KIMO®

INSTRUMENTS

KIGAZ 210

Analyseur de combustion
Flue gas analyser

Logiciel LIGAZ-2
Operating software

Gaz Nat. Sahara/Fos

O_2 %	3.4	λ	1.19
CO ppm	0	ηs %	95.5
CO_2 %	9.8	ηt %	130.8
Ta °C	25.8	Qs %	4.5
Tf °C	120.5	$NOx(O_2)$ ppm	0

Enreg.	Imprim	Hold

KIGAZ 210

Notice d'utilisation / *User manual*

European Manufacturer
www.kimo.fr

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LIGAZ-2 SOFTWARE

1.1. Description of the gas analyser

The KIGAZ 210 is a flue gas analyser with **two interchangeable sensors (long-life O_2 and CO-H_2)**, with additional possibility of a 3rd sensor **(NO** or **CH$_4$)** or is a flue gas analyser with **three interchangeable sensors (long-life O_2, CO-H_2 and NO)** with additional possibility of a 4th sensor **(CH$_4$)**.

Its main features are the following:
- Auto-zero in the duct
- Protection of CO sensor by solenoid valve
- Led on handle for lightning of dark areas
- External water trap
- LCD screen: 120 x 160 pixels, 50 x 67 mm
- Integrated printer
- 2 thermocouple connections
- 2 Go of memory

The gas analyser is supplied in a transport case in ABS or metallic (optional) with a magnetic protective cover, a differential pressure kit, an interchangeable flue gas probe of 300 mm length with integrated draft and LED, a Li-ion battery and its charger, LIGAZ-2 software, an USB cable and a calibration certificate. A paper roll for the printer and a filter are also provided.

⚠️ **This analyser is designed to control parameters of flue gas in exhaust duct or heating units. It can not be used in a permanently way and/or used as an alarm system.**

1.1.1. Overview of the analyser

Handle —
LED button —
LED —
Fixing cone —
Differential pressure plug —
Flue gas probe —

Integrated printer

LCD screen

Keypad

External water trap

Single connector for flue gas probe (TcK+gas) and draft

1.1.2. Presentation of the keypad and screen

Measurements menu

Setting menu

Information menu

Customers menu

Procedures menu

Home screen

Function keys

OK button

ESC button

Directional arrows

ON/OFF button

1.1.3. Connection of the analyser

C1 connection for external probes
(Pt100 temperature, CH_4,...)

Flue gas probe connection

Light for battery
charging

USB
connection

Power supply

Gas outlet

T1 and T2
thermocouple
connections
Top view

P- pressure tap

P+ pressure tap

Bottom view

Right side view

1.2. Main features

- **Screen**

LCD screen, 120 x 160 pixels, 50 x 67 mm. It allows to display the measured parameters in a comfortable format for the user. With the zoom function, the measured values can be visualised in increased characters.
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- **Printer**

The printer has 10-year guarantee thermal paper. The printer has an easy replacement system of the paper (Easyload). In addition, printing is fast.

- **Batteries charger**

The instrument is supplied with a 6 V, 1.5 A power adapter to load the internal batteries. The current loading is indicated by a battery symbol on the top left of the screen. The red LED on the right side of the gas analyser stays on until the battery loading is completed. The battery charging time is 10 hours. The voltage of power supply is 100-240 VAC, 50/60 Hz. The number of cycles of the battery is about 500 charging cycles.

- **Flue gas suction pump**

The pump, inside the gas analyser, is a diaphragm pump with a motor. It is energized in direct current directly by the instrument in a way to get an optimal suction of flue gases.

- **Flue gas probe**

Probe in stainless steel with a handle in ABS and a standard length of 30 cm (other probes are available as option, see the technical datasheet of accessories for KIGAZ), with a fixing cone to maintain the contact tip in the duct. Interchangeable, its LED allows to light dark areas. It is connected to the instrument with a neoprene tube of 2.50 m.

- **Interchangeable measurements sensors**

The analyser uses electrochemical sensors to measure the oxygen and the carbon monoxide (compensated in H_2 hydrogen). The measurement sensors are interchangeable.

- **Temperature sensors**

Flue gas temperature is measured with a thermocouple integrated in the contact tip. The connection to the analyser is made thanks to a single male connector compensated in temperature. K thermocouple (nickel-nickel chromium) allows continuous measurements up to **1250 °C**.

The instrument has a NTC thermoresistance for the measurement of internal temperature; this sensor is also used for the measurement of ambient temperature.

If a temperature control of the combustive air must be performed directly by the supply duct (room sealed boiler), a Pt100 temperature probe (ref: SPA 150 SP) will be used. It is recommended to perform this measurement to make the efficiency calculation of the installation more accurately.

- **Pressure sensor**

The analyser has one internal piezoelectric sensor for the measurement of the differential pressure (Delta P) with manual autozero.

- **Supply input of flue gases and +/- pressure**

The analyser has a single connector allowing the connection of a flue gas probe.

- **Types of combustibles**

The analyser is supplied with a memorization of technical data which characterize the 15 most known combustibles. It is also possible to add 5 combustibles and their corresponding features.

- **Calibration certificate**

The analyser is calibrated by comparison with standard of metrology laboratories, which are periodically certified closed to laboratories known at the international level. Each analyser is supplied with its calibration certificate in which, for every parameters, are indicated the nominal value, the one measured, the admitted error limits and the found error.

- **Conformity and standards**

The analyser complies with n°2004/108/EC directive on electromagnetic compatibility. Document available on request. It also complies with 2006/95/EC Low Voltage, 2011/65/EU RoHS II and 2012/19/WEE directives.

Moreover, the analyser complies with EN 50379-1 and 50379-2 standards.

- **Water trap**

The water trap is placed on the tube that links the flue gas probe to the KIGAZ 210. The measured gases go through the filtering element allowing the recovery of condensates (liquid one or solid one).
The filtering element is placed 15 cm from the analyser and is divided into 2 parts:
one recovers the liquid particles.
the other contains a filter that stops the smallest particles in suspension and avoid them to reach the electro-chemical sensors

For a better measurement, the water trap must be in vertical position.
Empty and clean the mater trap after use.

Check that both ends are well clipped to ensure a good waterproofness

In case of water presence, do not forget to empty it after each use

Lower plug
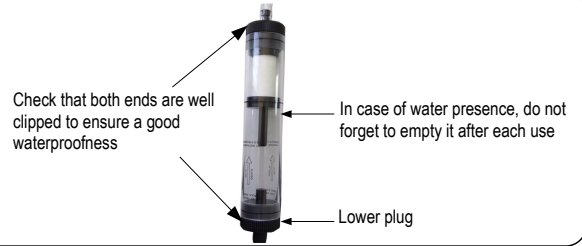
- **Auto-zero**

The analyser has the "auto-zero in the duct" function, it means that the operator can perform measurements (draft, temperature...) while the analyser inhales fresh air in the room. This function allows to save time on the inspection location.

- **Protection by solenoid valve**

The analyser is equipped with the CO protection function that allows to avoid high concentrations of CO that could damage the analyser and the sensors. The CO measurement is stopped when it exceeds 2000 ppm (default configuration of the threshold and adjustable by the operator). All the measurements stay possible unless the CO measurement.

- **Customers, boilers and inspections management**

The analyser allows to record customers, theirs respective boilers and inspections. Once the features of customers and boilers are completed in the analyser, the operator can easily assign the different measured values to a customer and his boiler.

- **Opacity index measurement (optional)**

It is possible to fill in the analyser with opacity index values measured according to the Bacharach scale. The analyser will calculate the average and results will be printed on the ticket. This measurement must be performed with an opacity pump which is available as an accessory (ref: PMO).

- **Gas flow**

It is possible to measure the gas flow of an installation, to compare it with a theoretical gas flow and as a result to estimate the installation consumption.

- **Gas network leak testing (optional)**

It is possible to check the tightness of an installation. For this control, use the pressure sensor used for the differential pressure measurement of the shaft (ref.: KEG).

- **Measured values**
  - **O_2:** percentage of oxygen in flue gases
  - **CO:** concentration of CO in flue gases
  - **NO:** concentration of NO in flue gases
  - **Tf:** flue gases temperature
  - **Ta:** combustive air temperature

- **Calculated values**
  - **λ: Air Excess :** connection between the volume of combustive air and the requested volume necessary for a combustion in stoichiometric conditions.
  - **CO_2:** percentage of carbon dioxide in flue gases.
  - **ΔT:** difference between the flue gases temperature and the combustive air temperature.
  - **NOx:** concentration of NOx in flue gases (calculated with the NO sensor, or measured with the NO and NO_2 sensors)
  - **Qs:** percentage of waste heat throughout the shaft.
  - **ηs: Lower efficiency (or sensible):** calculated burner efficiency. This is a ratio between the conventional heating power end the burner heating power. Among the combustion losses, only the sensible heat lost with the flue gases is taken into account, neglecting the radiation losses and incomplete combustion losses. This value is referred to LHV (Lower Heating Value) and can not be higher than 100%.

The sensible efficiency value is to be compared with the minimum efficiency stated for the heating systems performances.

- ηt: Higher efficiency (or total): is the sum of sensible efficiency and the additional efficiency deriving from the recovery of water vapour condensation contained in the flue gases. When it s greater than sensible efficiency, then condensation is taking place. It is referred to LHV (Lower Heating Value) and can exceed 100%. The LHV is calculated by an algorithm developed by Kimo and its value must be considered as indicative.

- CO (O$_2$): Concentration of CO in flue gases in mg/m^3. It is calculated according to O$_2$ reference value indicated in the analyser (see page 21).

- NO (O$_2$): Concentration of NO in flue gases in mg/m^3. It is calculated according to O$_2$ reference value indicated in the analyser (see page 21).

- NOx (O$_2$): Concentration of NOx in flue gases in mg/m^3. It is calculated according to O$_2$ reference value indicated in the analyser (see page 21).

1.3. Technical features

Parameter	Sensor	Measuring range	Resolution	Accuracy*	T_{90} response time
Long-life O₂	Electro-chemical	From 0 % to 21 %	0.1 % vol.	±0.2 % vol.	30 s
CO (with H₂ compensation)	Electro-chemical	From 0 to 8000 ppm	1 ppm	From 0 to 200 ppm: ±10 ppm From 201 to 2000 ppm: ±5% of measured value From 2001 to 8000 ppm: ±10% of measured value	30 s
NO	Electro-chemical	From 0 to 5000 ppm	1 ppm	From 0 to 100 ppm: ±5 ppm. From 101 to 5000 ppm: ±5% of measured value	30 s
Low range NO	Electrochemical	From 0 to 500 ppm	0.1 ppm	From 0 to 100 ppm: ±2 ppm From 101 to 500 ppm: ±2 % of the measured value	30 s
NOx	Calculated**	From 0 to 5155 ppm	1 ppm	-	-
CO2	Calculated**	From 0 to 99 % vol	0.1 % vol	-	-
CH₄	Semiconductor	From 0 to 10000 ppm From 0 to 1 % Vol From 0 to 20 % LEL	1 ppm 0.0001 % Vol 0.002 % LEL	±20 % of full scale	40 s
Flue gas temperature	K thermocouple	From -100 to +1250 °C	0.1 °C	±0.4 % of measured value or ±1.1 °C	45 s
Ambient temperature	Internal NTC	From -20 to +120 °C	0.1 °C	±0.5 °C	
Ambient temperature	Pt100 (1/3 DIN external probe)	From -50 to +250 °C	0.1 °C	±0.3 % of measured value ±0.25 °C	30 s
Dew point temperature	Calculated**	From 0 to +99 °Ctd	0.1 °C	-	-
DHW temperature	TcK (external probe)	From -200 to +1300 °C	0.1 °C	±0.4 % of measured value or ±1.1 °C	-
Differential pressure	Piezoelectric	From -20 000 to +20 000 Pa	1 Pa	From -20 000 to -751 Pa: ±0.5 % of measured value ±4.5 Pa From 750 to -61 Pa: ±0.9% of measured value ±1.5 Pa	-
Draft		From -10 to +10 Pa From -1000 to +1000 Pa	0.1 Pa 1 Pa	From -60 to 60 Pa: ±2 Pa From 61 to 750 Pa: ±0.9% of measured value ±1.5 Pa From 751 to 20 000 Pa: ±0.5% of measured value ±4.5 Pa	
Losses	Calculated**	From 0 to 100%	0.1%	-	-
Flue gas velocity	Calculated**	From 0 to 99.9 m/s	0.1 m/s	-	-
Excess air (λ)	Calculated**	From 1 to 9.99	0.01	-	-
Efficiency (ηs)	Calculated**	From 0 to 100 %	0.1 %	-	-
Efficiency (ηt) (condensation)	Calculated**	From 0 to 120 %	0.1 %	-	-
Opacity index	External instrument	From 0 to 9		-	-

*All accuracies indicated in this document were stated in laboratory conditions and can be guaranteed for measurements carried out in the same conditions, or carried out with required compensation.
** Calculation is made based on the measured values by the analyser.

2.1. Precautions for use

Please always use the device in accordance with its intended use and within parameters described in the technical features in order not to compromise the protection ensured by the device.

2.2. Symbols used

For your safety and in order to avoid any damage of the device, please follow the procedure described in this user manual and read carefully the notes preceded by the following symbol:

The following symbol will also be used in this user manual:
Please read carefully the information notes indicated after this symbol.

2.3. Safety instructions

**The following safety instructions have to be strictly observed.
Not respecting these safety instructions can lead to a loss of warranty.**

- **The analyser should not to be used in and under water.**

- **The analyser should not to be placed near or directly at open fire or heat.**

- **The indicated range of temperature of the probe is not to be exceeded, as the probe and temperature sensor could be destroyed.**

- **After measurements, before packing the analyser, wait for the probe to be cold. As long as it is hot, the probe could cause injuries.**

- **The exhalations of alcohol liquids (lubricants, petrol, spirit, vanish...) may damage the sensors of the analyser. Therefore, it is forbidden to preserve or use these fluids nearby the analyser.**

- **Load the battery only with Kimo charger. The charger must be used only for the power supply loading. Use another type of charger can damage the battery and the analyser and can cause electrical shocks.**

3.1. Prepare the instrument before the analysis

⚠️ **During the measurement, the analyser must be in vertical position or in horizontal position. Do not hold the analyser in inclined position.**

⚠️ **Before the 1st use of the analyser, a full charge of the battery must be made during 12 hours.**

⚠️ **Empty the water trap.**

⚠️ **In case of any default or damage of the instrument, Kimo After sales service shall be contacted. On the back of the analyser, there is a label with the analyser serial number. This number shall be communicated for every operation (technical operation or request of spare parts).**

3.2. Perform an analysis

➢ Connect the flue gas probe to the analyser.
➢ Turn on the instrument.
   Home screen is displayed with measurement menu highlighted.
➢ Insert the probe in the flue as show on the figure for at least 3 minutes.
➢ Press **OK**.
   The screen with the different possible measurements is displayed.
   Remaining time of auto-zero and its progress bar are displayed at the bottom of the screen.
   Measurements covered by the auto-zero are not available (Combustion, Max CO and ambient CO_2). At the end of the auto-zero, these menus are available.
   Take advantage of the auto-zero to perform the draft.
➢ Go to **"Flue gas"** with the up and down arrows.
➢ Press **OK**.
   The screen displays the different combustibles in the analyser.
➢ Select the type of used combustible by the boiler with the up and down arrows.
➢ Press **OK**.
   The screen displays values of the different parameters of the analysis. Perform measurement for at least 3 minutes.

Press the **"Hold"** function button to hold the measurement.

Inaccessible measurements during the auto-zero

Auto-zero
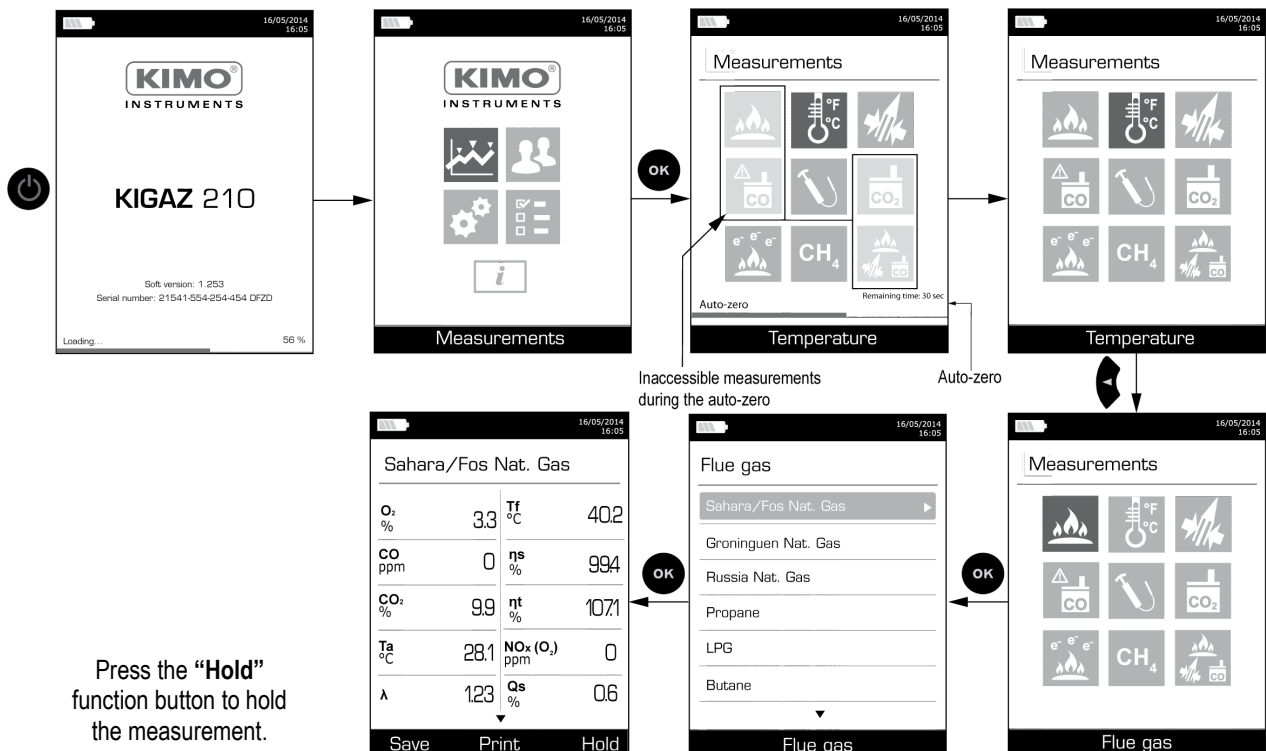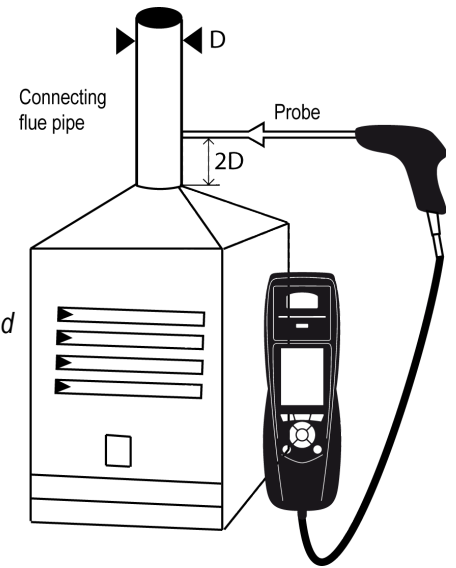
3.3. Zoom function

From the gas analysis screen, the zoom function is available using the direction arrows.

