

# GreenLine Mk2



Portable  
flue gas laboratory

Bulletin 06-28.3 E

GAS  
ANALYSIS

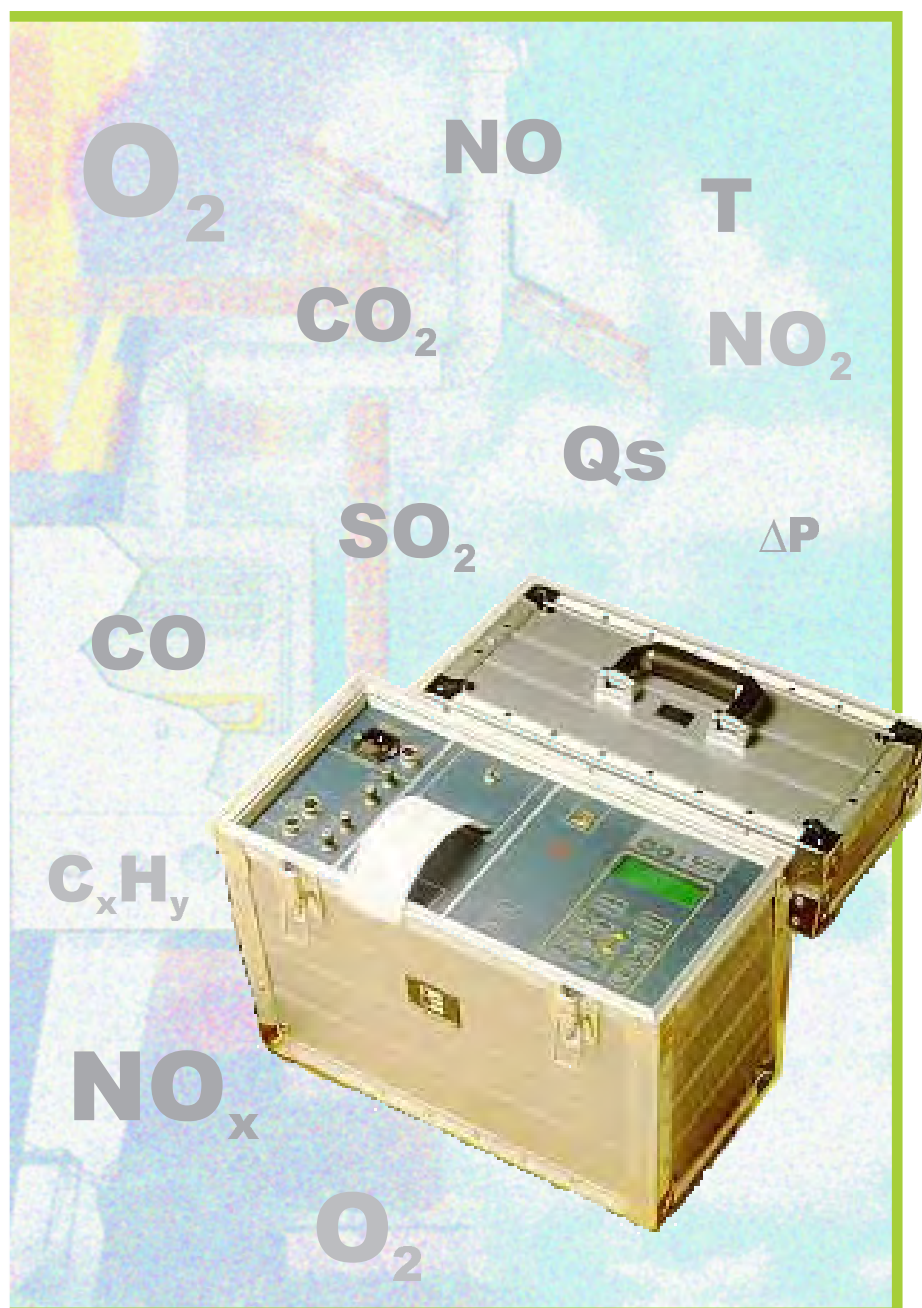
ISO 9001  
registered by  
GASTEC



Combustion gas  
analysis

Draft, pressure,  $\Delta P$   
and gas speed

Toxic gas  
measurements





# UP TO SIX CELLS

## Caratteristiche principali

- Improve plant performance*
- Energy saving through efficiency improvement*
- Emission monitoring to control and reduce pollution*
- Increase plant and operators safety*
- Lower cost for maintenance*

**GreenLine** is a high quality, multiple measurement apparatus for analyzing flue gas in heating and power industry, industrial plants, as well as chemical process, technical monitoring, servicing, environmental protection, and every situation where emissions have to be monitored and controlled.

