



## Chemist 900 - Industrial emissions analyser



MADE IN ITALY

[www.seitron.it](http://www.seitron.it)



## Industrial Analyser for Emissions

The Chemist 900 industrial analyser can measure and store values of gaseous emissions during the operation of industrial machinery and it can also calculate combustion efficiency .

### MAIN APPLICATIONS

- Industrial gas and diesel motors
- Marine motors
- Cogeneration groups
- Industrial Gas Turbines
- Industrial Burners
- Emissions measurement of combustion gases post-treatment
- Industrial glass, ceramic and cement furnaces
- Furnaces for thermal treatment of metal
- Chemical and Pharmaceutical process industry
- Industrial analysis laboratories
- Biogas factories from vegetable and animal waste
- Official emissions measurements compliant with applicable regulations

**CHEMIST 900**



## CHARACTERISTICS AND PERFORMANCE

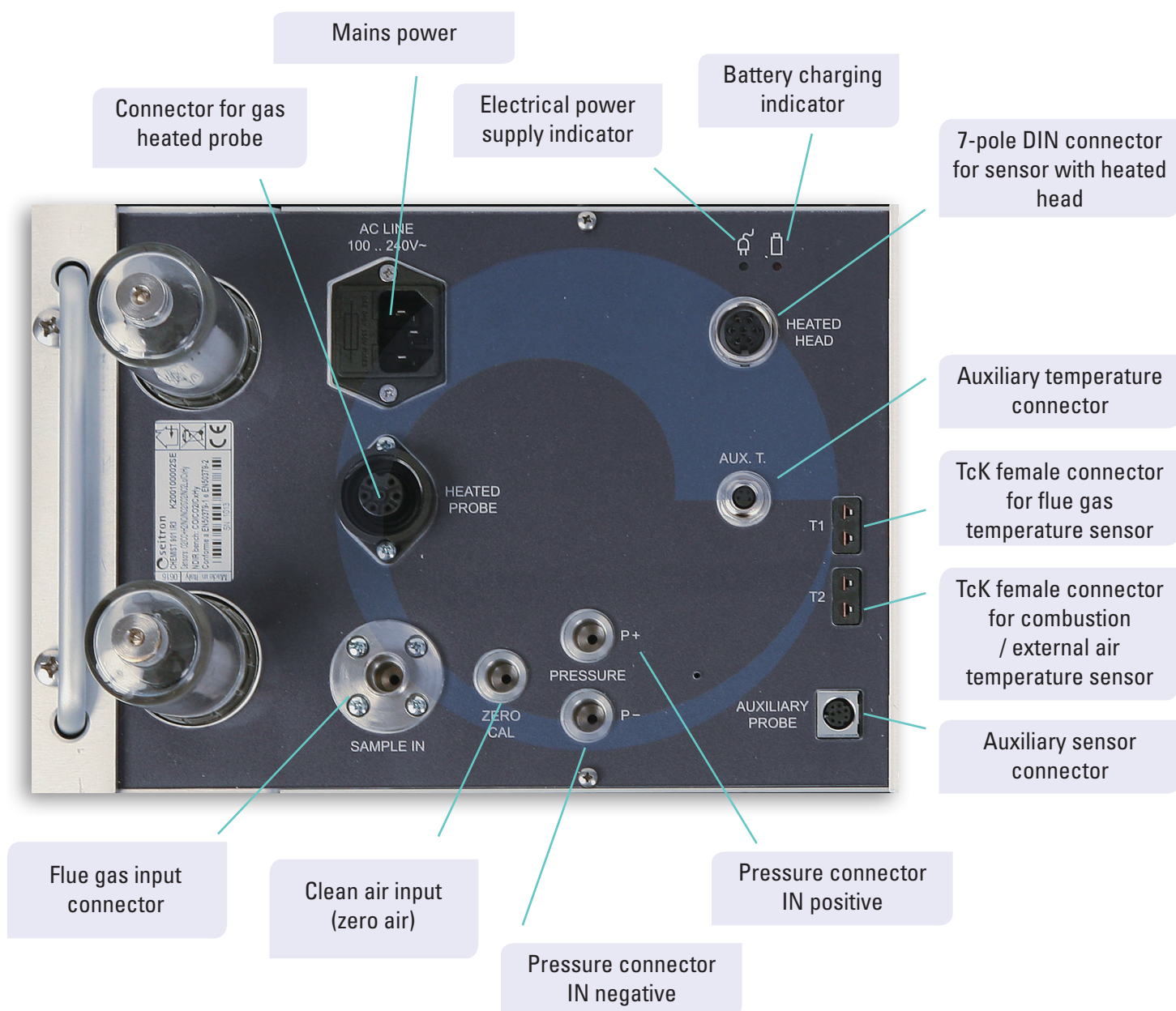
- Measurement of up to 12 gaseous emissions simultaneously.
- 9 gases measured with individual sensors: electrochemical, pellistor, NDIR (Non-Dispersive Infra Red), FLEX series, identical to those used in the hand held Chemist 500 and Chemist 600 analysers.
- Pre-calibrated FLEX-type gas measurement sensors which can be replaced in the field by the user.
- 3 gases (CO, CO<sub>2</sub> and CH<sub>4</sub>) measured simultaneously with NDIR bench with dedicated anti dust filter. The NDIR bench ensures maximum measurement accuracy for the 3 gases, because there is no interference from other gases, as is the case with other electrochemical cells.