The initial screen displays 12 measured values.

➢ To zoom in, press the right arrow.
The screen displays 6 measured values.

➢ To zoom in again, press the right arrow.
The screen displays 3 measured values.

➢ To zoom in again, press the right arrow.
The screen displays one measured value.

➢ To zoom out, press the left arrow.

➢ At any time, press the down arrow to scroll the values.
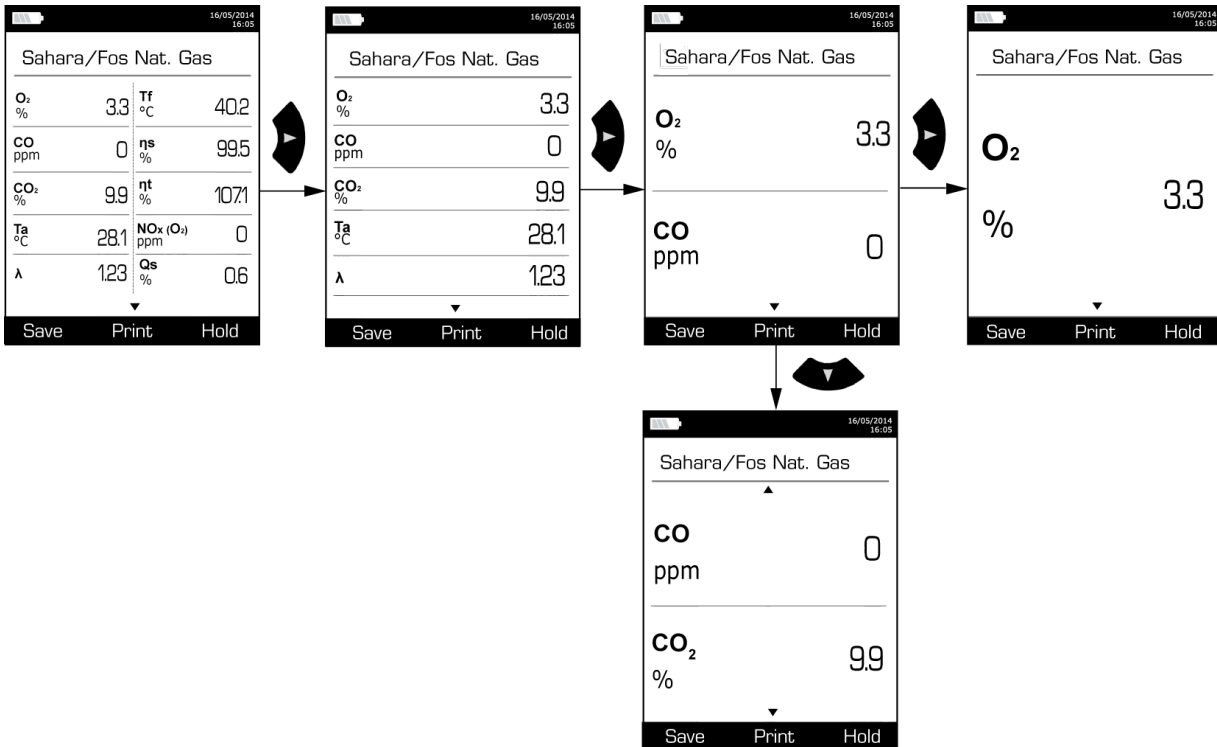
3.4. Assign the analysis to a customer

➢ At the end of the analysis, when measurements are constant, it is possible to assign it to a customer recorded in the analyser or to unrecorded customer that should be created.

➢ Press the **"Save"** function button.
The analyser displays the list of recorded customers.

➢ Select a customer with up and down arrows then press **OK** or create a customer (see page 23) then select it.
The analyser displays the list of available boilers.

➢ Select the boiler with up and down arrows then press **OK** or create a boiler (see page 24) then select it.
The analyser backs to the measurement screen of the analysis.

3.5. Add the measurement to a group

The groups allow to regroup measurements in folders. The group function has to be activated (see page 18).

Once the measurement is linked to a customer and a boiler, it is possible to add it in a group in the instrument, or create a group:

The analyser proposes to add the measurement to a group.

➢ Go to **YES** and press **OK**.

➢ Go to the required group with the arrows and press **OK**, or create a group (see page 25).
The analyser backs to the measurement screen.

3.6. Print the analysis results

It is possible to print the results on the ticket:

➢ Press the **"Print"** function button.
Results are printed on the ticket.

See page 17 for the printing configuration.

The quick measurement allows to perform in a few seconds:
- a flue gas measurement
- a draft measurement
- and an ambient CO measurement with Max CO.
- ➢ During the quick measurement, it is possible to print a ticket at each step by pressing the **"Print"** function button, or print the whole measurements when the analyser proposes it at the end of the quick measurement (screen 13).

Screen 1

Screen 2

Screen 3
Mesurements not accessible during the auto-zero

Screen 4

Screen 8*

Screen 7 Or "Purge" to perform a digital auto-zero

Screen 8

Screen 5

Screen 9

Screen 10

Screen 11 Or "Duration" to set the measurement duration

Screen 12

Screen 15
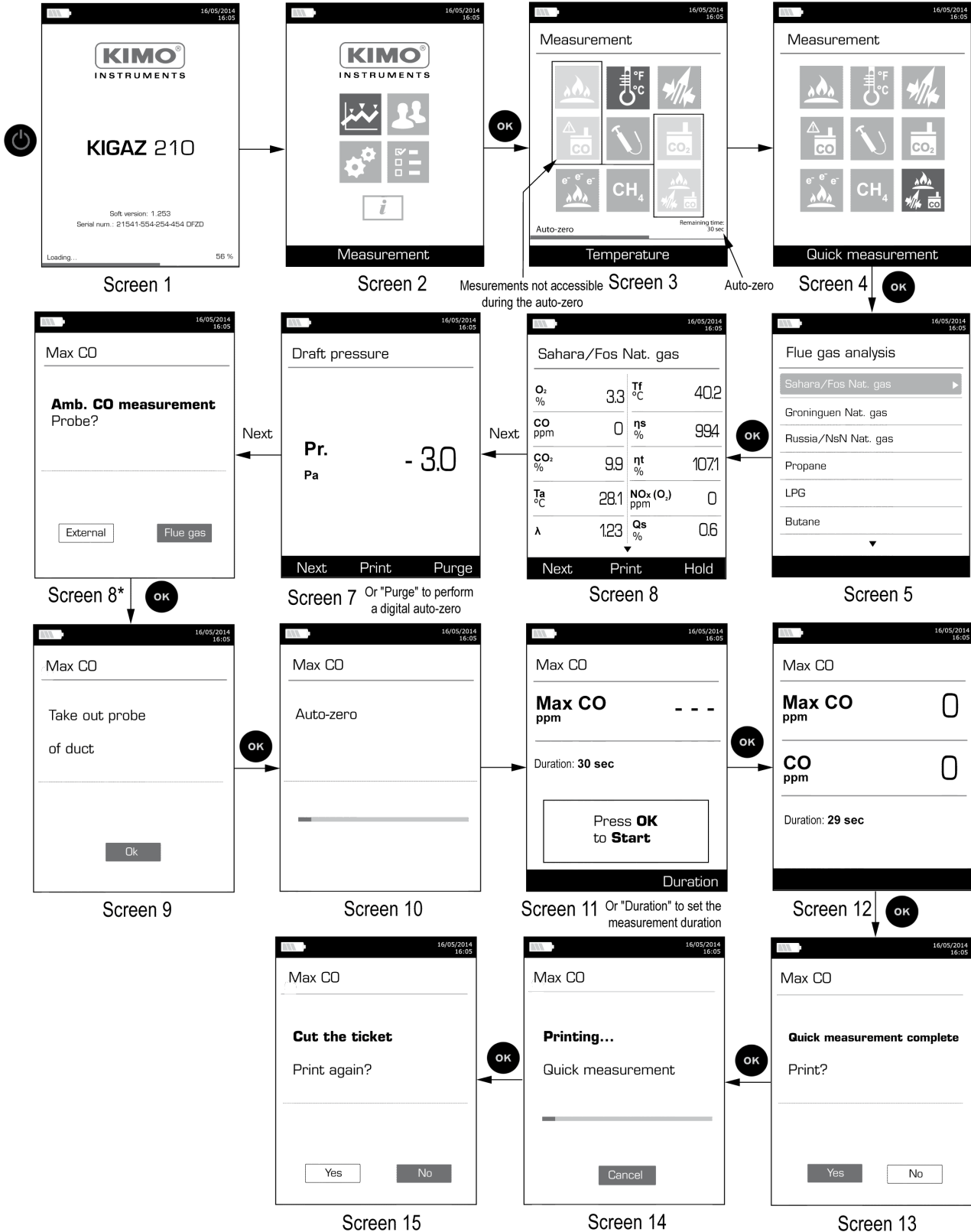
Screen 14

Screen 13

* If the CO SCOT probe is used, select "External" then follow the instructions on the analyser.

5. Set the different parameters of the analyser

The **"Setting"** menu allows to set the following parameters :
- Instrument (screen, printing, auto-off,...)
- Combustibles
- Measurement
- References (O_2, atmospheric pressure and altitude)
- Auto-zero/Purge
- Operators

The "Setting" part allows to set parameters that can affect the performed measurements. These settings must be made by a qualified technician.

5.1. Instrument setting

5.1.1. Screen setting

This part allows to set the backlight of the screen from 1 to 9.
- ➢ Turn on the instrument.
  Home screen is displayed with measurement menu highlighted.
- ➢ Go to **"Setting"** with the up and down arrows then press **OK**.
- ➢ Go to **"Instrument"** then press **OK**.
- ➢ Press **OK** on the **"Screen"** line.
- ➢ Go to **"Backlight"** then press **OK**.
- ➢ Use the up and down arrows to increase or decrease the value.
- ➢ Press **OK** to validate.

5.1.2. Set the auto-off

The auto-off allows to turn off the analyser automatically after some time of non-use.
It is possible to set the auto-off at 15 / 30 / 45 / 60 / 90 or 105 minutes or to deactivate it.
  "Setting > Instrument" screen is displayed.
- ➢ Go to **"Auto-off"** with the up and down arrows then press **OK**.
- ➢ Select the required time of auto-off or **"OFF"** to deactivate it with the up and down arrows.
- ➢ Press **OK** to validate.

5.1.3. Change the language

It is possible to select the language of the instrument: French or English in standard. A third language is downloadable through the LIGAZ-2 software.
  "Setting > Instrument" screen is displayed.
- ➢ Go to **"Language"** with the keypad then press **OK**.
- ➢ Select the language with the keypad.
- ➢ Press **OK**.

5.1.4. Modify date and time

  "Setting > Instrument" screen is displayed.
- ➢ Go to **"Date/time"** with the keypad then press **OK**.
- ➢ Go to the parameter to modify with the keypad (day, month, year, hour, minute or second).
- ➢ Press **OK**.
- ➢ Use the up and down arrows to modify the selected parameter.
- ➢ Press **OK**.
- ➢ Repeat the procedure on another parameter if required.
- ➢ Go to **"Date Format"** with the keypad then press **OK**.
- ➢ Select **« Day/Month »** to display the day then the month or **"Month/Day"** to display the month then the day then press **OK.**
- ➢ Go to **"Time Format"** with the keypad then press **OK**.
- ➢ Select the time format: **"12"** or **"24".**
  *If 12 is selected, **"AM"** for ante meridiem or **« PM »** for post meridiem will be displayed in front of the time.*
- ➢ Press the **"OK"** function key to quit the screen and save the modifications or press **Esc** to cancel.

5.1.5. Ticket printing setting

  "Setting > Instrument" screen is displayed.
- ➢ Go to **"Printing"** with the keypad then press **OK**.

- ➢ Go to **"Format"** with the keypad then press **OK**.
- ➢ Select the ticket format: long or short with the keypad then press **OK**.

Long ticket format: prints the headers, the user name, the type of device and its serial number, the customer and the selected boiler, the type of combustible, the inspection date and time and the measurements results.

Short ticket format: prints only the device reference, the type of combustible, the date and time and the measurement results.
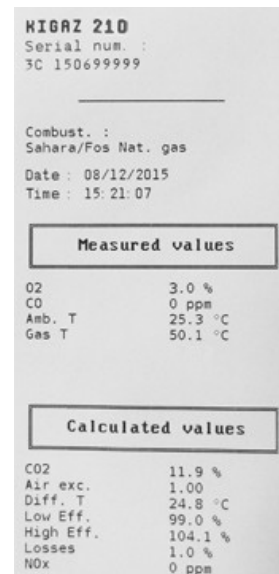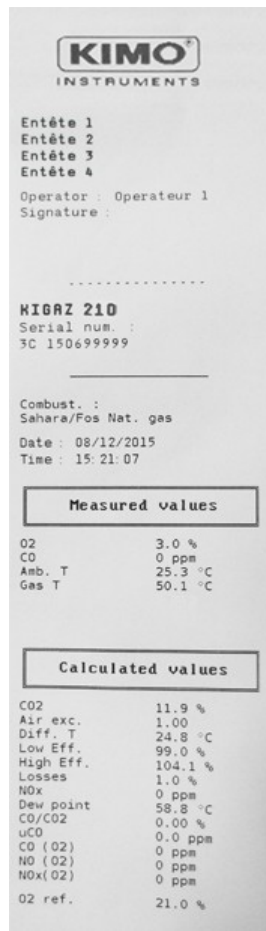
- ➢ Go to **"Logo"** then press **OK** to activate it: **ON** or deactivate it: **OFF**.
- ➢ Go to the first line of the **"Header"** then press **OK**.
  The keyboard appears at the bottom of the screen.
- ➢ Select the letters with the keypad then press **OK**.
- ➢ Press the **"OK"** function key to validate the line.
  The keyboard disappears.
- ➢ Press **Esc** to back to **"Setting instrument"** screen and validate modifications.
- • To go from lower-case keyboard to upper-case keyboard then to numeric keyboard: press the **"A a 1"** function key.
- • To erase a letter: press the **"Delete"** function key.

5.1.6. Activate or deactivate the visual support

The visual support corresponds to help windows displayed met during a measurement procedure.
  "Setting > Instrument" screen is displayed.
- ➢ Go to **"Support"** with the keypad.
- ➢ Go to **"Visual support"** line with the keypad.
- ➢ Press **OK** to activate it: **ON** or to deactivate it: **OFF**.

5.1.7. Activate the group function

Groups allow to gather measurements in a folder. To activate it:
  "Setting > Instrument" screen is displayed.
- ➢ Go to **"Group"** with the keypad.
- ➢ Press **OK** to activate it: **ON** or to deactivate it: **OFF**.

For the groups creation and management, see page 25.

Set the different parameters of the analyser

5.1.8. Select the alarm sound

"Setting > Instrument" screen is displayed.
- ➢ Go to **"Audio"** with the keypad then press **OK**.
- ➢ Press again **OK**
- ➢ Select with the keypad the Alarm 1 sound or the Alarm 2 sound then press **OK**.

5.1.9. Activate or deactivate Bluetooth® function (optional)

Bluetooth® allows to set and transfer data from a computer to the analyser or vice versa.

"Setting > Instrument" screen is displayed.
- ➢ Go to **"Bluetooth"** with the keypad.
- ➢ Press **OK** to activate it: **ON** or to deactivate it: **OFF**.

The ✱ *icon appears on the instrument screen when it is activated.*

When Bluetooth® is activated, Kigaz appears with the name **"Kigaz"** in the available devices list of the computer, tablet or smartphone.

5.2. Set the combustible

15 different combustibles are recorded in the analyser:

Sahara / Fos Natural gas	Cannel-coal
Groninguen – Natural gas	Low volatile coal
Russia – Natural gas	Coke gas
Propane	Biofuel 5%
LPG	Wood 20%
Butane	Hog fuel 21%
Light oil	Pellet 8%
Heavy fuel oil	

5.2.1. Modify a combustible

Each combustible has its own coefficient allowing to calculate losses and efficiencies in the most accurate way.

