Eclipse
®
**Eclipse
Combustion**

EGA2 Combustion
Analyzer

CE

ECLIPSE™
Innovative Thermal Solutions

INTRODUCTORY NOTE

NOTE: THIS MANUAL IS VALID FOR INSTRUMENTS WITH SERIAL NUMBER 49568 AND FIRMWARE REV. 1.004 OR HIGHER

*This manual has all the information you need to install, operate and maintain the flue gas analyzers **EGA2** and its accessories.*

***Eclipse** has used the best care and efforts in preparing this book and believes the information in this publication are accurate. The **Eclipse** products are subjected to continuous improvements, in order to pursue the technological leadership; these improvements could require changes to the information of this book.*
***Eclipse** reserves the right to change such information without notice.*

*The **EGA2** gas analyzer uses sophisticated analogic and digital technologies. Any maintenance operation must be carried out by qualified personnel ONLY. **Eclipse** supplies instructions and operative procedures for any operation on the instrument. We recommend contacting our technicians for any support requirements.*
The instrument is supplied by a Ni-MH rechargeable battery pack or by 100, 115, 230V ±10% 50/60Hz line supply using the special power supply module provided with the instrument.

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1   GENERAL DESCRIPTION

The EGA2 is designed to satisfy the market needs; but it is the result of the advanced research and experience of **Eclipse**. **EGA2** is a multigas compact palm-top multifunction instrument. The microprocessor-based instrument includes a flue gas analyzer, and an ambient parameters indicator. Two internal electrochemical sensors read the Oxygen (O_2) and carbonic 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 CO_2 concentration. 10 gas parameters programmable table is used for calculations approved in accordance with DIN33962.

External sensors are available for auxiliary measurements: ambient CO concentration (for operator's safety), gas network leakage procedure (pressure decay method) and natural gas leakage detector (sniffer).

The analyzer is completed with a differential pressure (draught) sensor, an internal printer, an internal memory for storing data and a RS232 serial interface for configuration and data transfer from and to a PC.

♦   Draft measurement is possible using the internal pressure sensor and the Eclipse special gas sample probe.
♦   The optional internal printer is impact type and the generated document is very legible and has long time duration.
♦   The internal standard memory may store up to 250 complete gas analysis divided by Tag.
♦   The instruments have a standard IR serial interface for external HP 82240B thermal wireless printer.
♦   The optional RS232 cable and a configuration PC software are available to configure the analyzers.

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, large format, with automatic and manual backlight device.
- **Easy and quick upgrading** hardware and software are made using modular design to upgrade the system by yourself.
- **Differential pressure measurement**: pressure, draft, ∆P, etc.
- **Averaging** between three or more gas analysis.
- **Built-in impact type printer**: more legible and long time duration for you documents.
- **Single battery pack**: rechargeable to power both the instrument and the internal printer.
- **Internal memory**: up to 250 complete data analysis.
- **Wireless printer**: compatible with your HP 82240B thermal printer.

1.1   Specifications

- **Type**: 1 or 2 cells palm-top flue gas analyzer.
- **Calibration**: automatic calibration procedure at instrument switching-on.
- **Self-diagnosis**: Sensors efficiency test with anomalous status announcement.
- **Fuel types**: Up to 10 totally programmable.
- **Pump**: rate of flow 1.4 lit /min. @ 100mbar
- **Power supply**: High capacity Ni-MH rechargeable battery pack / external battery charger.
- **Charging time:** 8h at 90% with instrument off.
- **Battery life**: 6h continuous operation (without printer and back-light).
- **Built-in printer**: optional impact type 24 columns with 58 mm large and 8 meters long paper roll
- **Built-in Printer power supply**: using the analyzer battery pack.
- **Built-in Print autonomy**: up to 40 reports with battery full.
- **Internal data memory**: up to 250 complete analysis data structured by Tags (max. 40).
- **Service and user data**: 3 programmable rows x 16 char for each programmed customer using a PC and GasConfig Software.
- **Report Herder**: 4 rows x 16 char programmable from GasConfig Software
- **Display**: Large (40x56 mm) LCD display with automatic back-light device.
- **Serial interface**: Infrared interface for wireless HP82240B thermal printer. External RS232 adapter cable available for PC communication.
- **Smoke measurement**: Using the optional external manual pump. Bacharach index memory store and printout capability as standard.
- **Flue gas Probe**: stainless steel with rubber handle and incorporated temperature sensor. 2 meters long rubber hose included.
- **Water trap**: external with purge plug.
- **Line filter**: with replaceable cartridge.
- **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 +60°C (3 months maximum at temperatures exceeding the operational limits).
- **Dimensions**: 2000: 105x75x290 mm; 2000+ 115x90x330mm
- **Weight**: 2000: 0.9 kg; 2000+ 1.1Kg, with battery and printer

External optional ambient CO probe
- **Range:** from 0 to 500ppm
- **Accuracy:** ±5ppm up to 100ppm; ±5% up to 500ppm
- **Resolution:** 1ppm
- **Response time:** 30s (t90)
- **Waiting starting time:** 30s
- **Working temperature**: from –5°C to +45 °C

External optional natural gas leak detection probe
- **Pre-heating time:** 30s minimum
- **Alarms indication:** visual with 5 steps
- **5 alarms levels:** 100, 200, 300, 400, 500 ppm
- **Acoustic Alarm indication:** respectively 1, 2, 3, 5 beep/s, continuous
- **Response time:** 5s (t90)
- **Alarm levels Accuracy:** ±10% at 90 days

1.2 Accuracies and ranges

Parameter	Sensor type	Range	Resol.	Max response	Accuracy
O₂	electrochemical	from 0 to 25.0%	0.1%	20 sec.	±0.2% Vol.
CO *H₂ compensated up to 2000ppm*	electrochemical	from 0 to 8000 ppm	1 ppm	50 sec.	±10 ppm up to 300 ppm ±4% rdg. up to 2000 ppm ±10% rdg. >2000 ppm
NO	electrochemical	from 0 to 4000 ppm	1 ppm	50 sec.	±5 ppm up to 125 ppm ±4% rdg. up to 4000 ppm
CO₂	Calculated	from 0 to 99.9 %	0.1 %		
Tair	Pt100	from -10 to 99.9 °C	0.1 °C		± 0.5 °C
Tgas	Tc K	from -10 to 600.0 °C	0.1 °C		± 1 °C
ΔT	Calculated				
Pressure / draft	Piezo	from -10 a +100hPa	0.01 hPa		±3Pa up to 300hPa ±1% rdg elsewhere
Excess air	Calculated	from 1.00 to infinite	0.01		
Efficiency	Calculated	from 0 to 99.9%	0.1 %		
Smoke index	External pump	from 0 to 9			

- *Technical units and ranges can be converted directly from ppm to mg/Nm^3 , mg/kwh and from hPa to mmH₂O, mbar or inH₂O.*
- *The relative accuracy shown is 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.*

Specifications may change without notice.

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.

1.3 Calibration certificate

Each portable gas analyzer **EGA2**, is factory calibrated and certified against **Eclipse** Standards that are periodically certified by an International recognized Laboratory, and shipped with a Report of Calibration stating the nominal and actual values and the deviation errors.

2   PHYSICAL DESCRIPTION

The portable analyzer **EGA2** consists of a rugged and compact case, a mother board with all base function circuits, 1 or 2 electrochemical cells, a gas pump, a keyboard, an LCD backlighted display, a Ni-MH rechargeable battery pack and, optionally, an impact printer.
The 2 pieces of the case are jointed 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 removing the paper roll.

At the bottom of the instrument, you can see all sampling probe connectors: gas inlet, and differential pressure / draft inputs.
On the left side are the connectors for: line power charger and IR serial port for external wireless printer.
On the right side are the connectors for: the auxiliary probes (combustion air temperature, ambient CO monitoring probe, gas leak sniffer, etc.), the thermocouple type K for flue gas temperature and the RS232 for PC serial communication (an optional RS232 and software should be used to configure the instrument and to transfer the analysis data).
The operator interface is on the front of the instrument and it consists of: a high contrast LCD display and a 9 button keypad. An automatic back-light device makes easier the data reading on the display.

2.1   Keyboard

The front panel keys functions are the following:
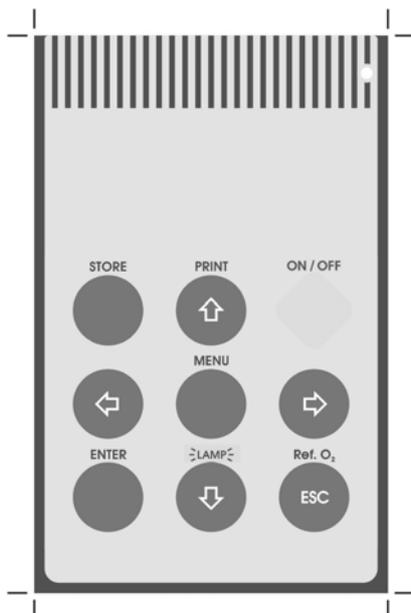
|	
[**ON/OFF**]	Switch the analyzer on or off.
[▲], [▼], [◄] e [►]	Increase or decrease numerical values.
[**ENTER**]	Accept and memory store modified parameter or variable. ***Pressing this key from the analysis page, the internal pump will be switched on and off.***
[**PRINT**]	go to the Printout menu
[**STORE**]	Read or store the analysis data from or to the memory. Pressing this key from the pressure/draft menu will zero the sensor offset.
[**MENU**]	Go to the auxiliary function menu. Scroll between the menu options.
[**ESC**]	return to the gas analysis function.
[**LAMP**]	switch the back-light on and off.
[**Ref. O₂**]	Display the CO measurement as referred to the specified oxygen percentage.

