



Sensonic 4500

CHARACTERISTIC | FEATURES | TECHNICAL DATA | SENSORS | EQUIPMENT | APPEARANCE

All-in-one professional gas analyser that combines high efficiency sample conditioning stage (heated filter, headed hose and a gas dryer) with great measurement accuracy.

Device is covered by a soft compact casing which makes it easy to carry on to the measurement field.

Gas analysis is made using mainly electrochemical sensors but it's also possible to install up to 2 sensors in non-dispersive infrared technology.

Built-in dot-matrix ribbon printer allows to generate a report to summarise measurements on site.

The device meets standards of EN50379 norm.

Sensonic 4500



CHARACTERISTIC	FEATURES	TECHNICAL DATA	SENSORS	EQUIPMENT	APPEARANCE
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- Equipped with up to 7 electrochemical cells
- Equipped with up to 2 NDIR sensors
- Built-in 58mm ribbon, graphic printer
- Built-in rechargeable battery for up to 8 hours of operation (heated hose and gas dryer require AC power)
- Built-in Peltier dryer with peristaltic pump for condensate removal
- Equipped with heated hose with built-in heated gas filter
- Heated hose with standard M30x1 fitting, fits all madur gas probes with K-type thermocouples
- Additional gas filter with condensate trap
- Differential pressure sensor - for measurements of chimney draft and flow velocity (with help of Pitot tube)
- Soot measurement programme
- Measurements of gas and ambient temperatures, 2 additional inputs for temperature sensors
- Analogue outputs (4-20mA / 0-10V) - optional
- Built-in large memory for results, two formats of data savings
- Calculations of many combustion parameters
- Calibration of electrochemical sensors allowed to user



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CHARACTERISTIC	FEATURES	TECHNICAL DATA	SENSORS	EQUIPMENT	APPEARANCE
Dimensions (W * H * D)		470 mm * 310 mm * 160 mm			
Weight (without accessories)		12,0 ÷ 12,8kg			
Casing material		Aluminium padded with foam and fabric (polyester)			
Operating conditions		T: 10°C ÷ 50°C, RH: 5% ÷ 90% (non-condensing)			
Storing temperature		0°C ÷ 55°C			
Power supply: input maximal power consumption		115 VAC or 230 VAC 90 W (without heated hose)			
Battery: type work time charging time		Lead-acid, rechargeable 12V / 2,2Ah 7h 14h			
Data memory: size number of results		32kB 30 reports + 10 banks (1024 sets of data)			
Display		Graphical LCD 128 * 128, with variable contrast and backlighting			
Printer		High-speed dot matrix, graphic printer for 57 mm normal paper			
Analogue outputs (optional)		Two current (0/4 ÷ 20mA) or voltage (0 ÷ 10V) outputs			
Gas pump gas flow		Diaphragm, max 2l/min (with automatic flow control) 90l/h (1,5l/min)			
Purging pump for CO sensor		Diaphragm, max 1,5l/min			
Communication interface with PC computer		RS-232C			
Gas filtering		1. Heated filter included in the heated hose 2. Built-in final filter (behind the gas dryer) with replaceable insert			
BUILT-IN GAS DRYER, HEATED HOSE DRIVER, HEATED HOSE					
Drying method		Water condensation by rapid cooling down			
Cooler type		Based on Peltier element			
Cooler temperature		+5°C electronically stabilised			
Cooler temperature hysteresis		~ 1°C			
Maximum gas flow for efficient drying		100 l/h			
Condensate pump		Peristaltic, 38 ml/min			
Heated hose temperature		+120°C electronically stabilised			
Heated hose temperature hysteresis		~ 5°C			
Heated hose length		3m (optionally 5m or 10m)			
Heated hose power consumption		360W (max)			
Heated hose thermocouple wires		K-type (S-type optionally)			



