

UniGas 3000+
GreenLine 4000
Handheld Flue Gas Analysers
Boiler Tuning Units
Instruction Manual MM850402 ed. K12



INTRODUCTORY NOTE

NOTE: THIS MANUAL IS VALID FOR INSTRUMENTS WITH SERIAL NUMBER 124012 AND FIRMWARE REV. 1.xx2 OR HIGHER.

*This manual includes all the information you need to install, operate and maintain the flue gas analysers **GreenLine 4000, UniGas 3000+** space and theirs accessories.*

***Eurotron** provides the best care and efforts in preparing this book and believes the information in this publication are accurate. The **Eurotron** products are subjected to continuous improvement, in order to pursue the technological leadership; these improvements could require changes to the information of this book.*

***Eurotron** reserves the right to change any information without notice.*

*The **3000-4000 series** gas analyser uses sophisticated analogical and digital technologies. Any maintenance operation must be carried out by qualified personnel **ONLY**. **Eurotron** supplies instructions and operative procedures for any operation on the instrument. We recommend to contact our technicians for any necessary questions requirements.*

The instrument is supplied by a Ni-MH rechargeable battery pack or by 100, 115, 230V $\pm 10\%$ 50/60Hz line supply using the special power supply module provided with the 3000-4000 series.

*The instruments are fully tested in conformity with the directive n°89/336/CEE Electromagnetic Compatibility. **Eurotron** shall not be liable in any event, technical and publishing error or omissions, for any incidental and consequential damages, in connection with, or arising out of the use of this book.*

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1 GENERAL DESCRIPTION

The **3000-4000 series** is designed to satisfy the market needs; they are the direct result of the advanced research and experience of **Eurotron**. Eurotron has been developing and manufacturing portable flue gas analysers since 1986.

GreenLine 4000, and **UniGas 3000+** are multigas compact hand-held multifunctional instruments. The micro-processor based instrument includes a flue gas analyser, an emissions monitor and an ambient parameters indicator. Two standard internal electrochemical sensors read the Oxygen (O₂) and carbon monoxide (CO) gas concentration. The gas temperature and air temperature are used in connection with the gas analysis to calculate the efficiency, excess air, and CO₂ concentration. A 10 gas parameter programmable table is used for calculations approved in accordance with DIN33962.

More optional sensors (NO and/or SO₂) can be installed to enable the pollution measurement. The NO concentration can be expressed in terms of NO_x as required by ambient laws.

External sensors are available to measure CO ambient and to check and find the gas network leakages.

The **3000-4000 series** can install a fourth electrochemical sensor to monitor pollution. In this way you can measure simultaneously and using a single unit, NO/NO_x and SO₂ gas concentration.

The instruments are completed with a pressure (Draft) sensor, an internal printer, internal memory for storing data and a USB serial interface for configuration and data transfer from and to a PC.

- ◆ Draft measurement is possible using the internal pressure sensor and the special gas sample probe.
- ◆ The optional internal printer is impact type and the generated document is very legible and has a long time duration (NON-thermal paper roll).
- ◆ The internal standard memory may store up to 250 complete gas analysis tests.
- ◆ The instruments have a standard USB serial interface and a configuration PC software to configure the analyser on your own.



Features & Benefits

- **New user friendly interface**: very intuitive and in English language to use the instrument without instruction manual.
- **Large dimensions and lighting LCD display**: very legible using the "Zoom" function and the automatic back-light device.
- **Easy and quick upgrading** hardware and software are made using modular design to upgrade the system yourself.
- **Differential pressure measurement**: gas velocity, pressure, Draft, ΔP , etc.
- **Averaging** between three gas analysis.
- **Internal impact type printer**: more legible and long shelf life.
- **Single battery pack**: rechargeable to power for both the instrument and the printer.
- **Internal memory**: up to 250 complete data analysis and USB port

THE INSTRUMENT IS FULLY EN 50379 PART 2 AND PART 3 COMPLIANT



1.1 Ordering Code

1.1.1 GreenLine 4000

7826 – A – B – CC – D – EEE – F – GGG – H

Each GreenLine 4000 is equipped with a O₂ sensor, internal 250 memory, real time clock capabilities, USB serial cable, Gas configuration software, magnetic rubber holster, electrovalve for autozero quick start-up, rechargeable battery pack, battery charger and supplied with a Report of Calibration and an instruction manual.

Table A Sensor n.1

1 O₂ (0-25%)

Table B Sensor n.2

2LO CO (0-500 ppm) + CO sensor dilution
2H CO (0-8000 ppm) H₂ compensated + CO sensor dilution
2X CO (0-20000 ppm) + CO sensor dilution
2Y CO (0-10.00 %)

Table C Sensor n.3 & 4

0 none
4 NO/NO_x (0-4000 ppm)
4LO NO/NO_x (0-500 ppm)
5 NO₂ (0-1000 ppm)
5LO NO₂ (0-100 ppm)
6 SO₂ (0-4000 ppm)
8 C_xH_y (0-5.00 %)

Table D Gas sampling probe (air filter and water trap included)

0 none
2 Standard (L=300 mm) max 800°C + Draft (dual hose) (cat. BB610046) max 500°C
5D Standard (L=750 mm) max 800°C + Draft (dual hose) (cat. BB610080) max 500°C
F Sinterized filter (max.800°C)

Table E Options

1 Internal impact printer
2H Draft and differential pressure measurements capability + dual hoses with connector
4 Graphic display capability

Table F Battery charger

1 115 Vac with USA plug
2 230 Vac with Schuko plug
3 230 Vac with UK plug
4 230 Vac with European plug
5 100 Vac with USA/Japan plug

Table G Accessories

0 None
1 Data Manager software Package DBGas 2004 standard (cat. EE260166)
3V Vinyl Carrying case with shoulder strap (instrument + gas probe + accessories) (cat. BB830043)
3 ABS Carrying case (instrument + gas probe + accessories) (cat. BB830028)
5 Remote air sensor with 2 meters cable length (cat. BB830018)
B External Manual pump for smoke measurement with filters and comparing table
E Pitot tube BB610032 (only with option E=2H)

Table H Calibration certificate

1 Eurotron report



1.1.2 Unigas 3000+

7825 – A – B – CC – D – EEE – F – GGG - H

Each UniGas 3000+ is equipped with a O₂ & CO sensors, differential pressure and Draft internal sensor, tightness test procedures, internal 250 memory, realtime clock capabilities, USB serial cable, Gas configuration software, magnetic rubber holster, rechargeable battery pack, battery charger and supplied with a Report of Calibration and an instruction manual.

Table A Sensor n.1

1 O₂ (0-25%)

Table B Sensor n.2

2H CO (0-8000 ppm) H₂ compensated + CO dilution
2X CO (0-20000 ppm) + CO dilution

Table C Sensor n.3 & n.4

0 none
4 NO/NO_x (0-4000 ppm)
4LO NO/NO_x (0-500 ppm)
5 NO₂ (0-1000 ppm)
6 SO₂ (0-4000 ppm)

Table D Gas sampling probe

0 none
1D Standard (l=180 mm) max 800°C + Draft (dual hose) (cat. BB610051)
3 Standard (l=300 mm) max 800°C + Draft (dual hose) (cat. BB610046)
5D Standard (l=750 mm) max 800°C + Draft (dual hose) (cat. BB610080)

Table E Options

1 Internal impact printer
3 Pressure decay program firmware + Gas network leak test kit
6 Electrovalve for autozero quick start
8 Internal sensor for gas leak detector

Table F Battery charger

1 115 Vac with USA plug
2 230 Vac with Schuko plug
3 230 Vac with UK plug
4 230 Vac with European plug
5 100 Vac with USA/Japan plug

Table G Accessories

0 None
1 Data Manager software Package DBGas 2004 standard (cat. EE260166)
2 Magnetic support
3V Vinyl Carrying case with shoulder strap (instrument + gas probe + accessories) (cat. BB830043)
3 ABS Carrying case (instrument + gas probe + accessories) (cat. BB830028)
5 Remote air sensor with 2 meters cable length (cat. BB830018)
7 Differential pressure connection kit (2 x EE300088)
B External Manual pump for smoke measurement with filters and comparing table (cat. F7828000)

Table H Calibration certificate

1 Eurotron report



1.1.3 Flue gas probes

| Probes Code | Description |
|-------------|--|
| BB610043 | 90° FIXED long L=180mm+180mm Ø8mm TcK |
| BB610046 | FIXED hose length 3mt L=300mm Ø8mm TcK |
| BB610047 | FIXED hose length 2,5mt L=180mm Ø6mm TcK |
| BB610048 | FIXED hose length 2,5mt L=300mm Ø6mm TcK |
| BB610051 | FIXED hose length 3mt L=180mm Ø8mm TcK |
| BB610080 | FIXED hose length 3mt L=750mm Ø8mm TcK |
| BB610081 | FIXED INCONEL hose length 3mt L=750mm Ø8mm TcK |
| BB610112 | FIXED 90° hose length 2,5mt L=300mm+450mm Ø8mm TcK |
| BB610119 | FIXED hose length 3mt L=500mm Ø8mm TcK |
| BB610122 | FIXED 90° hose length 2,5mt L=200mm+300mm Ø8mm TcK |

1.2 Specifications

- **Type:** 2, 3 or 4 cells hand-held flue gas analyser/Boiler tuning unit.
- **Calibration:** automatic 60 secs. calibration procedure at instrument switching-on. Optional autozero electrovalve for quick start-up
- **Self-diagnosis:** Sensors efficiency test with anomalous status announcement.
- **Fuel types:** Up to 10 totally programmable.
- **Pump:** rate of flow 0.8 lit / head -230mbar
All data measured using 3 meters long probe and line filter connected. Load loss = 10 mbar using a 3 meters probe extension
- **Power supply:** High capacity Li-ion rechargeable battery pack / external battery charger.
- **Charging time :** 3h at 90% with instrument off.
- **Battery life:** 10h continuous operation (without printer and back-light).
- **Printer:** Impact type 24 columns with 58 mm large and 18 meters long paper roll
- **Printer power supply:** using the analyser battery pack.
- **Automatic CO(ppm) dilution:** Automatic sensor protection from high CO concentration.
- **Internal data memory:** up to 250 complete analysis data structured by Tags.
- **Service and user data:** 3 programmable lines for each programmed customer using a PC and DBGas Software.
- **Report Header:** 4 rows x 16 characters programmable from keyboard
- **Display:** Large (40x56 mm) graphic LCD display with automatic back-light device. Bargraph and trend capability as option.
- **Serial interface:** USB standard interface.
- **Smoke measurement:** Using the optional external manual pump. Bacharach index memory store and printout capability as standard.
- **Optional probes:** ambient CO, explosive gas leakage sniffer.
- **Working temperature:** from -5°C to +45 °C (up to 50°C for short time)
- **Storage temperature:** from -20 to +50°C (3 months maximum at temperatures exceeding the operational limits).
- **Dimensions:** 115x90x330 mm
- **Weight:** Nett. 1.1 kg battery and printer included



External Probes

Low Draft Probe

- **Range:** ± 200 Pa
- **Resolution:** 0.1Pa
- **Operative temperature range:** from +5 to +45 °C
- **Accuracy**
 - From +10 Pa to -10 Pa: ± 0.5 Pa
 - Elsewhere: ± 3 Pa





Accuracies and ranges

| Parameter | Sensor type | Range | Resol. | Max response | Accuracy |
|----------------------------------|-----------------|--|----------|--------------|--|
| O ₂ | Electrochemical | from 0 to 25.0% | 0.1% | 20 sec. | ±0.2% vol. |
| CO H ₂ compensated | Electrochemical | from 0 to 8000 ppm | 1 ppm | 50 sec. | ±10 ppm <300 ppm ±4% rdg up to 2000 ppm ±10% rdg elsewhere |
| CO diluted | Electrochemical | from 0,8 to 10% | 0.05 % | | |
| CO | Electrochemical | from 0 to 20.000 ppm | 1 ppm | 40 sec. | ±10 ppm <300 ppm ±4% rdg up to 2000 ppm ±10% rdg elsewhere |
| CO% | Electrochemical | from 0 to 10.00 % | 0.01% | 50 sec. | ±0.01% up to 0.2% ±4% rdg elsewhere |
| NO | Electrochemical | from 0 to 4000 ppm | 1 ppm | 40 sec. | ±5 ppm <125 ppm ±4% rdg elsewhere |
| NO LOW | Electrochemical | from 0 to 500 ppm | 0.1 ppm | 40 sec. | ±2 ppm <40 ppm ±5% rdg elsewhere |
| NO ₂ | Electrochemical | from 0 to 1000 ppm | 1 ppm | 50 sec. | ±5 ppm <125 ppm ±4% rdg elsewhere |
| NO _x | Calculated | from 0 to 5000 ppm | 1 ppm | | |
| SO ₂ | Electrochemical | from 0 to 4000 ppm | 1 ppm | 40 sec. | ±5 ppm <125 ppm ±4% rdg elsewhere |
| CO ₂ | Calculated | from 0 to 99.9% | 0.1 % | | |
| Tair | Pt100 | from -10 to 100 °C | 0.1 °C | | ±(0.2% rdg+0.15°C) |
| Tgas | Tc K | from 0 to 1000 °C | 0.1 °C | | ±(0.3% rdg+0.3°C) |
| ΔT | Calculated | from 0 to 1000 °C | 0.1 °C | | |
| Tflow | Tc K | from -10 to 100 °C | 0.1 °C | | ±(0.3%rdg+0.3°C) |
| Treturn | Tc K | from -10 to 100 °C | 0.1 °C | | ±(0.3% rdg+0.3°C) |
| Pressure ΔP | Piezo | 0-200 hPa | 0.1 hPa | | ±0.5 hPa up to 50 hPa ±1% rdg elsewhere |
| Draft | Piezo | ±40 hPa | 0.01 hPa | | ±0.03 hPa up to 3hPa ±1% rdg elsewhere |
| Excess air | Calculated | from 1.00 to infinity | 0.01 | | |
| Efficiency | Calculated | from 0 to 99.9% (also for condensing boilers with automatic detection) | 0.1 % | | |
| Gas speed | Pitot tube | From 0 to 100.0 m/s | 0.1 m/s | | |
| Smoke index | External pump | from 0 to 9 | | | |

- Technical units and ranges can be converted directly from ppm to mg/Nm³, mg/kwh and from hPa to mmH₂O, mbar or inH₂O.
- The relative accuracy shown are expressed as absolute or % of rdg errors at -5°C to +40°C ambient temperature.
- The maximum response time shown is referred to 90% signal changes.
- The pressure relative accuracy shown is valid only after the auto-zero procedure.

N.B.: Specifications may change without notice.



2 GENERAL

2.1 Keypad & Display

The easy to use keyboard allows the operator to enter the main operative mode and all other complementary or auxiliary modes following the menu driven instructions.

The high contrast graphic LCD (40x56 mm), equipped with an automatic back-light device, displays the measured and/or calculated parameters in the preferred format (Zoom function). The above parameters can be also displayed in a graphic mode.

2.2 Built-In printer

The **3000-4000 series** can be equipped with a built-in, rugged, impact type printer. It uses a low cost common roll non-thermal of paper (58 mm large, 18 meters long) , more readable, long life time and heat resistant better than the thermal printout on chemical paper. One key instruction is enough to obtain one, two or more copies of the analysis report with header and company reference data.

2.3 Gas Sampling Probe

Flue gas sampling probes with different lengths, shapes and max. operating 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.

2.4 Measuring Sensors

The **3000-4000 series** use long life sensors for O₂, CO (H₂ compensated), NO, NO₂ and SO₂.

An automatic internal device diluted the CO concentration when a high level of CO is identified by the instrument. Dilution system allows to extend the measuring range of the CO sensor up to 10%.

The optional Autozero valve for quick start-up allows the operator to switch the instrument with the gas probe in the stack.

Four acoustic and visual alarms can be set on four programmable parameters.

2.5 Temperature probes

A thermocouple type K is incorporated in the tip of the gas sampling probe to measure the flue gas temperature. This thermocouple is suitable for measurements up to 800°C (max 1000°C for few seconds). Temperature measurement and gas sampling from the flue gas pipe are thus always performed in the same site.

The probe is connected to the instrument with the appropriate compensated cable and connector. A Pt100 resistance thermometer (local jig or remote sensor) is used for the air temperature measurement and best efficiency calculation.

2.6 Pressure sensor

The instrument is equipped with an internal sensor for pressure and stack Draft. Easy to change to and from pressure analysis and stack Draft. Easy to change to and from pressure analysis with a single-key operation.

