

Gas Analyser for IR-Sensitive Gases, Oxygen and H₂S BA 5000



The BA 5000 gas analyser can measure up to 4 gas components. The instrument can be configured a maximum of three infrared gases such as CO, CO₂, NO, SO₂, or CH₄ plus the measurement of O₂ with an electrochemical fuel cell. For oxygen analysis, the BA5000 can be equipped with either electrochemical or paramagnetic measuring cell.

The analyser can be used in emission measurement systems and for process and safety monitoring. In combination with the optional hydrosulphide analyser, the BA5000 provides a perfect solution for application in fermentation plants.

- **19" rack mount or portable configurations available**
- **Simple, fast user programming**
- **Calibration with cal gas is only necessary every 6 to 12 months, depending on application**
- **Large, backlit LCD**
- **Two measurement ranges per gas component**
- **Automatic correction atmospheric pressure variations**
- **Low-flow alarm**
- **Maintenance request alert**
- **Three binary inputs**
- **Eight relay outputs**
- **Four potential-free analog outputs 4-20mA**
- **RS 485**

Application Examples

- Optimization of combustion systems
- Monitoring of exhaust gas concentration from combustion systems with all types of fuel (oil, gas and coal) as well as operational measurements for thermal incineration plants
- Fermentation plants
- Room air monitoring
- Monitoring of air in fruit stores, greenhouses, fermenting cellars and warehouses
- Monitoring of process control functions
- Heat treating

General Technical Data

Measured components	max. 4 of which up to 3 infrared-sensitive gases, oxygen and H ₂ S	Dimensions	(H x W x D)
Analog outputs	max. 4, floating, 0 / 2 / 4 to 20 mA, linearised	Portable analyser Frame 19", 4 HU	170 mm x 465 mm x 392 mm 177 mm x 483 mm x 360 mm
Load	≤750 Ω	Weight	approx. 10 kg
Characteristics	linearised	Fittings for sample gas input and output and reference gas	Tube diameter 6 mm or 1/4"
Membrane keypad	LCD with LED backlighting and contrast control, function keys	Degree of protection 19" rack and portable unit	IP 21 (EN 60529)
Display	80 characters (4 lines / 20 characters)	Power supply	
EMC interference immunity	according to standard requirements of NAMUR NE21 (05/93) or EN 50081-1, EN 50082-2, EN 61010	Power supply	AC 100 V, + 10% / - 15%, 50 Hz AC 200 V, + 10% / - 15%, 50 Hz AC 230 V, + 10% / - 15%, 50 Hz AC 100 V, + 10% / - 15%, 60 Hz AC 120 V, + 10% / - 15%, 60 Hz AC 230 V, + 10% / - 15%, 60 Hz
Position of use	front panel vertical	Power consumption	approx. 50 VA
Relay outputs	8, e.g. for fault, maintenance request, limit, function check, AC/DC 24 V / 1 A	Gas input conditions	
Binary inputs	3, floating for pump on/off, AUTOCAL trigger and synchronisation	Sample gas pressure	0.5 to 1.5 bar absolute
Serial interface	RS 485	Sample gas flow	66 to 120 l/h (1.1 to 2 l/min.)
Warm-up time	approx. 5 min. max. accuracy is achieved after approx. 45 minutes	Sample gas temperature	0 to 50 °C
AUTOCAL function	automatic analyser calibration with ambient air, cycle time adjustable from 1 to 24 hours	Sample gas humidity	< 90% RH ¹⁾ or dependent on measuring task
		Ambient conditions	
		Permissible ambient temperature	
		Operation	+5 to +45 °C
		Storage and transport	-20 to +60 °C
		Permissible ambient humidity	<90% RH ¹⁾ for storage and transport
		Permissible pressure variations	700 to 1200 mbar