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MEASUREMENTS					
Variable	Method	Range Resolution	Accuracy	Time (T ₉₀)	
T _{gas} - gas temperature	K-type thermocouple	-10 ÷ 1000°C 0,1°C	± 2°C	10 sec	
T _{gas} - gas temperature	S-type thermocouple	-10 ÷ 1500°C 0,1°C	± 2°C	10 sec	
T _{amb} - boiler intake air temperature	PT500 resistive sensor	-10 ÷ 100°C 0,1°C	± 2°C	10 sec	
T ₁ & T ₃ – external temperatures	K-type thermocouple	-10 ÷ 1000°C 0,1°C	± 2°C	10 sec	
T ₁ & T ₃ – external temperatures	S-type thermocouple	-10 ÷ 1500°C 0,1°C	± 2°C	10 sec	
T ₂ & T ₄ – external temperatures	PT500 resistive sensor	-10 ÷ 100°C 0,1°C	± 2°C	10 sec	
Differential pressure	Silicon piezoresistive pressure sensor	-25 hPa ÷ +25 hPa 1 Pa (0,01hPa)	± 2Pa abs. or 5% rel.	10 sec	
Gas flow velocity	Indirect, with Pitot tube & pressure sensor	1 ÷ 50 m/s 0,1 m/s	0,3 m/s abs. or 5% rel.	10 sec	
Lambda λ - excess air number	Calculated	1 ÷ 10 0,01	± 5% rel.	10 sec	
qA - stack loss	Calculated	0 ÷ 100% 0,1%	± 5% rel.	10 sec	
Eta - η combustion efficiency	Calculated	0 ÷ 120% 0,1%	± 5% rel.	10 sec	
U ₁ & U ₂ – analogue inputs (voltage)	Delta-sigma ADC	-20V ÷ +20V 0,01V	± 2% rel.	10 sec	
I ₁ & I ₂ – analogue inputs (current)	Delta-sigma ADC	-20mA ÷ +20mA 0,01mA	± 2% rel.	10 sec	

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Method		Range Resolution	Accuracy	Time (T ₉₀)	Conformity
O₂ - OXYGEN					
Electrochemical		20,95% 0,01%	± 0,2% abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Electrochemical, partial pressure		20,95% 0,01%	± 0,2% abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Electrochemical, partial pressure		25,00% 0,01%	± 0,2% abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Electrochemical, partial pressure		100,00% 0,1%	± 0,2% abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Paramagnetic		25,00% 0,01%	± 0,2% abs. or 5% rel.	45 sec	EN 14789; OTM-13
Paramagnetic		100,00% 0,1%	± 0,2% abs. or 5% rel.	45 sec	EN 14789; OTM-13
CO - CARBON MONOXIDE					
Electrochemical		4 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Electrochemical		20 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Electrochemical		10% 0,001%	± 0,005% abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Electrochem., with H ₂ compensation		2 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	ISO 12039; CTM-030
NDIR		10% 0,01%	± 0,05% abs. or 5% rel.	45 sec	EN 15058
NDIR		100% 0,1%	± 0,5% abs. Or 5% rel.	45 sec	EN 15058
CO₂ - CARBON DIOXIDE					
NDIR		25% 0,01%	± 0,05% abs. or 5% rel.	45 sec	ISO 12039
NDIR		50% 0,01%	± 0,05% abs. or 5% rel.	45 sec	ISO 12039
NDIR		100% 0,1%	± 0,5% abs. or 5% rel.	45 sec	ISO 12039
CH₄ – METHANE					
NDIR		5% 0,01%	± 0,05% abs. or 5% rel.	45 sec	
NDIR		25% 0,01%	± 0,05% abs. or 5% rel.	45 sec	
NDIR		100% 0,1%	± 0,5% abs. or 5% rel.	45 sec	
NO - NITRIC OXIDE					
Electrochemica		1 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	EN 50379; CTM-022
Electrochemical		5 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	EN 50379; CTM-022
NO₂ - NITROGEN DIOXIDE					
Electrochemical		1 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	60 sec	EN 50379, CTM-022
SO₂ - SULPHUR DIOXIDE					
Electrochemical		2 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	EN 50379
Electrochemical		5 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	EN 50379
H₂S- HYDROGEN SULFIDE					
Electrochemical		1 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	70 sec	

