

abiotec

advanced bioprocess technologies



niesler

Gas Volume Monitor

robust and accurate

high-grade stainless steel design

water-protected measuring-head

professional tri-clamp sealing technology

plug&work technology

Motivation

On the initiative of Nestlé Research Center a new gas volume monitor was developed. Common Fermentographs on the market did not fulfil the requirements for registration of small as well as large gas volumes of dough samples, even over extended periods.

The modular and handy system presented here allows accurate determination of gasification rates over a very wide measuring range (>4 magnitudes) and is, therefore, applicable for both routine measurements in quality assurance and for sophisticated tasks in R&D.

Measuring principle

Gas volumes generated by yeast dough preparations in the range of very small to large amounts are monitored within closed vessels on the basis of accurate measurement of absolute pressure.

Changes in pressure during the trial runs are recorded and used for calculating the generated gas volumes according to the Ideal Gas Law ($p \cdot V = n \cdot R \cdot T$). The advantage is that no reference measurements are required.

If a definable threshold value of pressure is exceeded the vessel's pressure is balanced with the ambient pressure for a short interval. Subsequently, the system is closed again and integrating measuring procedure is continued. This method enables accurate and practically failure-free gas monitoring for even extended periods or large gas volumes.

Areas of application

Besides dough samples, all types of bio-/chemical reactions that are related to a corresponding gasification or gas consuming reaction can be determined at any degree of sensitivity. Related tasks are found mainly in the areas of pharmaceuticals, foodstuffs and environment.

Also purely physical effects, which are based on gas sorption or desorption phenomena, can be quantified.



Hardware

All measurement modules are constructed as gas-tight lockable single stainless steel systems with multi-functional lids. Each integrated lid contains a high-precision transmitter for absolute pressure, a special electromagnetic stop valve, the safety system for overpressure and electro-mechanical devices for communication with higher-level systems. Multiple stand-alone modules are connected via RS-485 / USB Interface directly to a Windows PC. Wireless communication is available on demand.



Software

The application software GoGas enables all automated and manual interaction with the measuring modules. For a maximum flexible setup for diverse experiments under various conditions the modules can be combined individually or in groups as sets; multiple experimental sets can be operated at the same time. Results are presented directly via online view on the screen (trend patterns). In addition, Excel-readable files are generated for subsequent user-specific operations. Further, our software is fully customizable for other requirements like generating standardised reports for QA related routine measurements.

Specifications

Wide measuring range over 4 orders of magnitude

1 ml per day to approx. 3 litres per hour

High resolution

0.05 to 0.2 ml gas (850 ml or 2.5 l vessel)

Measuring heads in stainless steel design with complete water-protection (IP67)

- All functions are integrated in the housing:
- Sensor for absolute pressure of 0.6 to 1.6 bar, high resolution, long-term stable, temperature-compensated calibration
 - Transmitter electronics with RS-485 interface
 - Selected electromagnetic stop valve with minimal gas leakage
 - Multi-level positive over-pressure safety concept (hardware and software based)

Measuring vessels in various dimensions

- Standard volumes: 850 ml and 2.5 l (customized fabrication)
- Tri-clamp sealing technology with gas-tight special gasket
- Pressure resistance up to 8 or 10 bar

Remarks

- The system is designed for temperature-controlled conditions (water-bath, incubator, refrigerating chamber) from 0° to approx. 45°C
- *Swiss Made* – all components are manufactured in proven Swiss quality
- Customer-specific adaptations (hardware and software) on demand.

Further technical details can be downloaded at www.abiotec.ch

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