> **The modification of these coefficients will lead some modifications in combustion analysis results. Only a qualified technician is authorized to modify them.**
> **It is still possible to reset the factory parameters pressing the "Factory parameters" function key or with the LIGAZ-2 software (see page 55).**

"Setting" screen is displayed.
- ➢ Go to **"Combustibles"** with the arrows then press **OK**.
- ➢ Go to the required combustible with the up and down arrows then press **OK**.
- ➢ Go to the coefficient to modify with the up and down arrows then press **OK**.
  The keyboard is displayed.
- ➢ Select the numbers with the arrows and press **OK** to validate.
  The analyser backs to the combustibles list.
- • To go from lower-case keyboard to upper-case keyboard then to numeric keyboard: press the **"A a 1"** function key.
- • To erase a letter: press the **"Delete"** function key.

It is also possible to modify the name of a combustible and its type of energy (solid, liquid or gas):

"Setting > Combustibles" screen is displayed.
- ➢ Go to the combustible to modify with the up and down arrows then press **OK**.
- ➢ Press the **"Modify"** function button.
- ➢ Press **OK** on the **"Name"** line.
  The keyboard appears.
- ➢ Select the letters with the direction arrows and press **OK** to validate.
- ➢ Press the **"OK"** function key to validate the new combustible name.
- ➢ Press **OK** on the **"Energy"** line.
- ➢ Select the combustible energy type: solid, liquid or gas and press **OK.**
- ➢ Press the **"Save"** function key.
  The instrument backs to the combustible list with the modifications applied.

5.2.2. Add a combustible

Up to 5 combustibles can be added in the instrument's memory:

"Setting > Combustibles" screen is displayed.

➢ Press the **"Add"** function key.

"Add combustible" screen is displayed.

➢ Press **OK**.

The keyboard appears.

➢ Enter the name of the combustible with the keypad and press **OK**.

➢ Press the **"OK"** function key to validate the name of the new combustible.

➢ Go to **"Energy"** line with the keypad and press **OK**.

➢ Select **"Solid"**, **"Liquid"** or **"Gas"** with the keypad and press **OK**.

➢ Press the **"Save"** function key to save the new combustible.

Screen backs to the list of combustible. The new combustible in well on the list in last position.

Every coefficient of the new combustible is set at 0.

➢ Follow the procedure of modification of combustible coefficients described page 19.

5.2.3. Delete a combustible

"Setting > Combustibles" screen is displayed.

➢ Go to the combustible to delete with the keypad.

➢ Press the **"Delete"** function key.

5.3. Set the alarms, measurement units and CO protection

It is possible to activate an alarm for each measurement parameter. This alarm can be **rising** (the alarm of the instrument is activated when the measured value exceeds the defined threshold) or **falling** (the alarm of the instrument is activated when the measured value is below the defined threshold).

It is possible to set an alarm for the following parameters:

O_2, CO, Amb. CO, CH_4, CO_2, Qs (losses), λ (excess air), ηt (lower efficiency), ηs (higher efficiency), Tf (flue gas temperature), Ta (ambient temperature), Td (dew-point temperature), Pr. (pressure), ΔP (differential pressure), draft.

5.3.1. Set the alarms

"Setting" menu is displayed.

➢ Go to **"Measurement"** with the keypad then press **OK**.

➢ Press **OK** on **"Alarms"** line.

➢ Go to the parameter to modify with the keypad then press the **"Modify"** function key.

The edge (rising or falling) and the threshold of the selected parameter are displayed.

➢ Go to the **"Edge"** line with the keypad then press **OK**.

Select the type of alarm with the keypad:

- Rising edge: 🔔 ↑
- Falling edge: 🔔 ↓
- Deactivated alarm: 🔔 ✖

➢ Press **OK**.

➢ Go to the **"Threshold"** line then press **OK**

The keyboard appears.

➢ Enter the alarm threshold value with the keypad and press **OK** to validate.

➢ Validate the threshold with the **"OK"** function key.

➢ Validate the modifications with the **"Save"** function key.

➢ Press **Esc** to quit the screen.

5.3.2. Set the measurement units

It is also possible to select the measurement unit for each measured parameter:

- **Temperature:** °C, °F
- **Pressure:** Pa, inWg, hPa, mbar, mmHg, mmH_2O, PSI
- **CO / CO$_2$ / NO / NOx:** ppm, mg/m^3, mg/kWh, g/kWh, g/GJ, g/m^3, %
- **CH$_4$:** ppm, %vol, %LIE

"Setting" menu is displayed.

➢ Go to **"Measurement"** with the keypad then press **OK**.

➢ Go to **"Units"** with the keypad then press **OK**

➢ Go to the parameter to modify with the keypad then press **OK**.

The list of the available units according to the parameter appears.

➢ Go to the requested unit with the keypad then press **OK**.

➢ Press **Esc** to quit the screen.

5.3.3. Set the CO protection threshold

The CO protection allows to protect the instrument against high concentrations of CO. Above the protection threshold, the instrument will stop the CO dilution by pump stopping but the other measurements are still possible. To set this threshold:

"Setting" menu is displayed.
➢ Go to **"Measurement"** with the keypad then press **OK**.
➢ Go to **"CO protection"** with the keypad then press **OK.**
➢ Press the **"Modify"** function key to modify the threshold.
➢ Enter the requested threshold then press the **"OK"** function key to validate the threshold.
➢ Press **Esc** to quit the screen.

5.3.4. Set the display

"Setting" menu is displayed.
➢ Got to **"Measurement"** with the keypad then press **OK**.
➢ Go to **"Display"** with the keypad then press **OK**.
➢ Press the **"Viewable"** function key to activate or deactivate the measurement display.
➢ Press the **"OK"** function key to validate.

5.4. Set the references

The **"Setting > References"** screen allows to set the features of the measurement environment: O_2 reference, %NO_2 (for the Nox calculation), altitude and atmospheric pressure. These data are used to calculate the efficiency.

⚠️ **These setting must be performed by a qualified technician.**

"Setting" menu is displayed.
➢ Go to **"References"** with the keypad then press **OK**.
➢ Select the parameter to modify with the keypad then press **OK**.
The keyboard appears.
➢ Enter the parameter value with the keypad then press **OK** to validate.

5.5. Set the duration of auto-zero and purge time

The auto-zero allows the analyser to exhaust ambient fresh air and as a result to put the sensors at 0 ppm.
"Setting" screen is displayed.
➢ Go to **"AutoZ/Purge"** line with the keypad then press **OK**.
➢ Press **OK**.
The list of available duration appears.
➢ Go to the required duration then press **OK**.
➢ Press **Esc** to quit the screen.

5.6. Set the operators

It is possible to enter in the analyser names of operators who will use the instrument. The operator who performs an analysis appears on the ticket (only for the long size format).

5.6.1. Add an operator

"Setting" screen is displayed.
➢ Go to **"Operator"** with the keypad then press **OK**.
➢ Press the **"Add"** function key.
The keyboard appears.
➢ Enter the name with the keypad: press **OK** to validate.
➢ Press the **"OK"** function key to validate the operator name and to add it in the list.
The analyser backs to the list of present operators.
➢ Press **Esc** to quit the screen.

5.6.2. Modify the operator name

"Setting" screen is displayed.
➢ Go to **"Operator"** with the keypad then press **OK**.
➢ Press the **"Modify"** function key.
The keyboard appears.

- ➢ Modify the name with the keypad: press **OK** to validate.
- ➢ Press the **"OK"** function key to validate the operator name.
  The analyser backs to the list of current operators.
- ➢ Press **Esc** to quit the screen.

5.6.3. Delete an operator

"Setting" screen is displayed.
- ➢ Go to **"Operator"** with the keypad then press **OK**.
- ➢ Go to the operator to delete with the keypad.
- ➢ Press the **"Delete"** function key.
- ➢ Press **Esc** to quit the screen.

5.7. Back to factory setting of the analyser

It is possible to set the analyser with its factory setting.
> *"Setting > Instrument" screen is displayed.*
- ➢ Press the **"Factory setting"** function key.
  A message is displayed and asks to confirm the return to factory settings.
- ➢ Go to **"OK"** with the keypad then press **OK**.
- ➢ Press **Esc** or go to **"Cancel"** with the keypad then press **OK**.

5.7.1. Units and values of measurement settings of the factory setting

- • **Temperature:** °C
- • **Draft:** Pa
- • **Differential pressure:** mbar
- • **CO:** ppm
- • **CO_2:** %
- • **NO:** ppm
- • **NOx:** ppm
- • **CH_4:** ppm
- • **CO (O_2):** mg/m^3
- • **NO (O_2):** mg/m^3
- • **NOx (O_2):** mg/m^3

Alarm thresholds:
- • **O_2:** 3.0 %
- • **CO:** 100 ppm
- • **Amb. CO:** 10 ppm
- • **CH_4:** 1200 ppm
- • **Air excess (λ):** 1.10
- • **Flue gas temperature (Tf):** 250.0 °C

Reference:
- • **O_2:** 21.0 %
- • **Altitude:** 800 m
- • **Atmospheric pressure:** 1013.25 hPa

CO protection threshold: 2000 ppm
Auto-zero and purge duration: 1 minute

⚠ **Created operators and combustibles will be deleted. Created customers, boilers and inspections on boilers are not deleted after a return to factory setting.**

5.7.2. Device factory setting

Back-light: 7
Auto-off: 15 minutes
Language: French
Print: long ticket, logo display deactivated and empty headers
Visual help: ON (activated)
Alarm audio parameter: Alarm 1
Groups: OFF (deactivated)
Bluetooth (option): deactivated

6. Manage customers

It is possible to save names and addresses of different customers in the analyser. The performed measurements could be assigned to them. It is possible to create up to 250 customers.

6.1. Manage a customer

➢ Turn on the analyser.
➢ Go to **"Customers"** with the keypad then **OK**.
➢ Press the **"Add"** function key.
  "Add customer" screen is displayed.
➢ Press **OK** on **"Name"** line.
  The keyboard appears.
➢ Enter the customer name with the keypad and press **OK** to validate the letters.
➢ Press the **"OK"** function key.
  The analyser backs to "Add customer" screen.
➢ Go to the 1st line of the address with the keypad then press **OK**.
➢ Enter the 1st line of the customer's address with the keypad and press **OK** to validate letters.
➢ Press the **"OK"** function key.
  The analyser backs to "Add customer" screen.
➢ Go to the 2nd line of the address with the keypad then press **OK**.
➢ Enter the 2nd line of the customer's address with the keypad and press **OK** to validate letters.
➢ Press the **"OK"** function key.
  The analyser backs to "Add customer" screen.
➢ Continue for both following lines of the address if necessary.
➢ Go to **"Phone"** line with the keypad then press **OK**.
➢ Enter customer's telephone number with the keypad and press **OK** to validate the numbers.
➢ Press the **"Save"** function key.
  The analyser backs to "Customer List" screen with the created new customer.

When a customer has been created, it is possible to link to this customer one or several boilers.

6.2. Modify a customer

  "Customers" screen is displayed.
➢ Go to the customer to modify with the keypad then press **OK**.
➢ Press the **"Detail"** function key.
  Details of the customer are displayed.
➢ Press the **"Modify"** function key.
➢ Go to the line to modify with the keypad then press **OK**.
  The keyboard appears.
➢ Make the changes.
➢ Press the **"Save"** function key to validate.
  The analyser backs to "Customer detail" screen.
➢ Press the **"Save"** function key once all the changes have been made.

6.3. Delete a customer

  "Customer" screen is displayed.
➢ Go to the customer to delete with the keypad then press **OK**.
➢ Press the **"Delete"** function key.
  A message appears asking to confirm the deletion of the customer.
➢ Go to **YES** then press **OK** to confirm the deletion.
➢ Go to **NO** then press **OK** to cancel.

7. Manage boilers

A boiler is compulsorily linked to a customer, at least one customer must be created to create a boiler. See page 23 for the creation of a customer. It is possible to link up to 10 boilers per customer.

7.1. Create a boiler

The list of customers saved in the analyser is displayed.
- Go to the customer which will be linked to the boiler with the keypad then press **OK**.
- Press the **"Add"** function key.
- Press **OK** on **"Model"** line.
The keyboard appears.
- Enter the model of the boiler with the keypad then press **OK** to validate the letters.
- Press the **"OK"** function key to validate the model.
The analyser backs to "Add boilers" screen.
- Do the same for **"Brand", "Address", "Location"** and **"Air pulsed burner".**
- Press OK on **"Tightness"** line, select **"B Type" (untight)** or **"C Type" (tight)** then press **OK**.
- Press OK on **"Combust."** line, select the type of combustible for the boiler then press **OK**.
- Press OK to tick the **"Air pulser burner"** box if the boiler has one.
- Press the **"Save"** function key to save the boiler features.
The analyser backs to the list of boilers.

7.2. Modify a boiler

The list of boilers saved in the analyser is displayed.
- Go to the boiler to modify with the keypad then press **OK**.
- Press the **"Detail"** function key.
Details of the boiler are displayed.
- Press the **"Modify"** function key.
- Go to the line to modify with the keypad then press **OK**.
The keyboard appears.
- Make the modifications.
- Press the **"Save"** function key to validate.
The analyser backs to "Modify boiler" screen.
- Press the **"Save"** function key once all the changes have been made.

7.3. Delete a boiler

The list of boilers saved in the analyser is displayed.
- Go to the boiler to delete with the keypad then press **OK**.
- Press the **"Delete"** function key.
A message appears asking to confirm the deletion of the boiler.
- Go to **YES** then press **OK** to confirm the deletion.
- Go to **NO** then press **OK** to cancel.

8. Manage the inspections

Each saved inspection is linked to a customer. It is possible to see the details of an inspection, to add one or to delete one.
Available inspections in the analyser are the following: combustion, ambient temperature, flue gas temperature, internal temperature, Flow/Return temperature, dew-point temperature, draft pressure, differential pressure, flue gas velocity, Max CO, opacity, ambient CO_2, ionisation current, leak detection, gas network tightness and gas flow.
The maximum number of inspections is 10 per boilers.

8.1. Get to inspections

To find every inspections of a customer and details of this inspection, follow the specified procedure:
> *The list of customers saved in the analyser is displayed.*
> ➢ Go to the required customer then press **OK**.
> *Every boilers linked to this customer are displayed.*
> ➢ Go to the required boiler then press **OK**.
> *Every inspections linked to this customer and boiler are displayed.*
> ➢ Go to the required inspection then press **OK**.
> *Details of the inspection are displayed.*

8.2. Create an inspection

It is possible to create an inspection for specific customer that will be performed later.
> *The list of customer's inspections is displayed.*
> ➢ Press the **"Add"** function key to add an inspection.
> *A list of inspections is displayed.*
> ➢ Go to the required inspection then press **OK**.
> *The inspection is added with **"Not done"** mention.*

8.3. Delete an inspection

To delete an inspection of a customer.
> *The list of customer's inspections is displayed.*
> ➢ Press the **"Delete"** function key to delete an inspection.
> ➢ Go to **YES** then press **OK** to delete the inspection or go to **NO** then press **OK** to cancel.

8.4. Create a group

Groups allow to gather measurements in a folder. This function has to be activated (see page 18). To create a group:
> ➢ Once the measurement is finished, press the **"Save"** function key to save it.
> *The analyser displays the recorded customers list.*
> ➢ Select a customer with the keypad and press **OK** or create customer (see page 23) and select it.
> *The analyser displays the available boilers list.*
> ➢ Select a boiler with the keypad and press **OK** or create a boiler (see page 24) and select it.
> *The analyser confirms the recording is done.*
> ➢ Press **OK**.
> *The analyser proposes to add the measurement to a group.*
> ➢ Choose **YES** to create a group: press the **"Add"** function key.
> ➢ Press **OK** to name the group.
> *The keyboard appears.*
> ➢ Use the direction arrows to select letters and press **OK** to validate them.
> ➢ Press the **"OK"** function key to validate the name.
> ➢ Press the **"Save"** function key to save the group.
> ➢ Press **OK** to save the measurement in this group.
> *The instrument backs to the measurement screen.*

The created group appears in the inspections list:
> ➢ Go to the **"Customer"** menu with the keypad and press **OK**.
> *The analyser displays the list of recorded customers on the instrument.*
> ➢ Go to the required customer with the arrows and press **OK**.
> *The analyser displays all the boilers linked to this customer.*
> ➢ Go to the required boiler with the arrows and press **OK**.
> *The analyser displays all the inspections linked to this customer and boiler and the created groups.*

> Go to the required group folder and press **OK**.
The analyser displays the inspection list recorded in this group.
> Go to the required inspection and press **OK**.
The analyser displays the inspections details.

8.5. Add an inspection to a group

The group function has to be activated (see page 18). If an inspection or a measurement is not added to a group during the recording, it is possible to add it later:
> Go to the required inspection or measurement with the arrows.
> Press **OK** to display the details.
> Press the **"Add"** function key to add it to a group.
> Select the group to add the measurement or inspection with the arrows, or create a new group (see page 25).
> Press **OK** to validate.
The measurement is saved in the group.

8.6. Delete a group

To delete a group:
> Go to the **"Customer"** menu with the keypad and press **OK**.
The analyser displays the list of recorded customers on the instrument.
> Go to the required customer with the arrows and press **OK**.
The analyser displays all the boilers linked to this customer.
> Go to the required boiler with the arrows and press **OK**.
The analyser displays all the inspections linked to this customer and boiler and the created groups.
> Go to the required group folder and press the **"Delete"** function key.
A confirmation message is displayed.
> To confirm the deletion: go to **YES** and press **OK**. To cancel: go to **NO** and press **OK,** or press **Esc** key.

9. Perform measurement of a customised procedure

Customised procedures, created by the LOGAZ-2 software (optional software), when they are transferred in the analyser can be performed.

