

## HiSense™ - Precision Gas Analysis



### THE exhaust gas analysis system for cell cultures

The HiSense™ precision gas analysis system from HiTec Zang for cell culture and fermentation applications provides reliable measurements, even in cases of low metabolic rates in cell cultures, in an extremely broad flow range (0.6 to 100,000 Ln/h, depending on the model). It is thus suited both for R&D and laboratory applications and for use in the production and quality assurance areas.

Its excellent measuring resolution enables meaningful measurements under normal conditions, even for the cultivation of mammalian cells.

### Areas of application

- » Process development
- » Process optimisation
- » Process monitoring
- » Strain optimisation
- » Media optimisation
- » Fermentation validation
- » R&D and production
- » Quality assurance

## What can HiSense™ do for you?

- » Monitoring for aerobic and anaerobic bio-processes in both microbial and mammalian cell cultures
- » Parallel process monitoring of up to 5 reactors
- » Gas feed regulation in conjunction with the Gmix™ gas mix station
- » Feed regulation based on OTR, CTR, OT, CT, TQ, CER, CE, RQ (corrected TQ), growth rate, dissolved O<sub>2</sub>, CO<sub>2</sub> etc.
- » High-resolution respiration data
- » Determination of the CER even in carbonate buffered media
- » Process balancing through measurement of gas feed and exhaust gas

High-quality sensors are used for oxygen analysis which are distinguished by their low interference, low-noise readings and high long-term stability.

NDIR photometers with a minimum of zero point and pitch errors are used for the CO<sub>2</sub> measurement. Through a new form of special measuring method even the precise measurement of low-level activity both for small differences and for small measured gas flows are possible.



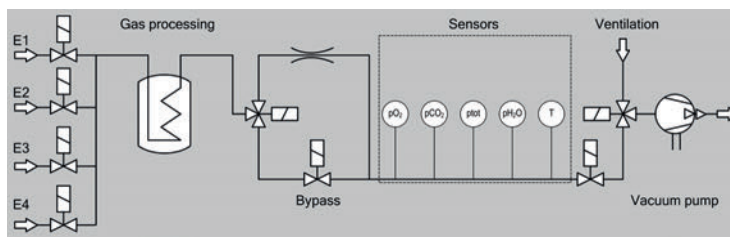
HiSense™-m

In the cell culture version influencing factors, such as overall pressure or humidity, can be corrected to a high degree of accuracy. The influencing factors may become very large in conventional exhaust gas analysis systems in cases of low metabolic rates in cultivation processes of cell cultures of especially long duration and can make a comparison of cultivations more difficult. The use of conventional exhaust gas analysis for quality assurance is rendered impossible as a result.

The HiSense™-c precision gas analysis system for cell culture and fermentation applications additionally provides an online determination of the true CO<sub>2</sub> production (CER) in the carbonate buffer systems normally found in a cell culture (optional pH value input required). In addition, those errors are corrected which normally make no valid measurements possible as a consequence of a shifting of the HCO<sub>3</sub>/CO<sub>2</sub> balance by metabolic products (e.g. lactate, NH<sub>3</sub>). The determination of the true RQ is also based on this technology.

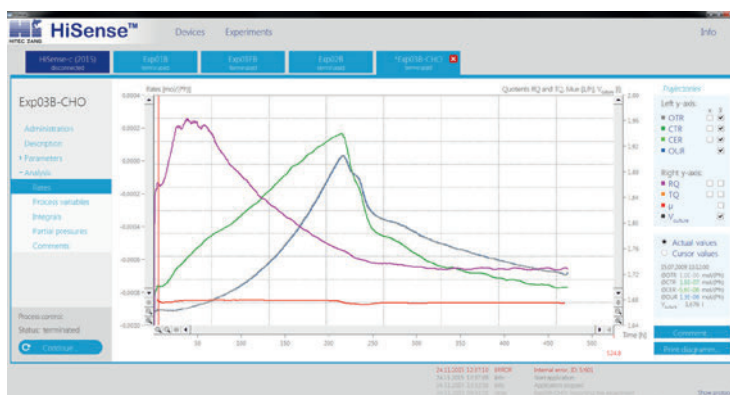


HiSense™-c



Process schematic of an exhaust gas measurement

The extremely high measuring resolution of the HiSense™-c enables meaningful measurements under normal process conditions, even for the low breathing rates of animal cell cultures and in a very broad range (reactor volumes of 1 l up to more than 100,000 l).



The most important parameters always in view

The software carries out calculations including corrections at run-time. All readings are saved in a database and may be progressively displayed on the x-t plotter.

Export is possible as, for example, a csv, or txt file.

### Features

- » 1...5 measuring channels
- » Genuine OUR, CER and RQ measurement (HiSense™-c)
- » Humidity correction / gas drying (HiSense™-c)
- » Excellent measuring resolution, e.g. OTR and CTR approx.  $1 \times 10^{-5}$  mol/l/h at 1 l culture volume, 5vvh gas injection rate (HiSense™-c)
- » Measured pH variables, OTR, CTR, OT, CT, TQ, CER, CE, RQ (corrected TQ), growth rate etc. (HiSense™-c)
- » Low interference
- » Remote operation via Ethernet interface (HiSense™-c)
- » Compact construction
- » Data export function
- » Maintenance-free

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