



**pAuto2000** *exhaust gas analyzer*

## Portable Automotive Exhaust Gas Analyzer

Ref: pAuto2000\_IntE  
Revision: 2004-02-09

### None Replacement of Sensors in 10 Years!

You would get infrared photometric analyzer in the price of that  
by electrochemical sensors

- Solid and advanced industry design for first of quality
- All sensor is of NIR photometer, except long life electrochemical sensor of oxygen
- Infra-red bench & sensors inside.
- Fast 30-second warms up
- Combined technology: infra-red & electrochemical
- 5 gases embedded and one or two gas sensor might added by user's order
- 1 watt power requirement, Battery supply.
- Pressure, temperature and moisture compensated
- Neural Network Analysis embedded for gas cross interferences correction
- Completely conformed to ASM/BAR 97, OIML Class 0 applied for Flue and automotive exhaust analysis
- Engine test parameters could be added together with emissions system



As with all BigDipper gas analyzer, the pAuto2000 outer casing is designed specifically for the field work environment, as well for laboratory and workshop. The BigDipper pAuto2000 is a latest modern arts engine smoke analyzer. It is designed as configuration by users, so that it is advanced to be adapted to different applications. Compact design, in approximately 12-14kg weight and 460x350x250mm, makes it movable to any where inside of car or around workshop by any normal physical person. The pAuto2000D meets the very latest professional specifications. Not only suitable for the Vehicle Inspectorate but also for auto industry quality monitoring and controls.

### Utilities:

- *Official Tests* – Exhaust patrol for traffic flow
- Maintenance check
- Quality control for car product line

## Applications

- Boiler smoke test and combustion efficiency calculation
- Industrial stove flue monitor and combustion efficiency measurement
- Power plant emissions monitoring and combustion efficiency measurement
- Coking plant emissions monitor for city site environ protection
- Concrete plant exhaust emissions monitoring
- Automotive exhaust analysis and engine quality control
- Motorcycle exhaust test for environmental protection
- locomotive smoke analysis

## Standards Supported

### *BAR 97 EPA ASM Range and Accuracy Requirements for Emissions Analyzer*

Gas	Range	Accuracy (% of point)	Accuracy (absolute)	Range	Accuracy (% of point)	Accuracy (absolute)
HC	0-2000 ppmh	±3%	4 ppmh	2001 - 5000 ppmh >5000 ppmh	±5% ±10%	N/A
CO	0-10.00%	± 3%	0.02% CO	10.01-14.00%	±5%	N/A
CO <sub>2</sub>	0-16%	±3%	0.3% CO <sub>2</sub>	16.1 - 18%	±5%	N/A
NO	0-4000 ppm	±4%	25 ppm	4001-5000 ppm	±8%	N/A
O <sub>2</sub>	0-25%	±5%	0.1% O <sub>2</sub>	-	-	-

### *OIML R99 class 1 Maximum permissible errors\* Requirements of Instruments for measuring vehicle exhaust emissions*

Class	Type of indication error	CO	CO <sub>2</sub>	O <sub>2</sub>	HC
0	Absolute	± 0,03 % vol	± 0,5 % vol	± 0,1 % vol	± 10 ppm vol
	relative	± 5%	± 5%	± 5%	± 5%
I	Absolute	± 0,06 % vol	± 0,5 % vol	± 0,1 % vol	± 12 ppm vol
	relative	± 5%	± 5%	± 5%	± 5%
II	Absolute	± 0,2 % vol	± 1% vol	± 0,2 % vol	± 30 ppm vol
	relative	± 10 %	± 10 %	± 10 %	± 10 %

\*Absolute or relative, whichever is greater.

