

Portable Flue Gas Analyser

Properties

Measurement of gas concentrations

- Gas concentrations measured with NDIR sensors: CO₂, CH₄
- Gas concentrations measured with electrochemical sensors: O₂
- Toxic gas concentrations measured with electrochemical sensors: CO, NO, NO₂, SO₂. Please ask for quote for other gases.

Measurement of other parameters

- Measurement of gas and ambient temperatures
- Pressure, draft and differential pressure measurements with 1 Pa resolution
- Soot test according to Bacharach with a pump flow of 1.63 l/min
- Three analogue inputs (1 current/voltage, 1 thermocouple, 1 thermistor)

Calculation

- CO₂ concentration
- Calculation of absolute and relative mass concentrations & relative emissions
- Calculation of all relevant combustion parameters

Processing and presentation of measured data

- All results shown on display
- Averaging of all measured values. Averaging time: 10 sec - 60min
- Graphical presentation of all measured values as diagram
- Memory capacity for 1024 sets of data, organised into 10 data banks
- Up to 9 separate items in a data set
- User definition of the 9 items
- Memory capacity for 30 reports
- Data logger function for the analogue inputs
- All measured values, stored values or displays can be printed on the internal printer.
- Powerful PC program for analyser settings and data communication

Software capabilities

- International compatibility (language, date format etc.)
- Password protection for settings
- Automatic zeroing when the analyser is switched on
- Calibration of O₂/CO₂ during use
- All parameters programmable
- List of 22 common fuels
- 10 further freely programmable fuels
- Permanent automatic check of the instrument with acoustic warning and full information in the "control list"
- Compensation of cross sensitivity and temperature drift of gas sensors

Hardware capabilities

- CO measurement - separate from the other gas channels. If the freely programmable maximum is exceeded, then the sensor is purged with air, without interrupting the other measurements
- Electronic regulation of the pump flow rate
- Integrated clock/calendar
- Internal 57 mm dot-matrix printer
- Power from rechargeable battery or mains
- Big (75 x 64 mm) LCD display with backlighting (Graphics or 11 x 21 characters)
- Gas probe with thermocouple and condensate trap
- Power for heated probe holder during mains operation
- RS-232C interface and multifunctional PC program

Optional accessories

- Choice of soft carrying case or hard housing
- Mini Peltier gas dryer with peristaltic pump
- External ambient temperature sensor



The combustion gas analyser GA-21plus is designed especially for service technicians who are permanently employed in measuring emissions and carrying out adjustments on various burner and heating equipment. Using the optional NO and NO₂ sensors it is possible to calculate NO_x simply as the sum of NO and NO₂. SO₂ can also be measured if needed. All parts of the combustion gas analyser are designed for a long and trouble-free operation. Using the optional Peltier dryer it is possible to carry out longer term measurements. Two extra analogue inputs allow the simultaneous measurement of a voltage or current signal and a temperature. This makes it ideally suited for measurements on district heating plants. Manufactured with EN50379 in mind.

Operating data

| Parameter | Description |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Size of case | WxHxD: 460 x 160 x 170 mm |
| Weight w/o probe | 6,2 kg |
| Display size | Graphical - LCD, with backlighting and variable contrast, 128x112pixels, 75x64mm |
| Printer | high-speed dot matrix printer with graphics capability for 57 mm normal paper |
| Data memory | Memory for 30 reports and 10 banks containing a total of 1024 sets of data |
| CO - measurement channel | Separate from the other gas channels. If the freely programmable maximum is exceeded then the sensor is purged with air, without interrupting the other measurements |
| Interface | RS232C |
| Power supply | 110/220V AC 50 ÷ 60Hz |
| Charging time | Lead-acid battery 12V / 2.2Ah, charging time 10 h, working time approx. 6h |
| Gas pump | Membrane pump, electronically regulated at 90l/h |
| Probe | Heated for soot test |
| Probe length | 300 mm (other options available) |
| Length of gas line | 3 m |
| Gas filter | In line filter 20 µm |
| Operating temperature | 10 °C ÷ 50°C |
| Storage temperature | -20 °C ÷ +55 °C |
| Humidity | 5 - 90 %, non-condensing |