As an additional standard feature , the instrument is equipped with a differential pressure sensor.

2.7 Fuel Technical Data

The instrument includes as standard the technical data for 4 of the most common fuels.

Using the optional GasConfig software, it is possible to modify or add data of up to 10 different fuels.



2.8 Smoke Measurement

Smoke index measurement is done by using an external hand pump (supplied as an accessory), the results can be stored in memory and printed in the report.

2.9 Remote Temperature Probe

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.

2.10 Leak test procedure

To check gas network tightness using a pressure decay method with programmable interval time. It uses the internal pressure sensor and a Eurotron leakage procedure.

2.11 External Low Pressure Sensor (UniGas 3000+)

The UniGas 3000+ only can use the external Pa sensor for pressure and Draft (BB830025). The sensor is a unique vacuum meter with higher precision ($\pm 0,5$ Pa) and resolution (0,1 Pa) specification if compared to the internal sensor ones. This sensor is useful to measurements that respond to the UNI10845.

2.12 Burner Pressure Probe

A 1 meter, 8x4mm silicon hose (cat. EE300088) is used to check the pressure inside the burner when you are installing the heating system.

2.13 Ionization Current Probe (option)

This special probe allows the operator to measure the ionization current of the boiler and to verify the value in accordance with the boiler specifications.

2.14 Internal Gas Sniffer Probe (option for UniGas 3000+)

An optional feature monitors the CH_4 and natural gas concentration and detects and locates the position of a gas leak in a domestic pipe network by using an internal gas sniffer sensor.

2.15 Pitot tube

The **3000-4000 series** analyzer can be connected to a pitot tube for gas speed measurements.

2.16 Calibration Certificate

Each **3000-4000 series** portable gas analyzer, is factory calibrated and certified against **Eurotron** Standards, that are periodically certified by an International recognized Laboratory, and shipped with a Certificate of Calibration stating the nominal and actual values and the deviation errors.

2.17 Electromagnetic Compatibility

The instrument case, made in shock-resistant injection moulded ABS + polycarbonate has been designed to fulfill the directive 89/336/CEE Electromagnetic Compatibility. See Appendix A1 for EMC declaration of conformity.

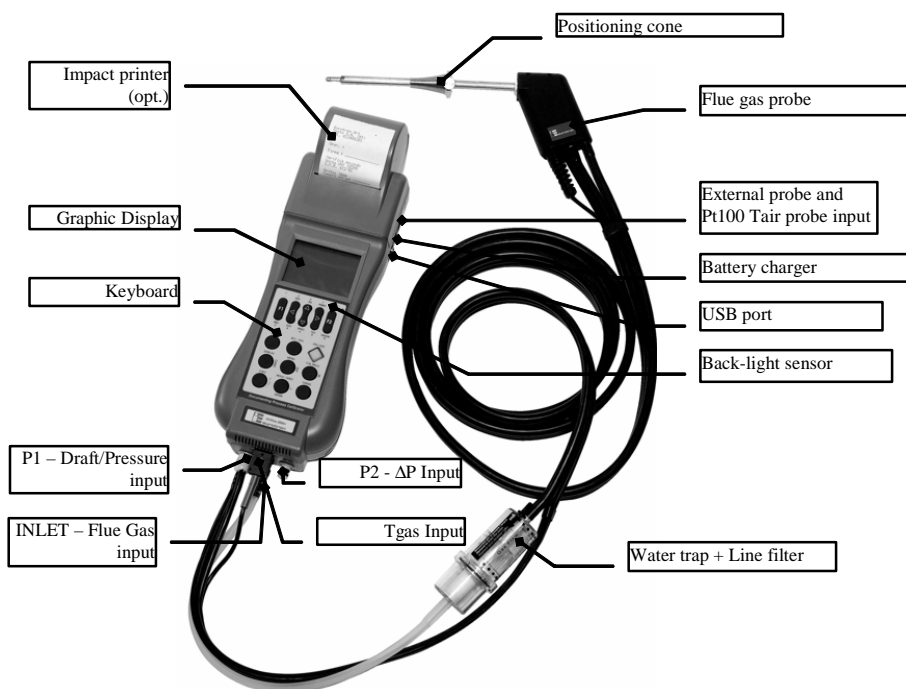


3 PHYSICAL DESCRIPTION

The **3000-4000 series** portable analyzer consists of a rugged and compact case, a mother board with all base function circuits, 2, 3 or 4 electrochemical cells, a gas pump, a keyboard, an LCD backlighted display, a Li-Ion rechargeable battery pack and, optionally an impact printer.

The 2 pieces of the case are joined by 8 screws. The batteries, the pneumatic circuit and the cells are positioned in the rear of the analyzer and 2 screws locked the lid.

A pressure lid allows the removal of the paper roll.



At the bottom of **3000-4000 series** you can see all sampling probe connectors: gas inlet, pressure and Draft input, thermocouple input for gas measurement and the 2nd pressure inlet connector.

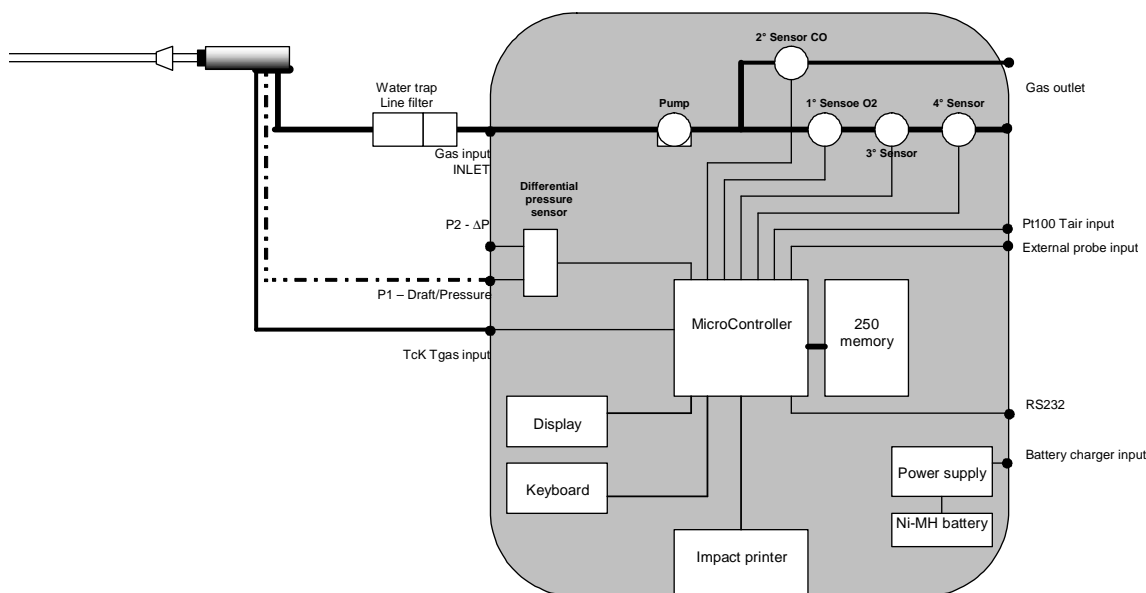
On the right side are the connectors for: the USB serial port, the line power charger and the auxiliary probes (T+RH%, leak checker, etc.).

The operator interface is on the front of the instrument and it consists of: a high contrast LCD display and a 14 button keypad. An automatic back-light device and a “zoom” function, make the data on the display much easier to read. The most used operation (analysis, Draft, printing and smoke index) can be accessed by the operator pressing a single key.



4 PRINCIPLE OF OPERATION

The **3000-4000 series** analyzer is based on the following functional blocks:



4.1 Measurement Principle

The gas is sampled and aspirated through the probe with a primary pump powered at constant voltage.

To position the sampling probe in the exhaust gas pathway a hole of 11mm, up to 16mm, should be drilled and the retaining cone of the sampling probe firmly screwed in it.

The retaining screw in the cone enables the probe to be easily moved to locate the core flow, normally correspondent to the center of the section of the smoke tube. The flue gas and exhaust gas pathway, should be checked for gas-tightness before carrying out a measurement and, if necessary, non gas-tight points should be sealed.

The O₂ sensor is essentially an electrochemical cell, with two electrodes and electrolyte solution. The behavior is similar to a normal battery and therefore the sensitivity decreases with time. The expected life does not relate to the operative time and is lost after approximately 24 months.

The toxic gas measurements (CO, SO₂, NO and NO₂) use electrochemical cells, with an expected operative life of 3 years.

The electrochemical cell grants accurate results for time intervals of approximately 60 minutes. The zero drift is automatically corrected by the instrument every time the instrument is switched-on, using fresh ambient air as reference. This operation should be made with the sampling probe not inserted in the chimney or with the sampling probe pneumatic connector disconnected from the analyser gas inlet.

When a long analysis has to be made, a new autozero procedure should be performed.

The pressure/Draft sensor is based on the principle of the extension metric measuring bridge. When the instrument is switched-on, a zero calibration of the Draft/pressure circuit is also executed. Leave open the "ΔP" connector during this phase.

Measured and calculated parameters are indicated on a LCD alphanumeric display (40x56 mm), equipped with a automatic back light device for easy readings, mainly in poorly lit conditions.

4.1.1 Gas Sampling Probe

The sampling probe consists of a steel tube and a handle of thermo-insulated material. A positioning cone allows user to place the probe in holes with a diameter from 11 to 16 mm.

The gas temperature is acquired using a thermocouple type K with the junction placed in the tip of the probe.

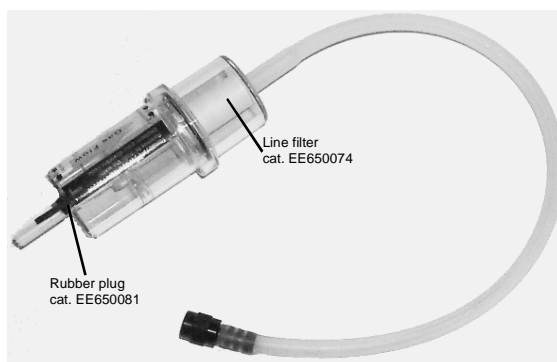


4.1.2 Water Trap & Line Filter

The gas flows through an external combined water trap and line filter to avoid the presence of condensation and suspended solid particles in the analysis section of the instrument. A cylinder is positioned at 15 cm from the instrument gas inlet it is divided into two parts: the water trap and the line filter.

The **water trap** works using the expansion principle: the gas flow decreases its speed inside the cylinder and it will cool; the humidity will condense and the solid particles fall down. The section of the water trap must be periodically drained off to avoid water from entering the analysis section. Pull the rubber plug (cat. EE650081) and shake slowly the trap to drain any condensation. Push the rubber plug to close the trap hole.

The **line filter** is positioned after the water trap and before the electrochemical cell. Its function is to stop the smallest solid particles before the analysis. Remember to change the filter (cat. EE650074) every time it is dirty.



WARNING

THE WATER TRAP MUST BE KEPT IN A VERTICAL POSITION DURING GAS SAMPLING. AN INCORRECT POSITIONING OF THE TRAP CAN ALLOW THE WATER TO ENTER INSIDE THE ANALYZER AND DAMAGE THE ELECTROCHEMICAL SENSORS.

NEVER MAKE ANY ANALYSIS WITHOUT THE DRAINING RUBBER PLUG. THE MEASUREMENTS WILL BE INCORRECT.

WHEN YOU FINISH THE ANALYSIS, REMEMBER TO DRAIN THE WATER TRAP. BEFORE PUTTING THE GAS PROBE IN THE CARRYING CASE, REMOVE THE CONDENSATION WATER FROM THE PROBE HOSE.

TO OPEN THE WATER TRAP GENTLY ROTATE THE TWO PARTS: DON'T FORCE THEM

THE LINE FILTER SHOULD BE REPLACED WHEN DIRTY. NEVER MAKE ANY ANALYSIS WITHOUT LINE FILTER AND/OR WATER TRAP, AS IT CAUSES AN IRREVERSIBLE DAMAGE TO THE ELECTROCHEMICAL SENSOR.

4.1.3 Gas Sensors

The analyzer uses long life sensors for O₂, CO (H₂ compensated), NO, NO₂ and SO₂. The sensor do not need special maintenance but must be replaced after the expected lifetime.

However a full maintenance and certification of the instrument is recommended once a year.

The gas sensors are electrochemical cells composed by two electrodes (anode and cathode) and an electrolyte solution. The sampled gas goes through a selective diffusion membrane.

The oxidation process produces an output electrical signal proportional to the gas concentration. The signal is evaluated by the electronics, converted to digital, processed by the microprocessor, displayed and printed with a 0.1% volume resolution.

The flue gas must not be at a pressure that could damage or destroy the sensor. Measurements are always carried out under "pressureless" conditions. The maximum permissible excess/reduced pressure is ± 100 mbar.

Each sensor has a different response time:

| | |
|---------------------------|-------------------------|
| O ₂ | = 20s to 90% of reading |
| CO (H ₂ comp.) | = 50s to 90% of reading |
| CO | = 50s to 90% of reading |



| | |
|-----------------|-------------------------|
| NO | = 40s to 90% of reading |
| NO ₂ | = 50s to 90% of reading |
| SO ₂ | = 40s to 90% of reading |

NOTE: TO OBTAIN AN ACCURATE MEASURE IT IS RECOMMENDED TO WAIT 3-5 MINUTES.

Toxic gas sensor can be present a $\pm 2\%$ drift and a long resuming time if an excessive ($>150\%$ of F.S.) gas concentration is applied. In that case it is recommended to wait for a measured value lower than 20ppm, by sucking fresh air before turning off the analyzer.

An optional Electro-valve can be installed inside the instrument to exclude/include manually or automatically the CO cell when the CO concentration is too high (e.g. when the burner is starting)

Four acoustic and visual alarm levels can be set on four programmable parameters.

4.2 Auxiliary Measurements

4.2.1 Temperature Measurements

The instrument is equipped with two temperature inputs to measure exhaust gas and the burner air input temperatures (combustion gas).

- ◆ A thermocouple type K (nickel-nickel chromium) is included in the tip of the gas sampling probe to measure the flue gas/exhaust gas temperature. This thermocouple is suitable for permanent measurements at temperatures up to 800°C and for short-term measurements up to 1000°C. Temperature measurement and gas sampling from the flue gas pathway are thus always performed at the same site. The probe is connected to the apparatus with compensated cable and connector. An internal Pt100 resistance thermometer is used for cold junction compensation.
- ◆ The same Tc K input can be used to measure the flow and return temperature in water circuit. If you have to measure the water temperature measuring the pipe temperature, use an arch-model thermocouple with an appropriate diameter.
- ◆ A remote Pt100 sensor, can be supplied on request with a 2 or 5 meter cable to measure the air inlet temperature in forced air boiler. This option is very important for an accurate efficiency calculation.

4.2.2 Pressure and Draft

The analyzer can be equipped with a temperature compensated pressure sensor to measure the chimney Draft or pressure. The pressure range is from -40 hPa to + 200.0 hPa.

The sensor is factory calibrated and does not require manual adjustment.

The zero drift, caused by ambient air temperature variation, is automatically cancelled at each instrument start-up. In addition, for more accurate readings the operator can reset, using the pertinent key, the zero if required. The instrument sensor is differential type and, if connected to a Pitot tube, it can be used to measure gas speed.

NOTE: FOR A MORE ACCURATE READINGS WE SUGGEST TO EXECUTE THE AUTOZERO PROCEDURE BEFORE PERFORMING THE MEASUREMENT.

CAUTION

IF A SINGLE TUBE GAS SAMPLING PROBE IS USED FOR PRESSURE/DRAFT MEASUREMENTS, BE SURE THAT IT IS CLEAN AND DRY BEFORE CONNECTION TO THE PRESSURE INPUT.

CAUTION

A +300hPA (OR -300hPA) OVER-PRESSURE CAN PERMANENTLY DAMAGE THE PRESSURE SENSOR.



4.2.3 Smoke Index Measurement (option)

This method consists of taking a gas sample from the center of the gas pipe behind the heat exchanger and crossing it through a special filter paper.

The color of the spot on the filter is compared with a graduated (from 0 to 9) reference scale and it is called "smoke index".

You can type in the instrument up to 3 smoke index values; the analyzer calculates the average value and can print these values on the report.

Normative and laws about the air pollution, describe the procedure: DIN51402, 2116, 2117 and 2297 VDI directives, ASTM D 2156-63 T, etc.

