



## Portable Flue Gas Analyser

The flue gas analyser *Sensonic 4500* is designed especially for service technicians who are permanently employed in measuring emissions and carrying out adjustments as well as making long-term measurements and inspections on various burner and heating equipment. For this purpose the analyser is fitted with a high-powered dryer and heated hose. The analyser can be equipped with 9 sensors (7 electrochemical and 2 IR sensors). All parts of the analyser are designed for a long and trouble-free operation. 6 additional analogue inputs for voltage/current signals and temperature together with 2 optional analogue outputs give the instrument an unheard of flexibility. The analyser can also be fitted with two IR sensors for direct measurement of CO<sub>2</sub> and CH<sub>4</sub>. Constructed to be compliant with EN50379.

### Operating data

Parameter	Description
Size of case	WxHxD:485 x 205 x 295 mm
Weight w/o probe	10 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	110/230VAC 50 ÷ 60Hz
Charging time	Lead-acid battery 12V / 2.2Ah, charging time 10 h, working time approx. 6h (w/o dryer)
Gas pump	Membrane pump, electronically regulated at 90l/h
Probe	Heated for soot test
Probe length	300 mm (other options available)
Length of heated line	3 m
Gas dryer	Peltier dryer
Gas filter	heated in line filter 20 µm
Operating temperature	10 °C ÷ 50 °C
Storage temperature	-20 °C ÷ +55 °C
Ambient humidity	5 - 90 %, non-condensing

### Properties

#### Measurement of gas concentrations

- Gas concentrations measured with NDIR sensors: CO<sub>2</sub>, CH<sub>4</sub>
- Gas concentrations measured with electrochemical sensors: O<sub>2</sub>
- Toxic gas concentrations measured with electrochemical sensors: CO, NO, NO<sub>2</sub>, SO<sub>2</sub>. 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
- 6 analogue inputs (2 current/voltage, 2 thermocouple, 2 thermistor)

#### Calculation

- CO<sub>2</sub> 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

- Special software for long-term measurements with measurement, purging, zeroing and standby times. All intervals programmable.
- International compatibility (language, date format etc.)
- Password protection for settings
- Automatic zeroing when the analyser is switched on
- Calibration of O<sub>2</sub>/CO<sub>2</sub> 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

- the analyser is fitted with a high-powered Peltier dryer and heated hose.
- 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 (70 x 60 mm) LCD display with backlighting (Graphics or 11 x 21 characters)
- Gas probe with thermocouple and condensate trap
- RS-232C interface and multifunctional PC program

#### Optional accessories

- External ambient temperature sensor

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# Sensonic 4500

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 / NOx - volumetric concentration of nitrogen oxides.	electrochemical gas sensor	0...5000ppm	1ppm	± 5 ppm or 5 % rel.	1ppm	45 s
NOmg/NOxmg - 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 / NOxrel - 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
NO2mg - 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
NO2rel - 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
SO2mg - 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
SO2rel - 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>						
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>						
Tgas - flue gas temperature	Thermocouple	-10..1000 °C	1 °C	1 °C	±2 °C abs., or 1.5 % rel.	30 s
Tamb - 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
qA - 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