- Gases measured: O<sub>2</sub>, CO, CO/H<sub>2</sub>, CO<sub>2</sub>, NO, NO<sub>2</sub>, SO<sub>2</sub>, H<sub>2</sub>S, CxHy.
- Selectable fuels: methane, LPG, butane, propane, propane-air mixtures, diesel, fuel oil, wood, wood chip, pellets, biogas, coal, olive pits.
- Additional 16 fuels can be added provided the physical chemical characteristics are known.
- Suction pump for gas samples, dilution pump to extend the measurement field / CO cell protection.
- Auto-zero cycle for gas and pressure sensors with sampling probe already inserted in the chimney.
- Flue gas, combustion air, external air and other auxiliary temperature measurement.
- Positive, negative and differential pressure measurement.
- High accuracy and resolution draught measurement with external accessory.
- Gas pipe tightness test with accessory fitting.
- Combustion analysis in automatic and manual modes.
- Data logger function.
- Gas sampling probes in various materials and lengths.
- Gas sampling probe with heated head and hose to avoid condensation.
- Special sampling probe for internal combustion engines.
- Mechanical water trap or Peltier effect cooler anti-condensation system
- Double anti-dust filter
- Automatic condensation emptying system with peristaltic pump.
- Data memory for up to 16,000 complete analyses.
- Type-B USB output for PC connection.
- Smart Flue Software for data storage and management.
- Bluetooth connectivity up to 100 m (in open field).
- Operation with mains power 100...240 V AC.
- Operation with internal rechargeable lithium ion battery power (not for heated line flue gas probe ).
- Robust metal housing with optional transportation trolley.



