

Gasanalyzer for IR-sensitive gases and oxygen

BA 5000



The BA 5000 gas analyser can measure up to 4 gas components at once: a maximum of three infrared sensitive gases such as CO, CO₂, NO, SO₂, CH₄ plus measurement of O₂ with an electrochemical fuel cell.

It can be used in emission measuring systems and for process and safety monitoring.

TÜV-approved versions of the BA 5000 are available for measurement of CO, NO, SO₂ and O₂ according to 13. BImSchV. and TA-Luft.

The unit must not be used in hazardous areas.

- **stable 19" sheet-steel housing option: bench-top version with handles**
- **operation based on NAMUR recommendations**
- **simple, fast programming and commissioning of analyser**
- **practically maintenance-free as a result of AUTOCAL with ambient air**
- **calibration with calibration gas is only necessary every 6 to 12 months, depending on application**
- **large, backlit LCD**
- **two measuring ranges per gas component**
- **automatic correction of variations in atmospheric pressure**
- **low-flow alarm**
- **maintenance request alert**
- **two limits can be freely configurated**
- **three binary inputs**
- **eight relay outputs**
- **four potential free analog outputs 4-20mA**
- **RS 485**

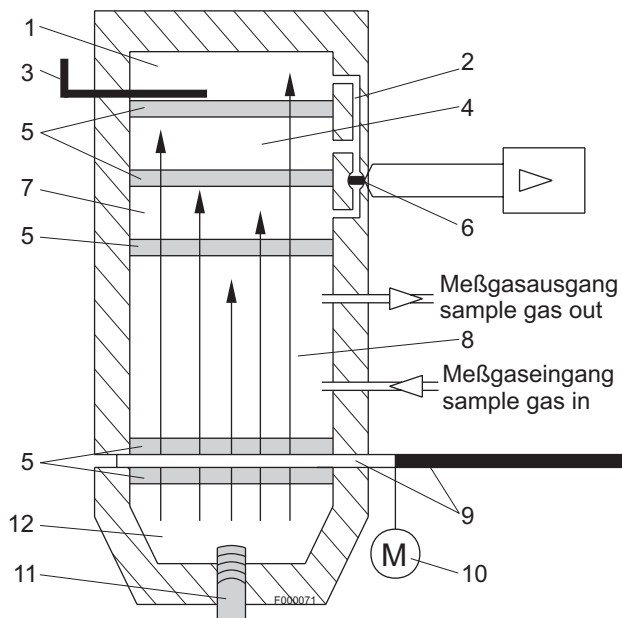
application examples

- optimisation of small firing systems
- monitoring of exhaust gas concentration from firing systems with all types of fuel (oil, gas and coal) as well as operational measurements with thermal incineration plants
- room air monitoring
- monitoring of air in fruit stores, greenhouses, fermenting cellars and warehouses
- monitoring of process control functions

Two independent, selective measuring principles are used in the BA 5000.

infrared measurement

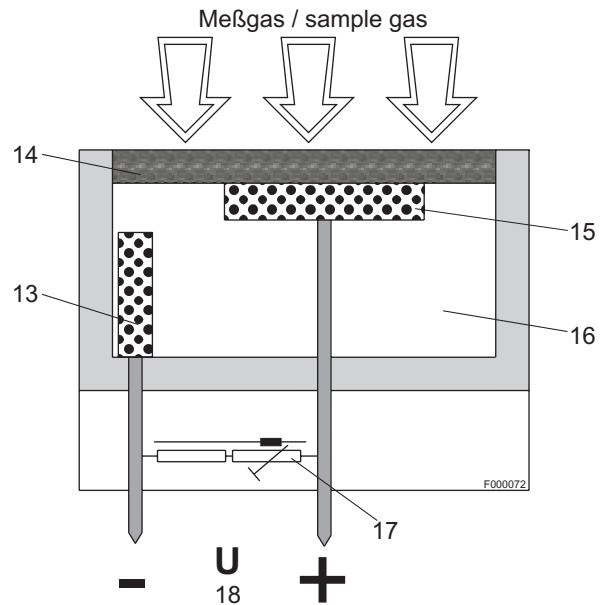
This spectroscopic method is based on the absorption of non-dispersive IR radiation. The attenuation in the radiation of specific wavelengths is a measure of the respective concentration of the gas.



- | | |
|----|-----------------------|
| 1 | third detector layer |
| 2 | capillary |
| 3 | slide |
| 4 | second detector layer |
| 5 | windows |
| 6 | microflow sensor |
| 7 | first detector layer |
| 8 | sample bell |
| 9 | chopper |
| 10 | synchronous motor |
| 11 | IR source |
| 12 | reflector |

oxygen measurement

The oxygen sensor operates according to the principle of a fuel cell. The oxygen is converted at the boundary layer between the cathode and electrolyte; the resulting current is proportional to the concentration of oxygen.