4.2.3.1 Measuring Instruments (option)

1. **Smoke pump:** it should suck 5.75 litres ± 0.25 l (normalized to 0°C, 760mmHg) through a 1 cm² filter.
2. **Smoke index reference table:** it is a grey scale sheet with 10 different areas numbered from 0 to 9. The number 0 corresponds to a 85% $\pm 2.5\%$ reflection. Every area reflects 10% less than the previous one. The scale is used to compare the scale with the paper filter and to calculate the smoke index.
3. **Paper filter:** When it is clean it has a reflection corresponding to the 0 scale index. It also has 3 litres per cm² a minute (normalized to 0°C, 760mmHg) with a 200/800 mmwc resistance to the air flux.





5 RECOMMENDATIONS

- The analyzer should be used in environments where the temperature is between -5°C and $+45^{\circ}\text{C}$.
- When the analysis are completed, before switch the instrument off, remove the probe from the gas pathway and wait about 30 seconds cleaning the pneumatic circuit from gas.
- Do not use the analyzer with clogged filters or filled with humidity.
- Before placing the probe in the case, be sure that the probe, the water trap and the hose are clean and cold.
- If you have ordered a double hose sampling probe, insert both connectors to the instrument during the gas analysis (pay attention to colour correspondences).
- To empty the water trap from the condensation water, remove the draining plug. **DO NOT OPEN** the water trap. **DO NOT** leave the water trap without the draining rubber plug (cat. EE650081).
- **For the best efficiency and accuracy, we suggest to calibrate the instrument every year.**

WARNING

IF THE 3000-4000 SERIES IS STORED A TEMPERATURE EXCEEDING THE OPERATIVE LIMITS, THE ANALYZER WILL NEED SOME TIME TO WARM-UP TO THE ACTUAL AMBIENT TEMPERATURE, BEFORE STARTING THE OPERATION.

5.1 Power Supply

The instrument can be powered from:

- Internal rechargeable Li-Ion battery pack.
- External battery charger, supplied as a standard accessory (the batteries must be installed).
- Optional external DC auto battery charger (the batteries must be installed).

The Li-Ion rechargeable batteries allows a long time operation and do not need maintenance. The same battery powers both the instrument and the internal printer. The internal battery will grant **10 hours** of continuous operation (without printing and the display back light off).

NOTE: 90% BATTERY CHARGING CAN BE OBTAINED IN 3 HOURS WITH THE INSTRUMENT SWITCHED OFF.

A red led on the top of the keyboard label, will lited to confirm the connection with the external charger; a green led will lited when the full charge is completed.

During operation a fully battery symbol “ \neq ” will be displayed on the display. This symbol means that the batteries are completely full. When the batteries will be discharged the symbol “-” will appear and the instrument still has about 20 minutes operation capability to end the running analysis. The battery symbol indicates that a full charge is required. Use only the dedicated battery charger supplied by Eurotron with the instrument.

CAUTION: OLD BATTERIES CAN LEAK AND CAUSE CORROSION. NEVER LEAVE RUN DOWN BATTERIES IN THE INSTRUMENT

WARNING

THE INSTRUMENT IS SHIPPED WITH AN AVERAGE LEVEL OF BATTERY CHARGE. AFTER UNPACKING, A FULL CHARGE OF THE BATTERY IS RECOMMENDED, BY CONNECTING THE INSTRUMENT TO THE MAIN LINE THROUGH THE BATTERY CHARGER (OFF CONDITION) FOR 8-10 HOURS.

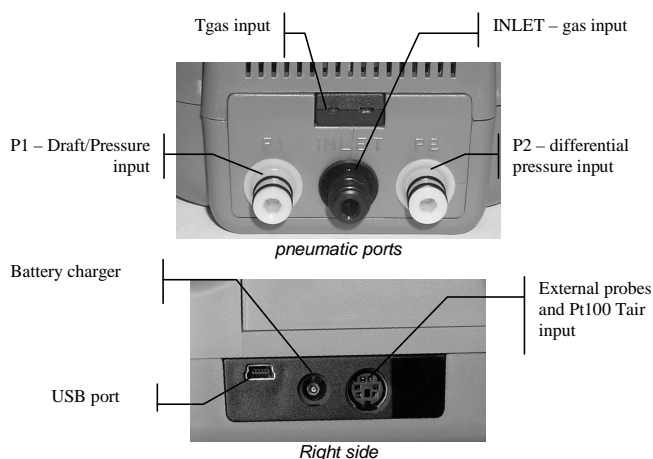


6 CONNECTIONS

6.1 Electro-Pneumatic Connections

To prepare the instrument for operation connect the sampling probe to the instrument:

- Plug the pneumatic connector of the probe to the GAS INLET connector. If you are using the gas sampling probe with Draft option, connect also its connector to the instrument Pressure/Draft inlet.
- Plug the probe temperature sensor plug to the pertinent connector.
- For more accurate readings and efficiency calculations, plug the remote air temperature Pt100 sensor to the connector on the right side of the instrument.



CAUTION

**WHEN YOU PERFORM THE COMBUSTION TEST BE SURE THAT:
BOTH THE DRAFT/PRESSURE INPUT (P1) AND THE GAS INPUT (INLET) ARE CONNECTED TO THE INSTRUMENT;
THE CAP OF CONDENSATION DRAINAGE MUST BE FIRMLY ON SEAT;
THE AIR FILTER MUST BE CLEAR.**

6.2 Gas Probe Positioning

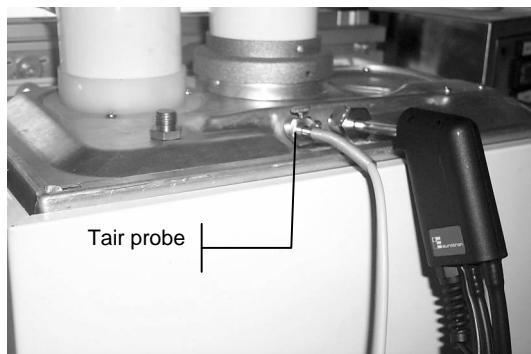
The measurement site should be arranged at a distance of $2xD$ behind the exhaust gas connection pipe, where D = diameter of the exhaust gas connection pipe.

To position the sampling probe in the exhaust gas pathway a hole of 11/16mm should be drilled and the retaining cone of the sampling probe firmly screwed in it.

The retaining screw in the cone enables the probe to be easily moved in order to locate the core flow, normally correspondent to the centre of the section of the stack.

The flue gas and exhaust gas pathways, must be checked for gas-tightness before carrying out a measurement and, if necessary, non gas-tight points should be sealed.

To locate the gas core flow, insert progressively the sampling probe and read the maximum value of temperature.



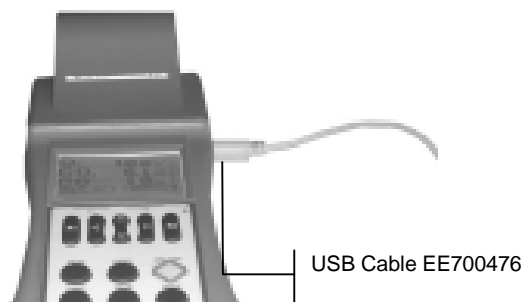
CAUTION

FOR A CORRECT GAS ANALYSIS, NO AIR MUST REACH THE FLUE GAS AS A RESULT OF NON-GAS-TIGHT CONNECTION POINTS BETWEEN THE HEAT PRODUCER AND THE MEASUREMENT SITE (PROBE).

THE FLUE GAS AND EXHAUST GAS PATHWAYS MUST BE CHECKED FOR GAS-TIGHTNESS BEFORE CARRYING OUT A MEASUREMENT, AND IF NECESSARY NON-GAS-TIGHT POINTS SHOULD BE SEALED.

6.3 Connecting to a PC

The instrument can operate with a personal computer through the USB serial port.



6.3.1 USB installation

The instrument can be used to directly connect the instrument to a USB computer port using the Windows™XP and Windows™ 95/98 operative system. Depending on the configuration of the computer, the adaptor could be automatically identified or not. If the adaptor isn't properly identified you'll need to manually install its driver, that you can find on the instrument's software CD.

You need to follow the driver installation below only at first connection of the instrument. Then, every time you connect the adaptor to your USB port, it will be automatically identified and it will be ready to operate.

- If you have previously installed a similar driver on your pc and the drivers that are about to install are different from those already installed, please uninstall the already installed drivers FIRST. Please refer to the Driver's Uninstall procedure of your Operating System.

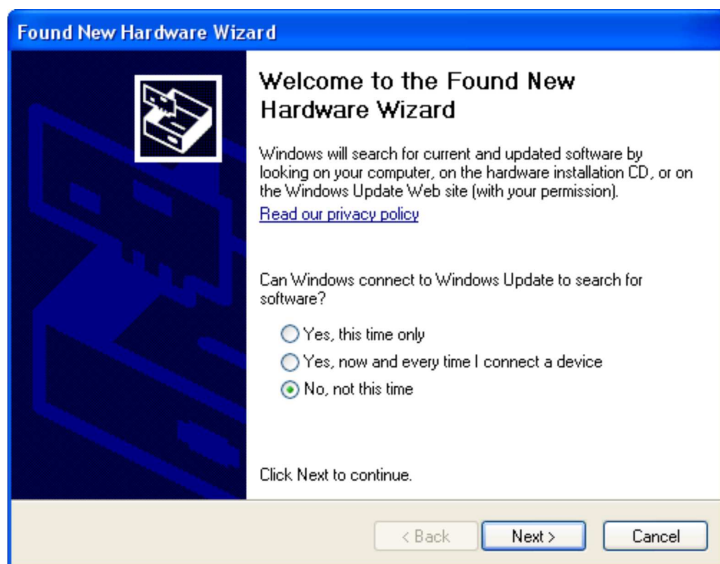
6.3.1.1 Installing the USB driver

- Close all the active windows and/or applications.
- If your computer runs in Windows™XP or Windows™ XP SP1, temporarily disconnect the PC from the web. To do this, temporarily remove the network cable from your pc, if connected, or by disabling your network card going to the

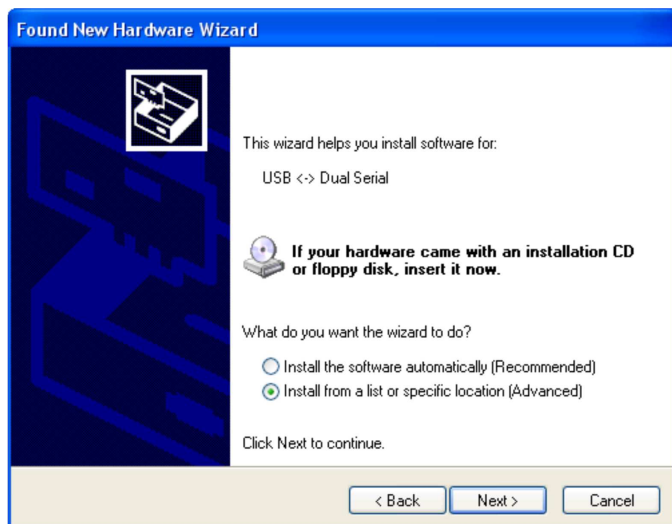


“Control Panel \ Network and Dial-Up Connections”, right-clicking on the appropriate connection and selecting “Disable” from the menu. The connection can be re-enabled after the correct driver installation. This it's not necessary if your computer runs Window™ XP SP2 if configured to ask before connecting to Windows Update. Windows™ XP SP2 can have this parameter already set, and to verify this open the Control Panel, select “System”, select the Hardware tab and click “Windows Update”. Please verify that this option is DISABLED.

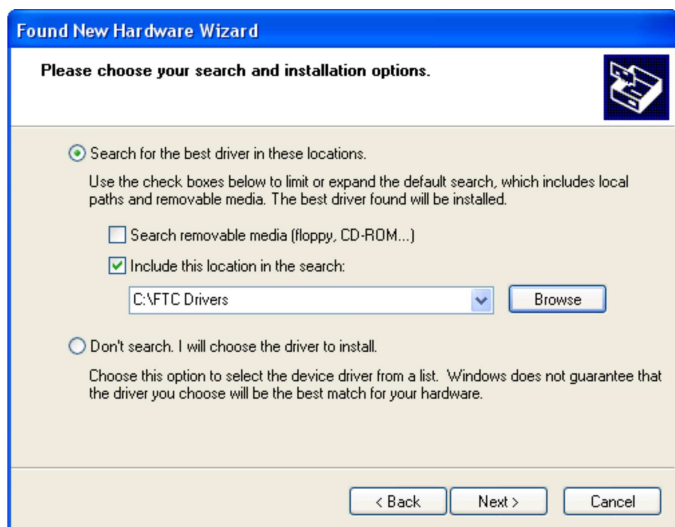
- Connect the instrument to a USB port of your computer. This will automatically run the “Windows Found New Hardware Wizard”, if the adaptor is not automatically identified and installed on your system.
- The following page will be displayed:



- Select “No, not this time” to avoid the driver search in internet, then click “Next” to proceed with the installation



- Select the second option: “Install from a list or a specific location (Advanced)”, then click “Next”
- Select the option referring to the following page, flagging “Search for the best driver in these locations”. Press “Browse” to select the file path.



- Select the folder where the driver is present on the CD:
- D:\EE26032-SW-DRIVER USB-Serial FTDI, then select the folder referred to your operative system and click "OK". The driver will be automatically installed on your system.

NOTE: IF WINDOWS XP IS CONFIGURED TO WARN WHEN UNSIGNED (NON-WHQL CERTIFIED) DRIVERS ARE ABOUT TO BE INSTALLED, YOUR COMPUTER WILL BE DISPLAY THE "HARDWARE INSTALLATION" WARNING PAGE. CLICK ON "CONTINUE ANYWAY" TO CONTINUE WITH THE INSTALLATION. IF WINDOWS XP IS CONFIGURED TO IGNORE FILE SIGNATURE WARNINGS, NO MESSAGE WILL APPEAR.

At the end Windows will show a message indicating that the installation was successful. Click "Finish" to complete the installation.

WARNING

THE INSTRUMENT WILL BE CONFIGURED ON YOUR SYSTEM AS A COMMUNICATION "COM" USB SERIAL PORT, NOT AS A CLASSIC USB PORT. INTO THE DEVICE MANAGER OF YOUR PC THE PORT WILL APPEAR IN THE "COM AND LPT PORT" CATEGORY.

REMEMBER TO SET BOTH THE CORRECT COM PORT NUMBER AND THE PORT SPEED IN BAUD ON THE SOFTWARE SETTINGS THAT YOU ARE RUNNING, OTHERWISE YOU WILL HAVE NO ONE COMMUNICATION BETWEEN THE INSTRUMENT AND THE COMPUTER.



7 OPERATIONS

7.1 Basic Operation

All the procedures and programming operations on the **3000-4000 series**, can be made using the keyboard and the display.

NOTE: ALL NUMERIC VALUES SHOWN IN THE FIGURES OF THIS MANUAL ARE INDICATIVE AND LISTED AS AN EXAMPLE.

The analyzer should be used in environments where the temperature does not exceed the specified limits (from -5°C to +45°C) and where the relative humidity is lower than 95% non-condensing.

7.1.1 Keyboard

The front panel keys functions are the following:



[F1] and [F2]

These keys are multifunctional. The instrument change the assigned function during the operations. All displayed pages have, in the bottom, 2 boxes each containing the assigned function (e.g. ANALYSIS). If no word is displayed inside the box, no function is assigned to that function key.

[▲], [▼], [◀] and [▶]

They move the cursor symbol or to increase or decrease numerical values.

[ENTER]

Accept and memory store the modified parameter or variable.

[PRINT]

Print the report of the analysis.

[ON/OFF]

Switch the analyzer on or off.

[STORE]

Read or store the analysis data to or in the memory.

[SETUP]

Go to the configuring page of the instrument.

[MENU]

Go to the auxiliary function (Ambient measurements, Flow and return Temperature, etc.) menu.

[DRAFT]

Go to the Pressure/ Draft measurement.

[SMOKE]

Allows the data input for smoke index measurements. You need an external pump for the gas sampling (Additional option/accessory).

[HELP]

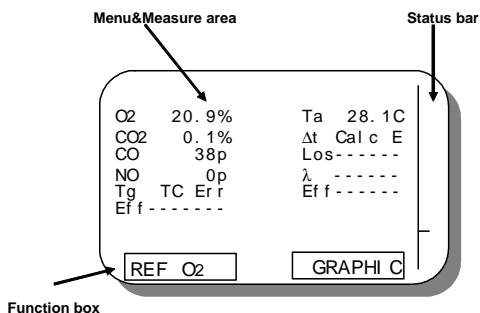
Display the most important information for the service: the battery charging level, the status of the gas sensors, the free memory, etc.