## Command Panel

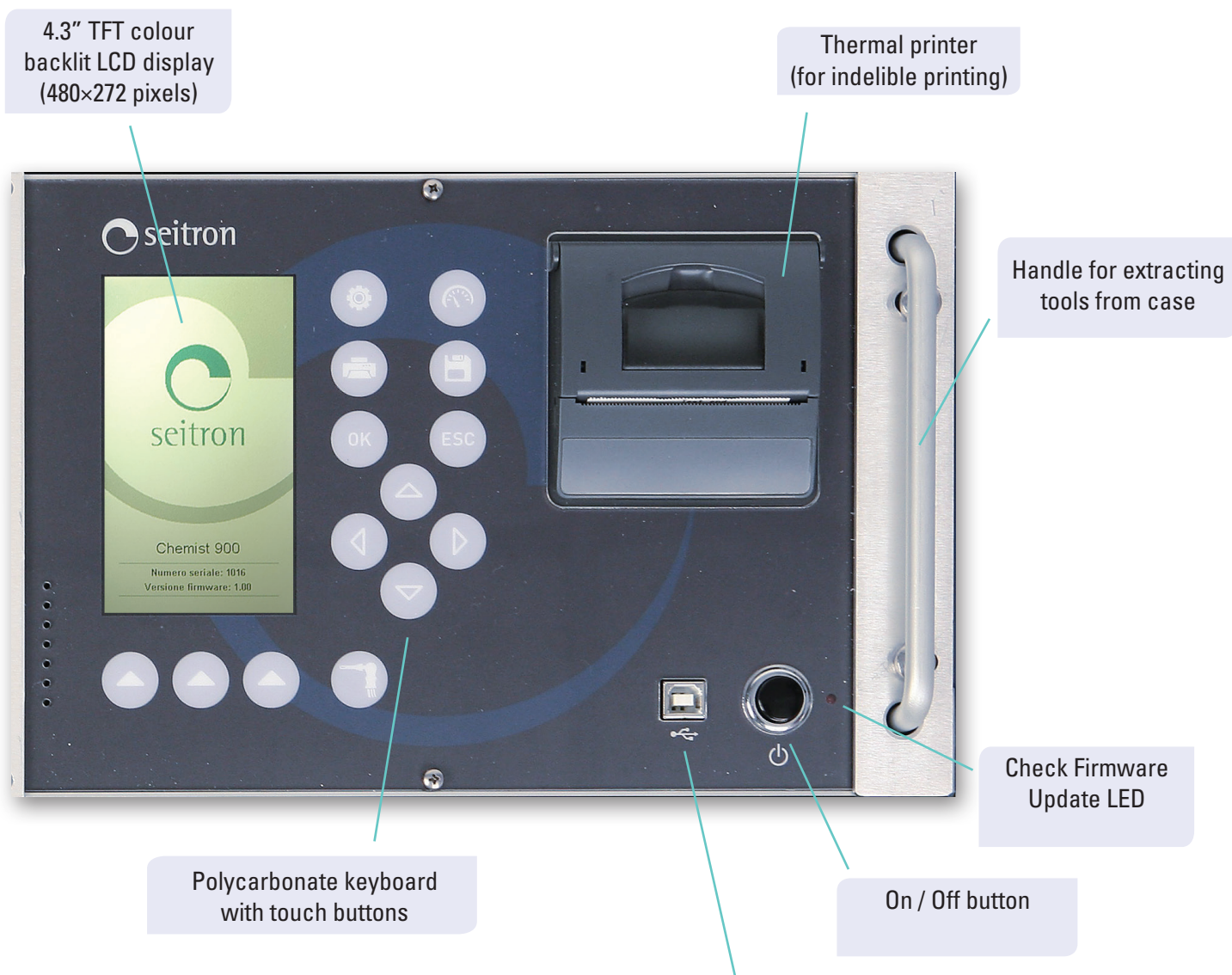


## CONNECTOR PANEL





## KEYBOARD / PRINTER PANEL



- Configuration Menu
- Measurements Menu
- Print Menu
- Memory Menu
- Confirm Data
- Exit screen
- Select and Modify
- Function activation
- Analysis menu



Integrated Bluetooth



**SmartFlue Mobile**

New Android App to monitor and save analyses and send via e-mail with smartphones and tablets.

**Available on the Google Play Store.**



## Composition: central unit and gas sampling system

The Chemist 900 industrial analyser is made up of two parts:

- the central unit
- the gas sampling system

Central Unit Version	Flex gas sensors (max 9)	NDIR bench (CO <sub>2</sub> /CO/C <sub>x</sub> H <sub>y</sub> )	Anti condensation cyclone cooler with Peltier cell	Anti condensation trap
Chemist 901	✓	-	-	✓
Chemist 901 IR3	✓	✓	-	✓
Chemist 902	✓	-	✓	-
Chemist 902 IR3	✓	✓	✓	-

N.B. A gas sampling probe with heated head and tube, powered by mains electricity, must always be installed together with the Chemist 902 central unit.

### GAS SAMPLING SYSTEMS

- Passive Type: utilises sensors with different tip lengths and fittings, made of different materials, with flexible tube connection to the central unit in various lengths. On page 9 you will find a complete list of available models.
- Active Type: utilises gas sampling sensor with heated head and flexible tube. This characteristic is in order to avoid water vapour condensation reaching the central unit thus affecting measurements of gases easily soluble in water, such as NO<sub>2</sub> and SO<sub>2</sub>. The active sensor maintains the gas sample at a higher temperature than the dew point and keeps it stable as far as the cooling system: this is a fast, cyclone type with Peltier cell. The water vapour condenses so quickly that the NO<sub>2</sub> and SO<sub>2</sub> gases do not have time to dissolve in water.



Active gas sampling probe with heated head and hose



Passive gas sampling probe



750 mm gas sampling probe for industrial motors





# Chemist 900 Models

## CHEMIST 901

- Pneumatic circuit to connect from 1 to 9 FLEX series gas measurement sensors: electrochemical, pellistor, NDIR; the sensors are the same type used in the Chemist 500 portable analysers. They are pre-calibrated and can be field replaced by the user.
- Sampling suction pump.
- Shut off solenoid valve to perform auto zero cycle with gas and pressure sampling probes present in the stack.
- Second dilution pump for CO cell extends measurement field up to 100,000 ppm.
- Two external anti-dust filters connected in series with anti-shock protection.
- Anti-condensation water trap.
- Condensation drain, with peristaltic pump, with intermittent duty cycle for longer operating life.
- Piezo electric internal pressure sensor for positive, negative and Differential pressures measurement.
- Internal battery charger / power supply unit. Operation can continue with flat batteries by connecting to 90...240 V AC mains power with the AC cable supplied.
- Lithium Ion rechargeable battery pack powers both the analyzer and the printer.
- Robust aluminium case. The top, fitted with safety locks, can also store the accessories.

