

APPLICATION NOTE A112-FP99 - MEASUREMENT OF HYDROGEN PEROXIDE FLOWS

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Although the main application of hydrogen peroxide (H_2O_2) is in bleaching of textiles, paper and pulp, this chemical compound is also used as a disinfecting agent - with the aim to remove (pathological) microorganisms from surfaces. To this end, hydrogen peroxide is split into two free hydroxyl radicals that attack essential components of the microorganism's cell metabolism, such as DNA and membrane lipids.

In a practical implementation, hydrogen peroxide enters the chamber that has to be decontaminated in its liquid state, after which it is vaporised on a hot surface. A circulating air flow sweeps the vapour along, and makes sure that the walls of the chamber get in contact with the disinfecting vapour.

The Swiss based company [SKAN](#), a global player in the field of cleanrooms and isolators for the pharmaceutical and biotech industries, asked Bronkhorst to help them with measuring low amounts of hydrogen peroxide for decontamination purposes in isolators for aseptic processes.



(Source: SKAN Switzerland)

Application requirements

It is required to measure continuously low amounts of a hydrogen peroxide solution. A high accuracy and reproducibility are needed, as well as an easy and fully integrated (built in-line) use of the measuring system. The measuring solution should be capable to transmit the measurement value to the PLC by means an analogue or Fieldbus protocol.

Important topics

- Continuous liquid flow measurement
- High accuracy and reproducibility

Process solution

The solution for accurately dosing and continuously measuring low amounts of 35-50% concentrated hydrogen peroxide consists of a peristaltic pump in series with a Bronkhorst [Coriolis mass flow meter](#) (series [mini CORI-FLOW ML120](#)). The 15 rollers of the peristaltic pump allow for a pulsation-free flow of the hydrogen peroxide solution.

The [Bronkhorst Coriolis mass flow meter](#) measures the liquid flow and monitors its density. A typical flow is 50 to 100 microliters per minute, or about 6 grams per hour. For measurement, an accuracy of less than 10% was required, and with the chosen mass flow meter an accuracy of 1% is achieved. The device is provided with a valve to control the peristaltic pump, if the request of controlling this flow should occur in a later stage. Communication to the PLC is possible via an analogue 4-20 mA protocol or a digital Profinet protocol.

Density monitoring of hydrogen peroxide is of importance to observe if degassing occurs. Besides being a reactive compound, H_2O_2 is rather unstable and decomposes into water and oxygen gas in due time. A low density is a measure of decomposition, which means that not enough hydrogen peroxide may remain for decontamination purposes.

Prior to this solution, the amount of hydrogen peroxide dosed was determined by measuring its weight using scales. However, for industrial application weighting is unsuitable due to vibration and draft sensitivity. Moreover, it is batch-wise rather than continuous, which made SKAN look for another solution. The company aimed to provide a high-quality and process-safe solution for long term stability and endurance. The combination of an peristaltic pump in series with the [Bronkhorst ML120 mass flow meter](#) indeed is a simple, reliable and future-proof solution for transferring precious content in a safe, fast and efficient way.

The compact and space-saving appearance together with the excellent performance convinced the customer to equip the isolators in-line with Bronkhorst technology. Since they have been introduced to the [ML120 technology](#) in 2016, about ten 'ML120 upgraded' SKAN isolators are currently in the field. Direct mass measurement, a broad (rescalable) measurement range and the density indication are seen as advantages. Moreover, due to zero stability, an optimised cycle time and the (virtual) absence of dead volume, the device operates at high precision and repeatability. SKAN declares the [ML120 mass flow meter](#) as an indispensable core component.

Recommended Products



MINI CORI-FLOW™ ML120V00

Min. flow 0,05...5 g/h
Max. flow 2...200 g/h
Pressure rating 200 bar
Independent of fluid properties
High accuracy, fast measurement



MINI CORI-FLOW™ ML120V21

Min. flow 0,05...5 g/h
Max. flow 2...200 g/h
Pressure rating 5 bar
Independent of fluid properties
High accuracy, control

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