

## Portable Flue Gas Analyser



### Properties

#### Measurement of gas concentrations

- ◆ Concentrations measured with electrochemical sensors: O<sub>2</sub>, CO, NO, NO<sub>2</sub>, SO<sub>2</sub>.
- ◆ Optional two electrochemical sensors: H<sub>2</sub>S, H<sub>2</sub>
- ◆ Gas concentrations measured with NDIR sensors: N<sub>2</sub>O, CO<sub>2</sub>, CH<sub>4</sub>

#### Measurement of other parameters

- ◆ Measurement of gas and ambient temperatures
- ◆ Pressure, draft and differential pressure measurements with 1 Pa resolution
- ◆ Ambient pressure measurement with resolution of 0.1 hPa – option
- ◆ 8 Temperature channels (4 thermocouples and 4 thermistors) – option.
- ◆ Soot test according to Bacharach with a pump flow of 1.63 l/min

#### Calculations

- ◆ CO<sub>2</sub> concentration if no CO<sub>2</sub> sensor is fitted.
- ◆ Calculation of all relevant combustion parameters.
- ◆ Calculation of absolute and relative mass concentrations for the measured gases
- ◆ Calculation of absolute and relative volumetric concentrations for the measured gases

#### Preparation and display of measured values

- ◆ All measured and calculated values can be displayed as averaged values as well. Averaging time can be chosen from the series: 2, 10, 20, 30, 60, 120, and 180 seconds.
- ◆ Single and triple long-term measurements (XL measurements). Period for long-term measurements chosen from the series: 10 s, 20 s, 30 s, 1 min., 5 min., 10 min., 15 min., 20 min., 30 min.
- ◆ Single or continuous storage of results. One set of data will contain all measured and calculated values.
- ◆ Memory for 1M sets of data (MMC 256MB)
- ◆ Complete software package for the PC to process readings and communicate on-line.

#### Software features

- ◆ Automatic zero calibration on switch-on
- ◆ All parameters can be freely programmed
- ◆ Complete list of 10 standard fuels
- ◆ Freely programmable fuels
- ◆ Continuous automatic monitoring of instrument function with acoustic warning and detailed information under "Control List"
- ◆ Cross-sensitivity and temperature drift of gas sensors is fully compensated

#### Hardware features

- ◆ Data logger with full 256 MB memory to facilitate continuous storing of results. The results can be read from the memory into a PC.
- ◆ Flash memory for all instrument settings
- ◆ Large LCD display (320 x 240) with backlighting
- ◆ Internal dot matrix printer 57 mm wide
- ◆ PC interface RS232C for communication with the analyser and data transfer
- ◆ Power for heated probe holder during mains operation
- ◆ Power from rechargeable battery or mains
- ◆ Twin gas filters (20 µm, 5 µm) and rotameter integrated in gas system
- ◆ Integral clock/calendar with separate buffer battery

#### Optional

- ◆ 8 Temperature channels (4 thermocouples and 4 thermistors)
- ◆ Output signal module. Freely programmable analogue outputs (8 channels voltage 0...11 V/12 bit resolution and 8 channels current 0...25 mA/12 bit resolution). Can be set to any parameter.

The instrument is fitted with 5 electrochemical sensors as standard. A further 2 electrochemical sensors and 3 infrared sensors can be added. The modular construction allows the instrument to be configured for nearly every customer requirement. The instrument also has various analog inputs and outputs to enable easy data transfer and documentation.

### Operating data

Parameter	Description
Size of case	BxTxH: 500 x 410 x 180 mm
Weight w/o probe	9.5 kg
Display size	LCD, with backlighting, 320 x 240 Pixel
Printer	Internal dot matrix printer 57 mm wide
Data memory	256 MB memory to facilitate continuous storing of results
CO - measurement channel	Separate from other gas channels. If the programmed maximum is exceeded, then the CO sensor will be automatically purged without inhibiting the other measurement channels.
Interface	RS232C
Power supply	110/230 VAC 50/60 Hz
Battery	Lead-acid battery 12V / 2.2Ah, charging time 10 h, working time approx. 6h
Gas pump	Membrane pump
Probe	Heated for soot test
Probe length	300 mm (other options available)
Length of gas line	3m
Gas filter	in line filter 5µm and 20 µm
Operating temperature	10 °C ÷ 50 °C
Storage temperature	-20 °C ÷ +55 °C
Ambient humidity	5 – 90 %, non-condensing

