

CONTROLLED OXYGEN SUPPLY IN BEER BREWING

What makes oxygen so important for beer brewing? Quite simple: oxygen is a crucial component for the reproduction of yeast cells. And indeed these yeast cells convert glucose into carbon dioxide and ethanol - or 'alcohol' in popular speech - in a process called fermentation.

Even though oxygen is not necessary for anaerobic fermentation to proceed, too much or too little oxygen will have a bad influence on the yeast cells themselves. An oxygen deficit prevents the cells from growing fast enough and results in unwanted by-products. On the other hand, excess of oxygen leads to an extravagant yeast growth, where the 'fluffy' yeast may spill-out on top of the vessel. Anyhow, an incorrect amount of oxygen will result in a reduced beer taste and quality.

The British Ossett Brewery requested Bronkhorst for a solution to supply oxygen to their brewing process in a controlled way.



(Source: Ossett Brewery UK)

Application requirements

In 'the old days', before using any kind of flow control solution, Ossett Brewery could only control the flow of oxygen into their system by the simple use of opening the valve on the gas cylinder and then time how long they dose the oxygen into a beer brewing vessel. This rough estimation could cause inconsistency with each batch with over- or under-oxygenation.

The solution they were looking for has to supply oxygen accurately over a well-defined period of time. Furthermore, the solution should be robust enough to be able to operate in an environment with gases as well as liquids.

Important topics

- Accurate and repeatable
- Built-in display as part of device for on-site control
- Direct through-flow measurement (CTA) ideal for beer brewing applications
- Improved product (beer) quality, reduced waste

Process solution

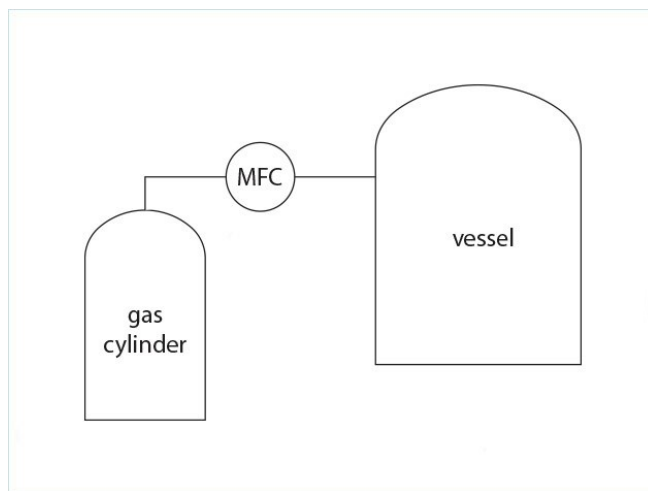
A Bronkhorst MASS-STREAM [D-6341](#) mass flow controller is used to accurately dose the desired amount of oxygen into the beer brewing vessels. Oxygen is added post paraflow en-route to fermenting vessel. The mass flow controller is positioned between the oxygen gas cylinder and a vessel that operates at atmospheric pressure. The oxygen enters the mass flow controller at a pressure of about 6 bars. It is a stand-alone solution provided with a multifunctional and multicolour display with operator buttons on the device, to set the desired oxygen flow rate using this display.

Beer brewing at Ossett Brewery is a batch process rather than a continuous process, with a couple of days between batches. Based on the weight of yeast in a vessel, the brewery can calculate how much oxygen the yeast cells will need to grow. In this case, the mass flow controller supplies 857 liters of oxygen gas over a period of 20 minutes. The usage rate is now 50 litres per 6500 litre brew.

Compared to the previous situation where an operator opened the valve of the gas cylinder manually, now the brewery can guarantee the quality of every brew in a consistent repeatable process. The controlled oxygen supply reduces over-oxygenising of the yeast. Ossett Brewery use traditional top fermenting ale yeast. It no longer becomes fluffy and does no longer spill-out on top of the vessel. So waste is reduced, and there are no extra efforts and costs for cleaning-up.

The [MASS-STREAM D-6300](#) series is perfectly suitable for the brewery industry because of the [CTA \(Constant Temperature Anemometry\) technology](#) inside. The inline thermal mass flow sensor based on this technology is less sensitive to contaminations and humidity, making it a robust solution for this type of application. This robustness is even emphasized by the compliance of the device with the IP65 ingress protection rating, which means that the device is dust-tight and protected against water jets.

This mass flow controller solution is so successful that the brewery will add it to a second site that they are building.



Flow scheme



Response Ossett Brewery

"This solution has improved the quality of each batch and furthermore reduced waste from manually overdosing oxygen plus the costs of additional cleaning and sampling time."

Recommended Products



MASS-STREAM D-6341 MFC

Min. Bereich 0,14...7 l/min
Max. Bereich 1...50 l/min
Druckstufe bis zu 20 bar
Robuster Sensor, IP65 Gehäuse
Option: integriertes TFT-Display



MASS-STREAM D-6310 MFM

Min. Bereich 0,01...0,2 l/min
Max. Bereich 0,1...2 l/min
Druckstufe bis zu 20 bar
Robuster Sensor, IP65 Gehäuse
Option: integriertes TFT-Display



BRONKHORST (SCHWEIZ) AG

Gewerbstrasse 7
4147 Aesch BL (CH)
Tel. [+41 61 715 90 70](tel:+41617159070)
info@bronkhorst.ch