## CHEMIST 901 IR3

In addition to Chemist 901:

- NDIR (Non Dispersive Infra Red) bench for simultaneous measurement of 3 gases: CO, CO<sub>2</sub> and CxHy (unburnt hydrocarbons) and relevant pneumatic circuit.
- Dedicated anti-dust filter.

## CHEMIST 902

In addition to Chemist 901:

- Rapid anti-condensation cyclone cooling system with Peltier cell and cooling fan instead of the mechanical anti-condensation trap.

## CHEMIST 902 IR3

In addition to Chemist 902:

- NDIR (Non Dispersive Infra Red) bench for simultaneous measurement of 3 gases: CO, CO<sub>2</sub> and CxHy (unburnt hydrocarbons) and relevant pneumatic circuit.
- Dedicated anti-dust filter.



Chemist 900 with passive gas sampling probe  
and air temperature sensor



Chemist 900 with active heated gas sampling probe





# Gas sampling systems

## PASSIVE GAS SAMPLING PROBES

Cod Sensor	Tip length	Tc-K temperature sensor	Hose length	Maximum operating temperature
AASF31	180 mm	✓	3 m	400 °C
AASF32	300 mm	✓	3 m	600 °C
AASF35	750 mm	✓	3 m	800 °C
AASF36	1000 mm	✓	3 m	1200 °C

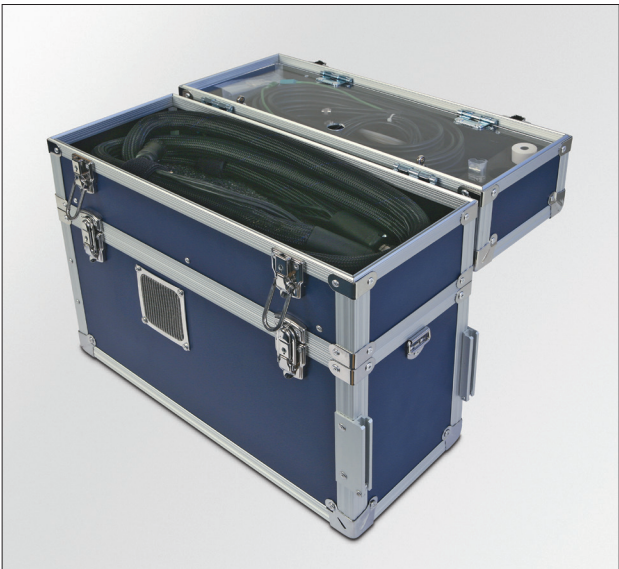
## ACTIVE GAS SAMPLING PROBES

Cod Sensor	Heated head gas sampling	Tc-K Temperature sensor	Metallic tip	Electro-heated flex tube	Carry case
AASR01	✓	-	300 m	3 m	✓
AASR02	✓	-	1000 m	3 m	✓
AASR03	✓	✓	300 m	3 m	✓
AASR04	✓	✓	1000 m	3 m	✓

N.B. The expansion case storing the heated sensor can be connected to the housing of the Chemist 900 analyser. (The tip of the 1000mm version cannot be inserted in the case because of its length)



