

## Gas Analysers

# TANDEM Analysers

**Real Time Off Gas Analysis and RQ Measurement**



**Effective And Dedicated On-Line CO<sub>2</sub> and O<sub>2</sub> Gas Analysis**

# TANDEM Gas Analysers

The Tandem Family of Gas Analysers offers you sophisticated CO<sub>2</sub> and O<sub>2</sub> gas measurement at a similar price to your other standard probes and sensors. Formerly the reserve of expensive equipment, you can now afford dedicated, individual, on-line monitoring and control of your processes. You gain the reliability and the flexibility required in your facility. The Tandem Gas Analysers provide portable systems with option of standalone software.

## Tandem

**Tandem TGA** The attractively priced entry level model is ideal for all laboratory and pilot applications. The small footprint means it can be placed right beside the reactor making installation quick and easy. It outputs a signal to the local fermenter control system where calibration is performed and the measurements displayed - just like other standard sensors such as pH and DO.



## Tandem PRO

Is used from laboratory through to production facilities and adds extra functionality to the TGA via a screen and microprocessor. An integrated pump aids installation where high gas flow rates are used, for example in large reactors. Manual and automatic calibrations are performed by the unit with alarms and error messages available. The output signals require no further calibration or modification in the reactor software.



## Tandem Multiplex

Is for facilities with several reactors where dedicated, continuous, monitoring is not required, the Mutlplex is the ideal choice. The functionality is similar to the PRO model, while it comes with a choice to connect from 6 up to 18 fermenters at one time. The cycle time between fermenters can be set by the user.



# Gas Analyser Benefits

## Greater understanding of your cells and processes

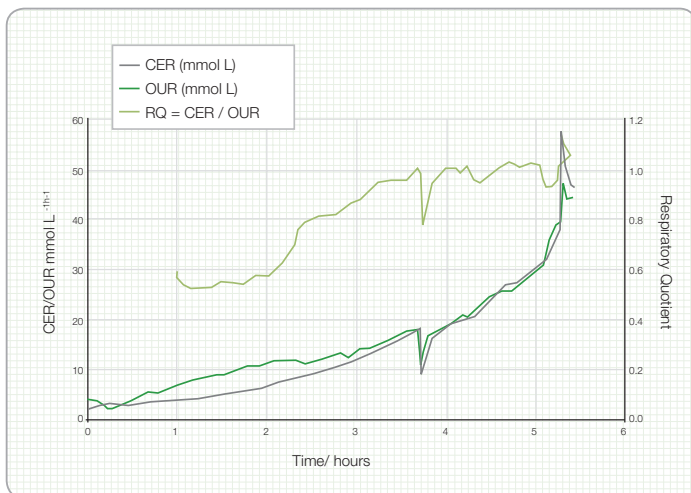
- | Physiological state measurement on-line
- | Scale-up and scale-down predictions
- | Batch variation studies: feature analysis
- | Metabolic flux analysis and mass-balance calculations

## Increase the reliability and repeatability of your processes

- | Accurate fed-batch control
- | Metabolic activity based feeding
- | Repeatable event decisions: induction, infection, harvesting etc.
- | Dedicated, continuous, standard signals for all your reactors
- | Automatic calculation of RQ, CER, OUR, and RQ
- | Integrates to any reactor size (250ml – 100m<sup>3</sup>)

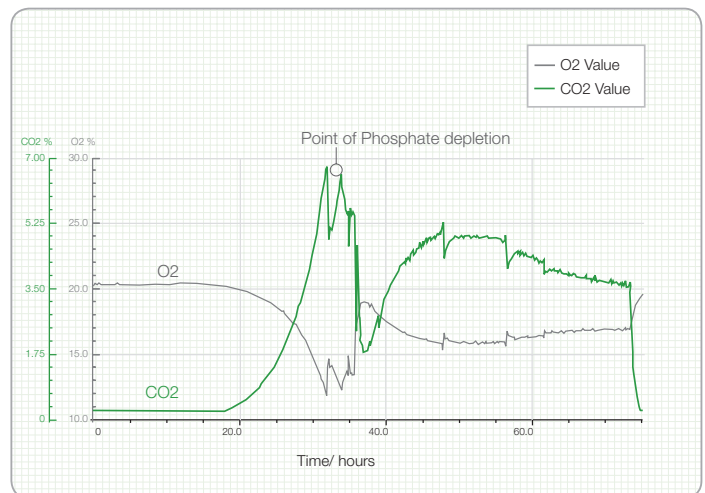
## Case Studies: *E. Coli* Process Development

The Tandem provides fine detail on the real-time activity of the organism: the first switch in feed is clearly visible while RQ changes may reflect metabolic changes in carbon and nitrogen substrates. Automating the feed profiles from this information has optimised the process.



By kind permission of Andrew Collis, GSK Operations, Ulverston, UK

The example below shows how the Tandem gas analyzer was used to determine the point of phosphate depletion. There was a sharp fall in carbon dioxide and a rise in oxygen, in the exhaust gas, corresponding to a metabolic event.



Predict metabolic events with a Tandem - UCB Group, UK- Dominic Reeks

# Specifications

<b>Feature</b>	CO <sub>2</sub>	O <sub>2</sub>
<b>Measurement Principle</b>	Infra Red Absorption	Electrochemical
<b>Range</b>	0-5%, 0-10%, 0-20%	0-30% 0-50%, 0-100%
<b>Resolution</b>	0.01%	0.01%
<b>Accuracy</b>	+/-2% of full scale	+/-2% of full scale
<b>Drift</b>	<0.05%/month full scale	<0.05%/month full scale
<b>Operating Temperature</b>	0 - 45°C	0 - 45°C
<b>Temp. Compensation</b>	Included	0.02%/°C
<b>T90 Response Rate</b>	<50 secs	<10 secs

Model	Lines	Sampling	Local Display	Calibration, with two known gases	Gas flowrate	Internal Gas Pump	Output	Dimensions (mm)
<b>TGA</b>	1	Continuous	No	Manual, on fermenter controller	25-1000 ml/min	No	Dual 0-10V & 4-20 mA	250w x 260d x 170h
<b>PRO</b>	1	Continuous	Yes	Manual & Automatic, on local display	25-1000 ml/min	Yes	Dual 0-10V & 4-20mA plus RS232	250w x 260d x 170h
<b>Multiplex</b>	6,8,12 or 18	User definable from 30 secs	Yes	Manual & Automatic, on local display	25-1000 ml/min	Yes	RS232	320w x 260d x 410h

## About HEL

HEL is an international company that specialises in chemical reactors, bioreactors and related data/logging tools for process R&D in the pharmaceutical, fine chemical, biotechnology and petrochemical industries. Established in 1987 and with clients worldwide our key strengths are:

Knowledgeable staff – highly qualified and experienced chemical engineers and chemists

Quality – underpinned by ISO9001 certification for over 16 years

Service – choice of service contracts backed by an established culture of unmatched client support

Range of products – both of-the-shelf and custom designs, manual and fully automated controls, low and high pressure/temperature applications, single and parallel/multi-vessel products

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