**NDIR gas analyser in single or dual channel version BA 6000 - IR**

The BA 6000 - IR gas analysers use the NDIR dual stream push-pull principle and highly selectively measure gases with absorption bands in the infrared wave range of 2 to 9 µm, e.g. CO, CO₂, NO, SO₂, NH₃, H₂O, CH₄, and other hydrocarbons. Single channel units measure one gas component. Dual channel units measure two separate gas components simultaneously. The units are designed for use in non-explosive areas.

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<th>Feature</th>
<th>Description</th>
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<tr>
<td>Four measuring ranges per channel, programmable, all measuring ranges linear (including with suppressed zero point)</td>
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<tr>
<td>Electrically isolated measurement output 0/2/4 to 20 mA per channel</td>
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<td>Automatic or manual measuring range switchover option</td>
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<td>Menu-guided control for ease of use</td>
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<td>Fast response time</td>
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<td>Low long-term drift</td>
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<td>Internal pressure sensor for correcting fluctuations in barometric pressure</td>
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<td>Programmable automatic measuring range adjustment</td>
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<td>Operation based on NAMIR</td>
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<tr>
<td>Sample gas monitor (flow rate and pressure)</td>
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<td>RS 485 serial port per channel</td>
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Design and Features

Housing
- 19" rack, 4 HE for installation in swing frames
- 19" rack, 4 HE for installation in cabinets, with or without telescopic rails
- Front panel can be swivelled down (laptop connection)
- Internal pressure sensor for correcting fluctuations in barometric pressure
- Internal gas paths: FPM (Viton) tube or titanium pipe
- Measuring chamber (with or without compensation path under flow) made from stainless steel or tantalum for highly corrosive sample gases. (such as HCl, Cl₂, SO₂, SO₃, etc.)
- Gas connections for sample gas inlet and outlet as well as (possible reference gas): Pipe diameter 6 mm or 1/4"

Display and control panel
- large LCD panel simultaneously displays:
  - Measurement (digital and analog display)
  - Status line
  - Measuring ranges
- LCD panel contract adjustable in menu
- permanent LED backlight
- wipe-clean membrane keyboard with five soft keys
- menu-guided operation for parametrisation, test function and adjustment
- Plain text help
- graphic display of concentration gradient; programmable time intervals
- Control software in two languages: German/English, English/Spanish, French/English, Spanish/English, Italian/English

Inputs/outputs
- One analog output per measurement value
- two analog outputs configurable to e.g. cross-correction
- six programmable binary inputs for e.g. measuring range changeover
- six programmable relay outputs for e.g. failure, maintenance requests, maintenance switch, limit alarm, external solenoid valves
- Optional expansion, eight each additional binary inputs and relay outputs for automatic adjustment with max. four test gases

Port
- RS 485 serial per channel
Function

The BA 6000 - IR gas analyser uses the infrared push-pull alternating light principle with double layer detector and optical coupler.

The measuring principle is based on infrared light absorption. The absorbed wavelengths are characteristic for individual gases. However, with a gas mixture, some spectra may overlap. On the BA 6000 - IR these cross-sensitivities are minimised by:

- the gas-filled beam splitter (6)
- the double-layer detector with optical coupler (11-13)
- optical filters based on analysis purpose (5)

A transducer (4) heated to about 700 °C which can then be shifted to balance the system generates two equal beams (measurement and reference beam) inside the beam splitter (6). The beam splitter also serves as filter cuvette. Whilst the reference beam impinges upon the right side of the detector chamber (11) through a reference cuvette (10) filled with N\textsubscript{2} (not infrared-active gas) practically unattenuated, the measurement beam flows through the measurement cuvette (9) with sample gas flowing through it and, weakened more or less depending on the concentration of the sample gas, impinges on the left side of the detector chamber (13). The detector chamber is filled with a defined concentration of the gas component to be measured.

The detector has a double-layer design. The top detector layer preferably absorbs the middle of the absorption bands, whilst the sides of the bands is absorbed about equally in the bottom and top layer. The top and bottom detector layer are pneumatically connected via the microflow sensor (3). This degeneration results a very narrow-band spectral sensitivity.

The optical coupler (12) optically extends the bottom detector chamber layer. Changing the slider position (14) generates a pulsing stream between the detector chambers, which the microflow sensor (3) converts into an electric signal.

The microflow sensor consists of two nickel grids which are heated to 120 °C, which together with two additional legs forms a Wheatstone bridge. The pulsing flow combined with a very dense grid arrangement changes the resistance of the Ni grids. This causes bridge detuning which varies by the concentration of the sample gas.

Technical Data

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BA 6000 IR Technical Data

**Power input**
- approx. 40 VA for single channel unit
- approx. 75 VA for dual channel unit

**Gas inlet conditions**
- Pressure:
  - Pressure: 0.5 to 1.5 bar absolute
- Pressure flow: 20 to 90 L/h (0.3 to 1 L/min)
- Temperature: 0 to 50 °C
- Humidity: < 90% RH or varies by measuring task

**Time behaviour**
- Heat-up time: at room temperature: < 30 min
- Lag (T₉₀ time): varies by dead time and programmable damping
- Damping: 0 to 100 s, programmable (electric time constant)
- Time lag: approx. 0.5 to 5 s depending on version (washout time of the gas path inside the device at 1 L/min.)
- Time for internal signal processing: < 1 s

**Pressure correction range**
- Pressure sensor (internal or external): 700 to 1200 mbar

**Measuring performance**

| Static | + 1 % of the smallest possible measuring range per type plate |
| Zero drift | < ± 1 % from measuring range / week |
| Measurement value drift | < ± 1 % from measuring range / week |
| Reproducibility | between 0.1 % and 1 % from the respective measuring range depending on version |

**Factors**
- Ambient temperature: < 1% from measuring range / 10K
- Sample gas pressure: with pressure compensation off: < 0.15 % from target value 1 % air pressure change
- Sample gas flow rate: negligible
- Auxiliary energy: < 0.1% from output signal range at a rated voltage of ± 10%

**Electric inputs and outputs**
- Analog output: 0 / 2 / 4 to 20 mA, potential-free, load ≤ 750 ῼ
- Relay outputs: 6 with change-over contacts, programmable e.g. to measuring range identification; rating: AC/DC 24 V / 1 A, potential-free, non-sparking
- Analog inputs: 2, configured for 0 / 2 / 4 to 20 mA for external pressure sensor and carrier gas influence (cross-gas correction)
- Binary inputs: 6, configured for 24 V, potential-free, freely parametrisable e.g. to measuring range changeover
- Port: RS 485
- Options: Add-on electronics with 8 each additional binary inputs and relay outputs, e.g. to trigger automatic adjustment

**Permissible climatic conditions**
- Ambient temperature: - 30 to + 70 °C during storage and transport, + 5 to + 45 °C during operation
- Humidity: < 90% RH or annual average during storage and transport
- IP rating: IP 20 (EN 60529)

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1) RH: relative humidity
2) highest accuracy is reached after 2 hours
3) based on sample gas pressure 1 bar absolute, 0.5 L/min sample gas flow and 25 °C ambient temperature