¹⁾RH: relative humidity

Technical Data of Infrared Measurement

Measuring ranges	see ordering data
Influencing variables	
- Drift	
With AUTOCAL	negligible
Without AUTOCAL	< 2% of smallest measurement range / week
- Temperature	max. 2% of smallest possible measurement range according to type plate per 10 K with an AUTOCAL cycle time of 3 h
- Atmospheric pressure	< 0.2% of measurement range per 1% change in pressure, corrected by internal pressure sensor
- Residual gases	Contact Bühler application specialist
- Electric - Voltage	< 0.1% of output signal span with a change of $\pm 10\%$
- Electric - Frequency	$\pm 2\%$ of full-scale value with a change in frequency of $\pm 5\%$
EM field 10 V/m, 80% amplitude modulation	
- 10 kHz to 500 MHz	1% of smallest possible measurement range
- 500 MHz to 1 GHz	2% of smallest possible measurement range
Response time (T_{90} time)	dependent on dead time and selectable damping
Damping	adjustable from 0 to 99.9 s (electrical time constant)
Output signal noise	< $\pm 1\%$ of smallest possible measurement range (see type plate)
Display resolution	dependent on selected measuring range; selectable number of digits following decimal point
Output signal resolution	< 0.1% of output signal span
Characteristic	linearised
Linearisation error	in largest measurement range: < 1% of full-scale value in smallest measurement range: < 2% of full-scale value
Repeatability	$\leq 1\%$ of smallest measurement range

Technical data for oxygen measurement with electrochemical sensor

Measurement range	0 to 5% or 0, to 25% O ₂ , programmable
Influencing variables	
- Drift	
With AUTOCAL	negligible
Without AUTOCAL	typical 1% O ₂ / year in air
- Temperature	< 0.5% O ₂ per 20 K, referred to a measured value at 20 °C
- Atmospheric pressure	< 0.2% measured value per 1% change in pressure
- Residual gases	residual gases containing heavy metals, H ₂ S and halogens result in analyser failures; O ₂ concentrations < 0.5% are only permissible for a short time
O ₂ error	on measurement of typical exhaust gases: < 0.05% O ₂
Output signal noise	< 0.5% of full-scale value
Response time (T_{90} -time)	dependent on dead time and selectable damping, but not < 30 s with a sample gas flow of approx. 1 l/min.
Display resolution	< 0.2% of full-scale value
Output signal resolution	< 0.2% of output signal span
Service life	approx. 2 years with 21% O ₂
Repeatability	$\leq 0.05\%$ O ₂

Technical data for oxygen measurement with paramagnetic sensor

Measuring components	max. 4, including up to 3 infrared active gases and one oxygen component
Measuring range	2 per component min. 0 ... 2 % vol O ₂ max. 0 ... 100 % vol O ₂
Permissible ambient pressure	700 ... 1200 hPa
Permissible operation temperature	5 ... 45 °C
Influencing variables	
- Zero drift	2 % meas. range: max. 0.1 % at weekly zero point adjustment 5 % meas. range: max. 0.1 % at weekly zero point adjustment 25 % meas. range or higher at monthly zero point adjustment
- Temperature error	< 2 % / 10 K for measuring range 5 % < 5 % / 10 K for measuring range 2 %
- humidity error for N ₂ with 90 % rel. humidity after 30 minutes	< 0,6% at 50 °C
- Atmospheric pressure	< 0.2 % of meas. value per 1 % pressure change
Output signal noise	< 1 % of the smallest measuring range
Response time (T ₉₀ -time)	< 60 s
Repeatability	≤ 1 % of the smallest measuring range

Technical data H₂S channel

Measuring ranges	min. 0 ... 500 vpm max. 0 ... 5000 vpm
Influencing variables	
- Drift	< 1 % per month
Repeatability	< 4 % of the full scale value
Resolution	< 0.2 % of the full scale value
Response time (T ₉₀ -time)	< 80 s at approx. 1 ... 1.2 l/min sample gas flow
Permissible ambient pressure range	750 ... 1200 hPa
Permissible ambient temperature	5 ... 40 °C
Sensor life cycle	approx. 12 months