7.1.2 Display

The **3000-4000 series** is designed with a large (40x56 mm) graphical display using an automatic back light system for the best reading poorly lit locations conditions also. The instrument is able to visualize simultaneously on the display 3, 6 or 12 parameters.

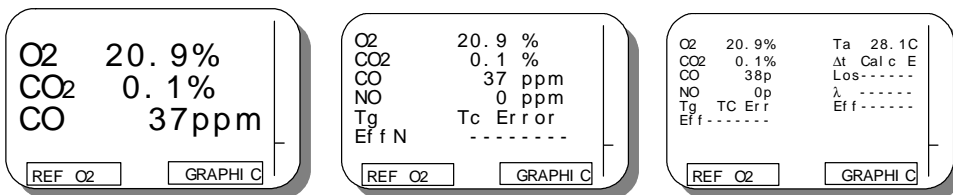
Three different areas can be identified on the display: Menu and Measure area, Status bar and Function boxes.



The Menu and Measure area displays the analysis data, the menu and all messages for the operator. The measured and calculated parameters are displayed in different pages of 6 parameters each.

Using the [▲] and [▼] keys you can change pages, changing the displayed parameters.

Pressing the [◀] and [▶] keys it is possible to increase or decrease the number of the displayed parameters (ZOOM function).



Two boxes are positioned on the bottom of the display. They contains the name of the function assigned to the [F1] and [F2] function keys.

The status bar uses graphical symbols to describe the actual operation mode of the instrument.

| | |
|---------------------|--|
| - / ≠ | Battery status: ≠=charged, -=discharged |
| Max/Min/ Med/Mem | The Max, Med, Min, Actual values are displayed in memory recalling mode. |
| O2 | The displayed measure are referred to oxygen |
| | Line operations |

7.1.3 Display adjustment

In the autozero procedure, you can press the [◀] and [▶] keys to adjust the LCD contrast.

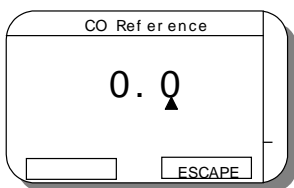
When the instrument is in the measuring mode you can press the [HELP] key and press the [◀] and [▶] keys to adjust the LCD contrast.

7.1.4 Numerical Input

If you have to set a numerical parameter (e.g. O₂ reference, etc.) use the following procedure:

Select the parameter to be changed (e.g. O₂ reference) with the [▲] and [▼] key from the configuring menu.

Press [ENTER] to enter in modify page as follows:



The “▲” symbol below the first digit is the cursor.

You can move the cursor between the digit using the [◀] and [▶] keys.

You can change the selected digit using [▲] and [▼]. If “9” or “0” values are exceeded, the left digit is increased or decrease.

Press [ENTER] to memory store the value and return to the previous page.

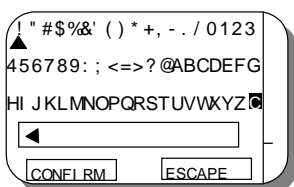
Press [ESCAPE] (F1) to return to the previous page without saving the changes.

7.1.5 Text input

If you have to set a text parameter (e.g. customer name, etc.) use the following procedure:

Select the parameter to be changed (e.g. customer name) with the [▲] and [▼] key from the configuring menu.

Press [ENTER] to enter in modify page as follows:



A “▲” symbol below the “ ” (blank) character in figure, represent the cursor. It is used to identify the selected character; you can move it using the [◀], [▶], [▲] and [▼] keys. The box below the characters table shows the currently inserted text. The symbol “◀” is the end of line symbol.

Press [CONFIRM] to write in the line box the selected char. The reversed char “◀”, when selected, delete the last inserted char.

Press [ENTER] to memory store the text and return to the previous page.

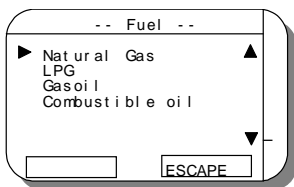
Press [ESCAPE] to return to the previous page without save the changes.

7.1.6 Select from a list

If you have to set a text parameter (e.g. Tag name, fuel type, etc.) use the following procedure:

Select the parameter to be changed (e.g. fuel type) with the [▲] and [▼] key from the configuring menu.

Press [ENTER] to enter in modify page as follows:



The “▶” symbol on the left is the cursor.

You can move the cursor between the digit using the [▲] and [▼] keys.

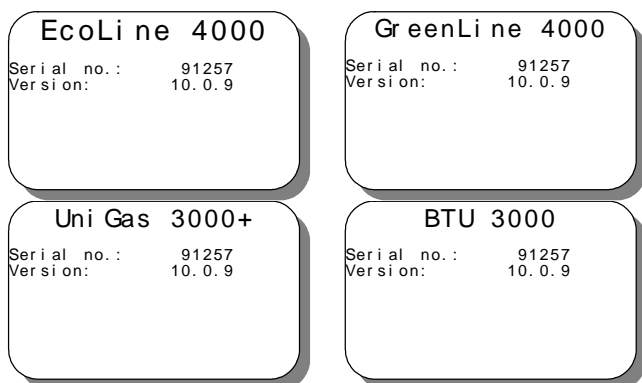
Press [ENTER] to memory store the selection and return to the previous page.

Press [ESCAPE] (F1) to return to the previous page without save the changes.

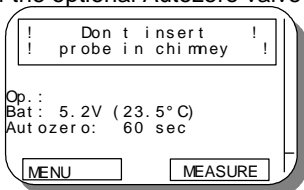


7.2 Flue Gas Analysis

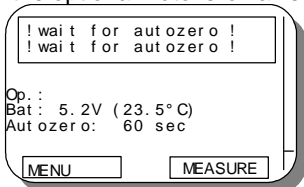
- Connect the gas probe to the analyzer as shown in chapter 7. If the optional Autozero valve is Not installed, **DO NOT INSERT THE PROBE IN THE CHIMNEY.**
- Switch the analyzer on pressing the [ON] key. The display will show the following page:



If you press a key, or after a few seconds, this page changes automatically as follows:
if the optional Autozero valve option is NOT installed, the display will show the page below:



if the optional Autozero valve option is installed, the display will show the page below:

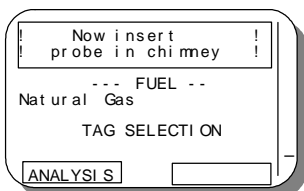


This page displays the following information: operator name, battery charge level, instrument internal temperature and the seconds to end the autozero procedure.

NOTE: THE ANALYZER MUST DRAW CLEAN AIR FROM THE AMBIENT DURING THE AUTOZERO PROCEDURE. OTHERWISE THE MEASUREMENTS WILL NOT BE ACCURATE.

It is possible to enter in "MENU" page (pressing [F1]) or in "MEASURE" page (pressing [F2]). See the appropriate paragraphs for operations.

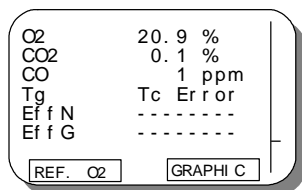
When the autozero procedure is finished, a beeping sound advises the user. Press the [ENTER] key to mute the unit. The following page will be displayed:



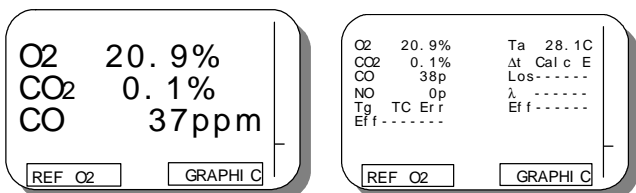
This page allows the operator to change the fuel used and to select the Tag between the available.



- **Fuel selection.** Move the cursor symbol "►" on the desired row using the [▲] and [▼] keys. Press [ENTER] to change the value. See instruction on paragraph 8.1.6.
- **Tag selection.** Move the cursor symbol "►" on the desired row using the [▲] and [▼] keys. Press [ENTER] to change the value. A new page will be shown. The Tag name, the description and the progressive number will be displayed. See instruction on paragraph 8.1.6. When in measuring mode, you can select another Tag pressing the [MEMORY] key.
- Insert the probe in chimney. Stop it using the retaining cone and adjust the immersion depth for a gas sampling in the middle of the exhaust gas connection pipe.
- Press the [ANALYSIS] (F1) key to start the measurements. The following page will appear:

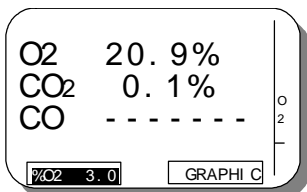


Pressing the [◀] and [▶] keys, it is possible to zoom-in and zoom-out increasing or decreasing the number of displayed parameters.

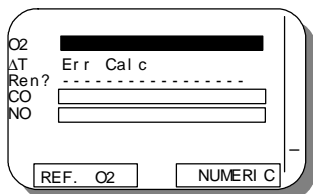


Pressing the [▲] and [▼] you can change page for others parameters.

Pressing the [REF. O₂] key the measured parameters will be referred to the user-defined programmed oxygen value. When operator select this mode, the symbol "O₂" will be displayed on the status bar.



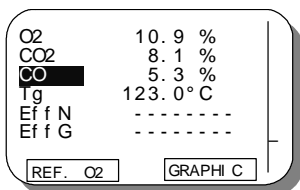
The instrument is enabled to display the measured values as bar-graph. Press the [GRAPHIC] (F2) key to change mode.



Using GasConfig Software, you can program the graph page: Assign up to 6 different parameter, range and increment direction. See chapter 9 for software instructions. Press the [NUMERIC] (F2) key to return to the normal display mode.

The integrated CO sensor dilution system, is an automatic device to protect the CO sensor from high concentration of CO. The device automatically switch to dilution when Automatic dilution procedure is activated (see ch. 9) and the high range (8000 ppm) value is exceeded.

When dilution is active, the CO value is displayed in reverse and the measuring unit change from ppm to % v/v.



Dilution system can be used to extend the sensor measuring range up to 10%.

7.3 Pressure/Draft measurement

If the internal pressure sensor is installed (Table E=2 on ordering code), you can execute the pressure/Draft measurements using the standard probe or the special probe.

Standard Probe (TG models):

The standard probe has a single gas collector for gas sampling. Usually you have the hose terminal connected to the instrument gas inlet; when you have to do the Draft measurements you have to move the connector to pressure inlet (P IN) connector.

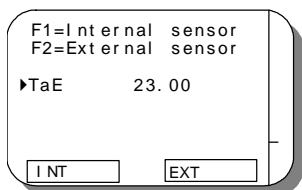
CAUTION

IF A SINGLE TUBE GAS SAMPLING PROBE (TG MODEL) IS USED FOR PRESSURE/DRAFT MEASUREMENTS, BE SURE THAT THE PROBE AND HOSE ARE CLEAN AND DRY BEFORE CONNECTION TO THE PRESSURE INPUT.

Special Draft Probe (TGD models):

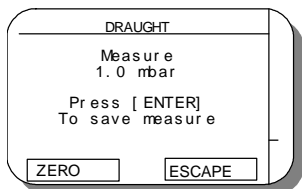
This special probe model has a double gas collector: one for the flue gas analysis and one for the Draft measurement. When you connect the probe to the analyzer you have to insert both gas inlet and pressure inlet connectors. Connect the hose with line filter to gas inlet connector.

- The pressure measurement requires the instrument in normal operating conditions indicating one of the measured or calculated parameters. Press **[DRAFT]** on the keyboard. **DO NOT INSERT THE PROBE IN THE CHIMNEY**. The internal pump will stop and the following page will be shown:



The pressure measurement depend on the external temperature. You can manually set this temperature on this page. To measure the right external temperature use a thermometer or the analyzer temperature probe.

- Press **[INT]** (F1) to show the following page:



- Press the **[ZERO]** key before insert the probe in the chimney to zero out the measured value.
- Insert the probe in the chimney. Check for mechanical positioning and flue gas intercepting. Wait for measurement stabilization.
- Press **[ENTER]** to memory store the pressure and Draft values.
- Press **[ESCAPE]** (F1) to return to the previous page.



Now you can proceed with the Smoke index measurement and/or the gas analysis. The memory stored value will be printed together with the analysis.

7.3.1 Pressure/Draft external probe (option for UniGas3000+)

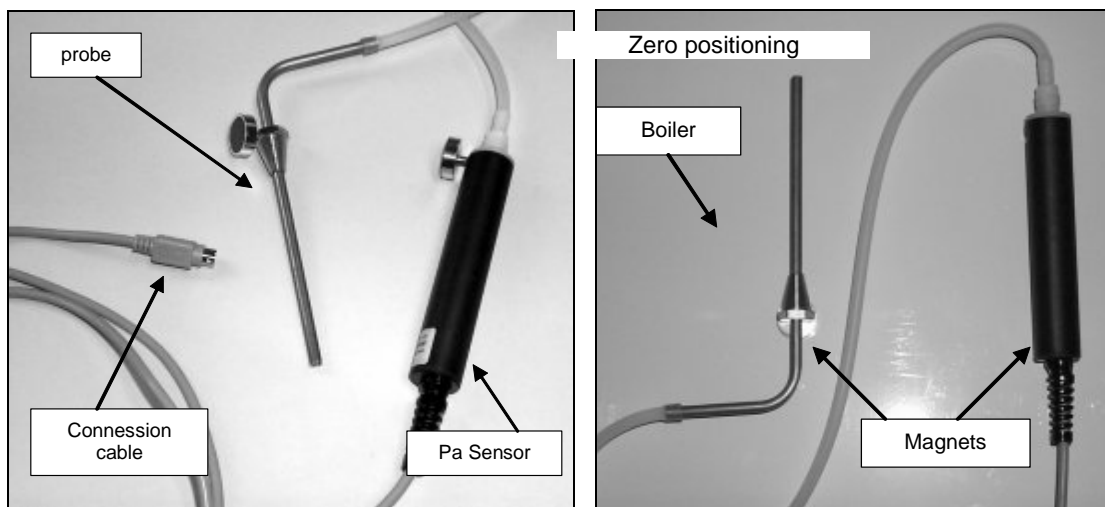
The pressure/Draft external sensor (BB830025) is a unique vacuum meter with higher both precision and resolution compared to the internal sensor. This sensor allows you to make measurements in accordance with the UNI10845. For measuring follow these steps:

- Connect the sensor to the instrument with the supplied connection cable (see the figure below) and the plug on its right side. Select the "DRAFT" option by pressing the "DRAFT" key on the keyboard and select the external sensor as shown on the paragraph 7.3
- Put the **sensor** on the boiler surface in a very stable position using its magnet
- Put the probe connected to the sensor to a very similar height compared to the sensor height using the magnet on the probe cone as shown on the figure below.
- Make the Zero by pressing [**ZERO**] (F1)

ATTENTION:

BE SURE THAT THE TWO ELEMENTS, SENSOR AND PROBE, ARE FIXED AND IN VERTICAL POSITION.

- Put the probe into the chimney hole avoiding to move the Pa sensor module and fix it in the center of the chimney
- Make the measurement (see par. 7.3) If you store the measured value by pressing the [**ENTER**] key, it will be printed on the test report.



- Press [**ESCAPE**] (F2) to exit and to return to the analysis page.

7.3.2 Burner Pressure Measurement

Using the burner pressure probe (cat. EE300088), it is possible to measure the pressure on the burner. Connect the probe to the instrument pressure input and connect to the burner plug. Follow the procedure described in paragraph 8.4 to read the pressure.

7.4 Smoke Measurement

To avoid condensation inside the smoke pump, it should aspirate ambient air before the gas sample. This can be obtained aspirating the air by the fireside (not in the exhaust gas connection pipe) without using the paper filter. Introduce now the filter in the pump. The gas sample should be drawn to the center of the combustion gas flux. The correct gas volume is sampled with 10 uniform shoots by the pump.



Compare the darkening of the filter with the smoke index table. The smoke index found does not exceed the ones defined by the current normative.

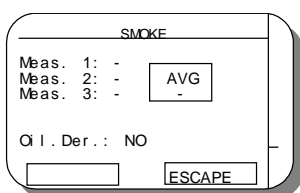
We suggested to use a retaining cone during gas sampling.

NOTE: IF YOU WANT TO PRINT THE SMOKE INDEX WITH THE ANALYSIS DATA, YOU SHOULD DO THE MEASUREMENT BEFORE THE FLUE GAS ANALYSIS.

7.4.1 Smoke Index data input

Before inputting the data, you have to execute the smoke index measurements. You can input up to 3 values; the analyser will do the average calculations.