### Gas sampling probe

Flue gas sampling probes with different length, shape and max. operating temperature (800°C and 1000°C) are available to match the requirement of different applications. The sampling probe is connected to the instrument with a rubber hose through a combined module of water trap and suspended particle filter.

### Sample conditioning

An efficient sample treatment section accomplish the important task of obtaining a clean gas sample, de-humidified and not altered in composition as at the aspiration point. A portable conditioning unit, **GreenCooler**, is available as accessory. It includes a special gas sampling probe with heating

hose and a Peltier cooling system. This unit, when connected to the GreenLine, allows long terms analysis preventing gas water down (ex. NO<sub>2</sub> and SO<sub>2</sub>).

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### 3 to 6 cells analyzers

The analyzer can be configured with up to 6 electrochemical cells for different gas concentration measurement (O<sub>2</sub>, CO, NO, NO<sub>2</sub>, SO<sub>2</sub>, and CxNy). A thermoelement is used by the unit to compensate the cells and special filters allow to annul the interference with other gas components.

These values, together with the flue gas and combustion air temperatures, are used to calculate the efficiency, excess air and CO<sub>2</sub> in compliance with the actual law and normative. Long term, fast response, high accuracy and pre-calibrated cells are used in Eurotron analyzers to assure you the maximum performance from Eurotron analyzers and quick replacement.

### Data Memory

The firmware allow a continuous autodiagnostic procedure to check each cell, sensor and battery. It is possible to memory store up to 250 analysis data for

Parameter	Sensor	Range ***	Res.	Accuracy **
O <sub>2</sub>	Electrochemical	0 - 25%	0.1%	±0.1% vol
CO	Electrochemical	0 - 4000 ppm	1 ppm	<300 ppm=±5 ppm >300 ppm=±4%
CO	Electrochemical	0 - 20000 ppm	1 ppm	<300 ppm=±5 ppm >300 ppm=±4% >4000 ppm=±6%
CO	Electrochemical	0 - 10%	0.01%	<2000 ppm=±100 ppm >2000 ppm=±5%
NO	Electrochemical	0 - 2000 ppm	1 ppm	<100 ppm=±5 ppm >100 ppm=±4%
NO	Electrochemical	0 - 4000 ppm	1 ppm	<100 ppm=±5 ppm >100 ppm=±4% >2000 ppm=±5%
NO <sub>2</sub>	Electrochemical	0 - 800 ppm	1 ppm	±5 ppm
NO <sub>x</sub>	Calculated *	0 - 2000 ppm	1 ppm	
SO <sub>2</sub>	Electrochemical	0 - 2000 ppm	1 ppm	<100 ppm=±5 ppm >100 ppm=±4%
C.H <sub>4</sub>	Pellistor	0 - 5% (methane)	0.01%	±5% f.s.
CO <sub>2</sub>	Calculated	0 - 99.9%	0.1%	
Tair	PT100	-10 - 100°C	1°C	±0.5%
Tgas	Tc K/N	0 - 1000/1300°C	1°C	±0.25%
	Tc S	0 - 1600°C	1°C	±0.25%
Pressure/Draught	Bridge	-20 to +50.00hPa	0.01 hPa	±2%
Excess air	Calculated	1.00 - infinity	0.01	
Gas speed	Calculated	0 - 99.9 m/s	0.1 m/s	
Efficiency	Calculated	1 - 99.9%	0.1%	
Smoke index	Paper filter method	0 - 9 Bacharach		
Differential temp.	Calculated	0 - 999°C	1°C	

All emission measurements can be recalculated by the GreenLine with a programmable O<sub>2</sub> reference value.