9.1. Preliminary operations to procedures

Before performing the measurements, names of the different customers and theirs respective boilers must be saved in the analyser. See page 23 to create customers and page 24 to create boilers or the LOGAZ-2 software user manual (optional software).

9.2. Launch a customised procedure

> Turn on the analyser.
> Go to **"Procedures"** with the keypad then press **OK**.
> Select the customer then the boiler in which measurements will be performed.
> Go to **"Customised"** with the keypad then press **OK**.
The list of procedures saved in the analyser is displayed.
> Select the procedure with the keypad then press **OK**.
The analyser displays the 1st step of the customised procedure.
> Go to **"Start"** with the keypad then press **OK**.
The analyser performs the measurement.
> Press **OK** on **"Next"** if the customised procedure has several step.
The analyser launches the next step.
OR
> Press **OK** on **"Quit"** if the customised procedure has only one step.

The analyser backs to the list of customised procedures. At the end of the procedure, the analyser saves it and automatically links it to the customer and boiler selected before launching the measurement. It is possible to get to details of this procedure in the **"Customer"** menu.

10. Perform a control of gas flow

10.1. Perform a measurement of theoretical flow

➢ Turn on the analyser. Go to **"Procedures"** menu with the keypad then press **OK**.
The analyser asks to select a customer: go to "OK" then press OK.
The list of customers is displayed.
➢ Select the customer then press **OK**.
The list of boilers is displayed.
➢ Select the boiler then press **OK**.
"Procedure" screen is displayed.
➢ Go to **"Gas flow"** with keypad then press **OK**.
A message indicating "Step 1: Theoretical flow" is displayed.
➢ Go to **"Next"** then press **OK.**
"Theoretical flow" is displayed.
➢ Specify the power capacity of the boiler in kW (data on the information plate of the boiler): go to each number, press **OK**, press the up and down arrows to **increment** or **decrement** the number then press **OK** to validate.
➢ Make the same operation to select the standard: **NF** or **CE**.
➢ Make the same operation to select the gas type: **GAS H**, **GAS B**, **BUTANE** or **PROPANE**.
➢ Press the **"OK"** function key to validate.
A message indicating "Step 2: Real flow" is displayed.

The theoretical flow is calculated according to a power capacity in kW of the boiler, the standard of the boiler (CE or NF standard), the gas type (Gas H, Gas B, butane or propane) and according to a coefficient. Table below allows to calculate this flow according to the power capacity:

Standard	GAS H (19-21 mbar)	GAS B (25 mbar)	Butane	Propane
NF	Pu/KW x 2.166	Pu/KW x 2.519	Pu/KW x 0.651	Pu/KW x 0.843
CE	Pu/KW x 1.927	Pu/KW x 2.241	Pu/KW x 0.579	Pu/KW x 0.750

10.2. Perform a measurement of real flow

The measurement of the theoretical flow must be performed previously
A message indicating "Step 2: Real flow" is displayed.
➢ Go to **"Next"** then press **OK**.
"Start index (L)" is displayed.
➢ Specify the start flow indicated on the gas meter: go to each number, press **OK**, press the up and down arrows to **increment** or **decrement** the number then press **OK** to validate.
➢ Press the **"OK"** function key to validate.
A message indicating "Step 2: Wait: 2 min." and a progress bar are displayed.
➢ Wait for 2 minutes. It is possible to cancel this measurement: press **OK**.
➢ Go to **"Next"** then press **OK** at the end of the 2 minutes.
"End index (L)" screen is displayed.
➢ Specify the end flow indicated on the gas meter: go to each number, press **OK**, press the up and down arrows to **increment** or **decrement** the number then press **OK** to validate.
➢ Press the **"OK"** function key to validate.
A message displays the flow measurement result.

When the measurement is finished:
➢ Press **OK**.
The analyser asks to save the measurement result then to print the measurement result.
➢ Go to **YES** or **NO** then press **OK**.

Read a gas meter :

Totaliser in m³   Totaliser in litres

10.3. Results interpretation

The analyser displays the flow result by the following:
• **OK:** lower or equal to 10%
• **A1:** between 10.1 and 20%
• **A2:** greater than 20%
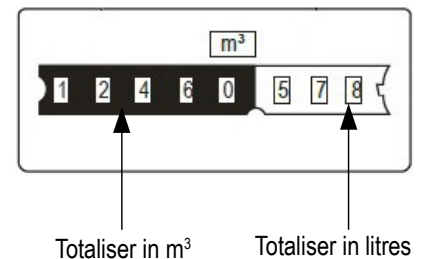
11. Perform a gas network leak test

To perform this test, it is necessary to have a gas network leak testing kit. This kit is available as option (ref: KEG).

11.1. Perform the test

➢ Connect the different items of the kit on the network to test (see user manual of the KEG).
➢ Turn on the analyser.
➢ Go to **"Procedures"** menu with the up and down arrows then press **OK**.
   The analyser asks to select a customer and a boiler: go to "OK" then press OK.
   The list of customers is displayed.
➢ Select the customer then press **OK**.
   The list of boilers is displayed.
➢ Select the boiler then press **OK**.
   "Procedures" screen is displayed.
➢ Go to **"Network tightness"** with the keypad then press **OK**.
   A message indicating "Plug silicone tube on P+" is displayed.
➢ Plug the silicone tube on P+ pressure tap then press **OK**.
   A message indicating "Pressurise to 50 mbar" is displayed.
➢ Pressurise the network to 50 mbar then press **OK**.
   A message indicating "Please wait 10 minutes" and a progress bar are displayed.
   At the end of the 10 minutes, results are displayed:
   • start pressure
   • end pressure
   • possible loss of pressure

11.2. Link the measurement to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.
➢ Press the **"Save"** function button.
   The analyser displays the list of recorded customers.
➢ Select a customer with up and down arrows then press **OK** or create a customer (see page 23) then select it.
   The analyser displays the list of available boilers.
➢ Select the boiler with up and down arrows then press **OK** or create a boiler (see page 24) then select it.
   The analyser backs to the measurement screen.

11.3. Print the results

It is possible to print the results on the ticket:
➢ Press the **"Print"** function button.
   *Results are printed on the ticket.*
See page 17 for the printing configuration.

12. Perform a pressure measurement

The draft measurement allows to check if the flue of the boiler correctly clears flue gas caused by the combustion.

12.1. Perform the measurement

➢ Connect the flue gas probe on the analyser.
➢ Turn on the analyser.
➢ Go to the **"Measurement"** menu with the keypad then press **OK**.
The analyser performs the gas autozero: remaining time and a progress bar display on the screen.
➢ Go to **"Pressure"** with the keypad then press **OK.**
➢ Go to **"Draught pressure"** with the keypad then press **OK.**
Measurement launches and the analyser displays the draft.

Measurement process of the draft in nozzle output

D

Connecting flue pipe

Probe

2D

Measurement process of the draft in nozzle output
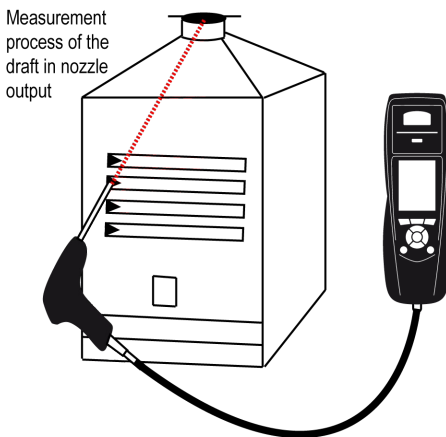
Put the probe of the KIGAZ 210 in the draft hood, going through the front face of the boiler
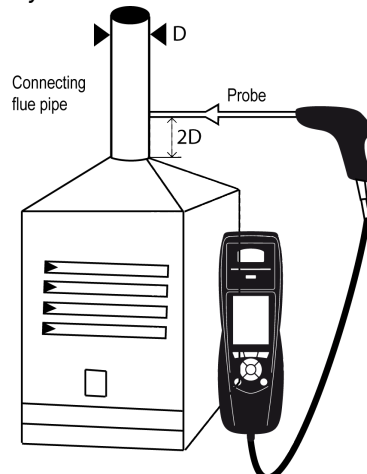
Put the probe of the KIGAZ 210 in the nozzle output, from the beginning of the connecting flue
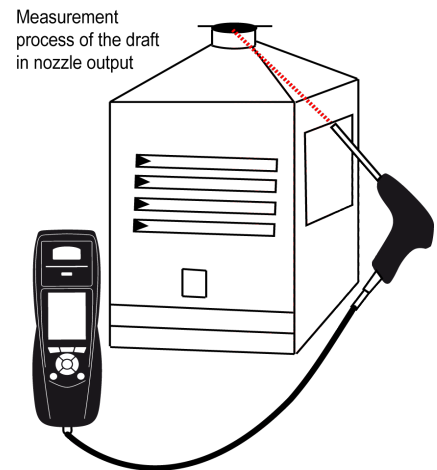
Put the probe of the KIGAZ 210 in the draft hood, going through the side openings of the boiler

12.2. Perform a differential pressure measurement

➢ Connect the flue gas probe on the analyser.
➢ Turn on the analyser
➢ Go to the **"Measurement"** menu with the keypad then press **OK**.
The analyser performs the gas auto-zero: remaining time and a progress bar display on the screen. The pressure measurement remains possible.
➢ Go to **"Pressure"** with the keypad then press **OK**.
➢ Go to **"Diff. Press."** with the keypad then press **OK**.
➢ Press **"Auto-zero"**.
Measurement launches and the analyser displays the differential pressure.

12.3. Perform a flue gas velocity measurement

➢ Connect the flue gas probe on the analyser.
➢ Turn on the analyser.
➢ Go to the **"Measurement"** menu with the keypad then press **OK**.
The analyser performs the autozero: remaining time and a progress bar display on the screen.
➢ Go to **"Pressure"** with the keypad then press **OK**.
➢ Go to **"Flue gas velocity"** with the keypad then press **OK**.
The measurement launches and the analyser displays the differential pressure.

12.4. Link the measurement to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.
➢ Press the **"Save"** function button.
The analyser displays the list of recorded customers.
➢ Select a customer with up and down arrows then press **OK** or create a customer (see page 23) then select it.
The analyser displays the list of available boilers.
➢ Select the boiler with up and down arrows then press **OK** or create a boiler (see page 24) then select it.
The analyser backs to the measurement screen.

12.5. Add the measurement to a group

The group function has to be activated (see page 18).
Once the measurement is linked to a customer and a boiler, it is possible to add it in a group in the instrument, or create a group:
> *The analyser proposes to add the measurement to a group.*
> ➢ Go to **YES** and press **OK**.
> ➢ Go to the required group with the arrows and press **OK**, or create a group (see page 25).
> *The analyser backs to the measurement screen.*

12.6. Print the results

It is possible to print the results on the ticket:
> ➢ Press the **"Print"** function button.
> *Results are printed on the ticket.*
See page 17 for the printing configuration.

13. Perform a measurement of ambient CO_2

13.1. Perform the measurement

> ➢ Connect a CO_2 probe (available as option) on C1 connection on the top of the analyser.
> ➢ Turn on the analyser.
> ➢ Go to the **"Measurement"** menu with the keypad then press **OK**.
> *The analyser performs the auto-zero: remaining time and a progress bar display on the screen.*
> ➢ Go to **"Ambient CO_2"** with the keypad then press **OK**.
> *Measurement launches and the analyser displays the level of ambient CO_2.*

13.2. Link the measurement to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.
> ➢ Press the **"Save"** function button.
> *The analyser displays the list of recorded customers.*
> ➢ Select a customer with up and down arrows then press **OK** or create a customer (see page 23) then select it.
> *The analyser displays the list of available boilers.*
> ➢ Select the boiler with up and down arrows then press **OK** or create a boiler (see page 24) then select it.
> *The analyser backs to the measurement screen.*

13.3. Add the measurement to a group

The group function has to be activated (see page 18).
Once the measurement is linked to a customer and a boiler, it is possible to add it in a group in the instrument, or create a group:
> *The analyser proposes to add the measurement to a group.*
> ➢ Go to **YES** and press **OK**.
> ➢ Go to the required group with the arrows and press **OK**, or create a group (see page 25).
> *The analyser backs to the measurement screen.*

13.4. Print the results

It is possible to print the results on the ticket:
> ➢ Press the **"Print"** function button.
> *Results are printed on the ticket.*
See page 17 for the printing configuration.

14. Perform a measurement of Max CO

14.1. Perform the measurement

➢ Connect a CO probe (available as option) on C1 connection on the top of the analyser or connect the flue gas probe on the single connector on the bottom of the analyser.
➢ Turn on the analyser.
➢ Go to the **"Measurement"** menu with the keypad then press **OK**.
The analyser performs the autozero: remaining time and a progress bar display on the screen.
➢ Go to **"Max CO"** with the keypad then press **OK**.
➢ Press **OK** to launch the measurement.
The measurement is launched, the instrument displays the level of CO and the level of Max CO.
When the measurement duration is finished, the analyser displays the value of CO maximum during the measurement.
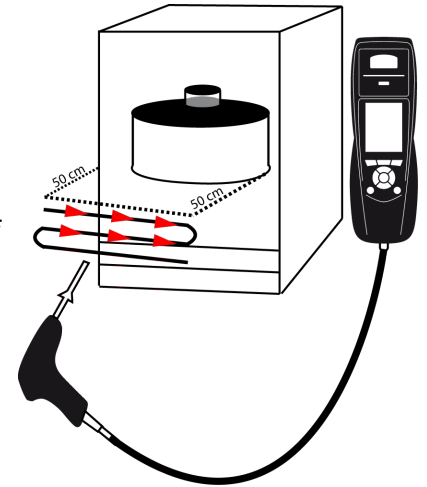
The default measurement duration is **30 s**. It is possible to change this duration before starting the measurement:
➢ On **"Max CO"** screen, before pressing OK to start the measurement, press the **"Duration"** function key.
"Duration" screen is displayed.
➢ Press **OK**.
➢ Use the keypad to select the required measurement duration: **30 / 40 / 50 s** or **1 / 2 / 3 / 4 / 5 minutes.**
➢ Press **OK** to validate the measurement duration.
➢ Press **Esc** to back to the screen of measurement start of Max CO.

14.2. Link the measurement to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.
➢ Press the **"Save"** function button.
The analyser displays the list of recorded customers.
➢ Select a customer with up and down arrows then press **OK** or create a customer (see page 23) then select it.
The analyser displays the list of available boilers.
➢ Select the boiler with up and down arrows then press **OK** or create a boiler (see page 24) then select it.
The analyser backs to the measurement screen.

14.3. Add the measurement to a group

The group function has to be activated (see page 18).
Once the measurement is linked to a customer and a boiler, it is possible to add it in a group in the instrument, or create a group:
The analyser proposes to add the measurement to a group.
➢ Go to **YES** and press **OK**.
➢ Go to the required group with the arrows and press **OK**, or create a group (see page 25).
The analyser backs to the measurement screen.

14.4. Print the results

It is possible to print the results on the ticket:
➢ Press the **"Print"** function button.
Results are printed on the ticket.
See page 17 for the printing configuration.

15. Perform some temperature measurements

15.1. Perform a measurement of ambient temperature

➢ Connect a Pt100 temperature probe (available as option) on C1 connection on the top of the analyser.
➢ Turn on the instrument
  Home screen is displayed with measurement menu highlighted.
➢ Press **OK**.
  The analyser performs the auto-zero: remaining time and a progress bar display on the screen. However it is possible to reach the temperature menu during the auto-zero.
➢ Go to **"Ambient Temp."** with the keypad then press **OK**.
  The temperature detected by the Pt100 probe is displayed on the analyser.

15.2. Perform a measurement of flue gas temperature

➢ Connect the flue gas probe on the analyser.
➢ Turn on the analyser.
  Home screen is displayed with measurement menu highlighted.
➢ Press **OK**.
  The analyser performs the gas auto-zero: remaining time and a progress bar display on the screen. However it is possible to reach the temperature menu during the auto-zero.
➢ Go to **"Flue gas Temp."** with the keypad then press **OK**.
  The screen displays the flue gas temperature detected by the thermocouple probe of the flue gas probe.

15.3. Perform an ambient temperature measurement with the internal sensor

➢ Turn on the instrument
  Home screen is displayed with measurement menu highlighted.
➢ Press **OK**.
  The analyser performs the auto-zero: remaining time and a progress bar display on the screen. However it is possible to reach the temperature menu during the auto-zero.
➢ Go to **"Internal Temp."** with the keypad then press **OK**.
  The screen displays the NTC temperature detected by the analyser.

15.4. Perform a Flow/Return temperature measurement

➢ Connect 2 thermocouples Velcro type (ref. : SKV 150) or lamella contact (ref. : SKCT) probes on the Kigaz.
➢ Turn on the instrument.
  Home screen is displayed with measurement menu highlighted.
➢ Press **OK.**
  The analyser performs the auto-zero: remaining time and a progress bar display on the screen. However it is possible to reach the temperature menu during the auto-zero.
➢ Go to **"Flow/Return Temp."** with the keypad then press **OK**.
  The screen displays the T1 temperature and the T2 temperature and the delta of temperature (ΔT) detected by the analyser.

15.5. Link the measurement to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.

➢ Press the **"Save"** function button.
  The analyser displays the list of recorded customers.
➢ Select a customer with up and down arrows then press **OK** or create a customer (see page 23) then select it.
  The analyser displays the list of available boilers.
➢ Select the boiler with up and down arrows then press **OK** or create a boiler (see page 24) then select it.
  The analyser backs to the measurement screen.

15.6. Add the measurement to a group

The group function has to be activated (see page 18).
Once the measurement is linked to a customer and a boiler, it is possible to add it in a group in the instrument, or create a group:
  The analyser proposes to add the measurement to a group.
➢ Go to **YES** and press **OK**.
➢ Go to the required group with the arrows and press **OK**, or create a group (see page 25).