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Method		Range Resolution	Accuracy	Time (T₉₀)	Conformity
H₂ - HYDROGEN					
Electrochemical sensor		2 000 ppm 1 ppm	± 10 ppm abs. or 5% rel.	50 sec	
Electrochemical sensor		20 000 ppm 1 ppm	± 10 ppm abs. or 5% rel.	70 sec	
Thermal Conductivity Detector		10% 0,1%	± 0,5% abs. or 5% rel.	45 sec	
Thermal Conductivity Detector		25% 0,1%	± 0,5% abs. or 5% rel.	45 sec	
Thermal Conductivity Detector		50% 0,1%	± 0,5% abs. or 5% rel.	45 sec	
Thermal Conductivity Detector		100% 0,1%	± 0,5% abs. or 5% rel.	45 sec	
CL₂ - CHLORINE					
Electrochemical		250 ppm/ 1 ppm	± 5 ppm abs. or 5% rel.	60 sec	
HCl - NITRUS OXIDE					
Electrochemical		100 ppm/ 1 ppm	± 5 ppm abs. or 5% rel.	70 sec	
N₂O - NITRUS OXIDE					
NDIR		2 000 ppm/ 1 ppm	± 10 ppm abs. or 5% rel.	45 sec	ISO 21258
VOC - VOLATILE ORGANIC COMPOUNDS					
PIT - Photo Ionization Detector		100 ppm 1 ppm	± 5 ppm abs. or 5% rel.	120 sec	METHOD 21
PIT - Photo Ionization Detector		1 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	120 sec	METHOD 21

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STANDARD EQUIPMENT					
SUPPLIED ALONG WITH THE DEVICE					
<ul style="list-style-type: none"> • 3m mains cable (type of plug to be selected) • Heated hose of selected length and supply voltage with heated filter and carrying bag • Single gas filter with condensation trap and filter insert (pore size 5µm) • Condensation container • 2,5m RS-232C communication cable with DB9 female connector • Software CD with programmes and manuals • Quick coupler for the pressure sensor fittings (2pc.) 					
ADDITIONAL EQUIPMENT					
NECESSARY FOR THE ANALYSER TO WORK					
<ul style="list-style-type: none"> • Heated hose <p>Heated hose with heated gas filter supplies gas sample to the the analyser's conditioning module. Hose has M30x1 threaded connection to fix gas probe pipe. The other end has magnetic quick coupler and electric connector to connect it to the analyser. Standard length of the hose is 3m, it is possible to order other lengths of hoses. The hose is provided with a carrying bag.</p>					
					

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CHARACTERISTIC

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• Gas probe pipe

Gas probe is immersed in the gas duct and is supposed to extract the gas sample and to measure its temperature.

Exchangeable probes are easily connected to probe holders (with M30x1 fastening) and to heated hoses. They have a threaded fixing cone and a thermocouple type K (in some configurations type S) for measurement of gas temperature.

There are many probe pipes available. They differ in length and working temperature. For work efficiency it is advised to own different probe pipes to be able to adjust to the measurement place.



OPTIONAL EQUIPMENT & SPARE PARTS

• Ambient temperature sensor

This ambient temperature sensor on a 3m cable is used for measurement of the boiler's inlet air. In basic configuration the ambient temperature is measured by sensor installed in the connector of the gas probe handle.

ordering code:

Z40P-SENS-TEMP



• Pitot tube

Pitot tube is an accessory that allows to perform measurement of the flow velocity of the gas stream. The measurement is performed indirectly – Pitot tube is connected to analyser's differential pressure sensor. Analyser recalculates the differential pressure on the Pitot tube's outlets to velocity.

