

Chemist 900 - Industrial Analyser




MADE IN ITALY

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 to applicable regulations

CHEMIST 900



CHARACTERISTICS AND PERFORMANCE

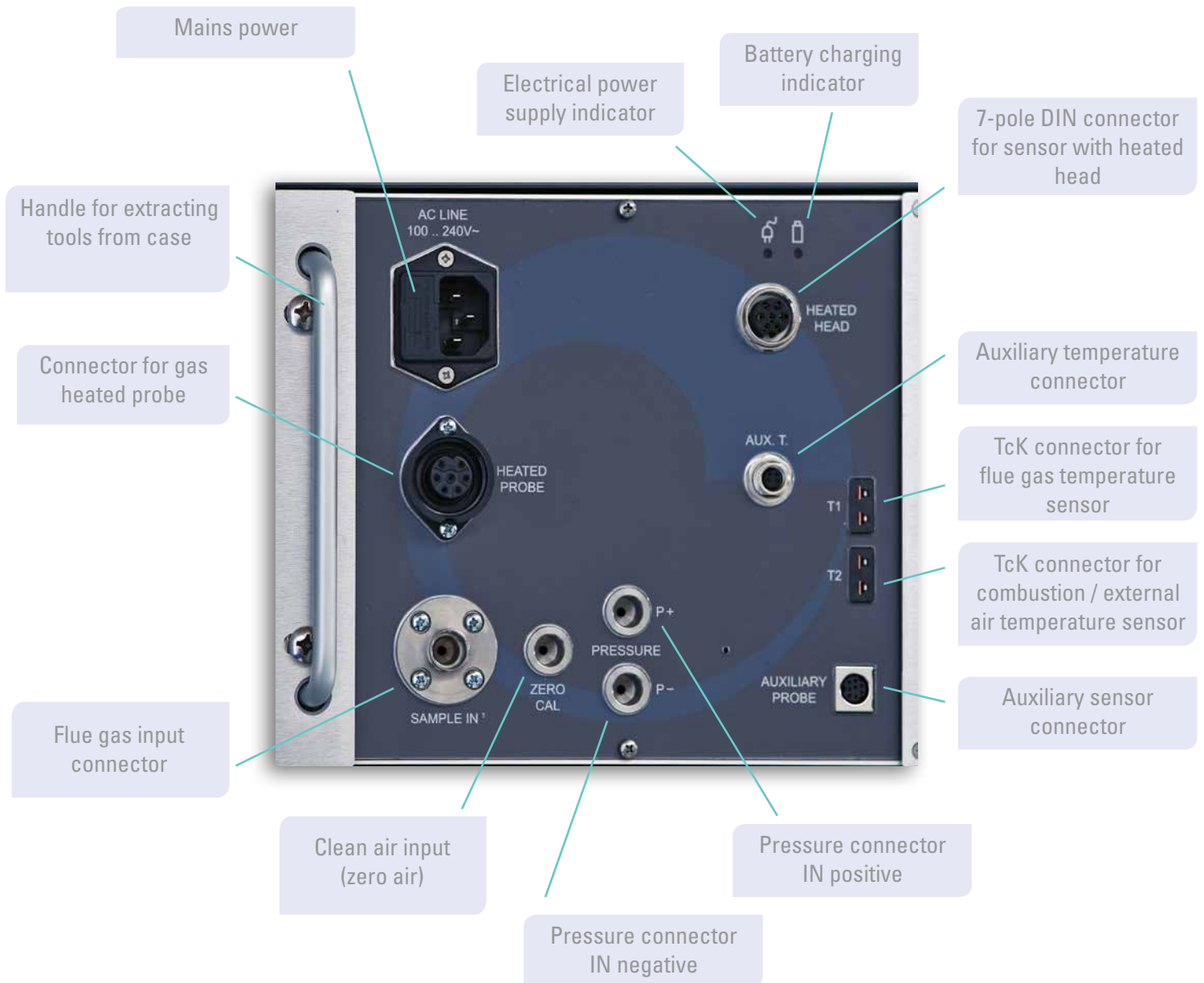
- Measurement of up to 12 gaseous emissions simultaneously.
- 9 gases measured with individual sensors: electrochemical, pellistor, NDIR (Non-Dispersive Infra Red), FLEX series, identical to those used used in the hand held Chemist 500 analysers.
- Pre-calibrated FLEX-type gas measurement sensors which can be replaced in the field by the user.
- 3 gases (CO, CO₂ e CH₄) measured simultaneously with NDIR bench and 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: O₂, CO, CO/H₂, CO₂, NO, NO₂, SO₂, H₂S, C_xH_y.
- Fuel already in the memory: methane, LPG, butane, propane, propane-air mixtures, diesel, fuel oil, wood, wood chip, pellets, biogas, coal.
- Additional 16 fuels can be added provided the physical chemical characteristics are known.
- Vacuum pump for gas samples, dilution pump to extend the measurement field / CO cell protection.
- Auto-zero cycle for gas and pressure sensors even with sampling probe already inserted in the chimney.
- Flue gas, combustion air, external air and other auxiliary temperatures measurement.
- Positive, negative and differential pressure measurement.
- High accuracy and resolution draught measurement with external accessory.
- Gas pipes tightness test with fittings accessory.
- 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 evacuation 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.



