Ozone Portable Gas Analyzer

Series 62200

Operating Manual

Dextens

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Disclaimer

Please read and understand the user manual before installing and using the products described herein. It is also recommended to follow the safety recommendations from this manual.

The material in this manual is for informational purposes only. The products it describes are subject to change without prior notice, due to the manufacturer's continuous development program.

Dextens SA makes no representations or warranties with respect to this manual or with respect to the products described herein.

Dextens SA shall not be liable for any damages, losses, costs or expenses, direct, indirect or incidental, consequential or special, arising out of, or related to the use of this material or the products described herein.

Symbols and conventions

The danger sign indicates actions or configurations that may be dangerous for the user or that may lead to wrong measurements. Read and understand these paragraphs before starting to use the described material.

CE conformity

The Series 6XXXX instruments are manufactured conforming to the requirements of the electromagnetic compatibility directive 89/336/CEE and the low voltage directive 73/23/CEE.

Table of Content

1 Process gas analyzer, Installation

1.1 Content of the Package

When ordering a 62200 portable gas analyzer, you receive the following items:

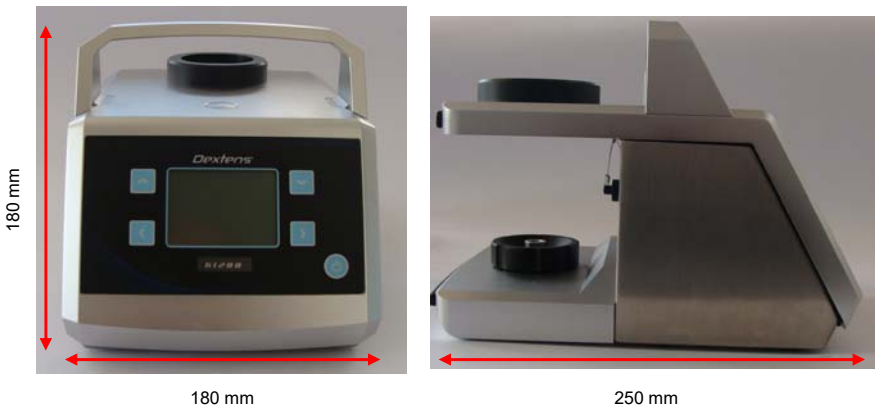
Portable ozone analyzer 	AC adaptor 	User Manual

1.2 Accessories

Following accessories are delivered according to application and customer's needs:

Part Nr. 75502.mmm Cable for connecting the sensor to a process or portable instrument 	**Part Nr. 87410 / 87411** Sensor maintenancee kit 	**Part Nr. 74009.00X** Peek/Derlin flow chamber for carbonated liquids. 6mm or ¼'' fitting and EPDM o-rings 

1.3 Dimensions



1.4 Installation

1. Connect the AC adaptor to the portable instrument and the main power (AC 100 to 240 V at 50 to 60 Hz). Before connecting the instrument on the main power, make sure that the instrument has been configured for your local power supply.

The portable instrument contains rechargeable batteries which are recharged when the AC adaptor is plugged.

Once recharged the autonomy of the recharged batteries is around 48hours

2. Introduce the sensor (with the collar) in the flow chamber space.

3. Plug the sensor in the Lemo connector of the base plate of the instrument.

4. Screw the sensor on the basement of the instrument. Do not screw too strongly to avoid to impair the lemo connector

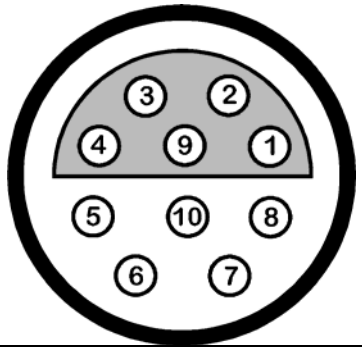
5. Insert the flow chamber in flow chamber space.

6. Adjust the flow chamber on the sensor 	7. Screw the collar of the sensor with the flow chamber. 

Remark: the sensor can also be connected to the portable with a dedicated cable (part Nr.75002.mm). Connect the push-pull connector to the instrument and screw the other part to the sensor: you are then ready to put the sensor in the measurement point and get the ozone concentration. More information about sensor installation can be found in the sensor manual.

1.5 Sensor Connection

There are the wiring details. They are given for information purpose only.



Lemo10 pin	Sensor signal
1	Guard ring electrode
3	Temperature measurement
4	Anode (counter electrode)
6	Temperature measurement
7	One-Wire signal
8	One-Wire ground
9	Cathode (working electrode)

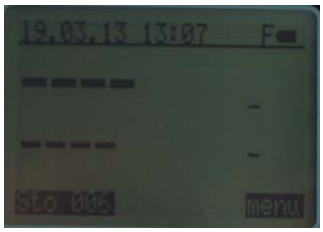
2 Instrument Operation

2.1 Portable Front panel

1. Graphical LCD display
2. Up key
3. Down key
4. Contextual key: related to the bottom left of the screen corner
5. Contextual key: related to the bottom right of the screen corner
6. On/Off button: press it about 2 seconds to switch on and off the instrument

2.2 Quick start

After installing the instrument and sensors as described in the previous chapter. Press for more than two seconds the “On / Off” button to switch on the instrument. The startup sequence is described in the following lines.