2.2   Display

The EGA2 is designed with a large (40x56 mm) graphical display using an automatic backlight system for the best reading in poor light conditions also.
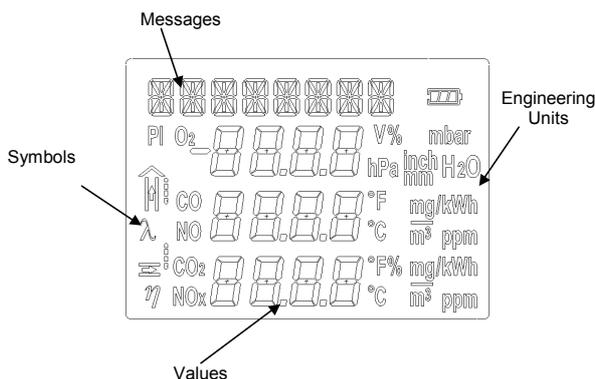
Symbols
The display has graphical symbols to describe the actual operation mode of the instrument.

🔋	Battery status: fully black=charged; empty=discharged. The symbol is flashing if battery are charging
	Flue gas temperature
	Ambient/combustion air temperature
λ	Excess air
η	Efficiency
PI	Poison Index.

Backlight
To increase the display readability, an automatic backlight device is included. It is also possible to switch the backlight on or off by pressing the [**LAMP**] key.

3   PRINCIPLE OF OPERATION

The EGA2 analyzer is based on the following functional blocks:
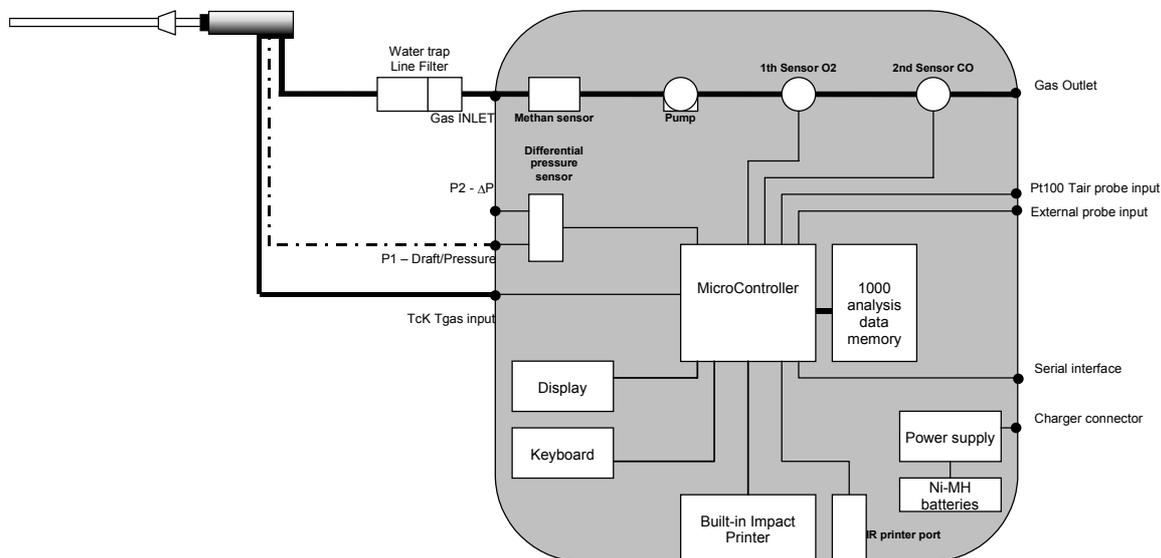
3.1   Measurement principle

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 chimney. 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 O_2 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 electrochemical cell grants accurate results for time intervals of approximately 60 minutes. The zero drift is automatically corrected by the instrument every time 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 analyzer gas inlet.
When a long time analysis has to be made, a new autozero procedure should be performed.
Measured and calculated parameters are indicated on a LCD alphanumeric display (40x56 mm), equipped with an automatic back light device for easy readings, also in poor light conditions.

3.1.1   Gas sampling probe

The sampling probe consists of a steel tube and a handle of thermoinsulating material. A positioning cone allows placing 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 on the top of the tip.

3.1.2   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 and shake slowly the trap to drain the water. 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 every time it is dirty.

Line filter
cat. EE650074

Rubber plug
cat. EE650081
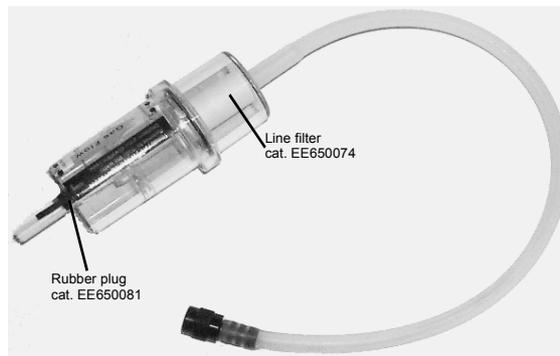
WARNING

THE WATER TRAP MUST BE KEPT IN VERTICAL POSITION DURING GAS SAMPLING. **A**N INCORRECT POSITIONING OF THE TRAP CAN ALLOW THE WATER TO ENTER INSIDE THE ANALIZER 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. **B**EFORE PUTTING THE GAS PROBE IN THE CARRYING CASE, REMUVE THE CONDENSATE WATER FROM THE PROBE HOSE.

THE LINE FILTER SHOULD BE REPLACED WHEN DIRTY. **N**EVER MAKE ANY ANALYSIS WITHOUT LINE FILTER AND/OR WATER TRAP, AS IT CAUSES AN IRREVERSIBLE DAMAGE TO THE ELECTROCHEMICAL SENSOR.

3.1.3   Gas sensors

The analyzer uses long life sensors for O_2 and CO measurements. The gas sensors are electrochemical cells composed by two electrodes (anode and cathode) and an electrolyte solution. The sampled gas goes trough 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

NOTE: **T**O OBTAIN AN ACCURATE MEASURE IT IS RECOMMENDED TO WAIT **3/5** MINUTES.

If an excessive (>150% of F.S.) gas concentration is applied to toxic gas sensor, then a ±2% drift and a long resuming time can be present. In that case it is recommended to wait for a measured value lower than 20ppm, by sucking fresh air before switching the analyzer off.
Four acoustic and visual alarm levels can be set on four programmable parameters.

3.2   Auxiliary measurements

3.2.1   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.

♦ A remote Pt100 sensor, can be supplied on request with a 2 meter cable to measure the *air inlet temperature* in forced air boiler. This option is very important for an accurate efficiency calculation.

3.2.2 Pressure and Draft

The analyzer is equipped with a temperature compensated pressure sensor to measure the chimney draught or pressure. The pressure/draught sensor is based on the principle of the extension metric measuring bridge. The pressure range is ±1000.0 mmwc (±100.00 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. Leave open the "ΔP" connector during this phase.

NOTE: WE SUGGEST EXECUTING THE AUTOZERO PROCEDURE FOR MORE ACCURACY 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 DRIED BEFORE CONNECTING TO THE PRESSURE INPUT.

CAUTION

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

3.2.3 Smoke index measurement (optional)

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 prints these values on the report.
Normative and laws about the air pollution, describes the procedure: DIN51402, 2116, 2117 and 2297 VDI directives, ASTM D 2156-63 T, etc.

3.2.3.1 Measuring instruments (optional)

1. **Smoke pump**: it should suck 1.63 litres ±0.07 l (normalized to 0°C, 760mmHg) through a 1 cm^2 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% ±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 cm^2 a minute (normalized to 0°C, 760mmHg) with a 200/800 mmwc resistance to the air flux.

3.2.4   Other measurements

The analyzer has an auxiliary input for special probes connections. Available probes are: ambient CO monitoring and natural gas monitoring probes.
An optional operative mode is the leakage pipe test to check gas network tightness using pressure decay method at programmable interval time.

4   RECOMMENDATIONS

- The analyzer should be used in environments where the temperature is between -5°C and +45°C.
- When the analyses 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 color correspondence).
- To empty the water trap from the condensate water, remove the draining plug. DO NOT OPEN the water trap. DO NOT leave the water trap without the draining rubber plug.
- **For the best efficiency and accuracy, we suggest calibrating the instrument every year**.

WARNING

IF THE INSTRUMENT IS STORED AT TEMPERATURE EXCEEDING THE OPERATIVE LIMITS, THE ANALYZER NEEDS SOME MINUTES TO WARM-UP TO THE ACTUAL AMBIENT TEMPERATURE, BEFORE STARTING THE OPERATION.

4.1   Power supply

The EGA2 can be powered by:
- internal rechargeable Ni-MH battery.
- 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 Ni-MH rechargeable batteries allow a long time operation and do not need maintenance. The same batteries power both the instrument and the internal printer. The internal battery will grant 6 hours continuous operation (without printing and display back light off).

NOTE: 90% BATTERY CHARGING CAN BE OBTEINED IN 8 HOURS WITH THE INSTRUMENT SWITCHED OFF.

During operation a fully battery symbol "▮" 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 Eclipse together the instrument.