Connection



Expansion case for storing the heated sensor



## Measurement ranges and accuracies

MEASUREMENT	GAS SENSOR	MEASUREMENT RANGE	RESOLUTION	ACCURACY
O <sub>2</sub>	Sensor Electrochemical	0 .. 25.0% vol	0.1% vol	±0.2% vol
CO with H <sub>2</sub> compensation	Sensor Electrochemical	0 .. 8.000 ppm	1 ppm	±10 ppm 0 .. 200 ppm ±5% measured value 201 .. 2000 ppm ±10% measured value 2001 .. 8000 ppm
with dilution	Sensor Electrochemical	0 .. 100.000 ppm	100 ppm	±20% measured value
CO Low range with H <sub>2</sub> compensation	Sensor Electrochemical	0 .. 500 ppm	0.1 ppm	±2 ppm 0 .. 40.0 ppm ±5% measured value 40.1 .. 500.0 ppm
with dilution	Sensor Electrochemical	6.250 ppm	10 ppm	±20% measured value
CO Mid range	Sensor Electrochemical	0 .. 20.000 ppm	1 ppm	±100 ppm 0 .. 2000 ppm ±5% measured value 2001 .. 4000 ppm ±10% measured value 4001 .. 20000 ppm
with dilution	Sensor Electrochemical	0 .. 250.000 ppm	100 ppm	±20% measured value
CO Hi range	Sensor Electrochemical	0 .. 100.000 ppm	100 ppm	±0.02% vol o ±5% m.v. 0 .. 2.00 % ±5% measured value 2.01 .. 10.00 %
NO	Sensor Electrochemical	0 .. 5.000 ppm	1 ppm	±5 ppm 0 .. 100 ppm ±5% measured value 101 .. 5000 ppm
NO Low range	Sensor Electrochemical	0 .. 500 ppm	0.1 ppm	±2 ppm 0 .. 40.0 ppm ±5% measured value 40.1 .. 500.0 ppm
NO <sub>x</sub>	Calculated			
SO <sub>2</sub>	Sensor Electrochemical	0 .. 5.000 ppm	1 ppm	±5 ppm 0 .. 100 ppm ±5% measured value 101 .. 5000 ppm
SO <sub>2</sub> Low range	Sensor Electrochemical	0 .. 500 ppm	0.1 ppm	±2 ppm 0 .. 40.0 ppm ±5% measured value 40.1 .. 500.0 ppm
NO <sub>2</sub>	Sensor Electrochemical	0 .. 1.000 ppm	1 ppm	±5 ppm 0 .. 100 ppm ±5% measured value 101 .. 1000 ppm
NO <sub>2</sub> Low range	Sensor Electrochemical	0 .. 500 ppm	0.1 ppm	±2 ppm 0 .. 40.0 ppm ±5% measured value 40.1 .. 500.0 ppm
C <sub>x</sub> H <sub>y</sub>	Sensor Pellistor	0 .. 5.00% vol	0.01% vol	±0.25% vol
H <sub>2</sub> S	Sensor Electrochemical	0 .. 500 ppm	0.1 ppm	±5 ppm 0 .. 100.0 ppm ±5% measured value 100.1 .. 500.0 ppm
CO <sub>2</sub>	Calculated	0 .. 99.9% vol	0.1% vol	
CO <sub>2</sub>	NDIR sensor	0 .. 20.0% vol	0.01% vol	±0.3% vol 0.00 .. 6.00 % ±5% measured value 6.1 .. 20 %
CO <sub>2</sub> *	NDIR bench	0 .. 50.0% vol	0.1% vol	±0.3% vol 0.00 .. 8.00 % ±5% measured value 8.01 .. 40.00 % ±10% measured value 40.01 .. 50.00 %
CO% *	NDIR bench	0 .. 150.000 ppm	100 ppm	±0.03% vol 0.0 .. 10.0 % ±5% measured value 10.1 .. 15 %
CH <sub>4</sub> *	NDIR bench	0 .. 50.000 ppm	1 ppm	±50 ppm 0 .. 200 ppm ±2% measured value 201 .. 50000 ppm