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| Technical data |
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| Parameter | Method | Indication range | Display resolution | Accuracy | Detection limit | Response time (t90) |
|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------|---------------------|-------------------------------------|----------------------|---------------------|
| Gases measured in standard configuration | | | | | | |
| O ₂ - oxygen, volumetric concentration | electrochemical gas sensor | 0...25 % | 0.01% | 0.2% | 0.2% | 45 s |
| CO ₂ - carbon dioxide, volumetric concentration | calculated from volumetric concentration of O ₂ | 0..25 % | 0.01% | 0.2% | 0.2% | 45 s |
| CO - carbon monoxide, volumetric concentration | electrochemical gas sensor | 0....20,000 ppm | 0.1 or 1ppm as set | ± 5 ppm or 5 % rel. | 5 ppm | 45 s |
| CO _{mg} - carbon monoxide, mass concentration | calculated from volumetric concentration of CO | 0... | 1mg/Nm ³ | ± 10 mg/Nm ³ or 5 % rel. | 10mg/Nm ³ | 45 s |
| CO _{rel} - carbon monoxide, mass concentration relative to O ₂ | calculated from volumetric concentration of CO and O ₂ | 0... | 1mg/Nm ³ | ± 10 mg/Nm ³ or 5 % rel. | 10mg/Nm ³ | 45 s |
| Gases measured with optional IR sensors | | | | | | |
| CO ₂ - carbon dioxides volumetric concentration | IR sensor | 0...25 % 0...100% | 0.01% 0.1% | 0,5 % from Range or +/- 3 % rel. | 0.2% | 45 s |
| CH ₄ - Methane, volumetric concentration | IR sensor | 0..5% 0...100% | 0.01% 0.1% | 0,5 % from Range or +/- 3 % rel. | 0.2% | 45 s |
| Gases measured with optional electrochemical sensors | | | | | | |
| NO / NO _x - volumetric concentration of nitrogen oxides. | electrochemical gas sensor | 0...5000ppm | 1ppm | ± 5 ppm or 5 % rel. | 1ppm | 45 s |
| NO _{mg} /NO _{xmg} - mass concentration of nitrogen oxides | calculated from volumetric concentration of NO | 0... | 1mg/Nm ³ | ± 10 mg/Nm ³ or 5 % rel. | 1mg/Nm ³ | 45 s |
| NO _{rel} / NO _{xrel} - mass concentration of nitrogen oxides relative to O ₂ | calculated from volumetric concentration of NO and O ₂ | 0... | 1mg/Nm ³ | ± 10 mg/Nm ³ or 5 % rel. | 1mg/Nm ³ | 45 s |
| NO ₂ - volumetric concentration of nitrogen dioxide. | electrochemical gas sensor | 0...1000ppm | 1ppm | ± 5 ppm or 5 % rel. | 1ppm | 45 s |
| NO _{2mg} - mass concentration of nitrogen dioxide | calculated from volumetric concentration of NO ₂ | 0... | 1mg/Nm ³ | ± 10 mg/Nm ³ or 5 % rel. | 2mg/Nm ³ | 45 s |
| NO _{2rel} - mass concentration of nitrogen dioxide relative to O ₂ | calculated from volumetric concentration of NO ₂ and O ₂ | 0... | 1mg/Nm ³ | ± 10 mg/Nm ³ or 5 % rel. | 2mg/Nm ³ | 45 s |
| SO ₂ - volumetric concentration of sulphur dioxide. | electrochemical gas sensor | 0...5000ppm | 1ppm | ± 5 ppm or 5 % rel. | 1ppm | 45 s |
| SO _{2mg} - mass concentration of sulphur dioxide. | calculated from volumetric concentration of SO ₂ | 0... | 1mg/Nm ³ | ± 15 mg/Nm ³ or 5 % rel. | 3mg/Nm ³ | 45 s |
| SO _{2rel} - mass concentration of sulphur dioxide. relative to O ₂ | calculated from volumetric concentration of SO ₂ and O ₂ | 0... | 1mg/Nm ³ | ± 15 mg/Nm ³ or 5 % rel. | 3mg/Nm ³ | 45 s |
| Other measured values | | | | | | |
| T _{gas} - flue gas temperature | Thermocouple | -10...1000°C | 1°C | ± 2 °C or 1. 5 % rel. | 1 °C | 30 s |
| T _{amb} - ambient temperature | Thermistor | -10...100°C | 1°C | ± 1 °C | 1 °C | 30 s |
| UI/ - 1 external current/voltage input | A/D Wandler | 0/4...+20mA -20...+20V | 0.01mA 0.01V | ±0.02mA ±0.02V | 0.01mA 0.01V | 10 s |
| T1 - 1 external input | Thermocouple | 0...1600°C | 1°C | ± 2 °C or 1. 5 % rel. | 1 °C | 10 s |
| T2 - 1 external input | Thermistor | -20...100°C | 1°C | ± 2 °C or 1. 5 % rel. | 1 °C | 10 s |
| Pressure/diff. pressure | DMS bridge | -25hPa ... +25hPa | 0.1Pa | ± 2 Pa or 5 % rel. | 1 Pa | 10 s |
| flow velocity (Option) | Pitot tube | 1..50m/s | 0.1m/s | 0.3m/s or 5% rel. | 0.1m/s | 10 s |
| Soot/smoke test | Bacharach method | 0...9 | 0.5 | 0.5 | 0.5 | |
| TI (CO/CO ₂ -Toxic Index) | calculated | 0...0.01 | 0.0001 | 5 % rel. | 0 | 10 s |
| Lambda - excess air number | calculated | 1...10 | 0.01 | 2 % rel. | 0 | 10 s |
| q _A - combustion losses | calculated | 0...100% | 0.1% | 2 % rel. | 0 % | 10 s |
| Eta - efficiency | calculated | 0...120% | 0.1% | 2 % rel. | 0 % | 10 s |