Concentration can be shown in terms of chimney equivalent NO<sub>2</sub>

\* On instruments with only the NO sensor installed, NO<sub>x</sub> measurements are calculated from NO measurement using a programmable percent increment.

\*\* Accuracy limits are stated as % of reading. Additional ± 1 digit error has to be considered.

\*\*\* Measuring reading can be directli converted from ppm to mg/Nm<sup>3</sup> and from hPa to mmH<sub>2</sub>O, mbar, inH<sub>2</sub>O.





# IN A COMPLETE, PORTABLE LABORATORY

displaying, printing and transfer to a PC.

### Remote temperature sensor

A remote Pt100 probe is available for combustion air temperature measurement from 10°C to 100°C. This probe is strongly recommended mainly in forced air boiler to obtain an accurate calculation of the efficiency.

### Built-in printer

**GreenLine** is equipped with a built-in rugged impact type printer. It uses a low cost common roll of paper, more readable, long time and heat resistant better than the thermal printout on chemical paper. One key instruction is enough to obtain one, two or three copies of the analysis report with header and customer reference data.

### Pressure/Draft measurements

The **GreenLine** can be optionally equipped with an internal sensor for pressure and stack draught. One key instruction move the operative mode to and from this function to gas analysis and viceversa. The measured data can be listed in the printed report.

### Smoke index

**GreenLine** Smoke Index measurement is done by using the special probe and the internal pump. The results can be memory stored and printed on the report.



### Specifications

**Display:** High contrast alphanumeric STN technology LCD display with 4 lines of 20 characters. Display backlight.

**Text language:** Italian, English, German (other languages on request)

**Type of combustibles:** Up to 10 totally programmable

**Zero calibration:** Automatic calibration at instrument start-up with local air as reference. Cycle time 3 minutes (programmable).

**Full scale calibration:**

-  $O_2$  sensor: automatic calibration at instrument start-up.

- **Other sensors:** semi-automatic with calibrated gas.

**Full scale drift:** Within the precision after 6 months in normal working conditions

**Response time:** Max 50 seconds for 95% variation (80 secs for  $SO_2$  cell)

**Self-diagnosis:** Sensors efficiency test with display of diagnostic indication

**Power supply:**

- Mains supply from 84 to 264 Vac

- Internal lead rechargeable accumulators with capacity of 12V 6.5 A/hour

- External batteries 12 Vdc

**Battery protection:** Overload protection circuit

**Autonomy:** 4 hours continuous operation (probe heater OFF)

**Data memory:** Up to 250 full analysis data with date, time and memory step identification

**Printer:** 24 columns impact type with paper width 58 mm (25 meters rolls)

**Printing speed:** 0.75 lines/second

**Alarms:** 4 alarms with visible (LED) and acoustic alarm.

**Digital interface:** RS232

**Smoke analysis:** Power supply heater and time program

**Working temperature:** From -5 °C to 40 °C (short time up to 45 °C)

**Storage temperature:** From -20 °C to +50 °C (3 months maximum at temperatures exceeding the operational limits)

**Case:** Rigid aluminum, with removable lid, handle and carrying strap.

**External dimensions:** 420 x 208 x 318 mm

**Weight:** Approximately 13 Kg

**Water trap:** Coalescent (30  $\mu$ ) with a secondary pump for automatic continuous drain

**Line filter:** 20  $\mu$  replaceable cartridge

**Interference filter:** CO cell protection from  $NO_x$  and  $SO_2$

### Ordering code

*Standard packaging includes: line cable, spare fuses kit, spare paper roll, dust material kit, instruction manual and calibration report.*

**7851 - A - B - C - DD - EE - F - G**

#### Table A Basic configuration

3	3 measurement cells
4	4 measurement cells
5	5 measurement cells
6	6 measurement cells

#### Table B Type of cell n. 1

1	$O_2$ (0-25%)
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#### Table C Type of cell n. 2