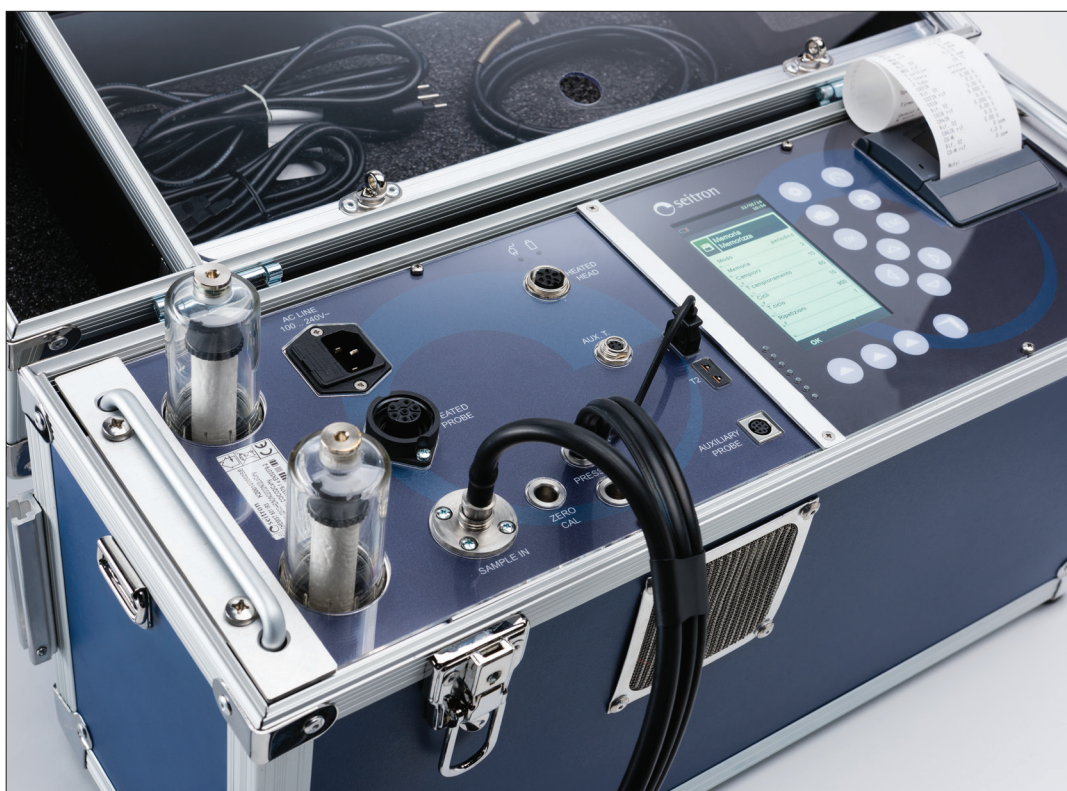




MEASUREMENT	GAS SENSOR	MEASUREMENT RANGE	RESOLUTION	ACCURACY
Air temperature	TcK Sensor	-20.0 ..120.0 °C	0.1 °C	±1 °C
Flue gas temperature	TcK Sensor	-20.0 .. 1250.0 °C	0.1 °C	±1 °C 0 .. 100 °C ±1% measured value 101 .. 1250 °C
Auxiliary sensor temperature	PT100	-20.0 .. 200.0 °C	0.1 °C	±0.5 a°C
Pressure (draught and differential)	Piezo electric Sensor	-10.00 .. 200.00 hPa	0.01 hPa	±1% measured value -10.00 .. -2.01 hPa ±2 Pa -200 .. 200 hPa ±1% measured value 2.01 .. +200.00 hPa
Differential temperature	Calculated	0 .. 1250.0 °C	0.1 °C	
Air index	Calculated	0.00 .. 9.50	0:01	
Air excess	Calculated	0 .. 850 %	1%	
Stack heat loss	Calculated	0.0 .. 100.0 %	0.1 %	
Efficiency	Calculated	0.0 .. 100.0 %	0.1 %	
Efficiency (condensation)	Calculated	0.0 .. 120.0 %	0.1 %	
Smoke index	External instrument	0 .. 9		

Note:

\*: The NDIR bench always measures the 3 gases CO, CO2 and CH4



## Technical Features

Power:	100 .. 240V~ or Li-ion battery pack with internal protection circuit, rechargeable With mains cable with IEC C14 socket.
Battery charge:	8 hours for recharging from 0% to 90%.
Recharging time:	10 hours of continuous operation (except printing and Peltier module group).
Instrument battery life:	2 hours with Cooler active.
Display:	4.3" 480×272 pixel backlit TFT graphical colour display.
<u>Connectivity</u>	
Communication port:	TYPE B USB connector.
Bluetooth:	Communication distance: <100 metres (open field).
Autozero:	Automatic autozero cycle with gas sampling probe in stack.
Dilution:	CO sensor measurement range expansion system up to 100,000ppm (10.00%), intervention point programmable by the user.
Gas measurement sensor:	Up to 9 sensors, configurable between electrochemical, NDIR (single cell) and pellistor.
Infrared bench:	3 gas NDIR bench: CO, CO <sub>2</sub> , CxHy.
Fuel type:	12 preset by the factory and 16 programmable by the user.
Self diagnostics:	Check of all functions and internal sensors with status indication.
Temperature measurement:	TcK double input with mini connector (ASTM E 1684-96) for differential tem- perature measurement (supply and return).
Ambient temperature measurement:	Via internal sensor or via T2 TcK input with remote sensor.
Printer:	Integrated, thermal, with easy paper loading and paper level sensor.
Printer power supply:	Analyzer batteries.
Printer battery life:	Up to 40 analysis reports (with fully charged batteries)
Internal Data Memory:	16000 complete data analyses, time and customer name can be stored.
User data:	8 programmable user names.
Printer header:	6 lines × 24 characters, user customisable.
In-line filter:	With replaceable cartridge, 99% efficiency with 20µm particles.
Vacuum pump:	2.0 l/min flow rate in the stack up to 300hPa head.
Flow measurement:	Internal sensor for measurement of the pump flow rate.
<u>Cooler sample treatment</u>	
Drying system:	Rapid water condensation using cyclone system.
Type:	Peltier cell.
Temperature cooler set point:	+5°C
Max. temp. deviation from set point:	+10°C from set-point.
Condensate drain pump:	Peristaltic hose 38 ml/min
Peristaltic duty cycle pump:	30s on .. 30s off
Warm-up time:	~ 15 .. 20 minutes.
Operating temperature:	-5°C .. +45°C
<u>Condensate trap</u>	
Type:	Integrated in the instrument.
Condensate drain pump:	Peristaltic pump 38 ml/min.
Operating temperature:	-5°C .. +45°C