- The smoke measurement requires the instrument in normal operating conditions indicating one of the measured or calculated parameters. Press **[SMOKE]** on the keyboard. The following page will be shown:



- Press **[▲]** and/or **[▼]** to move the cursor symbol to the “Measure 1” input field.
- Press **[ENTER]** to input the value. See instruction on paragraph 8.1.4.

If necessary, input the “Measure 2” and “Measure 3” smoke index. The instrument will compute the average.

- Press **[▲]** and/or **[▼]** to move the cursor symbol to the “Oil derivative”.
- Press **[ENTER]** to change the value for the correct fuel type.
- Press **[ESCAPE]** (F1) to return to the previous page without save the changes.
- Press **[ENTER]** to memory store the selection and return to the previous page.

7.5 Combustion Air Temperature (option)

It is important to measure the true combustion air temperature to have a correct boiler efficiency calculations. The 3000-4000 series have an auxiliary Rtd input to measure simultaneously the air temperature. A Pt100 with a 6 meters long cable can be connected on the right side of the analyzer.

Insert the Rtd inside the air combustion aspiration tube near the boiler.

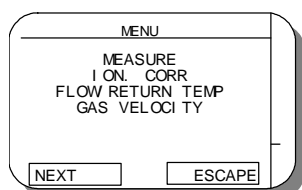
Follow the standard procedure to make measurements. The instrument will show the temperature on the display and the efficiency will be calculated using this value. If no external Rtd is connected, the analyzer will measure the instrument temperature (ambient) using the internal sensor.



7.6 Flow/Return Temperature measurement

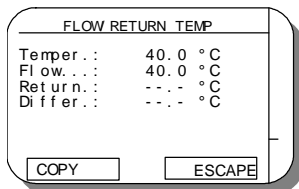
Connect the thermocouple type K on the bottom of the instrument (the same connector used for gas temperature). If the temperature measurement is made using the contact method on the external side of the flow and return water pipe. In this case, we suggest to use an arch type thermocouple.

Press **[MENU]** to display the following page:





- Use [▲] and [▼] to move the cursor symbol to “FLOW/RETURN TEMP” option
- Press the [ENTER] key to display the following page:



On the “Measure” field, the instrument will display the current temperature value measured using the connected thermocouple. The error message “Tc open” will be displayed if the thermocouple is not connected or broken. Positioning the thermocouple on the flow pipe.

- Use the [▲] and [▼] to move the cursor symbol to “T. Flow” field.
- Press [COPY] to copy the current temperature as T. Flow value.
- Press [ENTER] to manually change the temperature value

Positioning the thermocouple on the return pipe.

- Use the [▲] and [▼] to move the cursor symbol to “T. Return” field.
- Press [COPY] to copy the current temperature as T. Return value.
- Press [ENTER] to manually change the temperature value

The instrument will show the difference between the two values.

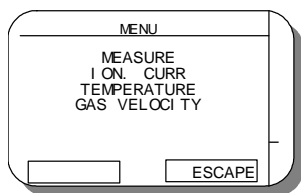
Press [ESCAPE] (F1) to return to the previous page. The temperature values will be printed pressing the [PRINT] key.

7.7 Gas velocity measurement

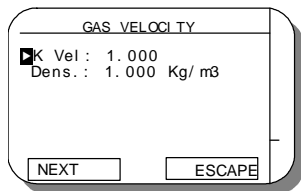
The **3000-4000 series**, is arranged for chimney speed measuring. For this measurement you need a Pitot tube to be connected to the differential pressure inputs.

Connect the “+” terminal of the tube to “P1” connector and the “-” terminal the “P2” the instrument connector.

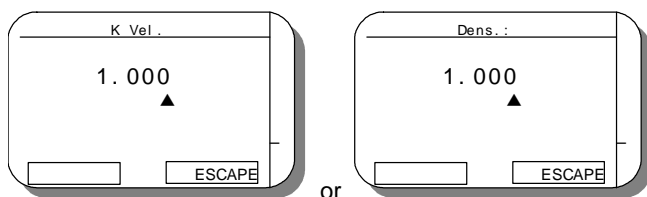
- Press [MENU] to display the following page:



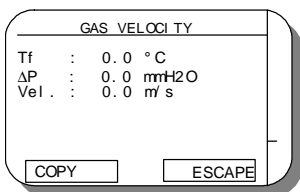
- Use the [▲] and [▼] keys to move the cursor symbol to “GAS VELOCITY” Option and press [ENTER].



- In this page you can manually enter, if known, two settings: the constant (K) of the used tube type as indicated on its user's manual, and the gas density, after its analysis. These two settings are set on "1" by default. Use the [▲] and [▼] keys to move the cursor symbol to the setting you want to modify and press [ENTER]. One of the following pages will be displayed:



- To enter your value, use the [▲] and [▼] keys change the digit indicated by the arrow, and use the [▶] and [◀] keys to move the arrow symbol on another digit.
- Press [ESCAPE] to return to the previous "GAS VELOCITY" page.
- Press [NEXT] to display the following page:



- Insert the gas probe in the chimney. Set the probe tip to the centre of the pathway. The display will show the current gas temperature. An error message "Tc open" will be displayed if the thermocouple is not connected or broken.
- Use the [▲] and [▼] keys to move the cursor symbol to "Tg" parameter. Wait for a stable temperature reading.
- Press [COPY] to copy the current temperature as Tgas value
- Press [ENTER] to manually change the gas temperature value

Extract the gas probe from the chimney. Insert the Pitot tube inside the chimney. Be careful that the probe is parallel to chimney axis and facing the burner.

- Use the [▲] and [▼] keys to move the cursor symbol to "ΔP" parameter.
- Press [COPY] to copy the current ΔP value.
- Press [ENTER] to manually change the ΔP value.

The instrument will display the gas speed.
Press [ESCAPE] to the previous page menu.

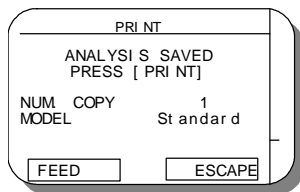
NOTE: FOR THE BEST SPEED CALCULATION, DO NOT CHANGE THE BURNER RATE BETWEEN THE TWO MEASUREMENTS. THE OPTIMUM CONDITIONS WILL BE ACHIEVED USING 2 HOTELS IN CHIMNEY AND THE SIMULTANEOUS MEASUREMENTS

7.8 Printing the analysis data

An internal impact printer can be installed as an option in the instrument. Read paragraph 8.10 for header report changing.

To print the report (ticket) of the analysis use the following procedure:

- Make all measurements you need: Smoke index, pressure and Draft, T. flow, etc. After making the gas analysis measurements, and wait a few seconds for the measurement to stabilize. Press the [PRINT] key. The following page will be displayed:



- Use the [▲] and [▼] keys to move the cursor symbol to "NO. copy" or "Model" field.
- Press the [ENTER] key to change the number of the reports you have to print and/or the print model for the report.
- Press the [PRINT] key again to print the report. You can abort the printing in progress by pressing the [ESCAPE] key.



- Press **[ESCAPE]** (F1) to abort the printing.
- Press **[FEED]** for paper advance. You can stop the paper advance by pressing the **[ESCAPE]** (F2) key.

NOTE: IF YOU RECALL THE LAST MEMORY USING THE **AVERAGE3** FEATURE (**UniGas 3000+ ONLY**) OR YOU PERFORM AN AUTO STORE WITH AUTOMATIC PRINTING, THE TICKET WILL SHOW THE DATA RELATED TO THE THREE MEASUREMENTS AND THEIR AVERAGE VALUES BOTH CALCULATED AND MEASURED. THE PARAMETER WILL BE PRINTED SEQUENTIALLY AS REQUESTED BY THE NEW PLANT LEAFLET.

7.8.1 Changing paper and ribbon

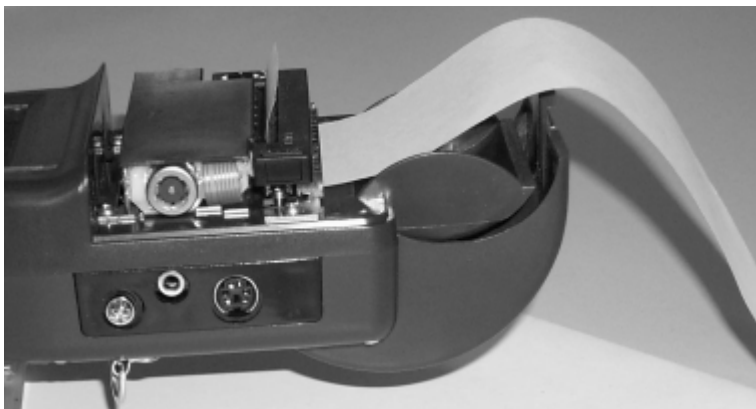
Open the cover pressing as photo below.



Remove the exhausted paper roll. You can use standard paper roll but you have to check before for its dimensions (max. 57mm \pm 1mm large and 48mm \pm 1mm roll diameter).

If necessary substitute the ribbon cartridge (cod. EE490002).

Approach the end of the new paper roll (cod. EE340005) to the slot under the printer.



Switch the analyzer on.

Keeping the **[HELP]** key down; press the **[▶]** key to bypass the autozero procedure.

Press **[PRINT]** then press the **[FEED]** key for paper feed. Press the **[ESCAPE]** key when the paper comes out freely.

Close the cover inserting the paper end in its slot.

7.9 Pressure decay procedure (option)

This is an additional feature that allows you to verify the condition of part or the entire plant. The system works with the pressure decay principle. Be sure to isolate and empty the plant section you want to verify at first !

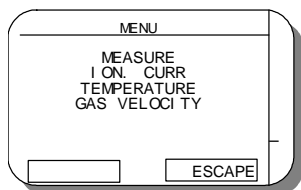


ATTENTION

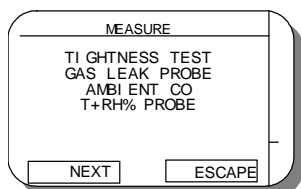
THE USAGE OF A PRESSURE HIGHER THEN ± 300 hPa WILL DAMAGE THE THE PRESSURE SENSOR OF THE INSTRUMENT IN IRREVERSIBLE WAY, CAUSING A PERMANENT DEFORMATION OF THE MEMBRANE.

7.9.1 Test A (1 minute)

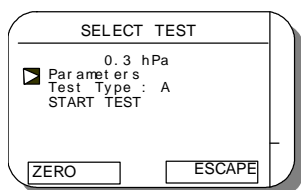
This optional operative mode allows operator to find pipe leakage. To set and run leak test, press the [MENU] key from measuring page. The following page will be displayed:



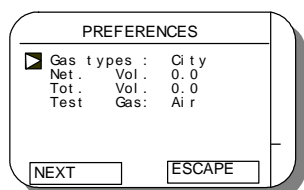
- Use the [▲] and [▼] keys to move the cursor symbol to “MEASURE” option.
- Press the [ENTER] key to select the option. Press [ESCAPE] (F2) to return to the previous menu.



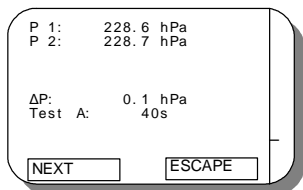
- Use the [▲] and [▼] keys to move the cursor symbol to “TIGHTNESS TEST” option.
- Press the [ENTER] key to select the option. Press [ESCAPE] (F2) to return to the previous menu.



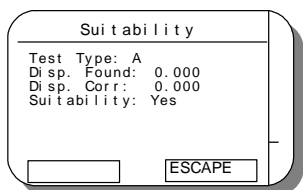
- Select “Parameters” option



- Set the follow parameters: Gas type (“City” or “Natural”) , Net. Vol.: (Total volume for Gas Network), Tot. Vol. (Internal volume for Gas Flow Totalizer), Test Gas (“Air” or “Gas”).
- Press Next to set Bar Press (Barometric Pressure).
- Press [ESCAPE] to return to the "SELECT TEST" page
- Use the [▲] and [▼] keys to move symbol on the Test Types A
- Select START TEST to start the procedure



- The instrument will display the initial pressure to the P1 input and the final pressure P2 , as third parameter There is the ΔP, this is a result test that will come shows after the countdown (60 seconds) will ends.
- Press **[NEXT]** to display the following page



- Press the **[PRINT]** button to print the report

Eurotron S.p.A
Unigas 3000+
Serial Number 000

Date: 00/00/0000
Time: 00:00
P DECAY LEAK TEST
TEST A

Gas Type: City

Barom.Press.1013 mbar

P1: 0.0 mmH₂O
P2: 0.0 mmH₂O

System vol: 0.0 dm³
Counter vol: 0.0 dm³

Test[Air] 0.0 mmH₂O
Diff of pr.0.0 mmH₂O

Dispersion correct
NaN dm³ /h
Suitability: Yes(*)

PLANT TAG
Plant 1

BOILER TAG
Boiler 1

CUSTOMER
Name: Customer 1
Addr.:

LEGEND

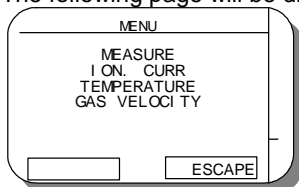
Time of the test
Gas Type: City or Natural
Barometric Pressure
P1: The Pressure initial
P2 : The Pressure end
System vol. Total Plant Volume
Counter vol. Gas Meter
Test[Air]
Diff of pr. ΔP difference of pressure between P1 and P2
Dispersion found Capacity of Gas Dispersed
Dispersion correct Capacity of Gas correct
Suitability Conformity of Plant



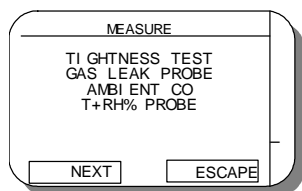
7.9.2 Test B (programmable)

This optional operative mode allows operator to find pipe leakage. The difference from Test A is the possibility for the use of programmable the time, to see (the next paragraph). To set and run leak test, press the [MENU] key from measuring page.

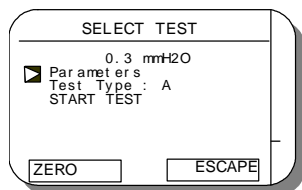
The following page will be displayed:



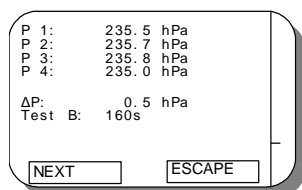
- Use the [▲] and [▼] keys to move the cursor symbol to "MEASURE" option.
- Press the [ENTER] key to select the option. Press [ESCAPE] (F2) to return to the previous menu.



- Use the [▲] and [▼] keys to move the cursor symbol to "TIGHTNESS TEST" option.
- Press the [ENTER] key to select the option. Press [ESCAPE] (F2) to return to the previous menu.



- Select "Test type" and select test type "B"
- Select "START TEST" to begin the test



- In this test there are four Pressures with times various. This times can be set like described in the paragraph 10.3.4 in this manual.
- Press the button Print for the test result



LEGEND

P1-P2-P3-P4 mmH₂O measures of pressure
 ΔP : Difference of pressure
 ΔT : Difference of Time

```

Eurotron S.p.A

Unigas 3000+
Serial Number 000

Date: 00/00/0000
Time: 00:00
P DECA Y LEAK
TEST B

P1: 0.0 mmH2O
P2: 0.0 mmH2O
P3: 0.0 mmH2O
P4: 0.0 mmH2O
ΔP :0.0 mmH2O
Δt :310 s

          PLANT TAG
Plant 1

          BOILER TAG
Boiler 1

          CUSTOMER
Name: Customer 1
Addr.:
City :
    
```

7.10 Ambient CO probe (option)

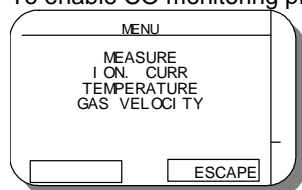
This optional external probe allows ambient CO monitoring for personal safety. When connected to the analyzer, it monitor continuously monitors CO concentration and it signal when the Long-term Exposure (TWA) limits are reached. An acoustic and visible signals are emitted by the unit.

The following page show the current exposure limits for CO gas. This table is a guidance only, and figures must be checked before being used. Sensors used in safety applications should be fully calibrated at least every six months.

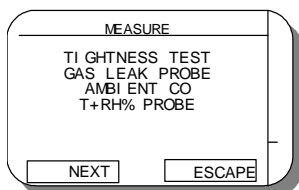
| | U.K. HSE | GERMANY DFG | USA OSHA |
|------------|-------------|----------------|-------------|
| TWA (8h) | 50 | 30 | 35 |
| STEL (10') | 300 | 60 (30) | 200 |

7.10.1 CO ambient external probe (option)

To enable CO monitoring press the [MENU] key from measuring page. The following page will be displayed:

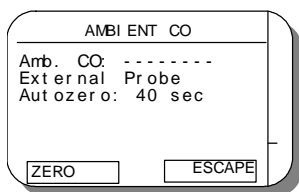


- Use the [▲] and [▼] keys to move the cursor symbol to “MEASURE” option.
- Press the [ENTER] key to select the option. Press [ESCAPE] (F2) to return to the previous menu.