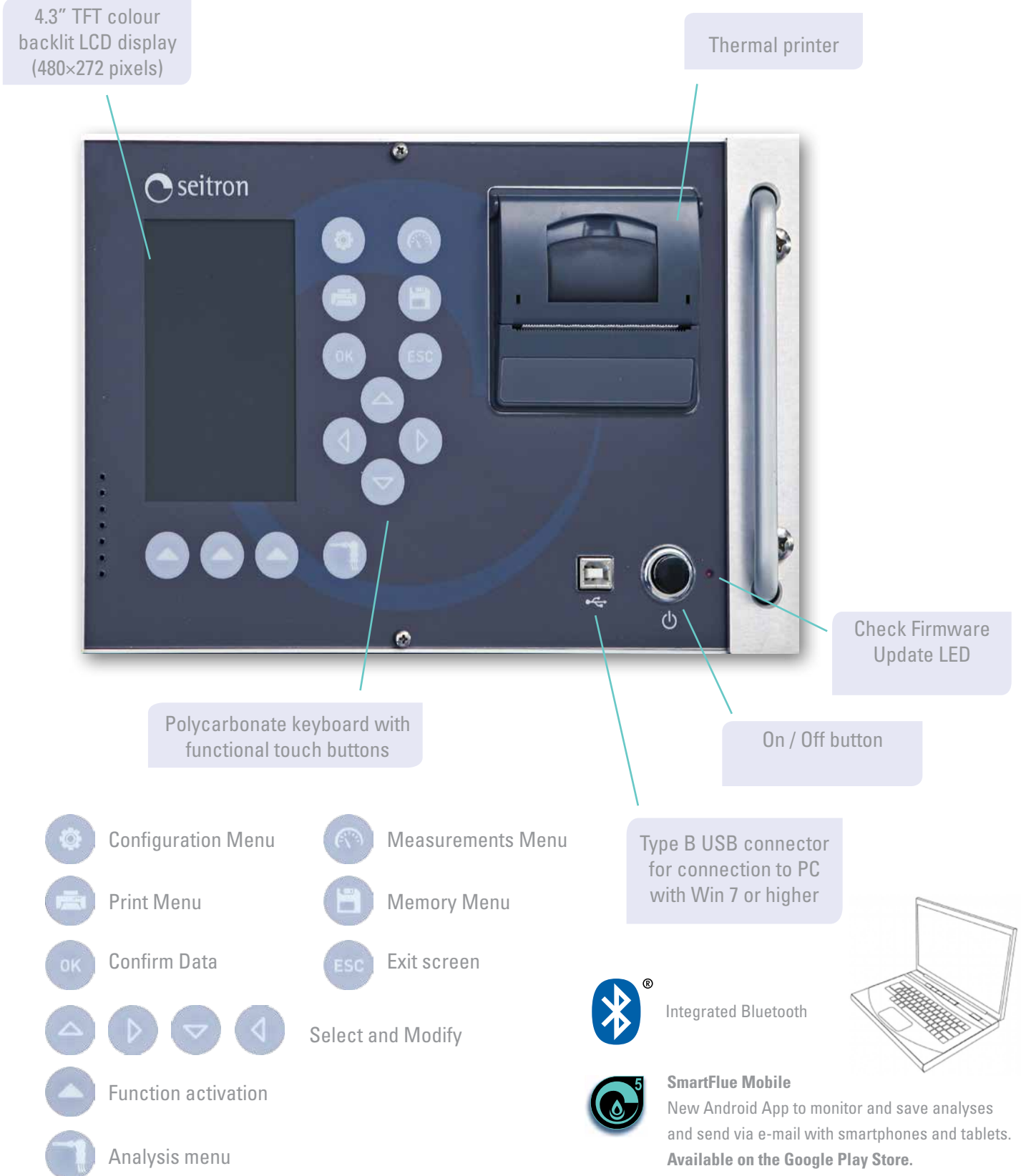
Command Panel



CONNECTOR PANEL



KEYBOARD / PRINTER PANEL



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 ₂ /CO/C _x H _y)	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:** sensors with different tip lengths and fittings, made of from 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:** 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 NO₂ and SO₂. 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 type, cyclone with Peltier cell. The water vapour condenses so quickly that the NO₂ and SO₂ 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 fits 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 vacuum pump.
- Shut off solenoid valve to perform auto zero cycle with gas sampling probe in the stack
- Second dilution pump for CO cell protection 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 hose pump, with on – off 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 housing 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, CO₂ and C_xH_y (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 in place 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, CO₂ and C_xH_y (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)



Connections panel



Expansion case for storing the heated sensor

Measurement ranges and accuracies

MEASUREMENT	GAS SENSOR	MEASUREMENT RANGE	RESOLUTION	ACCURACY
O2	Sensor Electrochemical	0 .. 25.0% vol	0.1% vol	±0.2% vol
CO with H2 compensation	Sensor Electrochemical	0 .. 8000 ppm	1 ppm	±10 ppm 0 .. 200 ppm ±5% measured value 201 .. 2000 ppm ±10% measured value 2001 .. 8000 ppm
with dilution	Sensor Electrochemical	10.00% vol	0.01% vol	±20% measured value
CO Low range with H2 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	6250 ppm	10 ppm	±20% measured value
CO Mid range	Sensor Electrochemical	0 .. 20000 ppm	1 ppm	±100 ppm 0 .. 2000 ppm ±5% measured value 2001 .. 4000 ppm ±10% measured value 4001 .. 20000 ppm
with dilution	Sensor Electrochemical	25.00% vol	0.01% vol	±20% measured value
CO Hi range	Sensor Electrochemical	0 .. 10.00% vol	0.01% vol	±0.02% vol o ±5% m.v. 0 .. 2.00 % ±5% measured value 2.01 .. 10.00 %
NO	Sensor Electrochemical	0 .. 5000 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
NOx	Calculated			
SO2	Sensor Electrochemical	0 .. 5000 ppm	1 ppm	±5 ppm 0 .. 100 ppm ±5% measured value 101 .. 5000 ppm