Carbon black: Tightness test (where required):	Using a manual external pump; the smoke index can be input and printed. Gas piping tightness test with separate receipt printing, using AAKT04 accessory, subject to UNI 7129 (new installations) and UNI 11137: 2012 (existing installations), with automatic calculation of the piping volume.
Condensing boiler efficiency :	Automatic detection of the condensing boiler, with calculation and printing of the boiler efficiency.
Ambient gases: Draught test:	Separate measurement and printing of the ambient CO concentration. Draught test execution. Using the internal sensor connected to port P-, resolution 0.1 Pa, accuracy 0.5 Pa.
Working temperature: Storage temperature: Humidity limit: Protection level: External dimensions:	-5°C .. +45°C -20°C .. +50°C 20% .. 80% RH IP21 50 x 36 x 20 cm (W x H x D). 50 x 46 x 13 cm (W x H x D) with intermediate drawer for heated head and sensor transportation.
Weight:	~ 12 kg (Typical configuration: nine sensors - Cooler - IR bench - one smoke sampling sensor - power cable - USB cable - carrying strap - two paper rolls - one USB stick - one condensate drain tube - one remote air intake tube - combustion air sensor). ~ 13 kg (Typical configuration with additional accessories such as: one 3m extension for smoke sensor - one auxiliary air sensor - one 300mm Pitot tube - one draught gauge). ~ 16,7 kg (Typical configuration with additional accessories and intermediate drawer containing one heated head sensor with 300mm tip and heated tube).

Compliant with European standards EN 50379-1 and EN 50379-2 for the following measurements:

- O<sub>2</sub>
- CO average
- NO
- SO<sub>2</sub>
- Temperature (flue gas)
- Temperature (combustion air)
- Pressure (draught)
- Pressure (differential)



**CHEMIST 900**



## ACCESSORIES

<b>AACCV01</b>	Schuko plug cable.
<b>AACCV04</b>	European plug cable.
<b>AACDP02</b>	Draught gauge for draught measurement.
<b>AACSA04</b>	100mm 4-wires Pt100 auxiliary temperature sensor, with 3m cable.
<b>AASA08</b>	Remote combustion air temperature sensor, 200mm tip, with 3m cable.
<b>AASF31</b>	180 mm gas sampling probe, extended temperature range up to 400°C, with 3m cable.
<b>AASF32</b>	300 mm gas sampling probe, extended temperature range up to 600°C, with 3m cable.
<b>AASF35</b>	750 mm gas sampling probe, extended temperature range up to 800°C, with 3m cable.
<b>AASF36</b>	1000 mm gas sampling probe, extended temperature range up to 1100°C, with 3m cable.
<b>AASX03</b>	750mm smoke sampling sensor for industrial motors with 3m cable.
<b>AACEX02S</b>	3m extension cable for smoke sampling sensors.
<b>AASR01</b>	Smoke sampling sensor with heated head, 300mm tip and electrically heated 3m tube (without thermocouple).
<b>AASR02</b>	Smoke sampling sensor with heated head, 1000mm tip and electrically heated 3m tube (without thermocouple).
<b>AASR03</b>	Smoke sampling sensor with heated head, 300mm tip and electrically heated 3m tube (without thermocouple).
<b>AASR04</b>	Smoke sampling sensor with heated head, 1000mm tip and electrically heated 3m tube (without thermocouple).
<b>AASP01</b>	Heat protection shield for smoke sampling sensors.
<b>AATT01</b>	"L" shaped pitot tube (no Tc-K sensor): Length 300mm - external diameter 6 mm. Comes with two 2m silicone tubes.
<b>AATT02</b>	"L" shaped pitot tube (no Tc-K sensor): Length 800mm - external diameter 6 mm. Comes with two 2m silicone tubes.
<b>AACKP01</b>	Differential pressure measurement kit.
<b>AAKT04</b>	Kit for tightness test.
<b>AAPM02</b>	Manual pump kit for carbon black measurement.
<b>AASW08</b>	Configuration software on USB pendrive.
<b>AAUA03</b>	USB-A / mini USB-B adapter cable.
<b>AAEB02</b>	Case extension.
<b>AATY01</b>	Trolley for transportation.