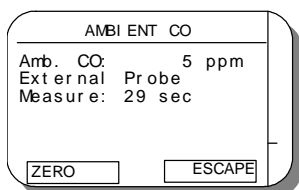
- Use the [▲] and [▼] keys to move the cursor symbol to “AMBIENT CO” option.
- Press the [ENTER] key to select the option. Press [ESCAPE] (F2) to return to the previous menu.

Connect the probe to the unit and wait for the following page:



NOTE: WHEN PROBE IS CONNECTED TO THE INSTRUMENT BEGIN A 40 SECOND WAITING TIME. IF PROBE IS CONNECTED IN AMBIENT CO MENU, A WAITING MESSAGE WILL BE DISPLAYED.

Before inserting the probe in working area, let it run for a few seconds in fresh and uncontaminated air. From this moment the unit will compare the monitored value with the CO limit (default OSHA limit: 35ppm). It is possible to change the CO limit using the GasConfig software for PC. After the 40 seconds waiting time the CO ambient monitoring will start. The procedure will measure the CO concentration for a 30 seconds period and the display will show the CO measuring and the time remaining:



At the end of the 30 seconds of measuring time the CO concentration will be displayed.

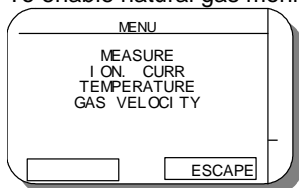
- Press the [PRINT] key to print the CO monitoring values
- Press the [ZERO] key to reset the measure and start a new CO monitoring.
- Press [ESCAPE] (F2) to return to the previous menu.

NOTE: IF THE PROCEDURE ABOVE IS EXECUTED AND THE CO PROBE REMAIN CONNECTED, THE INSTRUMENT WILL MONITOR AMBIENT CO ALSO DURING OTHER OPERATIVE MODE.

If alarm level is reached and unit begins beeping, press the [ENTER] key to silence it.

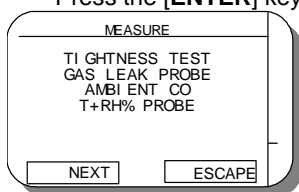
7.11 Natural gas leak external probe (option)

To enable natural gas monitoring press the [MENU] key from measuring page. The following page will be displayed:





- Use the [▲] and [▼] keys to move the cursor symbol to “MEASURE” option.
- Press the [ENTER] key to select the option. Press [ESCAPE] (F2) to return to the previous menu.

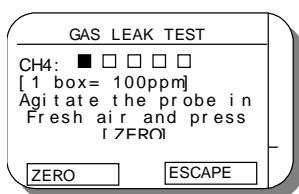


- Use the [▲] and [▼] keys to move the cursor symbol to “GAS LEAK PROBE” option.

WARNING:
CONNECT THE PROBE TO THE INSTRUMENT FIRST.

- Press the [ENTER] key to select the option. Press [ESCAPE] (F2) to return to the previous menu.

Connect the probe to the unit and wait for the following page:



NOTE: A 60 SECOND HEATING TIME COUNTDOWN WILL START. IF THE PROBE IS CONNECTED IN “GAS LEAK TEST” PAGE, A WAITING MESSAGE WILL BE DISPLAYED.

Refer to paragraph 10.3.3 to change the 60 sec. heating time.

Before inserting the probe in working area, let it run for a few seconds in fresh and uncontaminated air. Press the [ZERO] key to reset the measure and start CH₄ monitoring.

From this moment the unit will compare the correct CH₄ reading. Pressing the [▶] key you can change the probe range to 500ppm/box. Pressing the [◀] key you can return to 100ppm/box range.

Eurotron suggests to use 100ppm/box for ambient gas checking and 500ppm/box for pipe gas leak testing.

After zeroing, the boxes will fill proportionally with the reading and an beeping sound will advise the operator for gas concentration as shown in the following table:

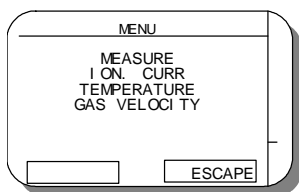
- 1 box = 1 beep/sec
- 2 box = 2 beeps /sec
- 3 box = 3 beeps /sec
- 4 box = 5 beeps /sec
- 5 box = continuous beep

Press [ESCAPE] (F2) to return to the previous menu.

7.12 Internal gas sniffer sensor (option for UniGas 3000+)

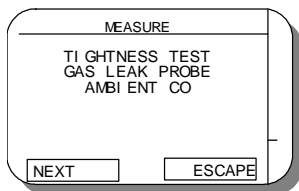
This feature let the operator to monitor the gas leaks by using the internal sniffer sensor.

- Press the [MENU] key from measuring page. The following page will be displayed:

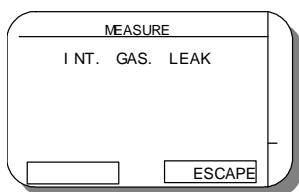




- Use the [▲] and [▼] keys to move the cursor symbol to “MEASURE” option.
- Press the [ENTER] key to select the option. Press [ESCAPE] (F2) to return to the previous menu.



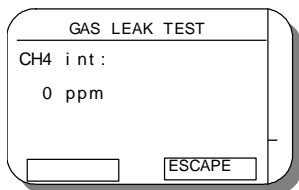
- Use the [▲] and [▼] keys to move the cursor symbol to “GAS LEAK PROBE” option.
- Press [NEXT] (F1) to enter the following page



- Press the [ENTER] key to select the “INT. GAS LEAK” option. Press [ESCAPE] (F2) to return to the previous menu.

NOTE: A 60 SECOND HEATING TIME COUNTDOWN WILL START.

The monitoring page will appear after the countdown ends.



Refer to paragraph 10.3.3 to change the 60 sec. heating time.

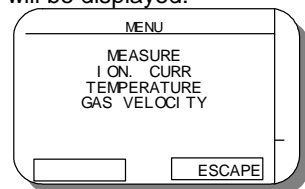
Before running the measuring, let the instrument run for a few seconds in fresh and uncontaminated air. From this moment the unit will compare the correct CH₄ reading with the maximum range of 500ppm.

The analyser will beep at the speed of one beep/sec and the display will show the read concentration

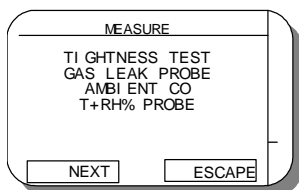
Press [ESCAPE] (F2) to return to the previous menu

7.13 Temperature & Humidity Probe (option)

To enable temperature and relative humidity monitoring press the [MENU] key from measuring page. The following page will be displayed:

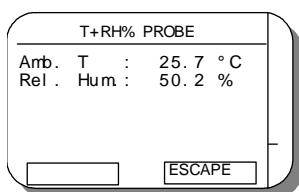


- Use the [▲] and [▼] keys to move the cursor symbol to “MEASURE” option.
- Press the [ENTER] key to select the option. Press [ESCAPE] (F2) to return to the previous menu.



- Use the [▲] and [▼] keys to move the cursor symbol to “T+RH% PROBE” option.
- Press the [ENTER] key to select the option. Press [ESCAPE] (F2) to return to the previous menu.

Connect the probe to the unit and wait for the following page:



NOTE: WHEN PROBE IS CONNECTED TO THE INSTRUMENT WILL BEGIN A 40 SECOND WAITING TIME. IF PROBE IS CONNECTED IN “T+RH% PROBE” PAGE, A WAITING MESSAGE WILL BE DISPLAYED.

Press [ESCAPE] (F2) to return to the previous menu.

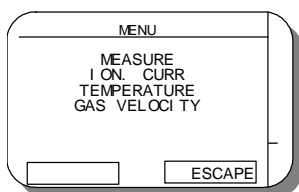
7.14 Ionization current external probe (option)

This feature let the operator to simply measures the ionization current of the boiler.

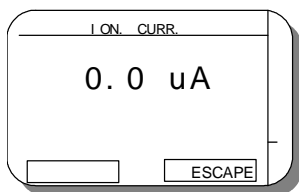
WARNING
TURN OFF THE BOILER FIRST

Carefully use the following procedure:

- Connect the ionization current probe to the Mini-Din connector on the right side of the analyser.
- Press the [MENU] key from measuring page. The following page will be displayed:



- Use the [▲] and [▼] keys to move the cursor symbol to the “ION. CURR” option.
- Press the [ENTER] key to select the option. The following page will be displayed:



- The display will display no current
- Put the two crocodile clips in series to the ionization current sensor of the boiler with the boiler **turned OFF**.
- **Turn ON** the boiler.
- The display will now show the ionization current value
- Press the [PRINT] button to print the report

Press [ESCAPE] (F2) to return to the main menu.



8 MEMORY MANAGEMENT

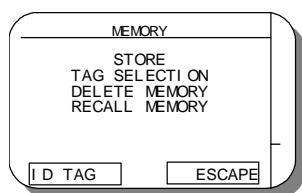
The standard configuration include an internal memory to store up to 250 complete gas analysis tests divided by Tags (max. 40 tags). Each analysis includes 10 gas concentration values, data and time. Each Tag includes one or more analysis data and for them can store the Draft and smoke index values, the name, the address and the telephone of the customer, a plant ID and the auxiliary measurements.

Normally you can select a Tag (the plant under test), make the auxiliary measurements, then the combustion analysis end store all. You can also store other analysis measurements, if necessary.

When you want you can select a Tag, display its measurements and print them.

If your instrument is connected to a PC, you can transfer the stored data into the PC, for example to create an historical situation of your plant. You can perform this feature after installing and running the DBGas 2004 software only.

Press the [STORE] key to store, delete and assign the Tag for a current analysis. The following page will be displayed:



- Use the [▲] and [▼] keys to move the cursor symbol to the desired option.
- Press the [ENTER] key to select the option.

NOTE: BEFORE STORING OR DELETING THE MEMORY YOU MUST SELECT THE TAG IF DIFFERENT FROM THE CURRENT.

8.1 Store Data Analysis

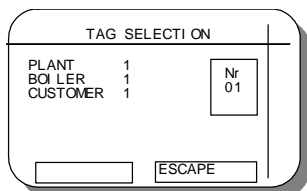
If you had pressed the [ENTER] key with the cursor on the “STORE” option, the analyzer will display the following message:

WAIT ... storing in process

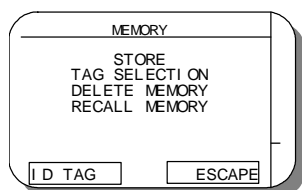
The analysis data will be memory stored in the current Tag and you can display or print all data when you need it.

8.2 Tag selection

If you had pressed the [ENTER] key with the cursor on the “Tag selection” option, the analyzer will display the following page:

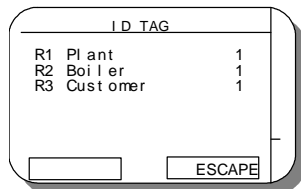


- Use the [▲] and [▼] keys to select the Tag number desired
- Press [ENTER] to select it. The displayed page will return to the following:





- You can set 3 rows of personal data of the selected tag by pressing [ID TAG] (F1). In this case the following page will be displayed:



- Select the row you want to modify and press [ENTER].
- Type in your text or edit the current one.
- At the end press [ESCAPE] to return.

8.3 Delete Memory

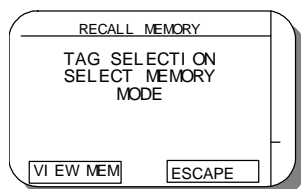
If you had pressed the [ENTER] key with the cursor on the “DELETE MEMORY” option, the analyser will display the following message:

!! ATTENTION !! The memory will be deleted when you press [DELETE]

If you press the [DELETE] key (F1), The analysis data will be deleted.

8.4 Recall Memory

If you had pressed the [ENTER] key with the cursor on the “RECALL MEMORY” option, the analyser will display the following page:



NOTE: BEFORE RECALLING THE MEMORY YOU MUST SELECT THE TAG IF IT IS DIFFERENT FROM THE CURRENT ONE DISPLAYED SELECT THE READING MODE: SINGLE OR AVERAGE AND SELECT THE STORED DATA.

Press [VIS.MEM] (F1) to visualize the analysis data: the selected memory data or the average values of the selected Tag. Press [PRINT] (F2) to print the report for the displayed data.

To change the recalling mode follow the procedure below:

- Use the [▲] and [▼] keys to move the cursor symbol to “MODE” option.
- Press the [ENTER] key to select the option.
- Use the [▲] and [▼] keys to move the cursor symbol to “Single” or “Average” mode.
- Press the [ENTER] key to select the option.
- Press [ESCAPE] (F1) to return to the previous menu without save the selection.

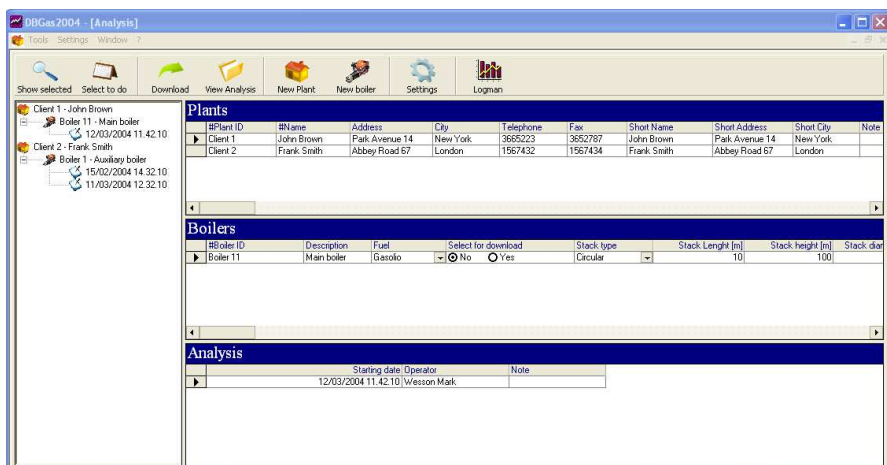
To change the memory date follow the procedure below:

- Use the [▲] and [▼] keys to move the cursor symbol to “MEMORY DATE” option.
- Press the [ENTER] key to select the option.
- Use the [◀] and [▶] keys to display the date/time for all current Tag memory.
- Press the [ENTER] key to select the option.
- Press [ESCAPE] (F1) to return to the previous menu without save the selection.

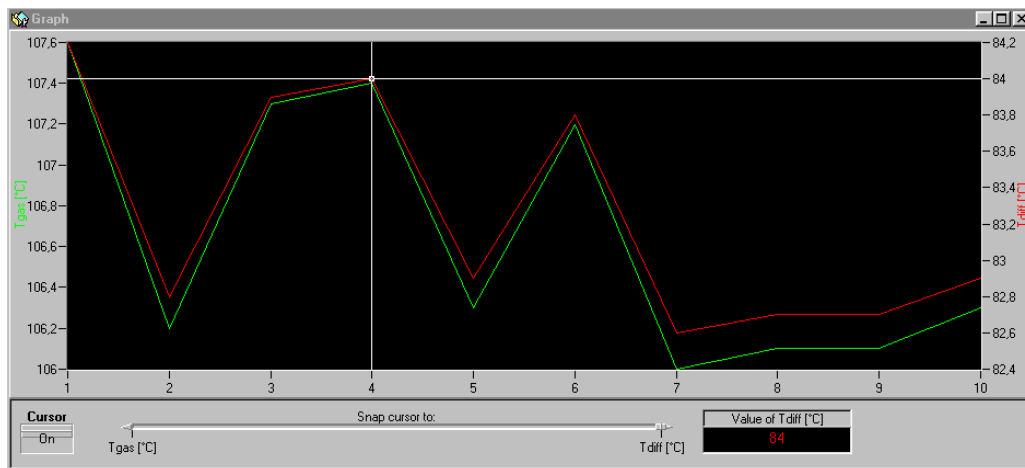


8.5 DBGas 2004

DBGas 2004 is a PC Windows compatible software to manage all checks and measures activities on boilers and to transfer data from and to Eurotron Gas analyzers. The software is designed for a complete and efficient managing and recording of the boilers analysis data of your clients. **DBGas 2004** allows you to have a no limits database on your PC with all customer and boiler's information, to select up to 40 boilers (each one is associated to a Tag) to be checked, to assign an operator name and transfer the data to the analyzer. The operator can store the analysis data and print the report; after the analysis he can transfer the data to the PC. The software will assign the analysis to the correct boiler in the database. Operator can view and print the data. Therefore, it is possible to maintain an historical archive for several years.