SO2 Low range	Sensor Electrochemical	0 .. 500 ppm	0.1 ppm	±2 ppm 0 .. 40.0 ppm ±5% measured value 40.1 .. 500.0 ppm
NO2	Sensor Electrochemical	0 .. 1000 ppm	1 ppm	±5 ppm 0 .. 100 ppm ±5% measured value 101 .. 1000 ppm
NO2 Low range	Sensor Electrochemical	0 .. 500 ppm	0.1 ppm	±2 ppm 0 .. 40.0 ppm ±5% measured value 40.1 .. 500.0 ppm
CxHy	Sensor Pellistor	0 .. 5.00% vol	0.01% vol	±0.25% vol
H2S	Sensor Electrochemical	0 .. 500 ppm	0.1 ppm	±5 ppm 0 .. 100.0 ppm ±5% measured value 100.1 .. 500.0 ppm
CO2	Calculated	0 .. 99.9% vol	0.1% vol	
CO2	NDIR sensor	0 .. 20.0% vol	0.01% vol	±0.3% vol 0.00 .. 6.00 % ±5% measured value 6.1 .. 20 %
CO2 *	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 .. 15.0% vol	0.01% vol	±0.03% vol 0.0 .. 10.0 % ±5% measured value 10.1 .. 15 %
CH4 *	NDIR bench	0 .. 50000 ppm	1 ppm	±50 ppm 0 .. 200 ppm ±2% measured value 201 .. 50000 ppm

MEASUREMENT	GAS SENSOR	MEASUREMENT RANGE	RESOLUTION	ACCURACY
Air temperature	Sensore TcK	-20.0 ..120.0 °C	0.1 °C	±1 °C
Flue gas temperature	Sensore TcK	-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)	Sensor Piezo electric	-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



Orthogonal view - Chemist 900

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 recharge from 0% to 90%.
Recharging time:	10 hours of continuous operation (except: printing and Peltier cell group).
Instrument battery life:	2 hours with Cooler active.
Display:	4.3" 480x272 pixel backlit TFT graphical colour display.
Connectivity	
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%), starting 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 ₂ , 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 temperature 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:	Analyser batteries.
Printer battery life:	With fully charged batteries up to 40 analysis reports.
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.
Capacity pump:	Internal sensor measuring pump flow rate.
Cooler sample treatment	
Drying system:	Rapid water condensation using cyclone system.
Type:	with Peltier cell.
Set point temperature cooler:	+5°C
Max. temp. deviation from set point:	+10°C from set-point.
Condensate emptying 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
Anti-condensation trap	
Type:	Integrated in the instrument.
Condensate emptying pump:	Peristaltic hose 38/ml min.
Operating temperature:	-5°C .. +45°C