## CERTIFICATES

The instrument is supplied with a ISO9001 Calibration Certificate, issued by the Seitron SpA Calibration Laboratory, through which measurement traceability to national samples is guaranteed.

The UNI 10389-1 standard requires the calibration certificate to be issued every year. The client can purchase the calibration certificate for the second and following years.

## MAINTENANCE CONTRACTS

At the end of the initial 2-year guarantee, a "Full Service" annual maintenance contract can be purchased. By paying a yearly subscription, the customer receives programmed maintenance as well as any additional maintenance required. All transportation costs are included.

The external parts, such as smoke sampling sensors subject to mechanical wear are not covered by the contract. The contract ensures that the customer maintains instrument efficiency and includes spent cell replacement and the calibration certificate.

## GUARANTEE

Guarantee is valid for two years from delivery date and covers electronics, measurement cells and printer. The measurement cells can be easily replaced by the user.





## SPARE PARTS

<b>AACADX005</b>	Dummy sensor
<b>AACSE10</b>	Flex-Sensor NO/NOx, pre-calibrated and interchangeable
<b>AACSE12</b>	Flex-Sensor CO+H2, pre-calibrated and interchangeable
<b>AACSE13</b>	Flex-Sensor SO2, pre-calibrated and interchangeable
<b>AACSE14</b>	Flex-Sensor NO2, pre-calibrated and interchangeable
<b>AACSE17</b>	Flex-Sensor CO 100,000ppm, pre-calibrated and interchangeable
<b>AACSE18</b>	Flex-Sensor CO 20,000ppm, pre-calibrated and interchangeable
<b>AACSE24</b>	Flex-Sensor CO+H2 low range, pre-calibrated and interchangeable
<b>AACSE25</b>	Flex-Sensor NO low range, pre-calibrated and interchangeable
<b>AACSE26</b>	Flex-Sensor NO2 low range, pre-calibrated and interchangeable
<b>AACSE28</b>	Flex-Sensor SO2 low range, pre-calibrated and interchangeable
<b>AACSE35</b>	Flex-Sensor H2S, pre-calibrated and interchangeable
<b>AACSE39</b>	Flex-Sensor CxHy referred to CH4, pre-calibrated and interchangeable
<b>AACSE40</b>	Flex-Sensor CO2 (0 .. 20%), pre-calibrated and interchangeable
<b>AACSE43</b>	Flex-Sensor O2 (Long Life), pre-calibrated and interchangeable
<b>AACSE47</b>	Flex-Sensor CO2 (0 .. 50%), pre-calibrated and interchangeable
<b>AAPB12</b>	Li-Ion battery pack 11.1V 6.2 Ah
<b>AARC08</b>	Printer thermal paper roll, h=57mm, diameter =30mm
<b>AARC09</b>	Printer thermal paper roll (unerasable), h=57mm, diameter =30mm



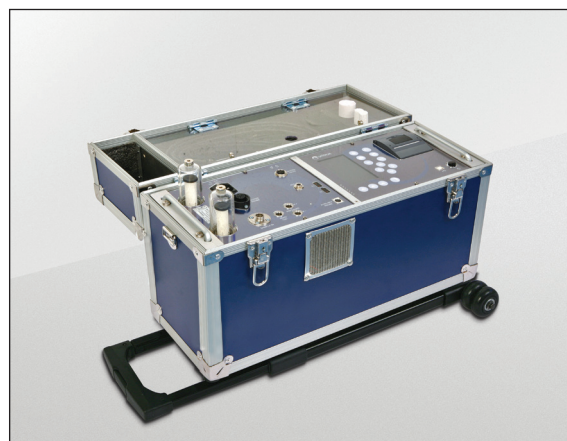
Housing extension drawer



Trolley for transporting Chemist 900



Housing in resistant aluminium



Chemist 900 can also be used with the trolley attached





จัดจำหน่ายโดย

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## Chemist 900 - Industrial emissions analyser