- | | |
|----|---|
| 13 | lead anode |
| 14 | oxygen diffusion membrane made of FEP |
| 15 | gold cathode |
| 16 | electrolyte (acetic acid) |
| 17 | thermistor and load resistor for temperature compensation |
| 18 | signal output |

general technical data

measured components	max. 4 of which up to 3 infrared-sensitive gases plus oxygen
analog outputs	max. 4, floating, 0 / 2 / 4 to 20 mA, linearised
load	≤750 Ω
characteristics	linearised
membrane keypad	LCD with LED backlighting and contrast control, function keys
display	80 characters (4 lines / 20 characters)
EMC interference immunity	according to standard requirements of NAMUR NE21 (05/93) or EN 50081-1, EN 50082-2, EN 61010
position of use	front panel vertical
relay outputs	8, e.g. for fault, maintenance request, limit, function check, AC/DC 24 V / 1 A
binary inputs	3, floating for pump on/off, AUTOCAL trigger and synchronisation
serial interface	RS 485
warming-up time	approx. 5 min. max. accuracy is achieved after approx. 45 minutes
AUTOCAL function	automatic analyser calibration with ambient air, cycle time adjustable from 1 to 24 hours

dimensions

portable analyser frame	(H x W x D) 170 mm x 465 mm x 392mm
19" rack and portable unit	177 mm x 483 mm x 360 mm
weight	approx. 10 kg
degree of protection	IP 21 (EN 60529)

power supply

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
power consumption	approx. 50 VA

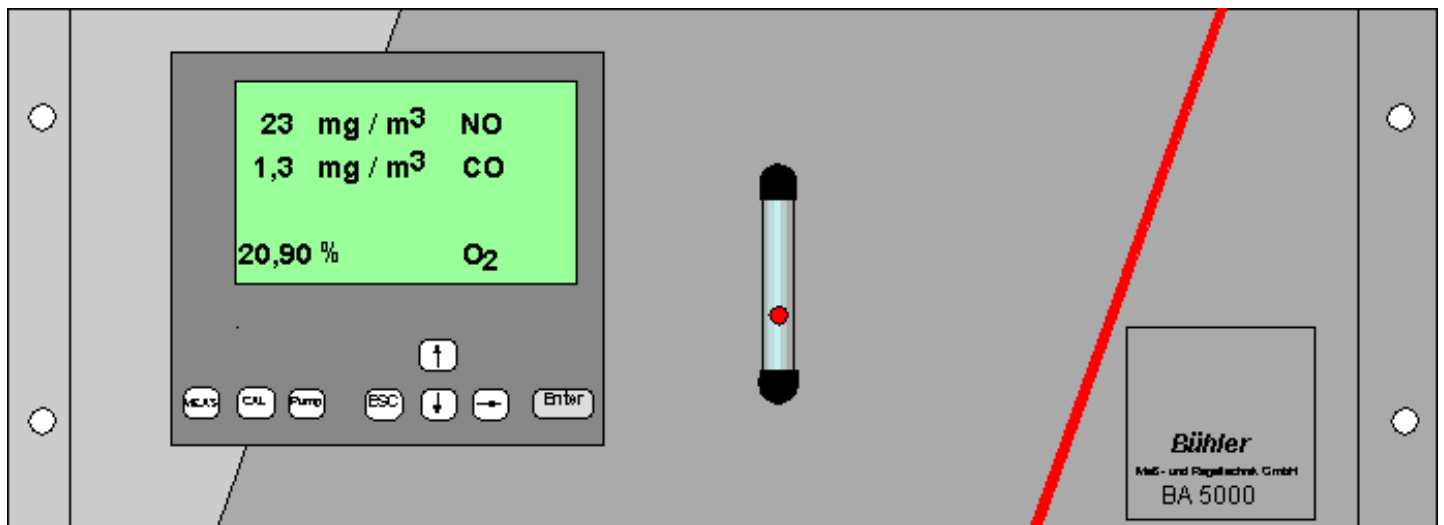
gas input conditions

sample gas pressure	0,5 to 1,5 bar absolute
sample gas flow	66 to 120 l/h (1,1 to 2 l/min.)
sample gas temperature	0 to 50 °C
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 measuring range/week
- temperature	max. 2% of smallest possible measuring range according to type plate per 10 K with an AUTOCAL cycle time of 3 h
- atmospheric pressure	< 0,2% of measuring range per 1% change in pressure, corrected by internal pressure sensor
- residual gases	minimized by selection proceeding
- mains voltage	< 0,1% of output signal span with a change of $\pm 10\%$
- mains 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 measuring range
- 500 MHz to 1 GHz	2% of smallest possible measuring range
display delay (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 measuring 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 measuring range: < 1% of full-scale value in smallest measuring range: < 2% of full-scale value
repeatability	$\leq 1\%$ of smallest measuring range

technical data of oxygen measurement

measuring 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
display delay (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	max. 360000% O ₂ x h approx. 2 years with 21% O ₂
repeatability	$\leq 0,05\%$ O ₂