The analyser backs to the measurement screen.

15.7. Print the results

It is possible to print the results on the ticket:
> Press the **"Print"** function button.
> *Results are printed on the ticket.*

See page 17 for the printing configuration.

16. Perform a measurement of opacity

It is possible to enter in the analyser from 1 to 3 opacity indexes performed thanks to opacity pump available as option.
The opacity index consists of the measurement of solid waste of combustion in the flue with a pump and a filter of measurement. The filter coloration is compared with a table reference composed by 10 greyed areas numbered from 0 to 9.

16.1. Perform the measurement

⚠️ **Preliminary operation:**
To avoid the condensation in the pump, it is necessary to breathe in WITHOUT FILTER fresh air before performing a measurement.

- ➢ Put the paper filter in the pump.
- ➢ Pump out flue gas in the middle of the flue.
  The necessary gas volume for a measurement of opacity corresponds to about 10 pump aspirations.
- ➢ Compare the filter clogging to the reference table to determine the opacity index.
- ➢ Make the same operation several times if necessary, replace the filter each time.

16.2. Enter the indexes in the analyser

When the measurement of opacity has been performed, enter the opacity indexes in the analyser:
- ➢ Turn on the analyser.
  The analyser performs the auto-zero: remaining time and a progress bar display on the screen. However it is possible to reach the Bacharach index menu during the auto-zero.
- ➢ Press **OK**.
- ➢ Go to **"Bacharach index"** with the keypad.
- ➢ Press **OK**.
- ➢ Press **OK** on **"Index 1"** line.
- ➢ Increment the index from 0 to 9 with the keypad.
- ➢ Press **OK**.
- ➢ Repeat the procedure for 2 and 3 indexes.
  *The analyser indicates the opacity indexes average on **"Average"** line at the bottom of the screen.*

16.3. Link the measurement to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.
- ➢ Press the **"Save"** function button.
  The analyser displays the list of recorded customers.
- ➢ Select a customer with up and down arrows then press **OK** or create a customer (see page 23) then select it.
  The analyser displays the list of available boilers.
- ➢ Select the boiler with up and down arrows then press **OK** or create a boiler (see page 24) then select it.
  The analyser backs to the measurement screen.

16.4. Add the measurement to a group

The group function has to be activated (see page 18).
Once the measurement is linked to a customer and a boiler, it is possible to add it in a group in the instrument, or create a group:
  The analyser proposes to add the measurement to a group.
- ➢ Go to **YES** and press **OK**.
- ➢ Go to the required group with the arrows and press **OK**, or create a group (see page 25).
  The analyser backs to the measurement screen.

16.5. Print the results

It is possible to print the results on the ticket:
- ➢ Press the **"Print"** function button.
  Results are printed on the ticket.
See page 17 for the printing configuration.

17. Perform a measurement of ionisation current

The measurement of ionisation current allows to check the presence of the flame. In standard operation, the ionisation probe produces a currant of a few µA or a few dozen of µA. In case of lack of flame, this current is not present anymore (measurement: 0 µA), the safety equipments of the boiler cut off the power supply.

17.1. Perform the measurement

➢ Connect an ionisation current probe on C1 connection of the analyser.
➢ Turn on the analyser.
   Home screen is displayed with measurement menu highlighted.
➢ Press **OK**.
   The analyser performs the autozero: remaining time and a progress bar display on the screen. However it is possible to reach the ionisation current menu during the autozero.
➢ Go to **"Ionisation current"** with the keypad then press **OK**.
➢ Connect the ends of the probe on the boiler.
   The measured ionisation current is displayed on the analyser. This value must be equal to several dozen of µA.

17.2. Link the measurement to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.

➢ Press the **"Save"** function button.
   The analyser displays the list of recorded customers.
➢ Select a customer with up and down arrows then press **OK** or create a customer (see page 23) then select it.
   The analyser displays the list of available boilers.
➢ Select the boiler with up and down arrows then press **OK** or create a boiler (see page 24) then select it.
   The analyser backs to the measurement screen.

17.3. Add the measurement to a group

The group function has to be activated (see page 18).
Once the measurement is linked to a customer and a boiler, it is possible to add it in a group in the instrument, or create a group:
   The analyser proposes to add the measurement to a group.
➢ Go to **YES** and press **OK**.
➢ Go to the required group with the arrows and press **OK**, or create a group (see page 25).
   The analyser backs to the measurement screen.

17.4. Print the results

It is possible to print the results on the ticket:
➢ Press the **"Print"** function button.
   Results are printed on the ticket.
See page 17 for the printing configuration.

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18. Perform a CH₄ measurement CH_4

There are two possibilities to perform a CH₄ measurement:
- With an internal sensor (optional)
- With a SDFG external probe (optional).

18.1. Perform the measurement with the probe

➢ Connect a CH₄ probe on C1 connection on the bottom of the analyser.
➢ Turn on the analyser.
➢ Go to the **"Measurement"** menu with the keypad then press **OK**.
  The analyser performs the auto-zero: remaining time and a progress bar display on the screen. However it is possible to reach the gas leak detection menu during the auto-zero.
➢ Go to **"Gas leak detection"** with the keypad then press **OK**.
➢ Press **OK** to launch the measurement.
  If the probe is connected for more than 1 minute, the measurement screen appears and indicates the concentration and places it on a bargraph.
  If the probe has just been connected, the screen indicates the remaining time of warming.
  The measurement begins, the analyser displays the CH₄ level.

18.2. Perform the measurement with the sensor

➢ Turn on the analyser.
➢ Go to the **"Measurement"** menu with the keypad then press **OK**.
  The analyser performs the auto-zero: remaining time and a progress bar display on the screen.
➢ Go to **"Flue gas"** with the keypad then press **OK**.
The measurement begins, the analyser displays the CH₄ level.

18.3. Link the measurement to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.
➢ Press the **"Save"** function button.
  The analyser displays the list of recorded customers.
➢ Select a customer with up and down arrows then press **OK** or create a customer (see page 23) then select it.
  The analyser displays the list of available boilers.
➢ Select the boiler with up and down arrows then press **OK** or create a boiler (see page 24) then select it.
  The analyser backs to the measurement screen.

18.4. Add the measurement to a group

The group function has to be activated (see page 18).
Once the measurement is linked to a customer and a boiler, it is possible to add it in a group in the instrument, or create a group:
  The analyser proposes to add the measurement to a group.
➢ Go to **YES** and press **OK**.
➢ Go to the required group with the arrows and press **OK**, or create a group (see page 25).
  The analyser backs to the measurement screen.

18.5. Print the results

It is possible to print the results on the ticket:
➢ Press the **"Print"** function button.
  Results are printed on the ticket.
See page 17 for the printing configuration.

19. Perform a flue gas velocity measurement with a Pitot tube

⚠ **The used Pitot tube must be a Pitot tube type L with K thermocouple connection.**
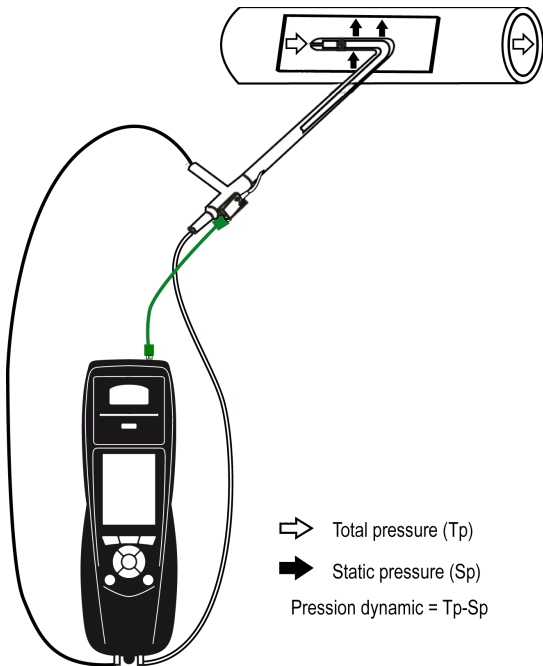
The Pitot tube must be introduced perpendicularly, in the middle into the duct and parallel to the flow.

The head (ending with an ellipsoidal nose) must be maintained parallel and facing the flow.

The total pressure (+) caught by the nose, is connected to the P+ at the bottom of the analyser.

The static pressure (-) caught by the holes of the head, is connected to the P- at the bottom of the analyser.

The connection cable of the thermocouple K probe is connected to the T1 K thermocouple inlet of the top of the analyser.

⇨ Total pressure (Tp)

➡ Static pressure (Sp)

Pression dynamic = Tp-Sp

⚠ **If the K thermocouple cable is not connected, no value is displayed.**

When the connections are made:
- ➢ Turn on the analyser.
- ➢ Go to **"Measurement"** menu then press **OK**.
- ➢ Go to **"Pressure"** menu then press **OK**.
- ➢ Go to **"Flue gas velocity"** then press **OK**.

The analyser displays the measured values.

19.1. Link the measurement to a customer

When the measurement has been performed, it is possible to link it to a customer registered in the analyser or to a customer unregistered in the analyser that must be created.
- ➢ Press the **"Save"** function button.
  The analyser displays the list of recorded customers.
- ➢ Select a customer with up and down arrows then press **OK** or create a customer (see page 23) then select it.
  The analyser displays the list of available boilers.
- ➢ Select the boiler with up and down arrows then press **OK** or create a boiler (see page 24) then select it.
  The analyser backs to the measurement screen.

19.2. Add the measurement to a group

The group function has to be activated (see page 18).
Once the measurement is linked to a customer and a boiler, it is possible to add it in a group in the instrument, or create a group:
  The analyser proposes to add the measurement to a group.
- ➢ Go to **YES** and press **OK**.
- ➢ Go to the required group with the arrows and press **OK**, or create a group (see page 25).
  The analyser backs to the measurement screen.

19.3. Print the results

It is possible to print the results on the ticket:
- ➢ Press the **"Print"** function button.
  Results are printed on the ticket.
See page 17 for the printing configuration.

20. To get to information about the analyser i

The **"Information"** menu of the analyser allows to get to several information:
- Type of analyser
- Version of the firmware
- Serial number of the analyser
- The adjustment date
- Phone and fax numbers, e-mail of Kimo Instruments
- Options of the analyser
- Type of sensor, its serial number and its installation date.

To get to this menu:

From the home screen:
➢ Go to **"Information"** menu with the keypad then press **OK**.
The information is displayed on the screen.
➢ Use the keypad to go from one screen to the other.

From any information screen:
➢ Press the **"Diagnostic"** function key.
The analyser displays information about sensors.
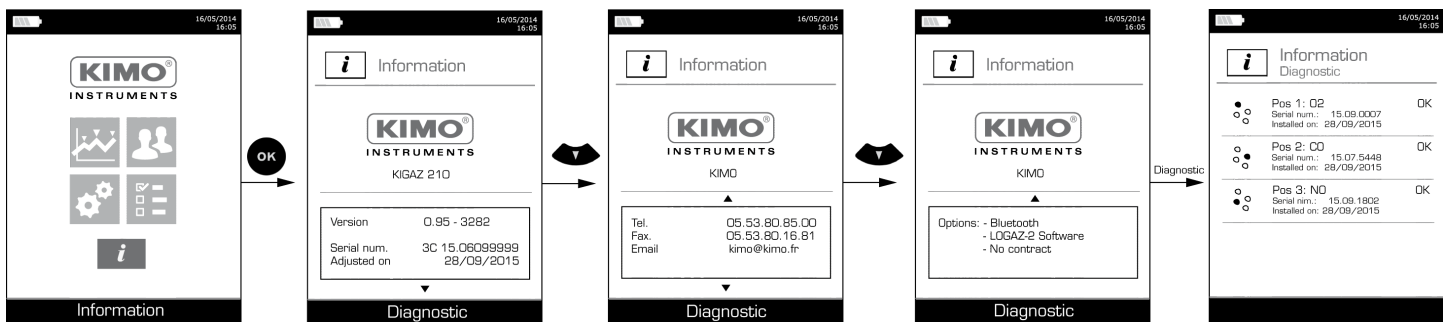
21.1. Life-time of the sensors

Sensors are electrochemical type: inside them, in the presence of gas to detect, a chemical reaction occurs that causes an emission of electrical current. The electric current strength detected by the instrument is converted into a corresponding gas concentration. The life-time of the sensor is strongly linked to the reagent consumption present in the sensor. As their consumption increases, features of the sensor are getting worse until their exhaustion, after which it is necessary to replace it. To ensure the measurement accuracy, sensors have to be calibrated only in Assistance centre qualified by Kimo.

Sensor	Average life-time	Required calibration
Long-life O_2	5 years	Annual
CO-H_2	2 to 3 years	Annual
NO	2 to 3 years	Annual
CH_4	3 to 5 years	Annual

21.2. Replace the sensors

Follow this procedure to replace a used sensor:

The analyser must be turned off.

➢ Remove the protective cover.
➢ Turn the analyser.
➢ Unscrew the sensors cover with a cross-head screwdriver.
➢ Remove the trap.
➢ Disconnect the ribbon cable of the sensor to replace.
➢ Rotate the sensor counter clockwise taking care not to bring pressure on the board of the sensor.
➢ Remove the sensor.
➢ Put the new sensor taking care to insert the two jacket hooks of the sensor in their location.

⚠ **Exercise the rotation constraint on the sensor body and not on the electronic card.**

➢ Rotate the sensor clockwise.
➢ Reconnect the ribbon cable of the sensor.

Board

Jacket hooks

1 **Sensors access**

2 **Disconnection of the ribbon cable of the sensor to replace**

3 **Sensor rotation**

4 **Remove the used sensor**
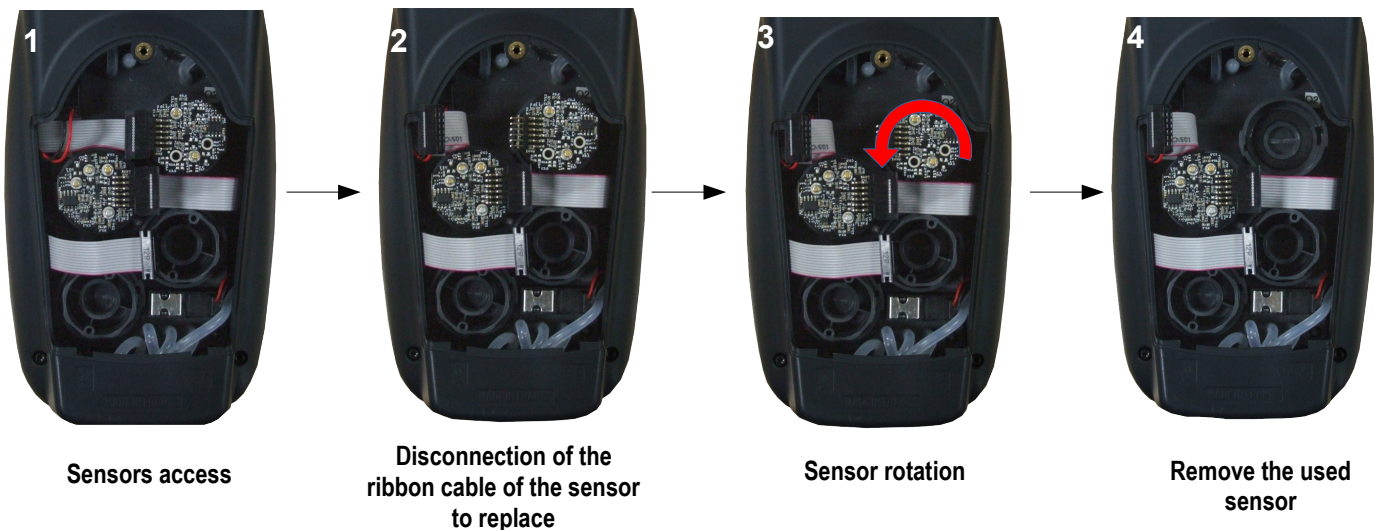
**Insertion of a new sensor then rotation
of the sensor**

**Connection of the
sensor ribbon cable**

⚠️ **Exercise the pressure on the sensor body and not on the electronic card.**

Sensors have very accurate locations, see the following locations defined for each sensor:

⚠️
- **long-life O₂** sensor must be in position **1**
- **CO** sensor must be in position **2**
- **NO** and **CH₄** sensors must be in position **3.**

When a sensor has been replaced, it is possible to check the proper functioning of this new sensor by going in the **"Information"** menu of the analyser. It is normal that a sensor that has just been installed gives the following message: **"Current Error"**, it is necessary to wait a few time to stabilise the polarisation of the sensor.
Here are the stabilisation times for each sensor:
- O_2: 48 hours
- $CO-H_2$: 48 hours
- NO: 48 hours
- CH_4: 48 hours

21.3. Replace the paper roll of the printer

Follow this procedure to replace the paper roll of the printer:
- ➢ Raise the upper part of the printer.
- ➢ Put the paper roll in the required location.
- ➢ Pull up slightly on the paper: it must be caught between the upper part and the lower part of the printer.
- ➢ Close the upper part.
  Some paper must be out from the slot situated between the lower part and the upper part of the printer part.

⚠️ **Both sides of the paper are different: the brightest side is the printed side and must be facing the user.**

Upper part to
raise

Paper location

Introduction of
the paper roll

Paper correctly
introduced

21.4. Replace the battery

Follow this procedure to replace the battery:

The analyser must be turned off.

➢ Remove the protective cover.
➢ Turn the analyser.
➢ Unscrew the battery cover with a cross-head screwdriver.
➢ Remove the battery cover.
➢ Disconnect the battery.
➢ Connect the new battery.