The main menu is made by 4 buttons: Plants/Clients, Analysis, Fuels and Exit from program.



Activate the cursor and snap cursor to the desired parameter. Using the mouse you can move the cursor amongst the measurements.

8.5.1 Installing DbGas 2004

Before starting installation, close all the programs active on your PC.

To install the software:

- Insert the DBGas 2004 CD-ROM in your drive;
- Follow the instructions on the screen to install the software.

If the DBGas 2004 setup program does not start automatically, follow these steps:

- Click the Start button
- Point to RUN



- Write D:SETUP.EXE (if "D" is the drive letter for your CD player).
- Click OK.
- Follow the instructions on the screen to install the software.

The software is installed. You can run the DBGas 2004 from the program menu. on your Windows screen and it will be possible to boot it by clicking on the icon as usual.

8.5.2 Registering the Software

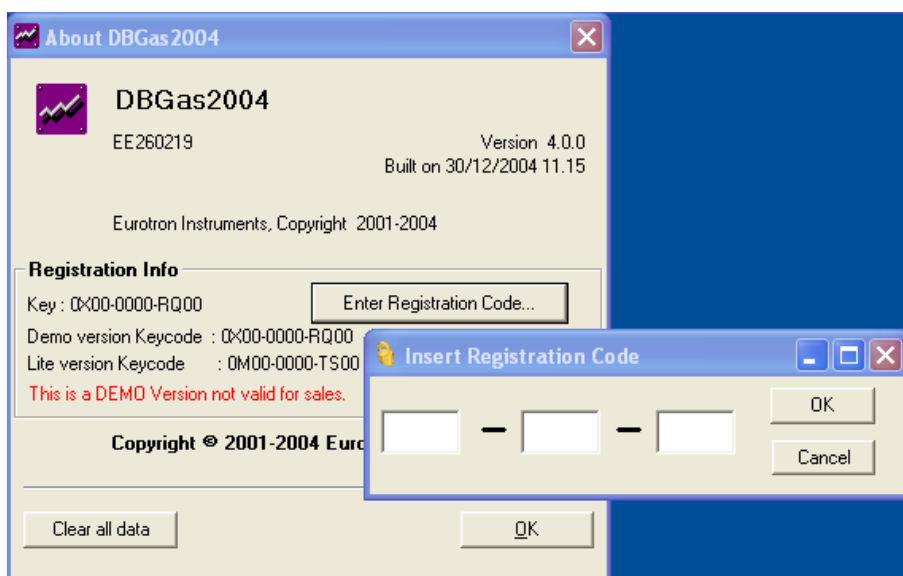
When installed the DBGas 2004 will run in Light Mode.

You should insert the registration key code included in your DBGas 2004 package.

This code should be entered to activate the program and to run in the different edition.

To register the software:

- Run DBGas 2004
- Click Help
- Click Info ...
- Click the "Enter Registration Code" button and write the registration code.



Demo Mode: DBGas 2004 includes all options but the database is limited to max 5 Plants.

Lite edition: DBGas 2004 do not allows the data download from the Flue gas analyser.

Standard edition: DBGas 2004 includes all options without database limits

8.5.3 Compatibility

DBGas 2004 can run with most of the Eurotron flue gas analysers.

The following list show the compatible instruments for this software revision.

Compatible Flue Gas Analysers

| | |
|--------------|----------------|
| UniGas 2000+ | GreenLine 2000 |
| UniGas 3000+ | GreenLine 4000 |
| | GreenLine 6000 |
| | GreenLine 8000 |

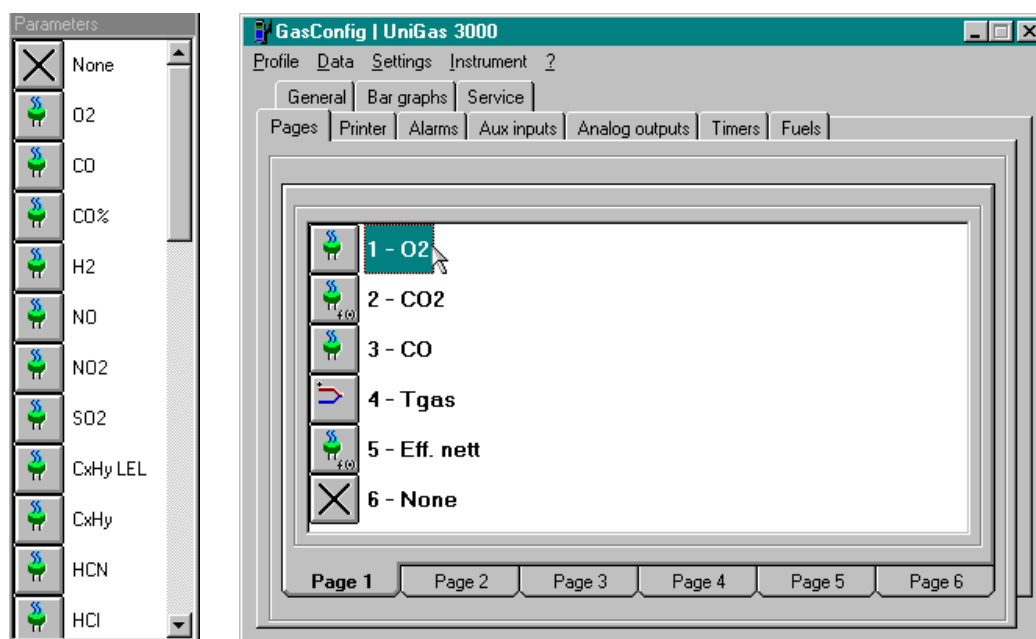


8.6 Software configuration

GasConfig software is a PC windows compatible program for configuring the 3000-4000 series flue gas analyzers. You can change all memory settings: displayed measurements pages, printed measurements layout, Alarms, Fuels coefficients, measuring technical units, etc.

8.6.1 How to operate using GasConfig

When you run **GasConfig**, a 2 independent windows systems will be displayed on the PC monitor.



The window on the left is a parameter icon list. This list show all possible parameters for measured (O₂, CO, Tgas, Draft, etc.) and calculated measurements (CO₂, Efficiency, etc.). Some of these may not be available in your instrument (it depends by instrument model, installed cells, and options).

The window on the right is the program user interface. It is organized in function pages; you can select the page for interesting parameters using the mouse.

A main menu bar allows you to load and save the configuration data, to the change the communication settings, for data transfer to and from the analyzer.

WARNING

BEFORE CONFIGURATION DATA TRANSFER TO AND FROM YOUR PC, BE SURE TO HAVE SELECTED THE 3000-4000 SERIES UNIT USING THE "INSTRUMENT" OPTION ON MAIN MENU BAR.

The available function pages are:

General

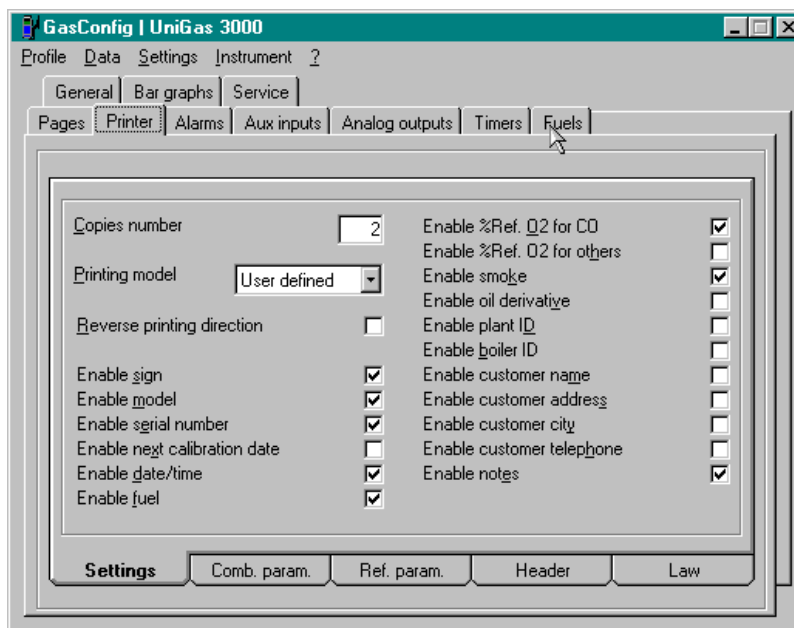
This page allows you to set the general parameters as engineering units, O₂% reference values, etc.

Pages

You can set up to 6 different pages in your instrument to display up to 36 different measured and calculated values.

Printer

You can program the complete layout for report printing: header, measured parameters, etc.



Alarms

You can enable, disable, and program up to 4 different acoustic and visible alarms for critical measurements.

Aux Inputs

Not available for software version 1.001

Analog Output

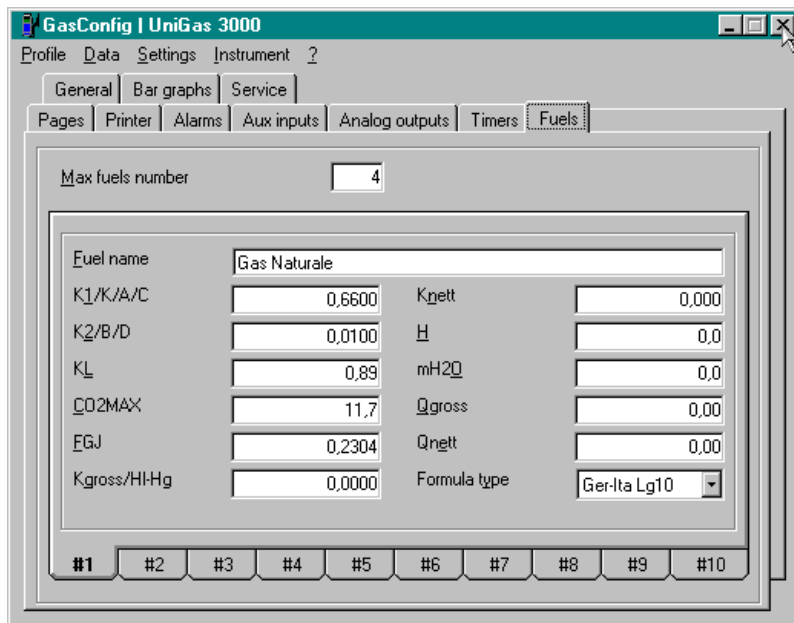
Not available for software version 1.001

Timer

You can change the autozero time and the leak decay time.

Fuels

Up to 10 different fuels coefficient tables can be programmed.



Bar graphs

You can set up to 6 different bargraphs (parameter and range).

Service

3 service information lines can be programmed for factory co-ordinates. (We suggest to keep Eurotron telephone and fax numbers for your reference).



8.6.2 GasConfig Installation

Software runs on IBM PC under WINDOWS 95/98/NT operative systems. Minimum requirements are a Pentium CPU with 16Mbyte Ram and 8 Mbyte on hard disk, a color monitor and a Microsoft mouse or a compatible one.

In order to install the Software for Windows, follow the below procedure:

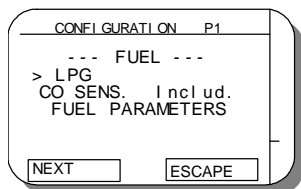
- Place the Software disk in a CD-ROM drive;
- From the Windows Start Menu, select **<RUN>**;
- Enter the filename D:SETUP.EXE (substitute the letter D for the disk drive that contains Software disk)
- Follow the on screen instructions making sure to provide the correct path to your Software directory when prompted.

Once installed, the **3000-4000 series Configuration Software** icon will appear on your Windows screen and it will be possible to boot it up by clicking on the icon as usual.

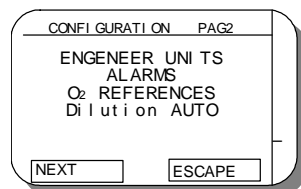


9 CONFIGURATION

Many parameters can be modified using the instrument keyboard. Pressing the **[SETUP]** key, you can change the current fuel, include or exclude the CO cell, change the technical unit, set the alarms, etc. The



- press **[NEXT]** to change menu page

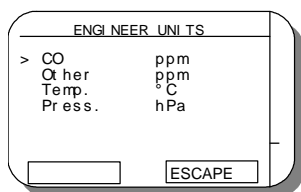


- Use the **[▲]** and **[▼]** keys to move the cursor symbol to the desired option.
- Press the **[ENTER]** key to select the option.
- Press **[ESCAPE]** (F1) to return to the previous menu.

| | |
|-------------------------|--|
| Fuel | You can select between the pre-set fuel table (LPG, Diesel oil, Oil, Natural gas) or, if programmed using the configuration PC software. |
| CO Cell | If the CO electro-valve option is installed, you can Include, exclude or automatically select (using the PC configuration software, you can program the CO level for automatic exclusion) the CO cell. |
| Fuel Parameters | You can display only the constant table for the selected fuel. To change the values, you should use the configuration PC software. |
| Engineering Unit | You can change the technical units for gas, temperature and pressure measurements. |
| Alarms | You can set the alarms levels, Min/Max operation and enable/disable all the 4 possible acoustic and visible alarms. |
| O2 References | You can set the %O2 for CO measurements and %O2 for other gas. |
| CO Dilution | Toggle from the AUTO, ON, and OFF dilution status pressing the [ENTER] key |

9.1 Engineering Units

When you select the Engineering units option, the following page will be displayed:



- Use the **[▲]** and **[▼]** keys to move the cursor symbol to the desired option.
- Press the **[ENTER]** key to change the value.
- Press **[ESCAPE]** (F1) to return to the previous menu.

The measuring units selectable for gas are: ppm, mg/m³, mg/kWh, g/GJ.

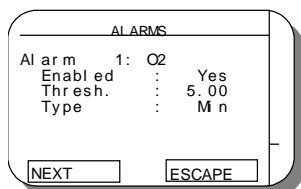
The measuring units selectable for temperature are: °C, °F.

The measuring units selectable for pressure are: hPa, mbar, mmH₂O, inH₂O.



9.2 Alarms

When you select the Alarms option, the following page will be displayed:



- Use the [▲] and [▼] keys to move the cursor symbol to the desired option.
- Press the [ENTER] key to change the value.
- Press [ESCAPE] (F1) to return to the previous menu.
- Press [NEXT] (F1) to display the next alarm page. Up to 4 alarms can be set for different gas types and levels.

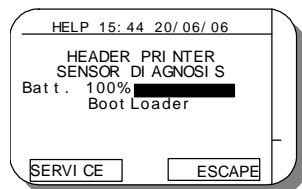
NOTE: THE REFERENCE GAS FOR ALARMS ARE PROGRAMMED IN THE FACTORY. THE GAS TYPE CAN BE CHANGED ONLY USING THE OPTIONAL PC CONFIGURATION SOFTWARE.

When the measured value becomes an in alarm band, a continuous sound (beep) informs you of the condition. Simultaneously, the parameter will be displayed in the measuring page in reverse mode. You can acknowledge the alarms by pressing the [ENTER] key. In this case the beeping will stop but the reverse mode remains the same.

9.3 HELP Key

The Help menu informs the operator on the instrument status (electrochemical cells status and battery level), Service information and allows you to change the header printer text.

When you press the [HELP] button on the keyboard, the following page will be displayed:

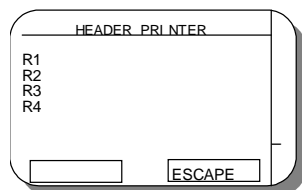


Press [ESCAPE] (F2) to return to the previous page.

9.3.1 Header Setting

The "HEADER PRINTER" option, allows you to set 4 rows of 16 characters for report header printing.

Press the [ENTER] key when the cursor symbol is positioned near the menu option. The following page will be displayed:



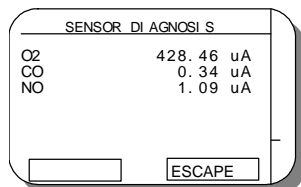
Select the R1, R2, R3, and R4 rows and press [ENTER] to insert or change the text. Press [ESCAPE] (F2) to return to the previous page.



9.3.2 Sensor Diagnostic

The "SENSOR DIAGNOSIS" option, allows you to read the actual status for the inserted cells.

Press the [ENTER] key when the cursor symbol is positioned near the menu option. The following page will be displayed:



Press [ESCAPE] (F2) to return to the previous page.