### *China Standards and Equal Analyzers:*

Auto	GB14761.1-14761.7-93 «Emission Standard for Exhaust Pollutants from Vehicles»	pSmoke-Auto	
	GB14761.1-93 «Emission Standard for Exhaust Pollutants from Light-duty Vehicles»	pSmoke-Auto.1	CO:0.2,65-143 g/km HC:10.8-17.3(C6) NOx:8.5-13.6(NO2)
	GB14761.2-93 «Emission Standard for Exhaust Pollutants from Gasoline Engine of Vehicles»	pSmoke-Auto.2	CO:34-54 g/kw-h HC:14-22 NOx:14-22.(NO2)
	GB14761.3-93 «Emission Standard for Fuel Evaporative Emissions from Vehicle with Petrol Engine»	pSmoke-Auto.3	VOC:2-4g/ Each cycle
	GB14761.4-93 «Emission Standard for Pollutants from Crankcase of Vehicle Engine»	pSmoke-Auto.4	VOC:
	GB14761.5-93 «Emission Standard for Pollutants at Idle Speed from Vehicle with Petrol Engine»	pSmoke-Auto.5	HCU/V :700-8000(mg·L <sup>-1</sup> ) CO:3.0-4.5%
	GB14761.6-93	pSmoke-Auto.6	Smoke Black ≤Rb3.5-5.0

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	«Emission Standard for Smoke at Free Acceleration from Vehicle with Diesel Engine» GB14761.7-93, ISO11614	pSmoke-Auto.7	Smoke Black: FSN:4.0-4.5
Motor emissions	«Emission Standard for Smoke at Full Load from Automotive Diesel Engine» GB14621-93 «Emission Standard for Exhaust Pollutants from Motorcycles»	pSmoke-MTC	CO:16-60 g/km;4.5-5.0% HC:7-21(C6) g/km;1200-9000ppm NOx:(NO2)

## Specifications

Parameter	Gas	Range	Accuracy	Repeatability	Response	Life/y	Method	E5	M5
Hydrocarbons	HC	0 to 2000 ppm	+4ppm abs. or 3% rel.	+3ppm abs. or +2% rel.	4.5s	10	ND IR	√	√
	n-hexane	2001 to 5000 ppm 5001 to 30000 ppm	+/- 5% rel. +/-10% rel.	+/-3% rel. +/- 4% rel.					
Organic vapor	VOC	0 to 30000 ppm	<+/-10% rel.	<+/- 4% rel.					
Carbon Monoxide	CO	0.00% to 10.00%	+0.02% abs. or +3% rel.	+0.02%abs. or +2% rel.	4.5s		RD IR	√	√
		10.01% to 15.00%	+/-5% rel.	+/-3% rel.		10			
Carbon Dioxide	CO <sub>2</sub>	0.00% to 16.00%	+0.3% abs. or +3%rel.	+0.1% abs. or +2% rel.	4.5s		ND IR	√	√
Nitric oxide	NOx	16.01% to 20.00%	+/-5% rel.	+/-3% rel.					
		0 to 3000 ppm	+25ppm abs. or +4% rel..	+20ppm abs. or ±3% rel.	5.5s	2	EC	√	
Nitric oxide	NO	4001 to 5000 ppm	+/- 8% rel.	+/-4% rel.					
		0 to 3000 ppm	+25ppm abs. or +4% rel..	+20ppm abs. or ±3% rel.	1s	10	IR		√
Oxygen	O <sub>2</sub> lambda	4001 to 5000 ppm	+/- 8% rel.	+/-4% rel.					
		0.00% to 25.00%	+0.1% abs. or +5% rel.	+0.1% abs. or +3% rel.	40s	2	EC	√	
Oxygen	O <sub>2</sub> lambda	0.00% to 25.00%	+0.1% abs. or +5% rel.	+0.1% abs. or +3% rel.	1s	10	NIR		√
		AFR	Lambda	0.00-14%	+/- 2% rel.	+/-1% rel.	1s		
Black dust/Opacity		Rb 0-10.0 Green:0-12; 0-100%;	<3%			10	Photo opacity	√	√
Suspended Particles	TSP	0-100/1000mg/M <sup>3</sup>	<5%			10	Light Scatter		
Engine speed	RPM	0-20000	< 1 abs		<1s	10			
Ignition test	IS	0-20kV, 0-100kHz			<8s	10			
Temperature	Toil	-40 to 125°C	<0.5°C abs		<10s	10			

## Auxiliary Parameters Tested

Combustion efficiency, Air-Fuel Ratio, λ(lambda), Revolution meter, Stove temperature, oil temperature, stove pressure

## BigDipper Technochem Institute

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