⚠ **Do not pull the cable, unplug softly the connector.**

22. Calculations of the different parameters

22.1. CO, NO and NOx conversions

$$CO[\frac{mg}{mg^3}]=CO[ppm]x1.24922$$

$$NO[\frac{mg}{mg^3}]=NO[ppm]x1.33845$$

$$NO_x[\frac{mg}{mg^3}]=NO_x[ppm]x2.05229$$

Conversions on units are the same for both gases. CO is taking as an example.
O_2 reference (O_{2ref}) is only linked to CO and NO.

$$\lambda=\frac{CO_{2max}}{CO_2}=\frac{21}{21-O_2}$$

$$CO[\frac{mg}{kWh}]=CO[\frac{mg}{m^3}]\lambda\frac{V_f}{PCIx0.277778}$$

$$CO[\frac{g}{kWh}]=CO[\frac{mg}{m^3}]\lambda\frac{V_f}{PCIx0.277778}x0.001$$

$$CO[\frac{g}{GJ}]=CO[\frac{mg}{kWh}]\lambda\frac{V_f}{PCIx0.277778}x0.001$$

$$CO[\frac{mg/m^3}{O_{2ref}}]=CO[\frac{mg}{m^3}]x\frac{21-O_{2ref}}{21-O_2}$$

$$CO[\frac{ppm}{O_{2ref}}]=CO[ppm]x\frac{21-O_{2ref}}{21-O_2}$$

$$CO[\%]=CO[ppm]x0.0001$$

$$CO[\frac{g}{m^3}]=CO[\frac{mg}{m^3}]x\,0.001$$

With:
- O_{2ref} a reference value selected by the user, this value has to be entered in the device in %.
- O_2 oxygen value measured in %.
- V_F the theoretical volume of flue gas in m^3 (given in the table of coefficient)
- NCV the net calorific value in MJ (given in the table of coefficient)
- CO_{2max} the maximum level in % in carbon dioxide of flue gas dry products (given in the table of coefficient)

22.2. Calculation of the level in NOx

$NO_x=\frac{NO}{0.97}$ with NO the level in nitrogen monoxide in ppm.

0.97 if the %NO_2 is at 3% in the **"Setting"** menu.
0.95 if the %NO_2 is at 5% in the **"Setting"** menu.
So for the measurement of the NO and NO_2

$NO_x=NO+NO_2$

22.3. Calculation of flue gas velocity

$$V=k\sqrt{\frac{2\Delta P}{M_{VF}}}$$

With:
- k: coefficient of the differential pressure item
- ΔP: differential pressure (dynamic pressure).
- M_{VF}: mass density of the flue gas (already calculated for the calculation of the higher efficiency).

LIGAZ-2

Logiciel d'exploitation
Operating software
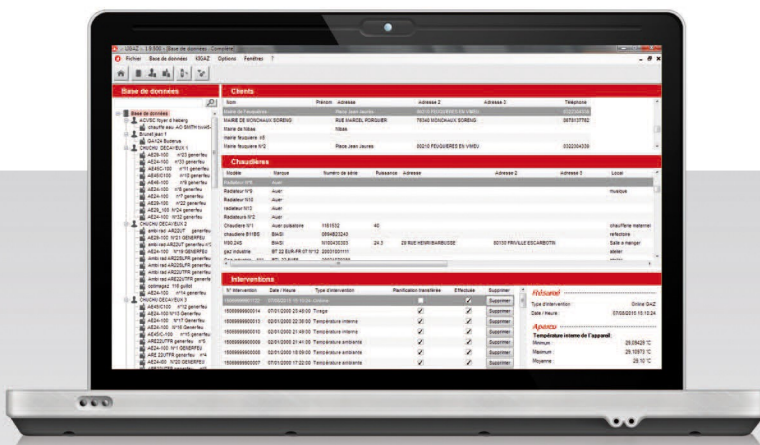
Notice d'utilisation / *User manual*

1. Introduction

LIGAZ-2 software, supplied with the gas analysers of the KIGAZ range, allows to set the analyser, to create and give information a customers, boilers and inspections database, to process and download measurement datasets.

2. Software installation

2.1. Recommended minimum configuration

For the proper functioning of the software, the following minimum configuration is recommended:
- **Operating system:** Windows, XP, VISTA, 7
- **Communication port:** USB 2.0
- **DVD player**
- **RAM memory:** 1 GO
- **Disk memory:** 1 GO

2.2. Installation

➢ Put the DVD into the player of the computer.
  It automatically starts. If not, go to **"My computer"**, *double-click on DVD drive then on* **"SetupLIGAZ-2"** *icon.*
➢ Follow the indications of installation.
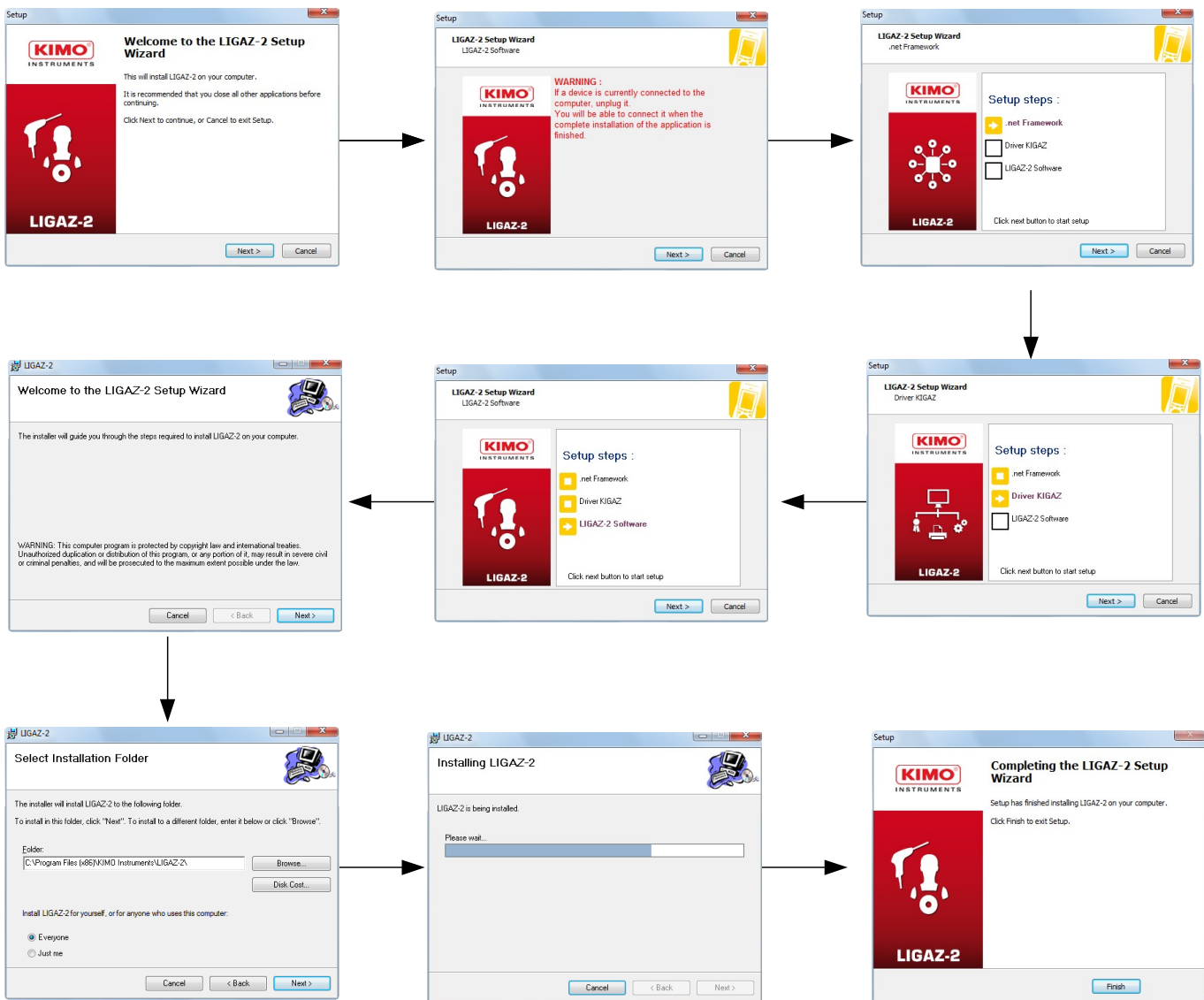
After double-clicking on the ⬤ software launching icon on the desktop, the homepage of the software opens:
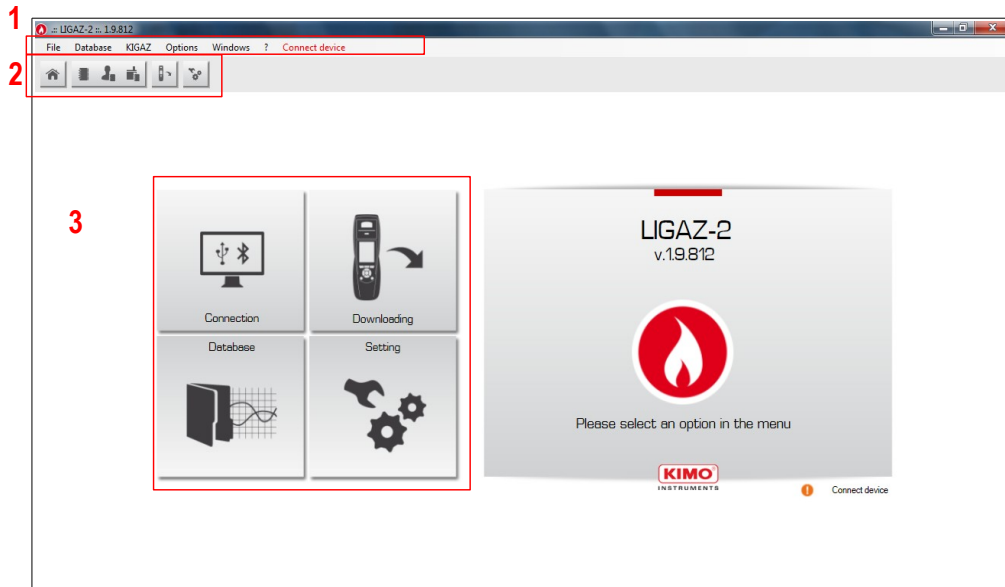
3.1. Meaning and functions of the menus bar (1)

➢ **File**
- **Back to homepage:** reduce all the opened windows
- **Save database:** save the database into the computer
- **Import database:** import a LIGAZ-2 or LOGAZ-2 (optional software) database saved into another computer
- **Quit:** close the software

➢ **Database**
- **Total:** opens the total database window (Customers, boilers and performed inspections)
- **Customers:** opens the customers database window
- **Boilers:** opens the boilers database window
- **Database setting:** opens the saving setting window of the database (location and recurrence)

➢ **KIGAZ**
- **Downloading:** allows to download data saved in the analyser and the instrument setting
- **Setting:** allows to set different parameters (autozero, combustibles, references…)
- **Customers / boilers deletion...:** allows to delete customers and/or boilers saved in the analyser
- **Comparison of PC elements with KIGAZ...:** allows to compare information on customers and boilers between the LIGAZ-2 database and the analyser

➢ **Options**
- **E-mail:** allows to set parameters to send emails
- **User:** information about the user
- **Languages: allows to select the software language** (French or English)

➢ **Windows:** allows to go from one window to another

➢ **?:**
- **User manuals:** allows to get to software and analyser user manuals
- **Hotline:** allows to get to the address and fax and phone number of the company or send a report to the after sales service
- **About:** indicates software version and database version

➢ **Device connection:** indicates the connection state of the device connection. **"Connect device"** or **"Device connected"**.

3.2. Meaning and functions of tool bar buttons (2)

🏠	Back to homepage: closes all the opened windows	📋	Opens the boilers database window
📓	Opens the complete database window (Customers, Boilers, Inspections)	📱➘	Opens the analyser download window
👤	Opens the customer database window	🔧⚙	Opens the analyser setting window

3.3. Meaning and functions of the homepage buttons (3)

⌨ Connection	Allows to connect the analyser to the software	📱➘ Downloading	Allows to connect the analyser and access the inspections unload window
Database 📘	Allows to access the complete database: Customers, boilers and inspections	Setting 🔧⚙	Allows to access the analyser setting

4. Download inspections

Inspections stored in the analyser can be downloaded on the computer:

➢ Connect the analyser to the computer thanks to the supplied USB cable and **turn on the analyser**.

➢ Launch **LIGAZ-2** software.

➢ Connect the analyser to the **LIGAZ-2** software clicking on the [⌨ Connection] homepage button.
The software indicates that connexion is successful.

➢ Click on the download homepage button [📱➘ Downloading]
Or

➢ Click on **"KIGAZ"** menu then on **"Downloading"**.
Or

➢ Click on the download icon of the tool bar [📱➘]
The software recovers inspections contained in the analyser. This operation can take a few minutes.
At the end of the recovery, the following window is displayed:
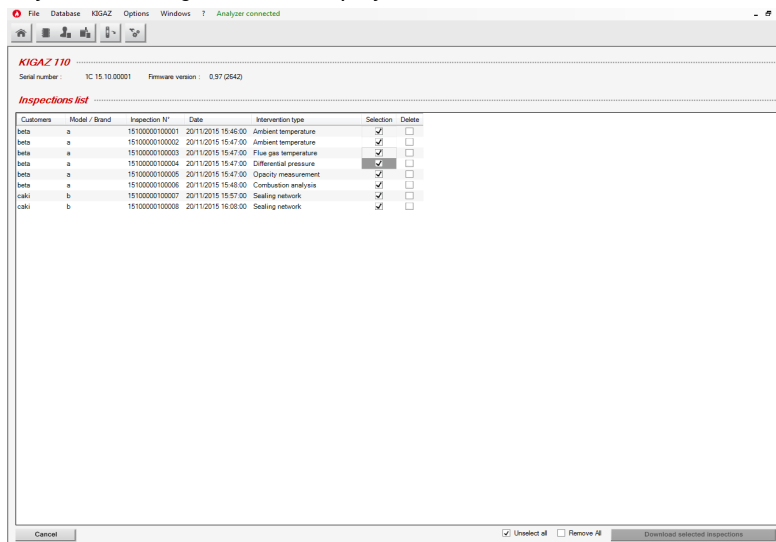
➢ Tick the boxes corresponding to the inspections to download on the computer. To delete an inspection from the instrument, tick the **"Delete"** box. To download an inspection to add to your database and delete it from the instrument, tick both boxes.

➢ Click on the [Download selected inspections] button.
*A message indicates that the transfer started, then the message **"Transfer done"** is displayed: the dataset has been downloaded successfully.*

➢ Click on **OK.**
*The **"Complete database"** window is displayed with the new inspections downloaded.*
*Customers and boilers linked to the downloaded inspections are added to the **"Customers"** and **"Boilers"** databases.*
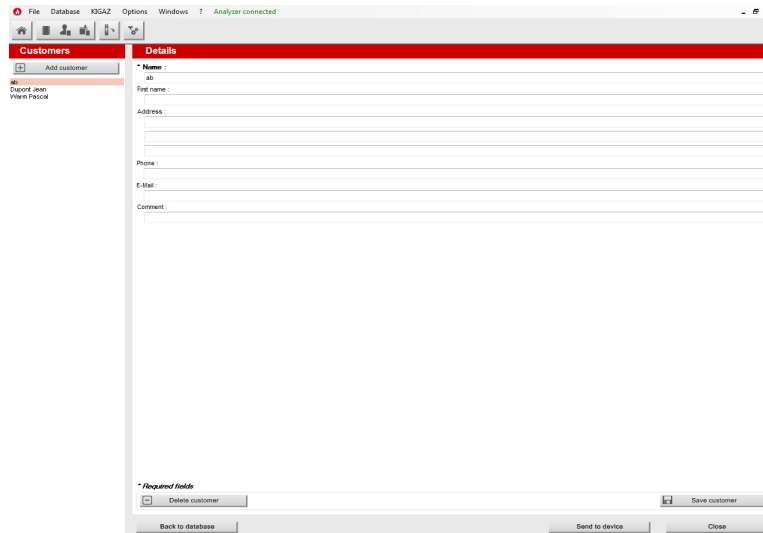
Databases are used to give information about features of boilers and customers. **LIGAZ-2** software allows to recover customers and boilers created in the analyser and allows to transfer customers and boilers created with **LIGAZ-2** software in the analyser.

➢ Launch the software by double-clicking on the 🔴 icon in the desktop.
➢ These databases are saved in the hard disk of the computer. See page 50 for the **"Database settings"**.