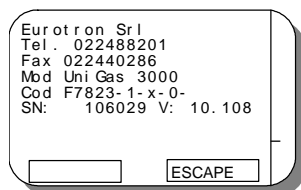
9.3.3 Bootloader

This unique feature allows you to upgrade the instrument Firmware directly copying it from another UniGas 3000+, by simply connecting them together with the special cable (see par. 10.4.1 for the procedure)

9.3.4 Service Data

The "SERVICE" option, allows you to read the information to contact us for service assistance and the information that we need to know for identify your instrument configurations: instrument configuration code and serial number, firmware version, etc.

Press [SERVICE] (F1) to display the following page:



Press [ESCAPE] (F2) to return to the previous page.



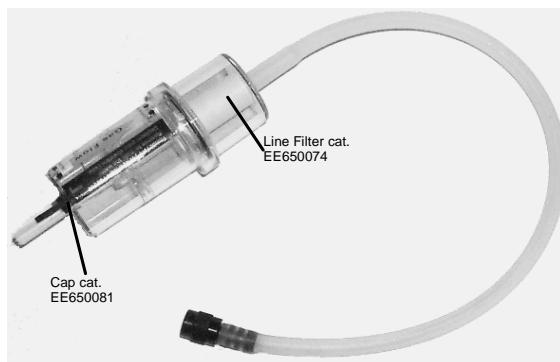
10 MAINTENANCE

The **3000-4000 series** analyzer has been developed and manufactured using high quality components. A correct, systematic maintenance will prevent damage and will increase the life of the instrument, giving excellent results. Any conditions that require extraordinary maintenance interventions are promptly displayed, either clearly or with an information code.

10.1 Water trap

Always keep in vertical position the water trap to avoid that the water condensation inside the trap could flow to the measuring sensors. For the same reason remember to periodically empty the trap and always at the end of the measurement. To empty the expansion vase remove the cap (code EE650081) and gently shake it. **Please be sure to reinsert the cap before the measurements.**

Just after the trap you can find a replaceable low porosity line filter (code EE650074). It holds the solid particles of the gas. We recommend you to replace this filter if it's dirty. **To replace the paper filter open the trap gently rotating the two trap parts.**



!! ATTENTION !!

DON'T MAKE MEASUREMENTS WITHOUT THE TRAP CAP. IF THE CAP IS NOT MOUNTED ON THE TRAP YOU WILL HAVE AN AMBIENT AIR INPUT INTO THE PNEUMATIC CIRCUIT THAT WILL GIVE YOU WRONG MEASUREMENT VALUES,

CONTROL AND EMPTY, AT EACH MEASUREMENT, THE WATER IN THE TRAP IF PRESENT. PUT THE TRAP IN HIS CASE AFTER EMPTYING THE CONDENSATION FROM BOTH THE TUBE AND THE EXPANSION VASE ONLY.

TO OPEN THE TRAP GENTLY ROTATE THE TWO PARTS. DON'T PULL. DON'T TWIST.

REPLACE THE FILTER IF IT'S DIRTY OR HUMID. DON'T MAKE MEASUREMENTS WITHOUT THE FILTER OR WITH A DIRTY FILTER: THIS WILL DAMAGE THE SENSORS IN A IRREVERSIBLE WAY.

CLOSE WITH CAUTION THE WATER TRAP TO AVOID THE FILTER DAMAGING.



10.2 Error Messages

The instrument performs an autodiagnostic procedure when switched on. When measuring it checks also for anomalous conditions. If analyzer and any errors or trouble, it displays a message on the LCD screen. Sometimes also these messages corresponds to a unrecoverable problem and it is necessary to return the instrument to Eurotron for maintenance. Frequently these message are referred to a recoverable trouble and can be solved by yourself. The following table show the possible instrument error messages:

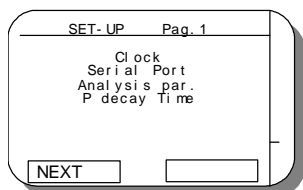
| Error message | Problem | Solutions |
|---------------|--|---|
| Calc Err | Parameter calculation error. | The instrument cannot perform the calculations correctly. Check and solve the other error conditions. |
| Probe Er | The external Rtd probe is disconnected or damaged. | Connect or replace the external temperature probe. |
| RJ Err | Internal temperature reference damaged. | Return the instrument to Eurotron for maintenance |
| Over | Overrange condition | The problem is solved automatically when measure return inside the range |
| Under | Underrange condition | The problem is solved automatically when measure return inside the range |
| ----- | No calculation available | The instrument cannot perform the calculations. Check and solve the other error conditions. (e.g. O ₂ >18%). |
| Excluded | CO sensor excluded by electro-valve | Automatic CO sensor protection is active. Perform one or more autozero cycles in fresh air. |
| Tc Error | The thermocouple is disconnected or damaged. | Connect or replace the temperature probe. |
| Tsens Er | Cell compensation error | Return the instrument to Eurotron for maintenance. |
| Zero Err | The autozero procedure is failing | Perform one or more autozero cycles in fresh air. If the problem remain, Return the instrument to Eurotron for maintenance. |
| Sens. Er | Broken cell | Return the instrument to Eurotron for maintenance. |
| No meas. | Empty Memory | |
| No sens. | The cell is non installed | |
| No probe | No external probe connected on mini-din connector. | Connect or replace the temperature probe. |

10.3 Set-Up Menu

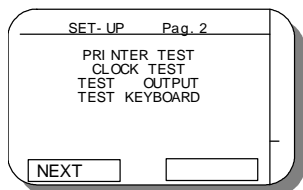
Configuration menu is protected by a password. This procedure menu allows the operator to change some internal parameter values: Date and time internal clock, communication baud rate, autozero time and leak test timing.

Follow the procedure below to activate the procedure:

- Switch the instrument off
- Press and keep the [SETUP] key down; press the [ON/OFF] key.
- The analyzer will switch on. A password input page will be displayed. Insert the password code "0011" and press the [ENTER] key. The following page will displayed:



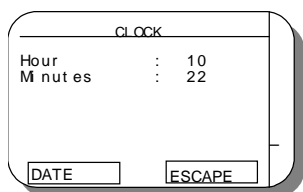
- Press the **[NEXT]** (F1) key to change menu page.



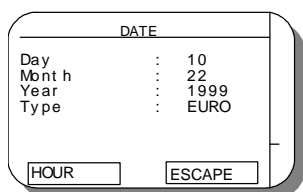
- Use the **[▲]** and **[▼]** keys to move the cursor symbol to the desired option.
- Press the **[ENTER]** key to enter in the option set-up page.
- Switch the instrument off to exit from the configuration procedure

10.3.1 Clock

Select this option for date and time set-up. Verify that the current values are correct because the analyzer use this data for analysis storing.



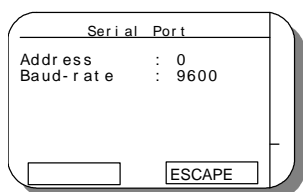
- Use the **[▲]** and **[▼]** keys to move the cursor symbol to the desired option.
- Press the **[ENTER]** key to enter in the option set-up page.
- Press **[ESCAPE]** (F2) to return to the previous menu.
- Press **[DATE]** (F1) to change date.



- Use the **[▲]** and **[▼]** keys to move the cursor symbol to the desired option.
- Press the **[ENTER]** key to set a new date or date format (European or USA).
- Press **[ESCAPE]** (F2) to return to the previous menu.
- Press **[TIME]** (F1) to change time.

10.3.2 Serial Port

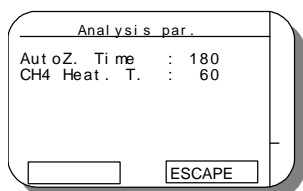
Selecting this option, you can set the baud rate and the ID number for the instrument using an infrared serial communication.



- Use the [▲] and [▼] keys to move the cursor symbol to the desired option.
- Press the [ENTER] key to set a new ID number or baud rate.
- Press [ESCAPE] (F2) to return to the previous menu.

10.3.3 Analysis par.

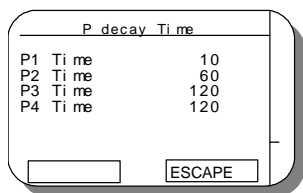
By Selecting this option you can change the analyzer auto-zeroing time and CH₄ & Natural gas heating probe time (we suggest to use the pre-set values of 180 seconds for autozero time and 60 seconds for CH₄ heating time).



- Use the [▲] and [▼] keys to move the cursor symbol to the desired option.
- Press the [ENTER] key to set a new Auto-zero time.
- Press [ESCAPE] (F2) to return to the previous menu.

10.3.4 P decay time

By Selecting this option, you can change the timing for leak test when using the decay method. The test has a total period of 310 seconds and the programmable time represent the interval between the measurements.



- Use the [▲] and [▼] keys to move the cursor symbol to the desired interval.
- Press the [ENTER] key to set new acquisition intervals.
- Press [ESCAPE] (F2) to return to the previous menu.



10.4 Firmware Upgrade

10.4.1 Firmware Upgrade: PC software

In order to upgrade the firmware of the instrument proceed as follows:

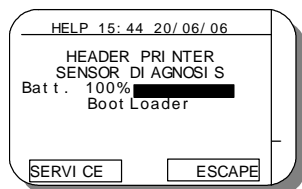
- 1 - Install the ST167Flash program from the CD.
- 2 - Connect the infrared interface adapter to the serial port of the PC with the supplied cable (note back the serial port used: COM1 , COM2 or other).
- 3 - Position the interface near the right side of the instrument.
- 4 - Run the ST167Flash program you have installed.
- 5 - Select the same serial port that you noted back.
- 6 - Select the Baud rate to 115200 Baud (if the PC owns an UART 16550 type), otherwise select a lower Baud rate.
- 7 - Press the three dotted button in order to load the firmware file (.HFW extension) normally located on a 3 1/2" diskette. A version number of the firmware being discarded is shown in the dedicated field.
- 8 - With instrument OFF press and hold the F1 key while pressing the ON/OFF key in order to set the instrument in firmware upgrade status.
- 9 - Click on the 'Program' button to start the upgrading phase and wait until a termination message appears.

NOTE: IF DATA TRANSFER FAILS, PLEASE TURN OFF THE INSTRUMENT AND REPEAT THE PROCEDURE FROM STEP 8.

10.4.2 Firmware Upgrade between two Unigas3000+ units: bootloader

The firmware of the UniGas 3000+ can be replaced by the higher version of another UniGas 3000+ if needed. Simply connect together the two instruments. To launch the procedure switch on the two instruments after you have connected them together.

- Switch on the instrument and go to the analysis page
- Press the [HELP] key on the keyboard of the instrument where you want load the new firmware: the following page will appear:



- Use the [▲] and [▼] keys to select "BootLoader" and press [ENTER]
- At the end of the firmware transferring press [ESCAPE] and switch off the instrument to exit the configuration mode.



10.5 Smoke Pump Maintenance

Gas-Tight Checking

To have a correct measurement the pump should be gas-tight. Turn the screw and close the probe with your finger. Pull the plunger for 3 cm and verify that the gasket does not leak the vacuum. If a leak is found the gasket needs to be lubricated. When you push the plunger the valve must close immediately to have a 1.9/2.0 litres of air with 10 shoots. The correct smoke index can be obtained only if the pump works correctly.

Service

1. Clean and lubricate the cylinder, the stem and the gasket around every 30 measurements.
2. Wash using alcohol if the valve is not gas-tight
3. Clean the probe and the paper support
4. Check the pump for gas-tight
5. Use only clean paper filters and a readable scale index table



11 CERTIFICATES

11.1 Warranty Terms

Eurotron Instruments warrants its products against defects in materials and workmanship for the period declared from the date of the original retail purchase.

This warranty applies to the original purchaser only.

If the unit should malfunction, it must be returned during the warranty period, transportation prepaid, to **Eurotron** for evaluation. Upon examination, if the unit is found to be defective it will be repaired or replaced at no charge. Direct all warranty and repair requests/inquiries to the **Eurotron** Customer Service Department. **BEFORE RETURNING ANY PRODUCT(S) TO EUROTRON, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM EUROTRON'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS).**

Please include a copy of the original invoice or a small service charge may be applied.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

Eurotron's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of **Eurotron's** control.

11.2 Letter of Conformity

This is to certify that the instrument has been manufactured and inspected to document procedures and where applicable, calibrated against standards which are traceable to National and International Standards.

The Instrument has been found to conform in all respects to specifications, drawings, workmanship standards and work order requirements.

11.3 Disposal



This symbol indicates that this product is to be collected separately. The following apply only to users in European countries.

- This product is designated for separate collection at an appropriate collection point. Do not dispose of as household waste.
- For more information, contact the retailer or the local authorities in charge of waste management.

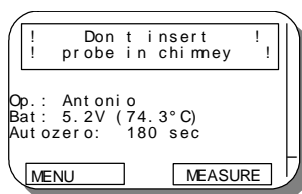
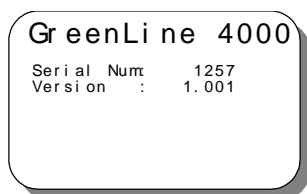


APPENDIX

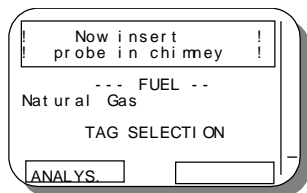
A1 Example

The following steps show how you can make a quick measurement using the GreenLine 4000 portable analyzer.

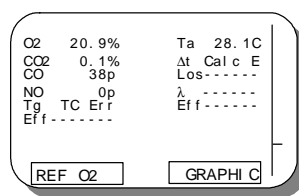
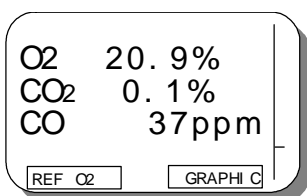
1. Turn the **GreenLine 4000** on. It will begin the autozero and the autodiagnostic procedure. System error and trouble will be displayed if encountered.



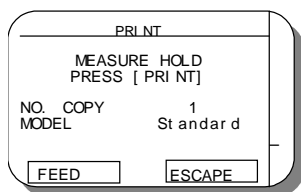
2. Select the combustible Fuel or oil used by burner. It is possible choosing between 4 preset and 6 other available custom types.



3. Connect the sampling probe electrical and pneumatic terminals to the **GreenLine 4000**.
4. Insert the sampling probe in chimney or stack. Be sure for mechanical positioning and flue gas intercepting.
5. Press **[ANALYSIS]** (F1) key to start the measurements. Select the desired data page using **[▲]** and **[▼]** keys. Zoom in or out to enlarge or reduce the visualized characters using the **[▶]** and **[◀]** keys.



6. When measurement procedure is completed, press the **[PRINT]** key to print one or more reports.



7. Dismount the instrument system and switch it off. Place instruments and all accessories back in the rugged and practical case.



A2 EMC Comformity

The instrument case, made in shock-resistant injection moulded ABS + polycarbonate fulfil the prevision of the directive 89/336/CEE Electromagnetic Compatibility.



Declaration of Conformity

We : Eurotron Instruments S.p.A

(Supplier's name)

Viale F.lli Casiraghi 409/423 20099 Sesto S. Giovanni (MI) - Italy

(Address)

declare under our sole responsibility that the product :

Palmtop flue gas analyser mod. GreenLine 4000

(Name and type)

cat. 7826

(Model)

to which this declaration relates is in conformity with the following normative documents :

EN 50082-2 (3/95)

IEC 1000-4-2 / IEC 1000-4-4 / IEC 1000-4-11

ENV 50140 - ENV 50141 - ENV 50204

EN 55011

(Title, number and date of issue of normative documents)

following the prevision of directive :

89/336/CEE Electromagnetic Compatibility (EMC)

Sesto S. Giovanni, January 08th, 2002

(Place and date of issue)

(Signature of authorised person)



Declaration of Conformity

We : Eurotron Instruments S.p.A.

(Supplier's name)

Viale F.lli Casiraghi 409/423 20099 Sesto S. Giovanni (MI) - Italy

(Address)

declare under our sole responsibility that the product :

Palmtop flue gas analyser mod. UniGas 3000+

(Name and type)

cat. 7825

(Model)

to which this declaration relates is in conformity with the following normative documents :

EN 50082-2 (3/95)

IEC 1000-4-2 / IEC 1000-4-4 / IEC 1000-4-11

ENV 50140 - ENV 50141 - ENV 50204

EN 55011

(Title, number and date of issue of normative documents)

following the prevision of directive :

89/336/CEE Electromagnetic Compatibility (EMC)

Sesto S. Giovanni, January 08th, 2002

(Place and date of issue)

(Signature of authorised person)

 **eurotron**



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