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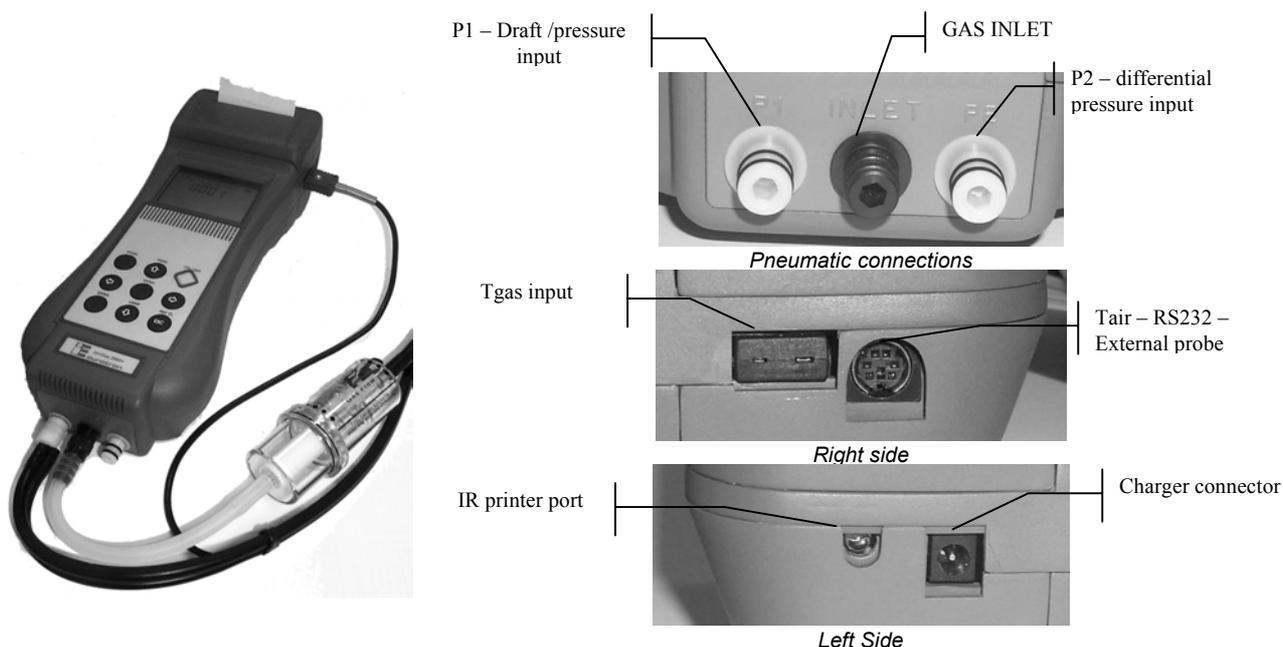

WARNING

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.

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5   CONNECTIONS

5.1   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 (double hose model), connect also the draft connector to the instrument Pressure/Draft inlet (P1).
- Plug the probe temperature sensor plug to the pertinent connector.
- If necessary, plug the remote air temperature Pt100 sensor to the pertinent connector.

P1 – Draft /pressure input — GAS INLET — P2 – differential pressure input

Pneumatic connections

Tgas input — Tair – RS232 – External probe

Right side

IR printer port — Charger connector

Left Side

| WARNING |
|---|
| **BEFORE STARTING THE GAS ANALYSIS PROCEDURE BE SURE THAT:**
PROBE DRAFT CONNECTOR (P1) AND GAS SAMPLING CONNECTOR (INLET) ARE PLUGGED TO THE INSTRUMENT;
DRAINING PLUG IS WELL INSERTED IN THE WATER TRAP;
LINE FILTER IS CLEAN. |

5.2   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 center 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.

Tair probe
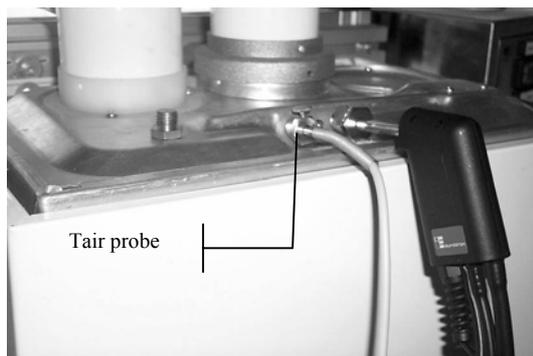
CAUTION

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 OPERATIONS

All the procedures and programming operations on the **EGA2**, 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.

6.1 Flue gas analysis

6.1.1 Switching ON

▪ Connect the gas probe to the analyzer as shown in chapter 6. **DO NOT INSERT THE PROBE IN THE CHIMNEY**.
▪ Switch the analyzer on pressing the [**ON**] key. The display will show the following page:
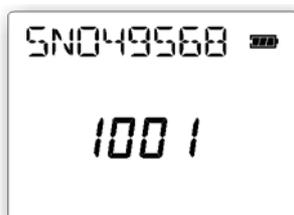
```
SN049568 ▭

  1001
```

This page changes automatically after some seconds or if you press a key as follows:

```
ECOLINE ▭        GREENLINE ▭        UNIGAS ▭
 2000             2000               2000 +
```

This page changes automatically after some seconds or if you press a key as follows:

```
AUTOZERO ▭

   60
```
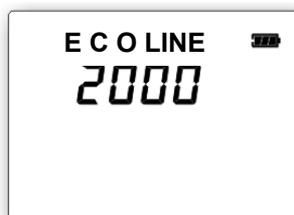
This page displays the seconds to end the autozero procedure.

NOTE: THE ANALYZER MUST DRAW CLEAN AIR FROM THE AMBIENT DURING THE AUTOZERO PROCEDURE. OTHERWISE THE MEASUREMENTS CANNOT BE ACCURATE AND A SENSOR ERROR MAY OCCUR.

When autozero procedure finishes, and no error occurs, an intermittent sound advises the operator.
Autozero time interval is standard set to 60 seconds. If one or more sensors have a problem, the instrument will perform another autozero procedure.

▪ Press the [**ENTER**] key to mute the unit. The following page will be displayed:
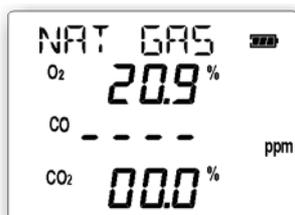
- The instrument is now ready for the flue gas analysis.

NOTE: AFTER THE INSTRUMENT IS SWITCHED ON, ALL SETTINGS WILL BE AS THE PREVIOUS SWINTCHING OFF.

6.1.2   Flue Gas Analysis

- Insert the probe in the chimney. Stop using the retaining cone and adjust the immersion depth for a gas sampling in the middle of the exhaust gas connection pipe.
- Plug the pneumatic connector of the probe to the GAS INLET connector. If you are using the gas sampling probe with Draft option (double hose model), connect also the draft connector to the instrument Pressure/Draft inlet (P1).
- Plug the temperature sensor of the sampling probe to the pertinent TcK connector.
- If necessary, plug the remote air temperature Pt100 probe to the pertinent connector. It is important to measure the true combustion air temperature to have a correct boiler efficiency computation. The instrument has an auxiliary Rtd input to measure simultaneously the air temperature. A Pt100 with a 2 meters long cable can be connected on the right side of the analyzer. Insert the Rtd inside the air combustion aspiration tube and near the boiler. 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.
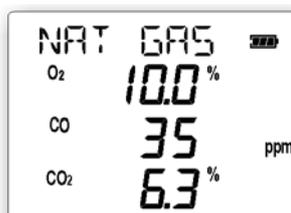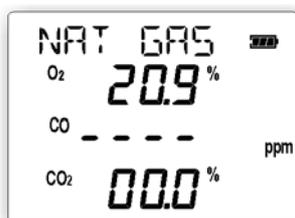

Pressing the [◄] and [►] keys you can change page to display others parameters
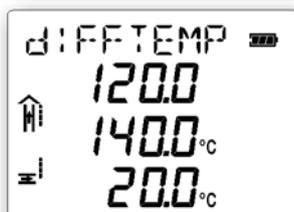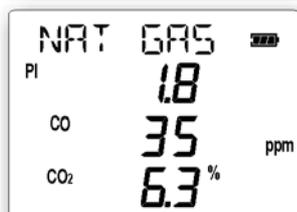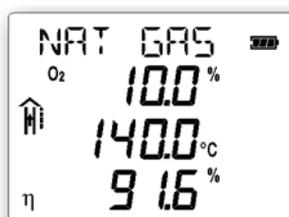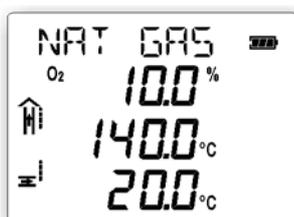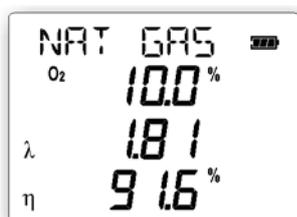
Pressing the [**REF. O₂**] key, the measured parameters will be referred to the programmed oxygen value. When selecting this mode, the message "**REF O2CO**" will be displayed.
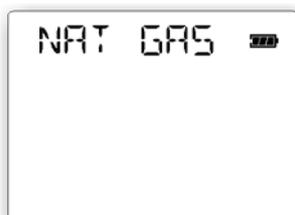
6.1.3 Fuel type set-up

If the displayed fuel type do not coincide with your necessity, you should proceed as follow:

```
NAT GAS   ▭
O₂  20.9 %
CO  _ _ _ _
          ppm
CO₂ 00.0 %
```

- Press the [**MENU**] key until the following page will be displayed:
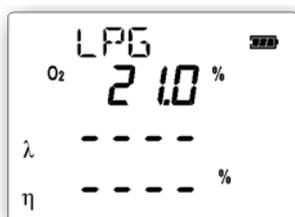
```
FUEL      ▭
```

- Press the [**ENTER**] key to change the fuel type.

```
NAT GAS   ▭
```

- Use the [▲] and [▼] keys to change the fuel type (standard available types are: LPG, Light oil, Oil, Town gas.

```
LPG       ▭
```

- Press the [**ENTER**] key to store the value.
- Press [**ESC**] to return to the measure page.

```
   LPG    ▭
O₂  21.0 %
λ   _ _ _ _
η   _ _ _ _ %
```

6.1.4 Pressure/Draft measurements

The EGA2 has an internal differential pressure sensor installed. With this sensor, you can execute the pressure/draft measurements by using either the standard probe or the special probe.
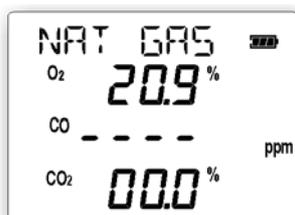
Standard single hose probe (TG models):
The standard probe has one gas collector for gas sampling. Usually you have the hose terminal connected to the instrument gas inlet; when you have to do the draft measurements you have to move the connector to pressure inlet (INLET) connector.