A few lengths of tubes are available. Pitot tube has 2m gas tubings to connect it to the analyser.

ordering codes:

pitot tube 800mm - Z00-PITOT-8002
pitot tube 500mm - Z00-PITOT-5002



• RS232C to USB converter

2.5m cable that allows to connect the analyser (its RS232C port) with USB port in PC computer (especially valuable when PC is not equipped with COM port).

ordering code:

Z40P-USB-ADAP



• Bluetooth communication module

Module connected to the analyser's RS232C port, allows to communicate with PC computer over Bluetooth protocol.

ordering code:

Z40P-BLUE-TOOTH



• Soot test adapter

Soot test adapter is installed in place of the standard lid.

Adapter allows to perform soot test according to Bacharach method.

ordering code:

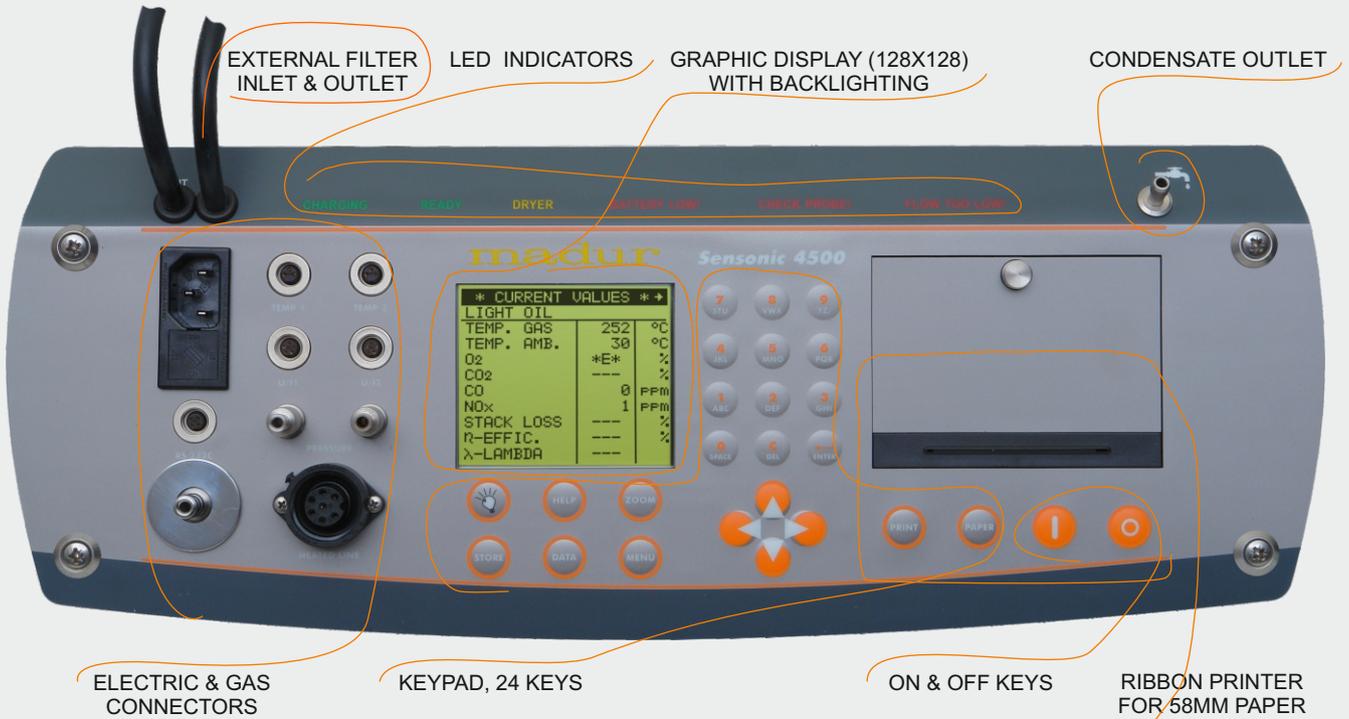
Z40T-HOSE-NAKR02



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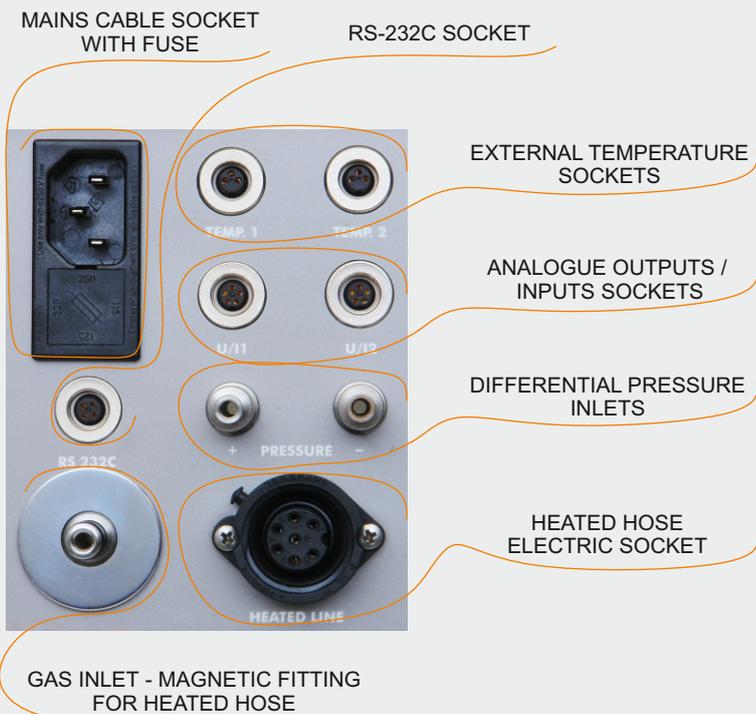
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FRONT PANEL



GAS AND ELECTRIC CONNECTORS

ANALYSER'S AND ACCESSORIES BAGS



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LED INDICATORS

CHARGING

READY

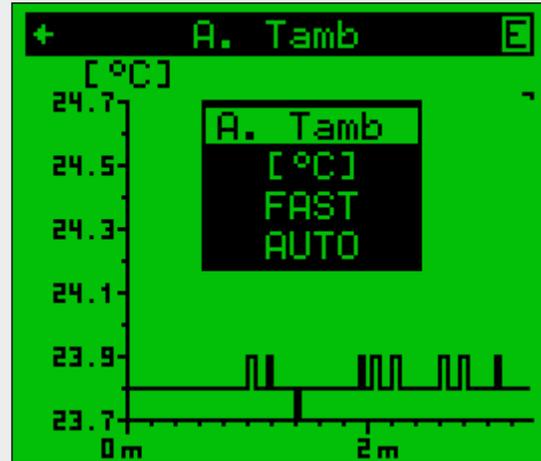
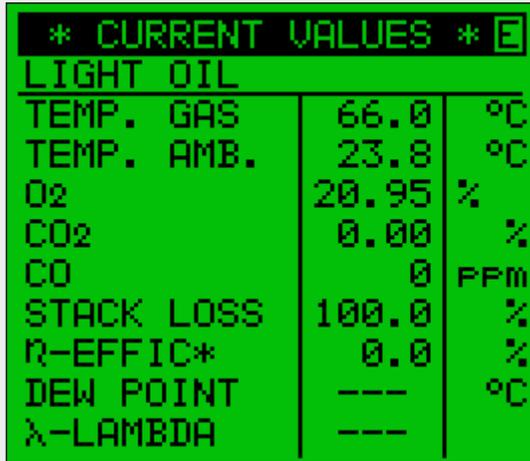
DRYER

BATTERY LOW

CHECK PROBE

FLOW TOO LOW

EXAMPLE PRINTSCREEN



EXAMPLE PRINTOUTS

EXAMPLE SCREENSHOT FROM THE PC PROGRAM