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

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

- O₂
- CO average
- NO
- SO₂
- Temperature (flue gas)
- Temperature (comburent air)
- Pressure (draught)
- Pressure (differential)

CHEMIST 900



ACCESSORIES

AACCV01	Schuko plug cable.
AACCV04	European plug cable.
AACDP02	Draught gauge for draught measurement.
AACSA04	100mm Auxiliary temperature sensor PT100 4W, with 3m cable.
AASA08	Combustion air temperature sensor, 200 mm distance, with 3m cable.
AASF31	180 mm gas sampling probe, extended temperature range to 400°C, with 3m cable.
AASF32	300 mm gas sampling probe, extended temperature range to 600°C, with 3m cable.
AASF35	750 mm gas sampling probe, extended temperature range to 800°C, with 3m cable.
AASF36	1000 mm gas sampling probe, extended temperature range to 1100°C, with 3m cable.
AASX03	750mm smoke sampling sensor for industrial motors with 3m cable.
AACEX02S	3m extension cable for smoke sampling sensors.
AASR01	Smoke sampling sensor with heated head, 300mm tip and electrically heated 3m tube (without thermocoupling).
AASR02	Smoke sampling sensor with heated head, 1000mm tip and electrically heated 3m tube (without thermocoupling).
AASR03	Smoke sampling sensor with heated head, 300mm tip and electrically heated 3m tube (without thermocoupling).
AASR04	Smoke sampling sensor with heated head, 1000mm tip and electrically heated 3m tube (without thermocoupling).
AASP01	Heat protection shield for smoke sampling sensors.
AATT01	"L" pitot tube (no Tc-K sensor): Length 300mm - external diameter 6 mm. Comes with two 2m silicone tubes.
AATT02	"L" pitot tube (no Tc-K sensor): Length 800mm - external diameter 6 mm. Comes with two 2m silicone tubes.
AACKP01	Differential pressure measurement kit.
AAKT04	Tightness testing kit.
AAPM02	Manual pump kit for gas black measurement.
AASW08	Configuration software on USB stick.
AAUA03	USB-A / mini USB-B adapter cable.
AAEB01	Trunk extension.
AATY01	Trunk trolley.

CERTIFICATES

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

The UNI 10389-1 norm 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 guaranteed, a "Full Service" annual maintenance contract can be stipulated. 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 exhausted cell replacement and the calibration certificate.

GUARANTEE

The instrument is guaranteed for two years from delivery, electronics, measurement cells and printer included. The measurement cells can be easily replaced by the user.

SPARE PARTS

AAPB12	Li-Ion battery pack 11.1V 6.2 Ah
AARC08	Printer thermal paper roll, h=57mm, diameter =30mm
AARC09	Printer thermal paper roll (unerasable), h=57mm, diameter =30mm
AACADX005	Dummy sensor
AACSE15	Flex-Sensor O2, pre-calibrated and interchangeable
AACSE12	Flex-Sensor CO+H2, pre-calibrated and interchangeable
AACSE10	Flex-Sensor NO/NOx, pre-calibrated and interchangeable
AACSE14	Flex-Sensor NO2, pre-calibrated and interchangeable
AACSE13	Flex-Sensor SO2, pre-calibrated and interchangeable
AACSE17	Flex-Sensor CO 100,000ppm, pre-calibrated and interchangeable
AACSE18	Flex-Sensor CO 20,000ppm, pre-calibrated and interchangeable
AACSE39	Flex-Sensor CxHy referred to CH4, pre-calibrated and interchangeable
AACSE24	Flex-Sensor CO+H2 low range, pre-calibrated and interchangeable
AACSE25	Flex-Sensor NO low range, pre-calibrated and interchangeable
AACSE26	Flex-Sensor NO2 low range, pre-calibrated and interchangeable
AACSE28	Flex-Sensor SO2 low range, pre-calibrated and interchangeable
AACSE41	Flex-Sensor CO2, pre-calibrated and interchangeable
AACSE35	Flex-Sensor H2S, pre-calibrated and interchangeable



Housing extension drawer



Trolley for transporting Chemist 900



Housing in resistant aluminium



Chemist 900 can also be used with the trolley attached



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