Special dual hose probe (TGD models):
This special probe model has two gas collectors: 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 (INLET) and pressure inlet (P1) connectors. Connect the hose with line filter to gas inlet connector.

CAUTION

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

NAT GAS
O_2 **20.9** %
CO – – – – ppm
CO_2 **00.0** %

- Press the [**MENU**] key until the following page will be displayed:

PRESSURE

- Press the [**ENTER**] key to show the following page. The internal pump will stop.

NOTA: DO NOT INSERT THE PROBE IN THE CHIMNEY.

ZERO
99.99 mbar

- Press the [**STORE**] key <u>before</u> insert the probe in the chimney to zeroing the measured value.
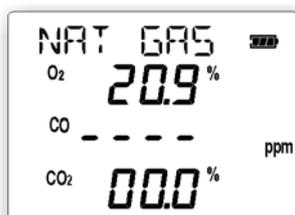
PRESSURE
0.00 mbar

- 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 M
-25.03        mbar
```

- Press [**ENTER**] to repeat the measurement.
- Press [**ESC**] to return to the measuring page.


```
NAT GAS
O₂    20.9 %
CO   - - - -
                ppm
CO₂   00.0 %
```

6.1.4.1   Burner pressure measurement

Using the burner pressure probe, 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 the previous paragraph to perform the measure.

6.2   Smoke measurement

To avoid condensation inside the smoke pump, the pump 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. We suggest using a retaining cone during gas sampling.
Compare the darkening of the filter with the smoke index comparing table. The smoke index found should not exceed the ones defined by the current normative.
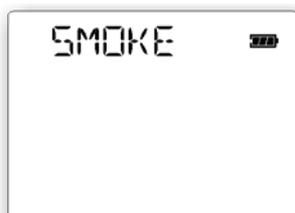

6.2.1   Input of the smoke index

Before input the data, you have to execute the smoke index measurements. You can input up to 3 values; the analyzer will make the average calculus.
These values will be printed on report with the other gas analysis data.

▪   Press the [**MENU**] key until the following page will be displayed:

▪   Press [**ENTER**] to input the smoke index values.
▪   Change the value of the 1st test by pressing the [▲] and [▼] keys. Press the [**ENTER**] key to store the value and input the test 2 value.

- Change the value of the 2nd test by pressing the [▲] and [▼] keys. Press the [**ENTER**] key to store the value and input the test 3 value.
- Change the value of the 3rd test by pressing the [▲] and [▼] keys.

```
SMOKE    ▥
 1  1
 2  3
 3  3
```

- Press the [**ENTER**] key to store the value.

```
dER: NO  ▥
 1  1
 2  3
 3  3
```
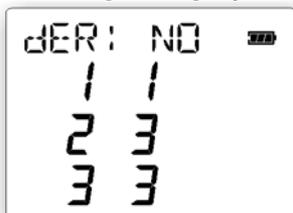
- Press the [▲] key to change the fuel specification.
- Press the [**ENTER**] key to store the value.
- Press [**ESC**] to return to the measure page.

6.3   Analysis data print

The EGA2 has two different possibilities to print the flue gas analysis data. You can use the optional internal impact printer or the standard IR port for your HP 82240B wireless thermal printer.

6.3.1   **Built-in printer** (option)

You can order the **EGA2** complete with an internal 24 column impact printer. The printer is integrated with the instrument and the power is supplied by the same batteries of the analyzer. The impact model gives you one more advantage: more readability and long time duration on your documents.

To print the data analysis follow the procedure:
- Wait for the stabilization of the measure on the display. Press the [**PRINT**] key.
- The display shows the last setting for number of copies to be printed and the document format.
- Check that the internal printer is enabled. Press the [**MENU**] key and verify that it displays the "**PRINTINT**" message.
- If you do not need any changes press the [**PRINT**] key again. The instrument will print the report as programmed
- If you need any changes, read the procedure on paragraph 6.3.3.
- Press [**ESC**] to return to the measuring page.

6.3.2   External printer

The EGA2 has a standard IR port compatible with your HP 82240B wireless thermal printer. The printer is external to the instrument and the power supply is separated from the analyzer. No connection cables are necessary: you can near the printer IR led to the IR led of the analyzer.

To print the analysis data follow the procedure:
- Wait for the stabilization of the measure on the display. Press the [**PRINT**] key.
- The display shows the last setting for number of copies to be printed and the document format.
- Check that the internal printer is enabled. Press the [**MENU**] key and verify that it displays the "**PRINTEXT**" message.
- If you do not need any changes press the [**PRINT**] key again. The instrument will print the report as programmed

- If you need any changes, read the procedure on paragraph 6.3.3.
- Press [**ESC**] to return to the measure page.

6.3.3   Printer setting

From the printer menu you can change the printer setting: the format of the report (short or complete form), the printer enabled (internal or external) and the number of the copies. From this menu, you can also perform the form feed also.

- Press the [**PRINT**] key to enter in the printer menu.
- the display shows the last setting for number of copies to be printed and the document format.
- Press the [**MENU**] key until the parameter to be changed is displayed.
- Press the [▶] key to change the value of the displayed parameter. Press the [**ENTER**] key to store the changes.
- Press the [**MENU**] key to change the parameter.
- Press the [**PRINT**] key to print the report.
- Press [**ESC**] to return to the measure page.

6.3.4   Header setting

Using the instrument keyboard, you can set the report header (4 text rows of 16 char each) with your data.
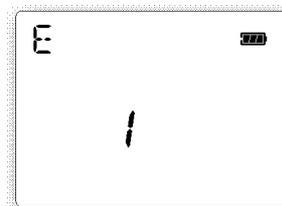Adopt the following procedures:

- Press the [**MENU**] key from measuring page until the following page is displayed:
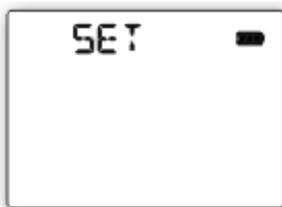
- Press the [**ENTER**] key. Press the [**MENU**] key until the following page is displayed:

- Press the [**ENTER**] key. A number "1" on display will show you that you are changing the first line of the header.
- Press the [▲] and [▼] keys to change the first of 16 characters of the header row.

- Press the [◀] and [▶] keys to change the cursor position and change another character.

- Press the [**ENTER**] key to confirm the row inputs and change the second row.

Repeat the previous procedure to change the other header rows.

- Press [**ESC**] to return to the menu page.
- Press [**ESC**] to return to the measure page.

6.4 Pressure decay procedure (option)

This optional operative mode allows you to perform Gas network leak test with pressure decay procedure.
Before starting the test, you have to isolate and to empty the gas network section to be tested.
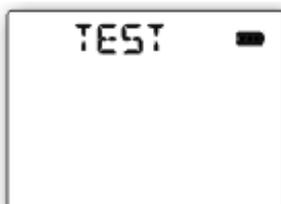
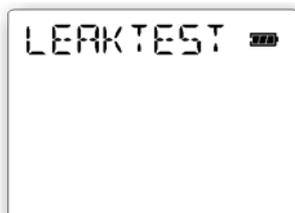| CAUTION |
| --- |
| BE SURE TO EMPTY AND CLEAN THE CIRCUIT: OVERPRESSURE, DUST, LIQUID AND CONDENSING MAY DAMAGE THE INSTRUMENT INTERNAL CIRCUITS. |

CAUTION
A +300HPA (OR –300HPA) OVER-PRESSURE CAN PERMANENTLY DAMAGE THE PRESSURE SENSOR.

To perform the leak test, press the [**MENU**] key from measuring page.

- Press the [**ENTER**]. Press the [**MENU**] key until the following page will be displayed:

- Press the [**ENTER**] key to display the following page:

Example:
Network type:
Length: 10 meters
Diameter: ½ "

- Change the network type by pressing the [▲] and [▼] keys. Press the [**ENTER**] key to store the value and input the network length.
- Change the network length by pressing the [▲] and [▼] keys. Press the [**ENTER**] key to store the value and input the network diameter.
- Change the network diameter by pressing the [▲] and [▼] keys.

- Press the [**ENTER**] key to store the values and to display the following page:

```
ZERO        ▰
   99.99    mbar
```

- Press the [**STORE**] key for sensor offset zeroing.
- Connect the P1 pressure input to the network. Apply a small pressure (lower than 100 hPa) to the network. Pressurize the circuit by using air or inert gases (e.g. Nitrogen).
- Press the [**ENTER**] key to start the test procedure.