5.1. Use the customer database
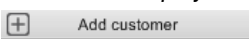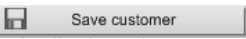
➢ Click on the 👤 button of the tool bar or click on **"Database"** menu, then on **"Customer".**

The following window is displayed:
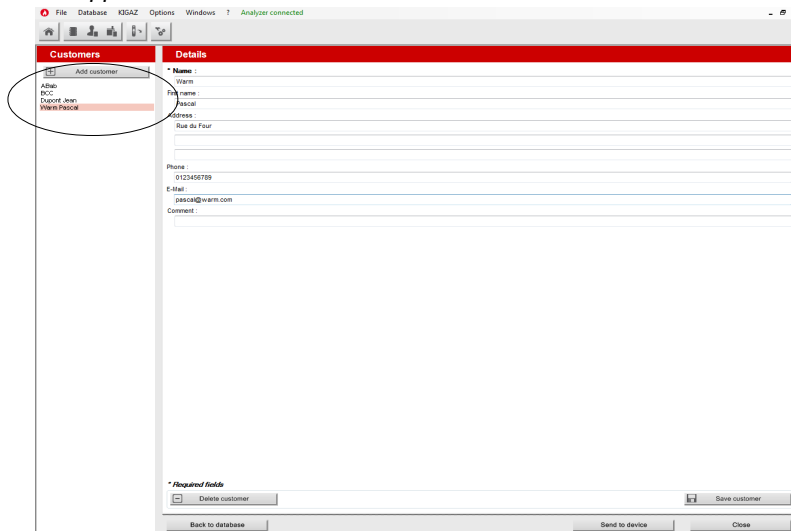
The fields are not accessible.
The customer list created on the device are displayed on the left of the screen.
➢ To add a customer, click on the ⊞ Add customer button.
The fields become accessible.
➢ Fill in the different fields. The **"Name"** field is required.
➢ To save it, click on the 💾 Save customer button.
A confirmation message is displayed.
➢ Click on **OK**.
The created customer appears in the list on the left of the screen:
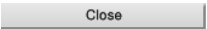
➢ Repeat the procedure to add other customers.
➢ To transfer a customer to the analyser, select it on the customer list on the left of the screen and click on the following button: Send to device . If it is inaccessible, check the device connection.
A message confirms the successful transfer.
➢ Click on **OK**.
➢ To download customers from the analyser to the software database, it is necessary to download inspections present on the

device (see page 54). Only the customers linked to an inspection are added to the **"Customers"** software database. The boilers linked to this customer are also added to the **"Boilers"** software database.
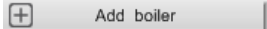
➢ To delete a customer, select it in the customer list and click on the [⊟ Delete customer] button.
   A confirmation message is displayed:
➢ Click on **YES** to confirm the deletion, or on **NO** to cancel.
➢ Click on the [Close] button to close the window and back to the homepage or on the [Back to database] button to access the complete database.
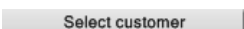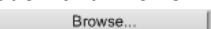
5.2. Use the boilers database

Each customer can have several boilers.

➢ Click on the [🔧] tool bar button, or on **"Database"** menu then choose **"Boilers".**
   The following window opens:

All the fields (type, model, power…) are inaccessible and the "Browse" button is inactive.

➢ To add a boiler, click on the [⊞ Add boiler] button.
   The fields become accessible and the [Browse…] button is active.
➢ Fill in the different required fields (customer, model, power in kW and combustible) as indicated below.
➢ Click on the [Browse…] button in front of the **"Customer"** field to link the boiler to a customer.
   The following window is displayed:

➢ Select the required customer in the list on the left then click on the [Select customer] button.
   The software back to the previous screen.
➢ Fill in the **"Model"** and **"Power"** required fields.
➢ Click on the [Browse…] button in front of **"Combustible"** and select the combustible type of the boiler.

The following window is displayed:
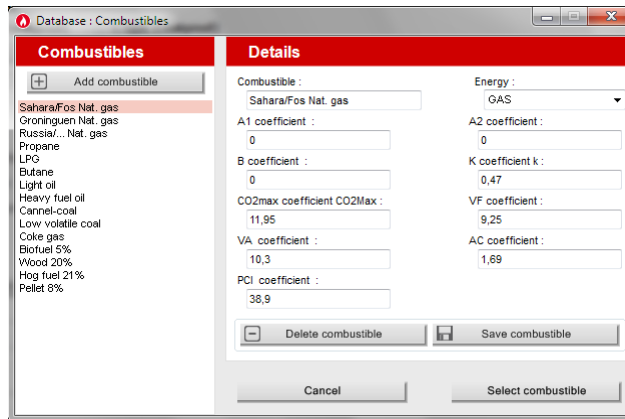
➢ Select the combustible used by the boiler and click on the [Select combustible] button.
15 types of combustible are programmed. If the combustible type used by the boiler is not available in the list, click on the [Add combustible] *button, fill in the fields, click on the* [Save combustible] *button then on the* [Select combustible] *button.*

➢ To save the boiler, click on the [Save boiler] button.
The software displays a confirmation message.

➢ Click on **OK**.
The created boiler appears on the list on the left of the screen:
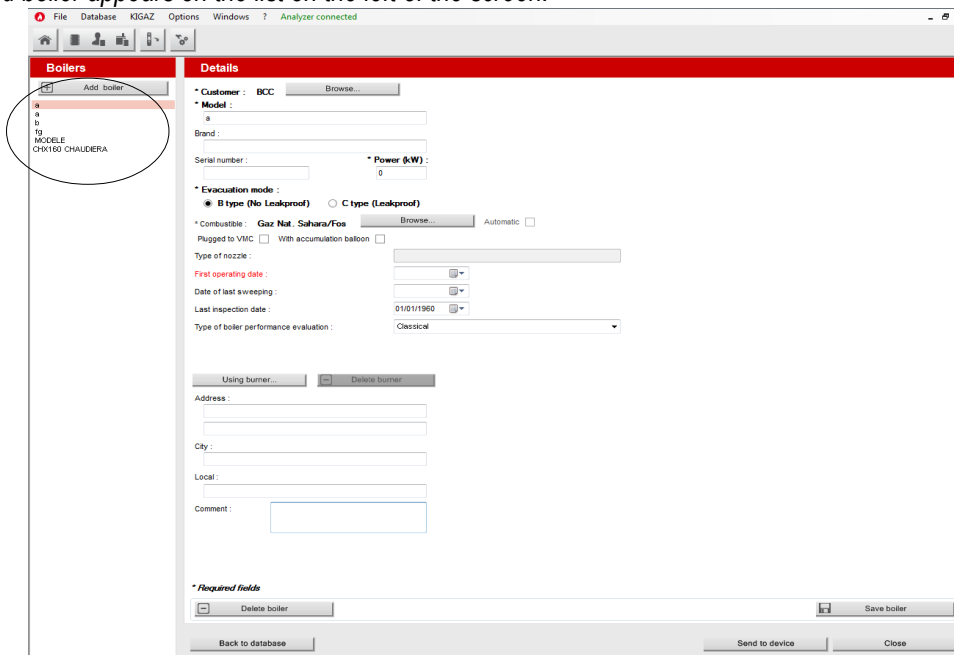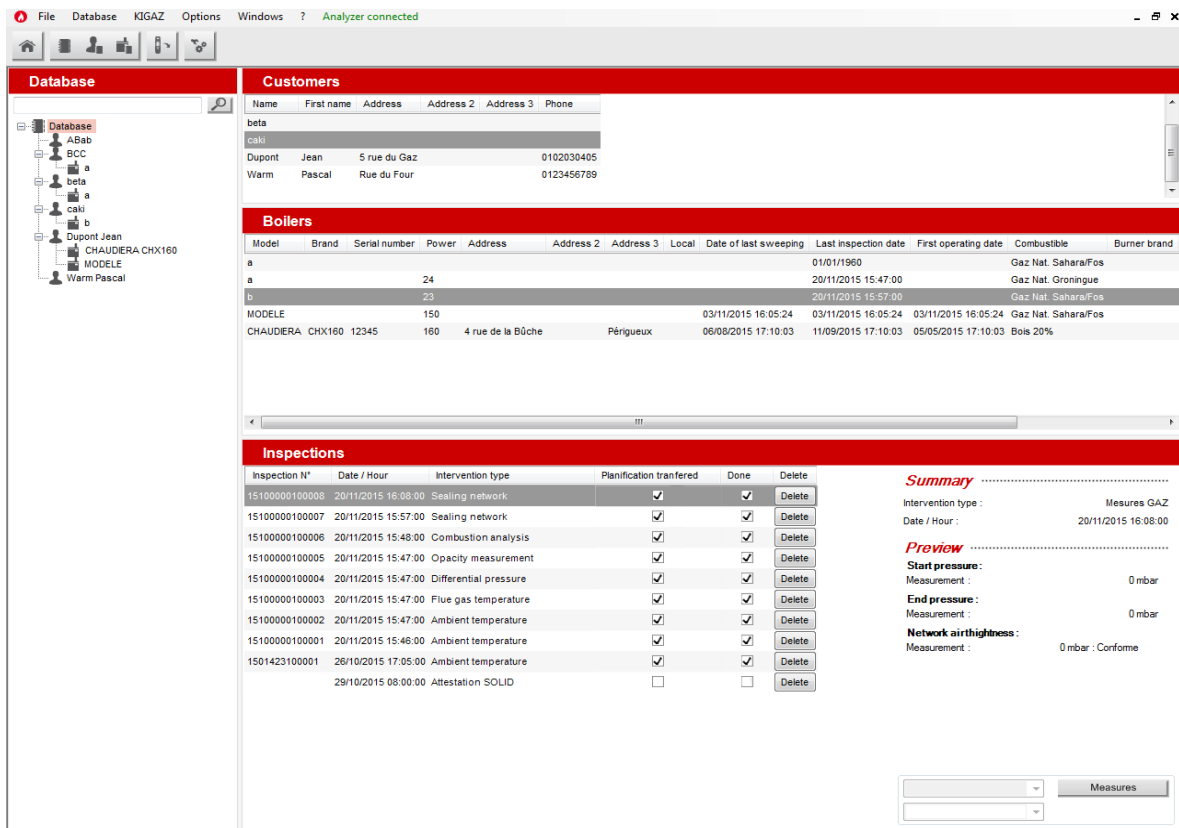
➢ Repeat the procedure to add other boilers.
➢ To transfer a boiler to the analyser, select it on the boilers list then click on the [Send to device] button. If it is not accessible, check the device connection.
A message is displayed to confirm the transfer:

➢ Click on **OK**.
➢ To download boilers from the analyser to the software database, it is necessary to download inspections present on the device (see page 54). Only the boilers linked to at least an inspection are added to the **"Boilers"** software database. The customer linked to this boiler is also added to the **"Customers"** software database.

➢ To delete a boiler, select it on the boilers list then click on the [Delete boiler] button.
A confirmation message is displayed.

➢ Click on **YES** to confirm deletion or **NO** to cancel.
➢ Click on the [Close] button to close the window and back to the homepage, or on the [Back to database] button access the complete database.

5.3. Complete database

This database allows to have a global view of all customers and their boilers with also the inspections.

➢ Click on the ▨ tool bar button or directly on the ▤ button on the homepage.
   Or
➢ Click on **"Database"** menu, then choose **"Complete".**
   The following window is displayed:

➢ To delete an inspection from the complete database, click on the Delete button of the inspections list.
   A message is displayed to confirm deletion.
➢ Click on **"OK"** to confirm or **"Cancel"** to cancel the inspection deletion.

5.3.1. Database settings

➢ Click on **"Database"** menu then on **"Database settings..."**.
   The database configuration window opens.
➢ Click on the Browse... button and define the save folder path.
➢ Select the recurrence, that is the automatic registration of the database:
   • Select the database registration frequency: from 1 to 30 hours or 1 to 30 days.
     Or
   • Tick "When closing software" to save automatically the database when the software is closed.
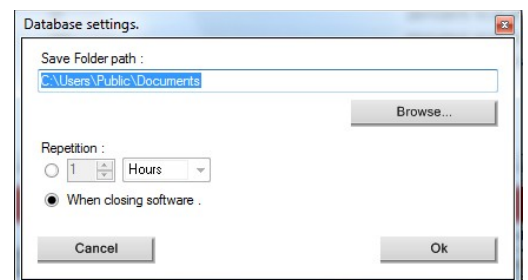
5.3.2. Save while using

To guarantee information saving, you shall regularly proceed this way:
➢ Click on **"File"** menu.
➢ Click on **"Save database"**.

5.3.3. Import a database

When opening **LIGAZ-2** software, to recover a database:
➢ Click on **"File"** menu.
➢ Click on **"Import database"**.
➢ Go to the saving folder of the database, select the database to open then click on **OK**.
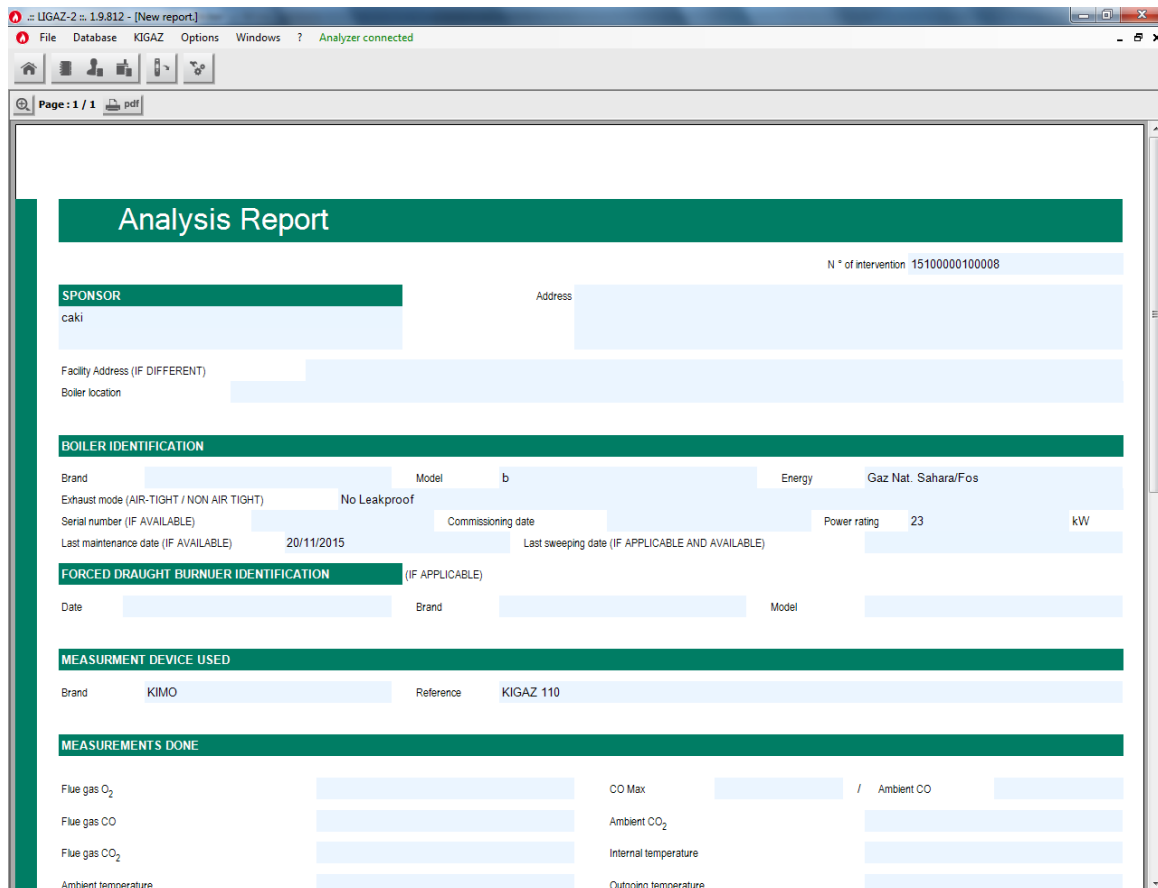
5.4. Edit an analysis report

From the complete database screen, it is possible to edit a measurements report.

➢ In the menu on the left of the screen, click on the required boiler for the report edition.
➢ Click on the [Measures] button.

The analysis report is displayed:

➢ Use the 🔍 button to zoom in or zoom out on the report.
➢ Click on the 🖨 button to print the report or on the [pdf] button to export it in PDF format.

LIGAZ-2 software allows to set the analyser. It is possible to:
- set the combustibles
- set the references (O_2 reference, altitude, atmospheric pressure)
- set the operators
- set date and time
- get details about sensors (State and serial number)
- set the header of printing
- see the battery level
- get information about the analyser, update it and send report to after-sales service

➢ Connect the analyser to the computer with the supplied USB cable.
➢ Connect the analyser on main power thanks to the supplied adapter to avoid extinguishing of the analyser (low battery).
➢ Click on **"KIGAZ"** in the menu bar.
➢ Go down to **"Setting"** then click on the parameter to modify.
  Or
➢ Click on the [⚙] tool bar button or directly on the [⚙ Setting] button from the homepage.
  "KIGAZ settings" window opens.
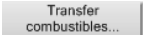
⚠ **Changing parameters of the analyser has consequences on performed measurements and on the analysis calculation. Only a qualified technician is empowered to change the parameters of the device.**
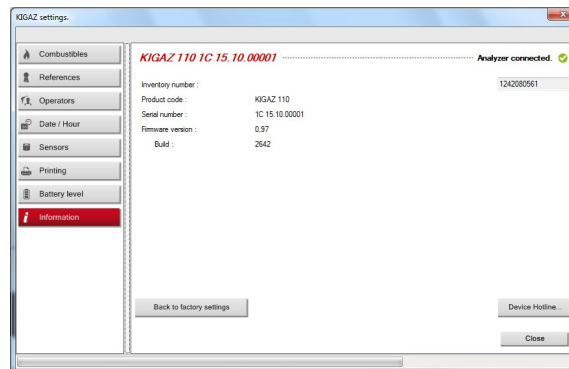
6.1. Change the combustibles
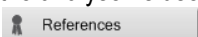
This window allows to change the list of combustibles programmed in the analyser. It also allows to modify features of each combustibles.
  "*KIGAZ settings*" *window is open on* **"Combustibles"** *or click on the* [🔥 Combustibles] *button.*
➢ Click on the **"Energy"** field and select the combustible type: solid, liquid or gas.
➢ Double-click on one of the combustible features to modify.
➢ Enter the new value for the feature.
➢ Click on the [Transfer combustibles...] button to send modifications to the analyser.

6.2. Change the references

This window allows to modify the O_2 reference (percentage of oxygen in the air which the analyser is used), the altitude (altitude in which the analyser is used) and the atmospheric pressure (pressure in which the analyser is used).
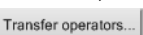 *"KIGAZ settings"* *window is open on* **"References"** *or click on the* [References] *button.*
➢ Click on the field to modify.
➢ Write the new value.
➢ Click on the [Transfer references...] button to send modifications to the analyser.