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Parameter	Method	Indication range	Display resolution	Accuracy	Detection limit	Response time (t90)
<b>Gases measured in standard configuration</b>						
O <sub>2</sub> - oxygen, volumetric concentration	electrochemical gas sensor	0...25 %	0.01%	± 0.2% or 2% rel.	0.01%	45 s
CO <sub>2</sub> - carbon dioxide, volumetric concentration	calculated from volumetric concentration of O <sub>2</sub>	0..25 %	0.01%	± 0.2% or 2% rel.	0.01%	45 s
CO - carbon monoxide, volumetric concentration	electrochemical gas sensor	0...20,000 ppm	0.1 or 1 ppm as set	± 5 ppm or 5 % rel.	5 ppm	45 s
CO - carbon monoxide, volumetric concentration (optional)	electrochemical gas sensor	0...10%	10 ppm or 0.001 %	± 50 ppm or 5 % rel.	10 ppm	45 s
COmg - carbon monoxide, mass concentration	calculated from volumetric concentration of CO	0...	1 mg/Nm <sup>3</sup>	± 10 mg/Nm <sup>3</sup> or 5 % rel.	10mg/Nm <sup>3</sup>	45 s
COrel - carbon monoxide, mass concentration relative to O <sub>2</sub>	calculated from volumetric concentration of CO and O <sub>2</sub>	0...	1 mg/Nm <sup>3</sup>	± 10 mg/Nm <sup>3</sup> or 5 % rel.	10mg/Nm <sup>3</sup>	45 s
NO / NO <sub>x</sub> - volumetric concentration of nitrogen oxides.	electrochemical gas sensor	0...5000ppm	1ppm	± 5 ppm or 5 % rel.	1ppm	45 s
NOmg/NO <sub>x</sub> mg - mass concentration of nitrogen oxides	calculated from volumetric concentration of NO	0...	1 mg/Nm <sup>3</sup>	± 10 mg/Nm <sup>3</sup> or 5 % rel.	1mg/Nm <sup>3</sup>	45 s
NOrel / NO <sub>x</sub> rel - mass concentration of nitrogen oxides relative to O <sub>2</sub>	calculated from volumetric concentration of NO and O <sub>2</sub>	0...	1 mg/Nm <sup>3</sup>	± 10 mg/Nm <sup>3</sup> or 5 % rel.	1mg/Nm <sup>3</sup>	45 s
NO <sub>2</sub> - volumetric concentration of nitrogen dioxide.	electrochemical gas sensor	0...1000 ppm	1 ppm	± 5 ppm or 5 % rel.	1 ppm	45 s
NO <sub>2</sub> mg - mass concentration of nitrogen dioxide	calculated from volumetric concentration of NO <sub>2</sub>	0...	1 mg/Nm <sup>3</sup>	± 10 mg/Nm <sup>3</sup> or 5 % rel.	2 mg/Nm <sup>3</sup>	45 s
NO <sub>2</sub> rel - mass concentration of nitrogen dioxide relative to O <sub>2</sub>	calculated from volumetric concentration of NO <sub>2</sub> and O <sub>2</sub>	0...	1 mg/Nm <sup>3</sup>	± 10 mg/Nm <sup>3</sup> or 5 % rel.	2 mg/Nm <sup>3</sup>	45 s
SO <sub>2</sub> - volumetric concentration of sulphur dioxide.	electrochemical gas sensor	0...5000ppm	1 ppm	± 5 ppm or 5 % rel.	1 ppm	45 s
SO <sub>2</sub> mg - mass concentration of sulphur dioxide.	calculated from volumetric concentration of SO <sub>2</sub>	0...	1 mg/Nm <sup>3</sup>	± 15 mg/Nm <sup>3</sup> or 5 % rel.	3 mg/Nm <sup>3</sup>	45 s
SO <sub>2</sub> rel - mass concentration of sulphur dioxide. relative to O <sub>2</sub>	calculated from volumetric concentration of SO <sub>2</sub> and O <sub>2</sub>	0...	1 mg/Nm <sup>3</sup>	± 15 mg/Nm <sup>3</sup> or 5 % rel.	3 mg/Nm <sup>3</sup>	45 s
<b>Gases measured with optional IR sensors</b>						
N <sub>2</sub> O – nitrous oxide volumetric concentration	IR sensor	0...2000ppm	1 ppm	± 5 ppm or 5 % rel.	1 ppm	45 s
CO <sub>2</sub> - 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 <sub>4</sub> - Methane, volumetric concentration	IR sensor	0...5% 0...100%	0.01% 0.1%	0.5 % from Range or +/- 3 % rel.	0.2 %	45 s
<b>Temperature measurements</b>						
T <sub>gas</sub> - flue gas temperature	Thermocouple	-10..1000 °C	1 °C	1 °C	±2 °C abs., or 1.5 % rel.	30 s
T <sub>amb</sub> - ambient temperature	Thermistor	-10..100 °C	1 °C	1 °C	±1 °C abs., or 1.5 % rel.	30 s
<b>Other measured values</b>						
Pressure	DMS bridge	-20...+20 hPa	0.1 Pa	0.1 Pa	±2 Pa abs., or 5 % rel.	10 s
Diff. Pressure	DMS bridge	-20...+20 hPa	0.1 Pa	0.1 Pa	±2 Pa abs., or 5 % rel.	10 s
<b>Calculated parameters</b>						
TI (CO/CO <sub>2</sub> -Toxic Index)	calculated	0... 1 %	0.01 %	5 % rel.	0.01 %	10 s
Lambda - excess air number	calculated	1...10	0.01	0.01	0.01	5 s
q <sub>A</sub> - combustion losses	calculated	0...100 %	0.1 %	0.1 %	0.1 %	5 s
Eta - efficiency	calculated	0...100 %	0.1 %	0.1 %	0.1 %	5 s