```
TEST   P1  ▰
   100.0   mbar

   0110
```
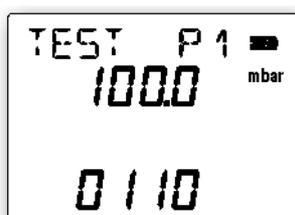
The instrument will display the pressure applied to the P1 input and the remaining time to end of the procedure. The following paragraph will show you how to change this value (std = 300 sec).

When the procedure is finished, the instrument will display the total leak in the network.

```
dELTA P    ▰
   0.01    mbar
```

Press the [**PRINT**] key to print the leak results.

6.4.1   Leak constant set-up

The total leak time testing period, is the sum of four different test constants. The following procedure will show you as to change these values.
- Switch the instrument off.
- Switch the instrument on by pressing the [**PRINT**] and [**ON/OFF**] simultaneously.
- DO NOT change the "AUTOZERO" value (it should be 180 sec). Press the [**ENTER**] key to select the next parameter.
- The display will show the P1 time constant (standard = 10 sec.). Press the [▲] and [▼] to change the value. Press the [**ENTER**] key to store the value and display the next parameter.
- The display will show the P2 time constant (standard = 60 sec.). Press the [▲] and [▼] to change the value. Press the [**ENTER**] key to store the value and display the next parameter.
- The display will show the P3 time constant (standard = 120 sec.). Press the [▲] and [▼] to change the value. Press the [**ENTER**] key to store the value and display the next parameter.
- The display will show the P4 time constant (standard = 120 sec.). Press the [▲] and [▼] to change the value. Press the [**ENTER**] key to store the value and display the next parameter.
- DO NOT change the "BAUDRATE" value (standard = 9600 baud). Press the [**ENTER**] key to store the value and display the first parameter.
- Switch the instrument off.

6.5   Ambient CO monitoring

The EGA2 allows ambient CO monitoring for personnel safety. Two different sensor types can be used to perform this function: an external probe or an internal sensor (the CO electrochemical sensor installed for flue gas analysis). An acoustic and visible signal is emitted by the unit if the programmed limit is reached.

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

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

WARNING

SENSORS USED IN SAFETY APPLICATIONS SHOULD BE FULLY CALIBRATED AT LEAST EVERY SIX MONTHS.

6.5.1 External CO probe (option)

This optional external probe allows ambient CO monitoring for personnel safety. When connected to the analyzer, it monitors continuously CO concentration and it signals when the Long-term Exposure (TWA) limits are reached.

To perform the test, press the [**MENU**] key from measuring page.
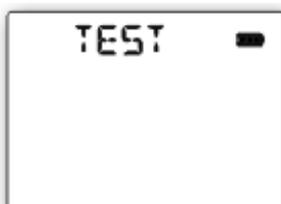
- Connect the probe to the instrument.
- Press the [**ENTER**]. Press the [**MENU**] key until the following page will be displayed:

- Press the [**ENTER**] key to initialize the external probe.

NOTE: WHEN PROBE IS CONNECTED, THE INSTRUMENT BEGINS A 30 SECONDS WAITING TIME.

Before insert the probe in the working area, agitate it for some 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.

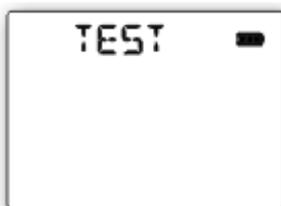- Press [**ESC**] to return to the measure page.

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

If the alarm condition is marked, press the [**ENTER**] key to silence it.

6.5.2 Internal CO sensor

This operative mode needs the internal CO sensor installed (the CO installed for flue gas analysis). It allows the ambient CO monitoring for personnel safety. When this function is active, the instrument monitor continuously CO concentration and it signals when the Long-term Exposure (TWA) limits are reached.

- Remove any pneumatic connection from the instrument gas INLET.
- To perform the test, press the [**MENU**] key from measuring page.

```
TEST        ▬
```

- Press the [**ENTER**]. Press the [**MENU**] key until the following page will be displayed:

```
COAMbINT  ▬
```

- Press the [**ENTER**] key to monitor ambient CO.

Wait for 30 seconds sensor zeroing countdown. Before inserting the instrument in the working area, agitate it for some 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.
If alarm condition is marked, press the [**ENTER**] key to silence it.

NOTE: AMBIENT CO MONITORING IS ACTIVE ONLY ON "COAMBINT" OPERATIVE PAGE.
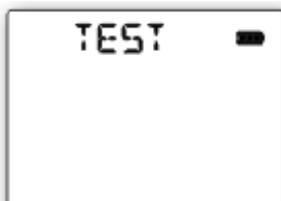
- Press [**ESC**] to return to the measure page.

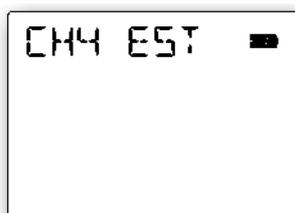## 6.6   Gas network leak test (option)

6.6.1   External natural gas leak probe

To enable natural gas monitoring connect the optional external probe to the instrument.

- To perform the test, press the [**MENU**] key from measuring page.

```
TEST        ▬
```

- Press the [**ENTER**]. Press the [**MENU**] key until the following page will be displayed:

```
CH4 EST   ▬
```

- Press the [**ENTER**] key to monitor gas concentration.

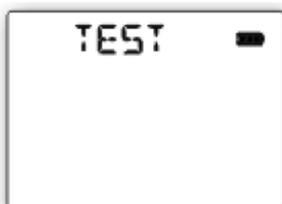**NOTE: WHEN THE PROBE IS CONNECTED, THE INSTRUMENT BEGINS A 50 SECONDS HEATING TIME.**

Before inserting the probe in the working area, agitate it for some seconds in fresh and uncontaminated air.
From this moment, the unit will display the gas concentration.

▪ Press [**ESC**] to return to the measure page.

6.6.2 Internal natural gas leak sensor

This operative mode needs the internal gas sensor installed. It allows natural gas monitoring for gas network leak test.

▪ Remove any pneumatic connection from the instrument gas INLET.
▪ To perform the test, press the [**MENU**] key from measuring page.

▪ Press the [**ENTER**]. Press the [**MENU**] key until the following page will be displayed:
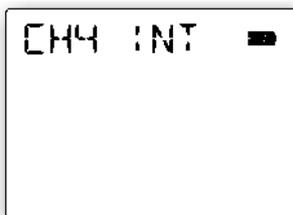
NOTE: WHEN THE PROBE IS CONNECTED, THE INSTRUMENT BEGINS A 50 SECONDS HEATING TIME.

Before inserting the instrument in the working area, agitate it for some seconds in fresh and uncontaminated air.
From this moment, the unit will display the gas concentration.

▪ Press [**ESC**] to return to the measure page.

7 MEMORY MANAGEMENT

The standard configuration includes an internal memory to store up to 1000 complete gas analysis divided by Tags (max. 40 tags). Each analysis includes the gas concentration values, data and time. Each Tag includes one or more analysis data, 16 characters ID, 3 rows for the Customer data, Draft and smoke index values, etc.

7.1 Store data analysis

- Press the [**STORE**] key to enter in memory management menu.
- Select the desired Tag [▲] and [▼] until it is displayed.
- Press the [**STORE**] key to memory store the gas analysis data.

The complete analysis data are stored in the internal memory complete with data and time. You can recall and print them any time you need.

- Press [**ESC**] to return to the measure page.

7.2 Delete all data

| WARNING |
|---|
| THIS OPERATION WILL DELETE PERMANENTLY AL THE MEMORIZED MEASUREMENTS IN THE INSTRUMENT. |

- Press the [**STORE**] key to enter in memory management menu.
- Press the [**MENU**] key to display the "**DELETE**" message.
- Press the [**ENTER**] key to delete all memory data in gas analyzer.
- Press [**ESC**] to return to the measure page.

7.3 Recall single data

- Press the [**STORE**] key to enter in memory management menu.
- Select the desired Tag [▲] and [▼] until it is displayed.
- Press the [**MENU**] key to display the "**SINGLE**" or "**AVERAGE**" message.
- Press the [▲] until the "**SINGLE**" message is displayed.
- Press the [**MENU**] key to display the "**RECALL**" message.

Progressive measurement

Storing date: gg.mm

Storing time: hh:mm
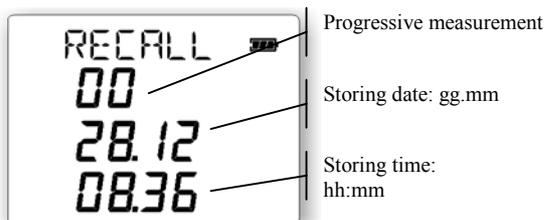
- Press the [◄] and [►] keys to display the desired analysis.
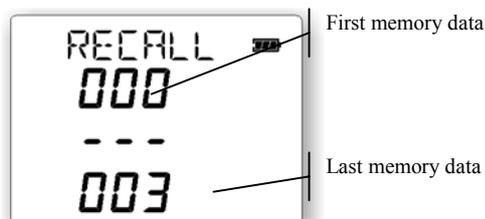- Press the [**ENTER**] key to display the data.
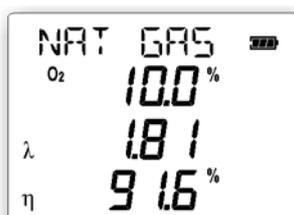
- Pressing the [◄] and [►] keys you can change page to display other parameters.
- Press the [**PRINT**] key to print the data.
- Press [**STORE**] to go to the previous page.

▪ Press [**ESC**] to return to the measure page.

7.4   Recall average data

▪ Press the [**STORE**] key to enter in memory management menu.
▪ Select the desired Tag [▲] and [▼] until it is displayed.
▪ Press the [**MENU**] key to display the "**SINGLE**" or "**AVERAGE**" message.
▪ Press the [▲] until the "**AVERAGE**" message is displayed.
▪ Press the [**MENU**] key to display the "**RECALL**" message.

RECALL   First memory data
000
- - -
003   Last memory data

▪ Press the [**ENTER**] key to display the data.
▪ Press the [**PRINT**] key to print the data.
▪ Press [**STORE**] to go to the previous page.
▪ Press [**ESC**] to return to the measure page.

7.5   RS232 Serial interface set-up

The EGA2 is enabled for RS232 bi-directional serial communication. An optional adapter can be included for PC connection.
Before starting the data transfer, you need to check and eventually to change the baud–rate to be sure that the PC and the instrument have the same communication speed.
Adopt the following procedure:
❑ Switch the instrument on pressing simultaneously [**PRINT**] + [**ON/OFF**] keys.
❑ Press the [**ENTER**] key until "**BAUDRATE**" parameter is displayed.
❑ If needed, change the "**BAUDRATE**" (standard = 9600 baud) pressing the [▲] and [▼] keys. Available speeds are: 9600, 19200, and 38400 baud.
❑ Press the [**ENTER**] key to store the changes.
❑ Switch the instrument off.

7.6   DBGas 2000 software

DBGas 2000 is a PC Windows 95/98/NT compatible program to manage all checks and measures activities on boilers and to transfer data from and to Eclipse Gas analyzers. The software is designed for a complete and efficient managing and recording of the analysis data of your clients. **DBGas 2000** allows you to have a no limits database on your PC with all customer and boiler information, to select up to 40 boiler to be checked, to assign an operator name and transfer the data to the analyzer. The operator can store up to 250 boiler checks 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 until he deletes these.

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

Plants / Clients   Analysis   Fuels   Exit

7.6.1   Plants/Clients menu

Selecting this option, you can manage the customers, boilers and plants information database and it is possible to transfer this data from the PC to the analyzer. For each plant the customer personal data can be assigned (name, address, phone and fax numbers, etc.) and one or more boiler information (name, type, fuel, etc.).
Database is organized as two separate tables: Plants/Clients database and Boilers installed.
Selecting one plant on the upper table, the lower table will show you the boilers installed on that plant.

All data can be changed easily by clicking with the mouse pointer on the cell. You can input the new data on the blank row (the last one) for adding a new boiler or new plant record. To delete a boiler or a plant you have to select it with a click and press the "Delete" key on PC keyboard.

To have a more readable database, you can reduce, enlarge or hide the columns; approach the mouse pointer to the right limit of the cell to be reduced (enlarged), pressing the right button move the mouse to the left (right). By pressing two times quickly the left mouse button on the column, this will be automatically adapted to the pre-set dimensions. All changes will be saved when you exit from the program.
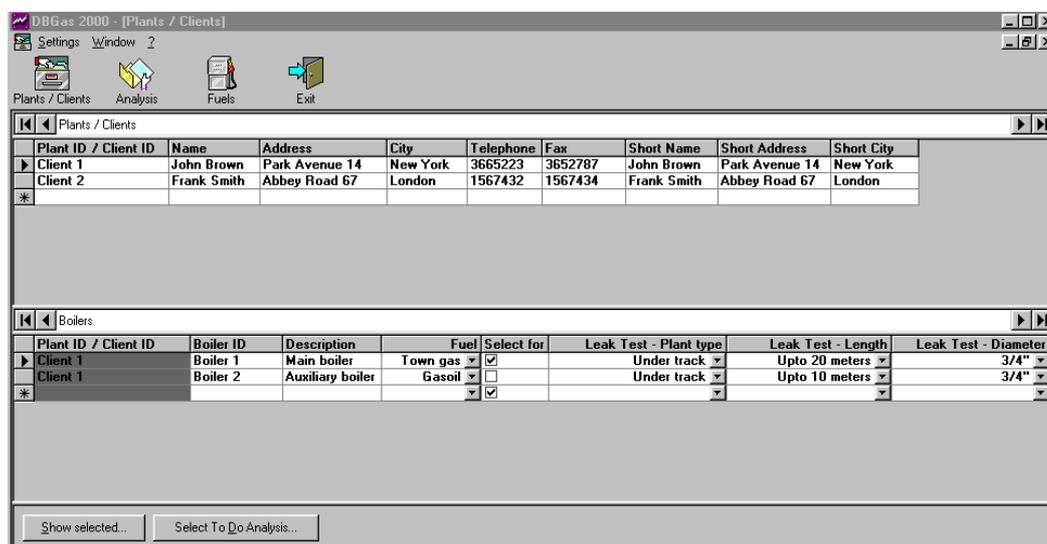
When database is completed, you can select up to 40 boilers on the table for data transfer by selecting the "Select for data transfer" column. Pressing the "Select to Do Analysis", you can select in automatic mode all analysis made by more than "XX" months.
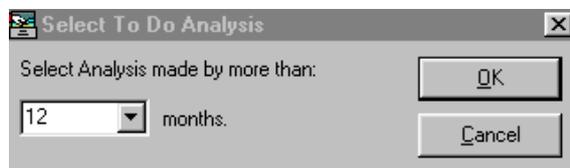
Pressing the "Show selected" button, the program will show all boilers selected for data transfer.
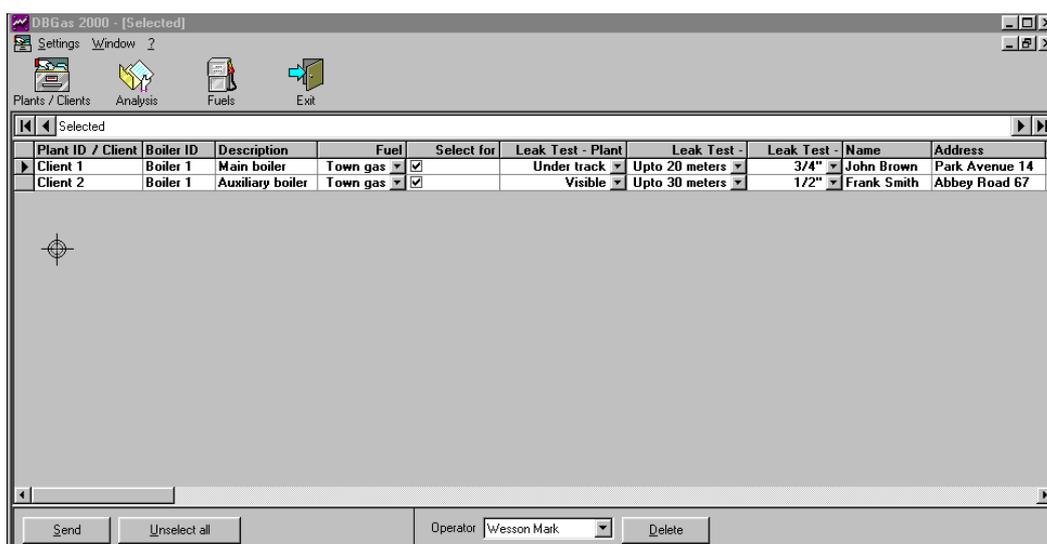
You can exclude manually one or more boilers from the list. Select or input the operator's name, connect the IR to RS232 adopter to the PC, approach the IR terminal to the analyzer IR communication windows, and press the "Send" button to send the data to the analyzer.

7.6.2   Analysis menu

This option is the main part of the program. You can transfer the analysis data from the analyzer to the PC, save and manage it using a database structure, display and export the data in Microsoft Excel™ compatible format.
The analysis window is made of 3 tables: plant and customer information, boiler information for the selected plant and analysis groups data for the selected boiler.
The analysis groups data will be ordered by data and will show the general data for the group of measurements (smoke indexes, T flow and return, etc.).

Select with the mouse the Plant, Boiler and Group to be displayed. The arrows on the left column on the tables will show you the current record. Pressing the "View measure" button you can read the single data measurements for the selected group (contents of gas, temperatures, pressure/draught, efficiency, smoke index, etc).

The operator can change the measuring units, the fuel type, etc. The program will made the conversion in real time and will display the new values.

A set of 4 buttons allows you to set the printer, to print measures, export measures using an Excel compatible format, show or hide the columns.

A fifth button is normally disabled and it allows displaying graphics. To display a graph, you have to select one or more columns for graphics. Select the column by positioning the mouse pointer on the desired column header and click, using the mouse left button; click using the mouse right button and select the "Select for graph" option. The column header will be displayed in *Italic*. The "Show graph" button becomes active. You can display the graph by pressing the "Show graph" button.
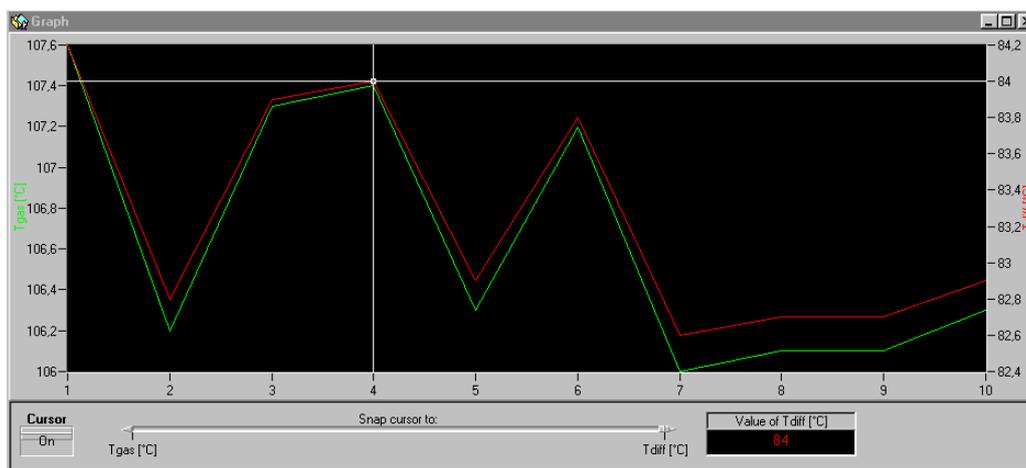
Activate the cursor and snap cursor to the desired parameter. Using the mouse, you can move the cursor amongst the measure.

7.6.3   Fuels menu

You can read from the analyzer all data parameters for the stored fuels. Press the "read from instrument" button to transfer, using the IR interface, the fuel data from the analyzer.

NOTE: THE FUEL DATA TRANSFER FROM ANALYZER SHOULD BE MADE AFTER THE PROGRAM INSTALLATION OR IF THE FUEL DATA CHANGES ON THE ANALYZER ITSELF.

IMPORTANT

TO CHANGE OR ADD NEW FUELS DATA, YOU HAVE TO USE GASCONFIG SOFTWARE. THE INSTRUCTIONS ARE SHOWN ON PARAGRAPH 8.6.

7.6.4   DBGas 2000 Installation

DBGas 2000 runs on IBM PC under WINDOWS 95/98/NT. Minimum requirements are a Pentium CPU with 16Mbyte Ram and 20 Mbytes on hard disk, a color monitor and a Microsoft mouse or a compatible one.
In order to install **DBGas 2000** for Windows, follow the below procedure:

- Place the **DBGas 2000** 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 **DBGas 2000** disk)
- Follow the on screen instructions making sure to provide the correct path to your **DBGas 2000** directory when prompted.

Once installed, the **DBGas 2000** icon will appear on your Windows screen and it will be possible to boot it by clicking on the icon as usual.

8 CONFIGURATION

8.1 Engineering Units

You can change, directly from the keyboard, the engineering unit for the measured parameters.
Gas concentration available units are: ppm, mg/m^3, mg/kWh.
Temperature available units are: °C, °F.
Pressure available units are: hPa, mbar, Pa, mmH_2O, $inchH_2O$.
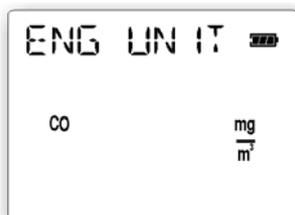
Adopt the following procedures:

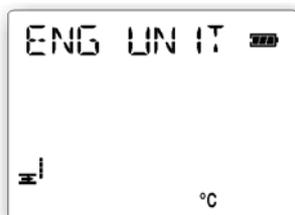▪ Press the [**MENU**] key from measuring page until the following page is displayed:

```
 SET        ▬
```

▪ Press the [**ENTER**]. Press the [**MENU**] key until the following page is displayed:

```
 ENG UNIT  ▬
```
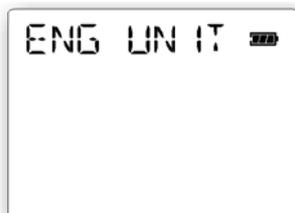
▪ Press the [**ENTER**] key to change the unit for the CO parameter.

```
 ENG UNIT  ▬

 CO           mg
             ──
             m³
```

▪ Press the [▲] key to select one different unit.
▪ Press the [**ENTER**] key to store the changes and to modify the temperature unit.

```
 ENG UNIT  ▬



 ≖
         °C
```

▪ Press the [▲] key to select one different unit.
▪ Press the [**ENTER**] key to store the changes and to modify the pressure unit.

ENG UNIT
hPa

- Press the [▲] key to select one different unit.
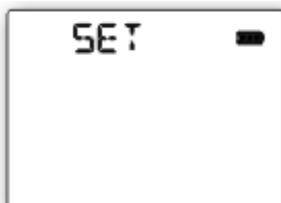- Press the [ENTER] key to store the changes.

ENG UNIT
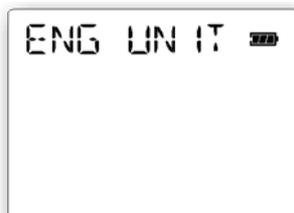
- Press [ESC] to return to the measure page.
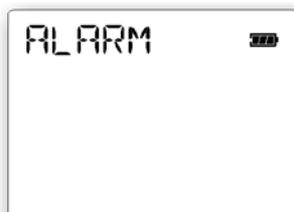
8.2   Alarms

You can set up to 3 alarms related to 3 different (O_2, CO, and Tair) measured parameters.
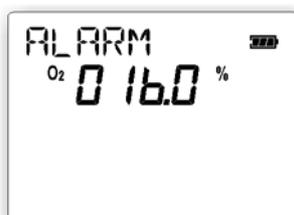
Adopt the following procedures:

- Press the [MENU] key from measuring page until the following page is displayed:

SET

- Press the [ENTER]. Press the [MENU] key until the following page is displayed:

ALARM

- Press the [ENTER] key to change the O_2 alarm level.

ALARM
O_2 016.0 %

- Press the [▲] and [▼] keys to change the flashing digit. Press the [◀] and [▶] keys to select a different digit.
- Press the [ENTER] key to store the changes and modify the CO alarm level.

```
 ALARM          ▭

   CO 1000      ppm
```

- Press the [▲] and [▼] keys to change the flashing digit. Press the [◄] and [►] keys to select a different digit.
- Press the [**ENTER**] key to store the changes and modify the Tair alarm level.

```
 ALARM          ▭

   ⌐¹ 050.0 °C
```

- Press the [▲] and [▼] keys to change the flashing digit. Press the [◄] and [►] keys to select a different digit.
- Press the [**ENTER**] key to store the changes.

```
 ALARM          ▭


```

- Press [**ESC**] to return to the measure page.

When one of the alarm levels is more than the reading, a continuous beep is generated by the analyzer. Press the [**ENTER**] key to mute the instrument.

8.3   Measure related to Oxygen percentage

Directly form the instrument keyboard, it is possible to set the Reference Oxygen percentage for CO measurements. The normative related with your application would give you the correct value to input. The analysis printed report carriers both measured and calculated CO values.
Pressing the [**REF. O₂**] key the CO measured parameter will be displayed as referred to the programmed oxygen value. When selected this mode, the message "**REF O2CO**" will be displayed.

Adopt the following procedure:

- Press the [**MENU**] key from measuring page until the following page is displayed:

```
   SET          ▭


```

- Press the [**ENTER**]. Press the [**MENU**] key until the following page is displayed:

```
R!F  O2         ▰
```
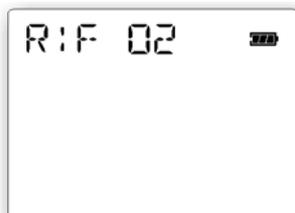
- Press the [**ENTER**] key to change the O_2 percentage.

```
R!F  O2CO   ▰
   005.0 %
```

- Press the [▲] and [▼] keys to change the flashing digit. Press the [◄] and [►] keys to select a different digit.
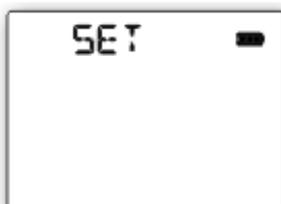- Press the [**ENTER**] key to store the changes.