6.3. Manage the operators

This window allows to add, delete or modify an operator.
  "KIGAZ settings" *window is open on* **"Operators"** *or click on the* [👤 Operators] *button.*
➢ In the "Name" column, click on the field to write an operator name.
➢ Click on the [Transfer operators...] button to send modifications to the analyser.

6.4. Modify the date and time

This window allows to de sync the analyser time and the computer time.

"KIGAZ settings" *window is open on* *"Date / Hour"* *or click on the* [🔒 Date / Hour] *button.*

➢ Click on the [Set to local time...] button to adjust analyser time to computer time.

6.5. Sensors state

This window allows to access the sensors features of the connected analyser.

"KIGAZ settings" *window is open on* *"Sensors"* *or click on the* [🗐 Sensors] *button.*

➢ The displayed features are:
- Type of sensor (CO, NO,...)
- State of sensor (connected, not connected...)
- Serial number of the sensor

6.6. Set printings
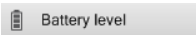
This window allow to enter the 4 header lines of the ticket printed by the analyser.

"KIGAZ settings" *window is open on* *"Printing"* *or click on the* [🖶 Printing] *button.*

➢ Enter the required text in **"Header line 1, 2, 3 and 4"** lines.
➢ Click on the [Send lines...] button to send modifications to the analyser.

6.7. Battery level

This window allows to see the battery level of the analysis. The analyser must be turned on and on battery.

"KIGAZ settings" *window is open on* *"Battery level"* *or click on the* [🔋 Battery level] *button.*
The software displays the battery level.

6.8. Access to information about the instrument and update the instrument

6.8.1. Access to information about the instrument

"KIGAZ settings" *window is open on* *"Information"* *or click on the* [*i* Information] *button.*
The following information is displayed:
- Product code: ex: KIGAZ 310
- Serial number: ex: 00.01.2057
- Firmware version: ex: 0.92
- Build: ex: 1247

It is possible to give an inventory number to the device (number selected and given by the user):

➢ Click on **"Inventory number"** field and enter the desired number.

6.8.2. Update the device

It is possible to update the firmware of the analyser, it means the internal software that allows to the analyser to work properly. It is also possible to install a 3rd language.

➢ Click on **KIGAZ** menu then go to **Settings** and click on **Information,** or click on the [⚙] tool bar button then on the [*i* Information] button.
The "KIGAZ settings" window is displayed.
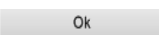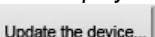
➢ Click on the [Device Hotline...] button.
The following window opens:

➢ Click on the [Get the last firmware ...] button.

*The connection parameters window opens:*
Two choices are then possible:

- ***The Internet connection is not protected by a proxy***

➢ Click on [Ok] button on the connection parameters window.
A progress bar is displayed then the available firmware number is displayed.

➢ Click on the [Update the device...] button.

The update lasts for a few minutes.
➢ Turn off then turn the device.
A black screen with a progress bar are displayed (see opposite) then It turns off itself.
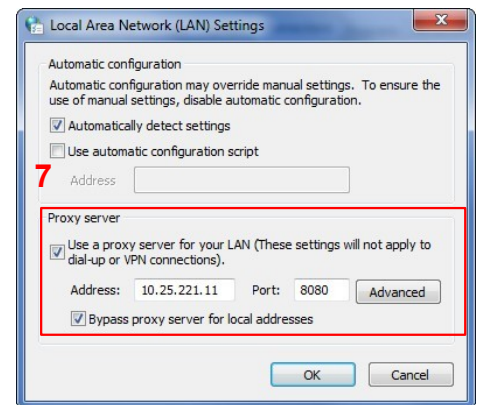➢ Turn on the device then go to **"Information"** menu of the analyser to check if the update has been taken into account.
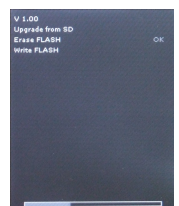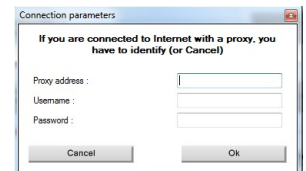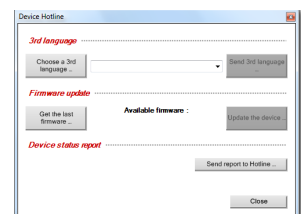

- *The Internet connection is protected by a proxy*

Address and serial number of the proxy, user name and corresponding password must be entered.
To get them into Windows 7:

➢ Click on **"Start" (1)** then on **"Control panel" (2).**
➢ In **"Control panel"** window, click on the up right on **"Large icons"** in **"View by" (3).**
➢ Click on **"Internet Options" (4)**:the **"Internet Properties"** window opens.
➢ Click on **"Connections"** tab **(5)** then on **"LAN settings"** button **(6):** the **"Local Area Network (LAN) Settings" window** opens with the information about the proxy server **(7)**.
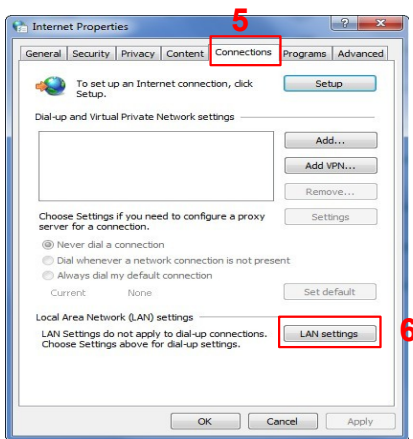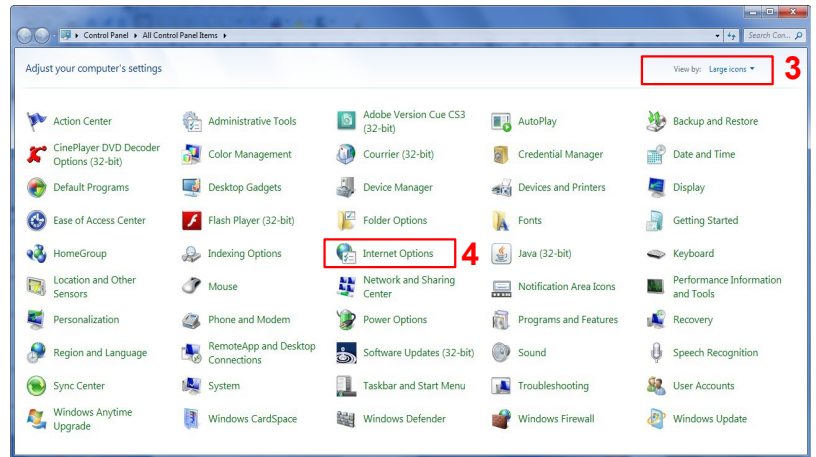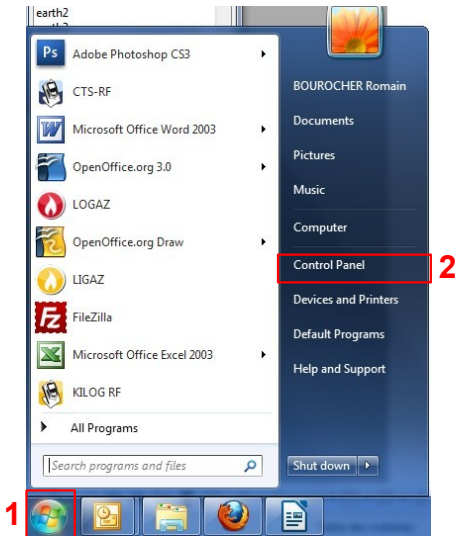
➢ Copy the address and the port in the **"Address"** line of the connection window as follows: 00.00.000.00**:0000**

              Address   Port

➢ Enter the user name and the corresponding password: data entered at the starting of the computer when the user logins.
➢ Click on the   **Ok**   button.

➢ Click on the **Update the device...** button.

The update lasts for a few minutes.
Turn off then turn on the device.
A black screen with a progress bar are displayed (see opposite) then the device turns off itself.
➢ Turn on the device then go to **"Information"** menu of the analyser to check if the update has been taken into account.
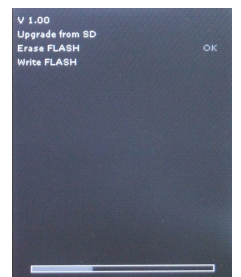
6.8.3. Install a 3rd language

➢ Select the language to send in the drop-down list box.

➢ Click on the **Send 3rd language ...** button.

6.8.4. Send a report of the device to the After-Sales Service

➢ Click on the [Send report to Hotline …] button.
Kimo after-sales service will receive a report about the general state of the device only readable by the after-sales service.

6.8.5. Back to factory parameters

It is possible to set the device with the factory parameters.
*The **"Settings"** window is open on **"Information"**.*
➢ Click on the [Back to factory settings] button.
The device is now set with the factory parameters.(see the factory parameters page Error: Reference source not found).

7. Options

7.1. E-mail

This option allows to set the email sending parameters in order to send report to the after-sales service.

➢ Click on the **"Options"** menu then on the **"Email"** sub-menu.
The following window is displayed:
➢ Fill in the different fields:
- **Email address of the outgoing mail:** e-mail address of the sender (p.durand@orange.fr)
- **Outgoing mail server:** server address used to send e-mail (ex: smtp.orange.fr).
- **Mail format:** plain text or html
- **Advanced options:** by clicking on the [Advanced options...] button, the email setting window opens and allows to set the SMTP outgoing server. This information is delivered in the subscription documents of the Internet access provider

➢ Click on the [Ok] button.
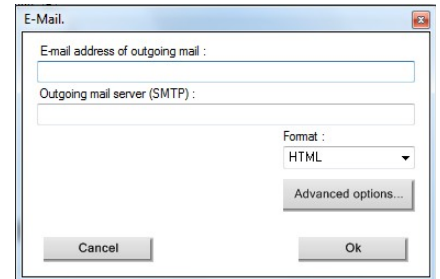
7.2. User information

This option allows to give information about the software user.
➢ Click on the **"Options"** menu then on the **"User"** sub-menu.
The following window is displayed:
➢ Fill in the different fields.
➢ Click on the [Ok] button.

7.3. Change the language

This option allows to change the interface language.
➢ Click on **"Options"** menu.
➢ Click on **"Languages"** sub-menu.
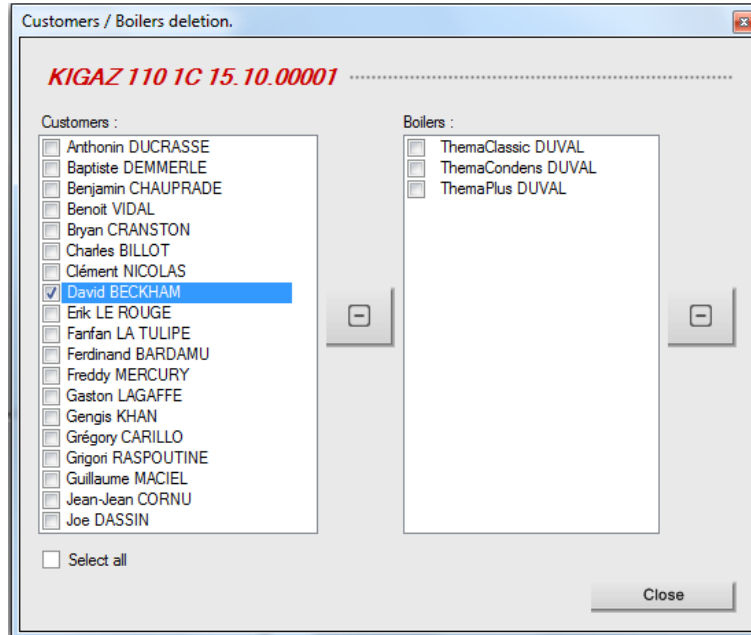➢ Select the required language.
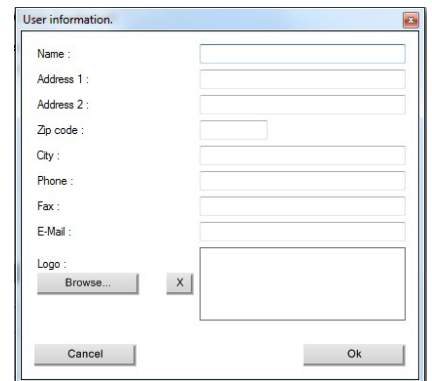
8. Customers / Boilers deletion of the analyser

It is possible to delete customers and/or boilers saved in the analyser via the LIGAZ-2 software.
  ➢ Connect the analyser to the computer then detect it with the LIGAZ-2 software.
  ➢ Click on **"Menu"** then **"Customers/boilers deletion...".**
    The following windows opens:

To delete a customer from the analyser:
  ➢ Tick the box of the customer to delete then click on the ⊟ button between **"Customer"** and **"Boiler"** columns.
    A message of confirmation is displayed.
  ➢ Click on **"Yes"** to confirm the deletion.

To delete a boiler on the analyser:
  ➢ Click on the line of the customer to whom the boiler to delete is associated.
  ➢ Tick the box of the boiler to delete then click on the ⊟ button on the left of the **"Boilers"** column.
    A message of confirmation is displayed.
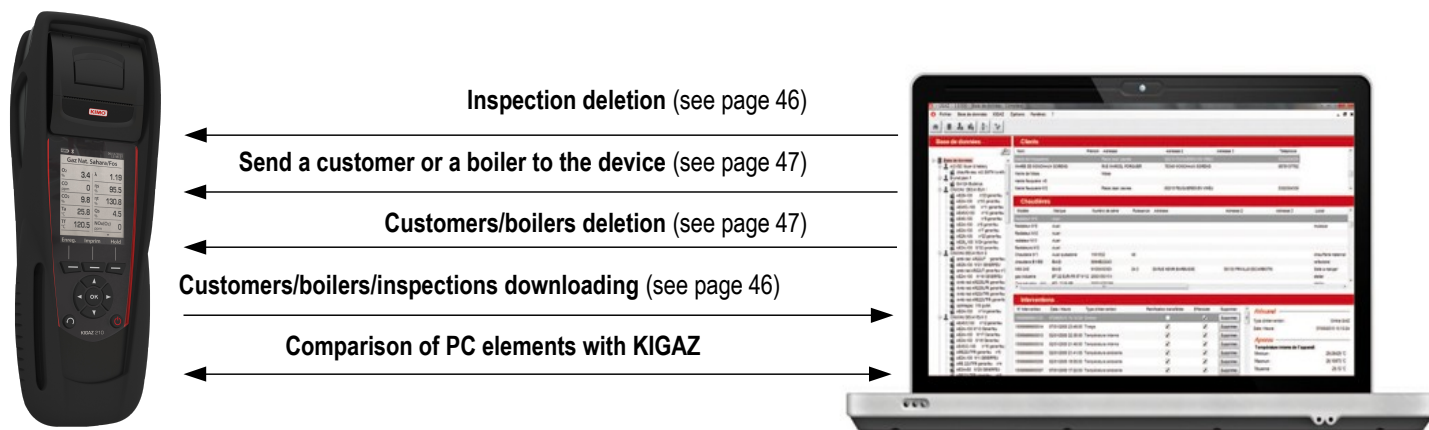   Click on **"Yes"** to confirm the deletion.

⚠ **Inspections linked to the deleted customer or boiler are also deleted.**

9. Compare the instrument and software information

As we have seen, the LIGAZ-2 software allows to send information to the analyser or to delete information from the analyser:
- Sending customers or boilers to the **analyser**
- Download customers/boilers/inspections **from the KIGAZ to the software**
- Delete customers and boilers from the **analyser**

The **"Comparison of PC elements with KIGAZ"** function in the KIGAZ menu allows to update customers and boilers information in the analyser and in the LIGAZ-2 software databases. There are different possibilities.

Inspection deletion (see page 46)

Send a customer or a boiler to the device (see page 47)

Customers/boilers deletion (see page 47)

Customers/boilers/inspections downloading (see page 46)

Comparison of PC elements with KIGAZ

9.1. Add elements automatically in the databases

The LIGAZ-2 software will add automatically customers and boilers in the following cases:
- If the same customer is present in the analyser and the software **"Customers"** database but different boilers are associated to this customer, the software will add automatically the missing boilers in the **"Customers"** and **"Boilers"** databases.
- If a customer is present in the analyser with at least one associated boiler, the software will add it automatically in the **"Customers"** and **"Boilers"** databases. But if a customer is present in the analyser without associated boiler, the software will not add this customer in the **"Customers"** database.

Procedure:
- ➢ Click on **"KIGAZ"** menu.
- ➢ Click on **"Comparison of PC elements with KIGAZ"**.

9.2. Modification of customer and boilers features

The LIGAZ-2 software will compare the information: if a customer or a boiler is present in the analyser and the database but with different features, the software will ask which features have to be taken into account.

Procedure:
- ➢ Click on **"KIGAZ"**.
- ➢ Click on **"Comparison of PC elements with KIGAZ".**

The following window opens:

To keep the data as they are on the PC and KIGAZ:
  - ➢ Tick the **"Do nothing (keep the data as they are on the PC and KIGAZ)"** box.
  - ➢ Click on the **"OK"** button.

To update the information:
  - ➢ Tick the **"Synchronise data of the PC and KIGAZ"** box.
  - ➢ Tick the boxes of data to keep.
  - ➢ Click on **"OK"** button.

To do the same actions on the following data, tick the "Apply this choice for other items to synchronise" box.
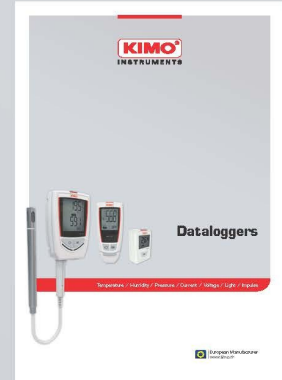
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