallel transmission of level (differential pressure) and head pressure
- Measuring accuracy $\pm 0.15\%$ of calibrated measuring range, reproducibility 0.05% , temperature effect (drift) $< 0.03\%$ per $10\text{ }^{\circ}\text{C}$
- Response time < 0.2 seconds
- Volume/mass output selectable (kg, l, %)
- Modular design: individual configuration and easy replacement of components
- Variants: Head unit with sensor and one separate pressure stem or head unit without sensor with two separate pressure stems

Temperature effect



The temperature effect (i.e. the deviation compared to calibration at room temperature) is only 0.4% for the D3 when the process temperature is changed to $110\text{ }^{\circ}\text{C}$. The D3 therefore measures the level extremely precisely over the entire temperature range.