```
R!F  O2         ▰
```

- Press [**ESC**] to return to the measure page.

8.4   Clock set-up

Adopt the following procedure:

- Press the [**MENU**] key from measuring page until the following page is displayed:

```
    SET         ▰
```

- Press the [**ENTER**]. Press the [**MENU**] key until the following page is displayed:

```
 T IME      ▰
   06.12
   2001
   09.50
```

- Press the [**ENTER**] key to enter in set-up mode.
- Press the [▲] and [▼] keys to change the flashing digit (Day). Press the [**ENTER**] key to store the changes.
- Press the [▲] and [▼] keys to change the flashing digit (Month). Press the [**ENTER**] key to store the changes.

- Press the [▲] and [▼] keys to change the flashing digit (Year). Press the [**ENTER**] key to store the changes.
- Press the [▲] and [▼] keys to change the flashing digit (Hour). Press the [**ENTER**] key to store the changes.
- Press the [▲] and [▼] keys to change the flashing digit (Minutes). Press the [**ENTER**] key to store the changes.
- Press [**ESC**] to return to the measure page.

8.5 Configuration Software

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

8.5.1 GasConfig Installation

The Software runs on IBM PC under WINDOWS 95/98/NT operative systems. Minimum requirements are a Pentium CPU with 16Mbyte Ram and 8 Mbytes 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 procedures:
- 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 **EGA2 Configuration Software** icon will appear on your Windows screen and it will be possible to boot it by clicking on the icon as usual.

8.5.2 How operate using GasConfig

When you run **GasConfig** a 2 independent windows system will be displayed on the PC monitor.
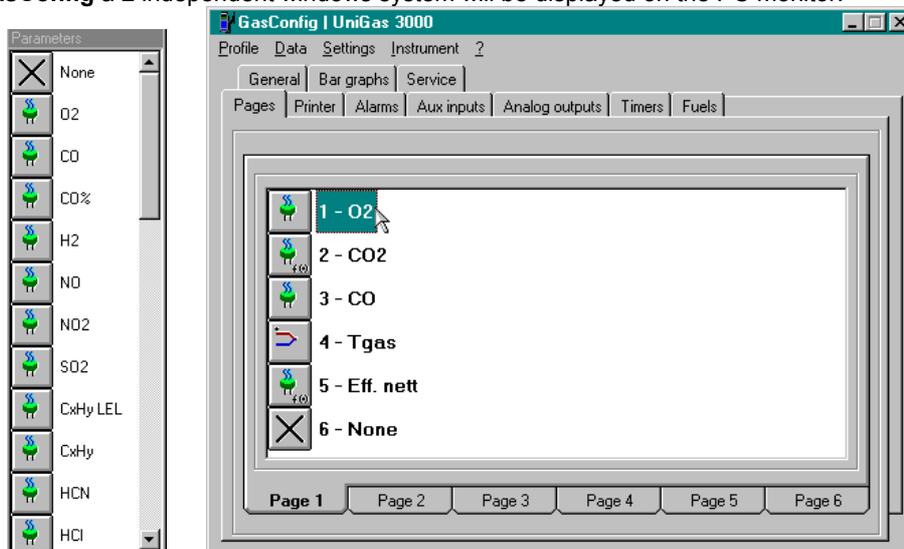
The window on the left is a parameter icon list. This list shows all possible parameters to measure (O_2, CO, Tgas, Draught, etc.) and calculate measures (CO_2, Efficiency, etc.). Some of these may not be available in your instrument (it depends by instrument model, installed cells, and options).

The window on the right is the program user interface. It is organized in function pages; you can select the page for interested parameters using the mouse.
A main menu bar allows you to load and save the configuration data, to change communication setting, for data transfer to and from the analyzer.

WARNING

BEFORE CONFIGURATION DATA TRANSFER TO AND FROM YOUR PC, BE SURE TO HAVE SELECTED THE EGA2 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, O_2% 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.
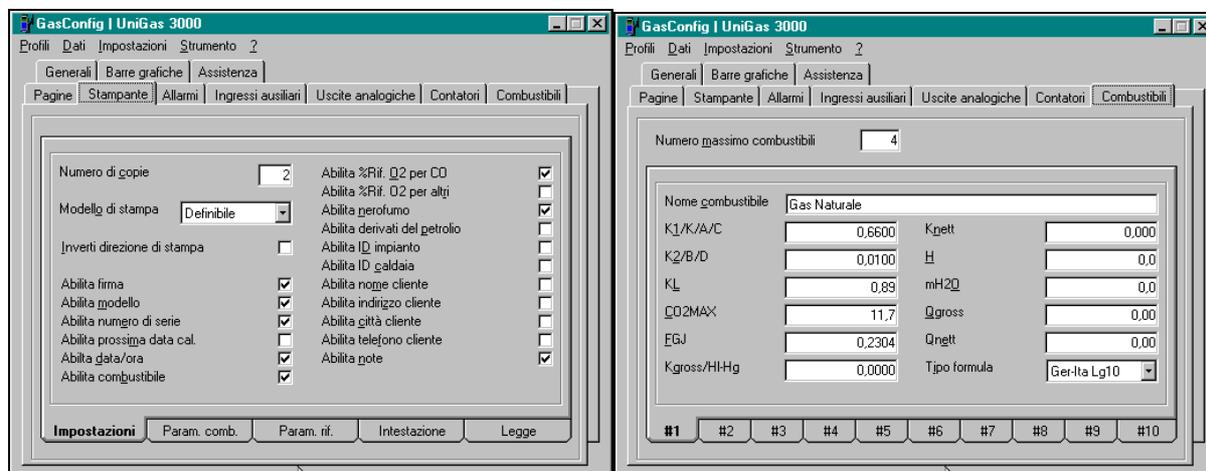
Alarms   You can enable, disable, and program up to 4 different acoustic and visible alarms for critical measurements.

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 bargraph (parameter and range).

Service   3 services information lines can be programmed for factory co-ordinates. (We suggest having Eclipse telephone and fax numbers).

9   MAINTENANCE

The EGA2 analyzer has been developed and manufactured using high quality components. A correct systematic maintenance will prevent damage and will increase substantially the life of the instrument, giving excellent results. Anomalous conditions that require extraordinary maintenance interventions are promptly displayed, either clearly or with an information code.
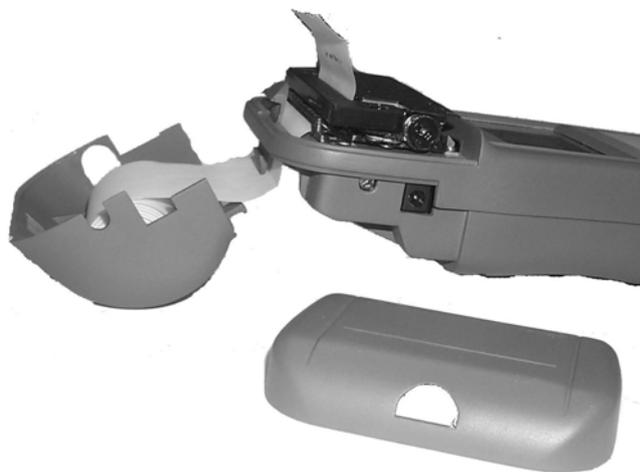
9.1   Printer maintenance

Open both the covers pressing as in figure, to change the paper and/or the ribbon.

Extract the exhausted paper roll. You can use standard paper roll but you have to check before for its dimensions (max. 57mm ±1mm large).
If necessary, substitute the ribbon cartridge.
Approach the end of the new paper roll to the slot under the printer.

Switch the analyzer on.
Press the [**PRINT**] key down; press the [**MENU**] key until the "**FEED**" message is displayed.
Press [**ENTER**] for paper feed. Press the [**ESC**] key when the paper will come out for some centimeters.
Close the cover inserting the paper end in its slot.

9.2   Firmware Upgrade

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

• Install the ST167Flash program from the CD.
• 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).
• Connect the interface to the instrument.
• Run the ST167Flash program you have installed.

- Select the same serial port that you noted back.
- Select the Baud rate to 115200 Baud (if the PC owns an UART 16550 type), otherwise select a lower Baud rate.
- 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.
- From instrument OFF press and continue to press the F1 key while pressing the ON/OFF key in order to set the instrument in firmware upgrade status.
- 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 THE SECOND LAST STEP.

9.3   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 from 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 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 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

9.4   Error messages

The instrument performs the autodiagnostic procedure when switched on. When measuring it checks also for anomalous conditions. If analyzer founds trouble, it displays an error for the related parameters. Printing the report, the error messages will be printed. Sometimes these messages correspond to an unrecoverable problem and it is necessary to return the instrument to Eclipse for maintenance. Frequently these messages are referred to a recoverable trouble and can be solved by yourself.
The following table shows the possible instrument error messages:

| Error message	Problem	Solutions
Calc Err	Parameter calculus error.	The instrument cannot perform the calculus. Check and solve the others error conditions.
Probe Er	The external Rtd probe is unconnected or damaged.	Connect or replace the external temperature probe.
RJ Err	Internal temperature reference damaged.	Return the instrument to Eclipse 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 calculus available	The instrument cannot perform the calculus. Check and solve the others 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 cycle in fresh air.
Tc Error	The thermocouple is unconnected or damaged.	Connect or replace the temperature probe.
Tsens Er	Cell compensation error	Return the instrument to Eclipse for maintenance.
Zero Err	The autozero procedure is failed	Perform one or more autozero cycle in fresh air. If the problem remains, Return the instrument to Eclipse for maintenance.
Sens. Er	Broken cell	Return the instrument to Eclipse 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.

9.5 Display battery level

▪ Press the [**MENU**] key from measuring page until the following page is displayed:

▪ Press the [**ENTER**]. Press the [**MENU**] key until the following page is displayed:
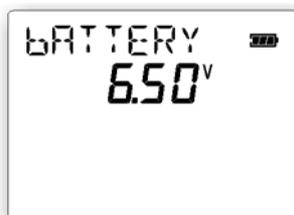
10 CERTIFICATES

10.1 Warranty terms

Each instrument is shipped with a Warranty Certificate that indicates the validity conditions of the warranty itself. **Eclipse** guarantees its products against defects in materials and workmanship.

If the unit should malfunction, it must be returned during the warranty period, transportation prepaid, to **Eclipse** for evaluation. Upon examination, if the unit is found defective it will be repaired or replaced at no charge.

Eclipse'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 **Eclipse**'s control.

This warranty applies to the original purchaser only. Please include a copy of the original invoice or a small service charge may be applied.

Direct all warranty and repair requests/inquiries to the **Eclipse** Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO **ECLIPSE**, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM **ECLIPSE**'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS).

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

10.2 Letter of conformity

Each instrument is shipped with a Letter of Conformity, to grant that the characteristics of the instrument correspond to the required ones and that the instrument calibration is traceable to the National and International Standards.

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