2	$CO$ (0-4000 ppm)
2x	$CO$ (0-20000 ppm)
3	$CO$ (0-4000 ppm) $H_2$ compensated

#### Table D Type of cells n. 3, 4, 5 and 6

4	$NO$ (0-2000 ppm)
4x	$NO$ (0-4000 ppm)
5	$NO_2$ (0-800 ppm)
6	$SO_2$ (0-2000 ppm)
6x	$SO_2$ (0-5000 ppm)
7	$CO$ (0-10%)
8	$CxHy$ (0-5%) calibrated with $CH_4$
9	Special

#### Table E Sampling probe

0	300 mm standard probe (no smoke measurements)
1	300 mm pistol-grip
2	750 mm pistol-grip
3	1500 mm pistol-grip
S	Smoke measurement capability and heater for pistol grip probe
P	Gas and draft simultaneous measurement capability for pistol grip probe

#### Table F Options

0	No option
1	Smoke heater powered by internal battery
2	Draught measurement capability
3	250 analysis internal data memory

#### Table G Power supply and cord plug

1	120 V US plug
2	230 V Schuko plug
3	240 V UK plug
4	230 V European Plug
5	100 V USA/Japan Plug



# WITH HIGH PERFORMANCE

## GreenCooler

## We care

Long term analysis can lead to inaccurate concentration measurements of Nitrogen Dioxide (NO<sub>2</sub>) and Sulfur Dioxide (SO<sub>2</sub>) due to the condensation of water vapor. Condensate can be present in the flue gas sampling system and analyzer inlet (probe, hose and filter) and it can absorb some NO<sub>2</sub> and SO<sub>2</sub> or other gas that can be water diluted. The **GreenCooler** gas sample preparation unit can be used also when the flue gas temperature is high and can reach the analyzer at variable high temperatures compromising the temperature compensation of the gas sensor module with incremental errors. The flue gas to be analyzed can be fed to the gas preparation unit model **GreenCooler** directly or through a special heated hose. A Peltier device is used into the exchanger of the gas preparation module based on the cyclone principle. The collected condensate is pumped out with an internal peristaltic pump and collected into a built-in container. The conditioned, water vapor free gas is aspirated by the sampling pump of the analyzer through a standard unheated hose.



### Specifications

**Principle of operation:** Peltier cooler  
**Heat exchanger:** cyclone separator made of DURAN  
**Volume of heat exchanger:** 25 ml  
**Sample flue gas Inlet temperature:** maximum 135°C  
**Sample flue gas outlet temperature:** +5°C dew point with environment temperature of 40°C visual alarm if it deviates ± 3°C  
**Inlet sample dew point:** max. 65°C  
**Sample flow maximum:** 2.5 liter/min  
**Automatic removal of condensation:** built-in peristaltic pump and condensate container  
**Condensate container capacity:** 100 ml  
**Warm-up time:** approximately 6 minute @ 40°C  
**Operating pressure:** max. 1 bar  
**Operating ambient temperature:** +5 to 40°C  
**Power supply:** 115 V 50/60 Hz or 230 V 50 Hz  
**Power consumption:** maximum 830 VA  
**Case:** Portable aluminum case with cover and carrying handle  
**Dimensions:** 419x 208x318 mm  
**Weight:** 14 kg

### Report of Calibration

Every instrument is factory calibrated and certified against Eurotron Standard, that are periodically certified by Internationally recognized Laboratory to ensure traceability, and shipped with a Report of Calibration stating the nominal and actual values, the acceptable error and the deviation error.

### Quality system

Research, development, production, inspection and certification activities are defined by methods and procedures of the Eurotron Quality System inspected for compliance and certified ISO9001 by GASTEC, a Dutch notified body.

### Customer support

The experience of Eurotron engineers is available for any kind of support you may require relevant with your specific application and maintenance. The service department is every time ready to give you back the instrument as only just exited from the factory and in the shortest possible time.

### Ordering code

#### 7656 - A - B - C

Table A	Heated Hose
0	none
2	2 meters long
3	3 meters long

Table B	Power supply
1	120 Vac USA plug
2	230 Vac Schuko plug
3	240 Vac UK plug
4	230 Vac European plug
5	100 Vac USA/Japan plug

Table C	Options
0	None
1	Heated hose temperature controller