The first operation done by the instrument is to initialize the software and proceed with some hardware test and configuration. During this phase the screen displays a Dextens Logo.	
Immediately after the following screens appears, if no sensor is connected yet: the battery drawing on the top right corner shows the battery charge (full = fully recharged)	
Shortly after starting, the display shows the device manufacturing information. • **Model**: Instrument model identification. • **SN**: Instrument serial number. • **Manu**: Manufacturing date. • **Soft**: Software revision. These are useful when you need information from Dextens and must be included in all your communications.	
It continues with the information about the connected sensor. • **Sensor**: Sensor serial number. • **Manu**: Manufacturing date. • **Calib**: Date of the last calibration. • **Memb**: Type of the used membrane. In case no sensor has been connected or when the connected sensor has no tag (also called 1 wire EEPROM), the mentioned information are not available and it requires a calibration before entering the measurement screen.	
Finally the instrument enters the measurement mode and will show the ozone concentration and the sensor temperature.	

Once you finished using the instrument, press for about 2 seconds the power button to switch off the instrument.

2.2.1 Measurement screen

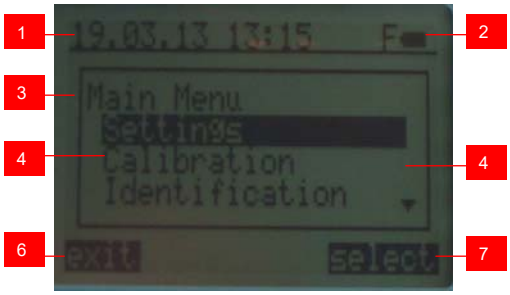
The picture below shows you a typical measurement screen with explanations about the different area in the screen.

1. Date and time indication.
2. Battery gauge
3. Ozone concentration
4. Ozone concentration unit
5. Temperature
6. Temperature unit
7. Data storage or logging indication
8. Menu soft key

When the sensor is disconnected, the display line 3 and 5 are both filled with dashes. When the temperature is too high and the thermal cutoff is enabled, the display line 3 contains dashes but the temperature is still displayed.

2.2.2 Menu screen

The picture below shows you the first menu screen with explanations about the different area in the screen.



1. Date and time indication.
2. Battery gauge
3. Menu title
4. Menu items
5. navigation slider
6. Function attached to the left soft key: Exit menu or return to previous menu.
7. Function attached to the right soft key : Enter sub-menu or execute item

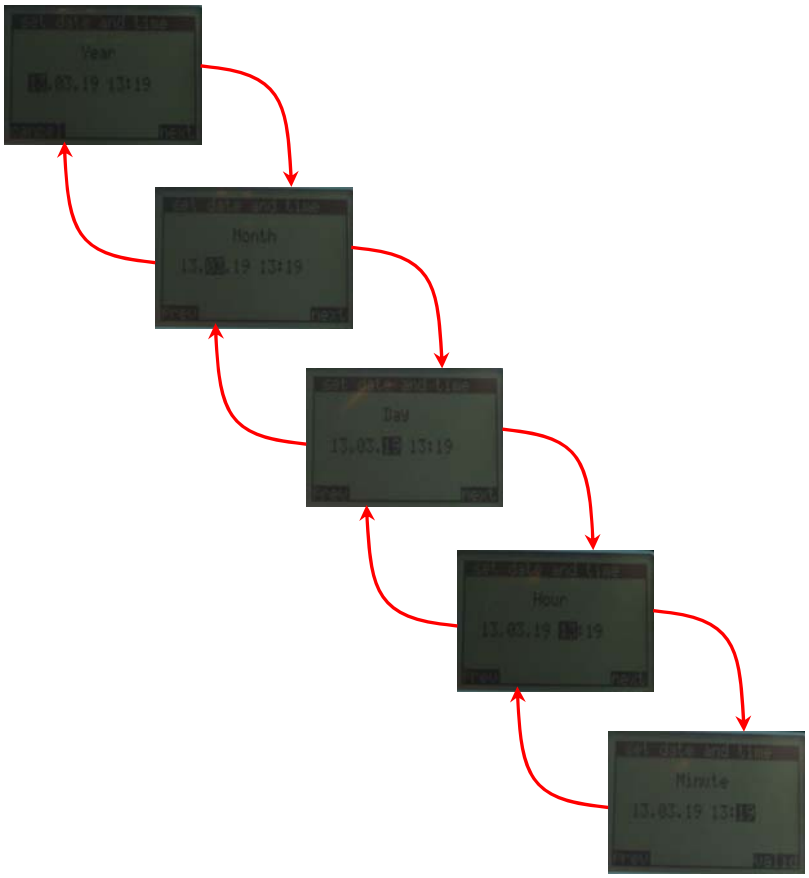
When you are in the measurement screen, press the right contextual key to open the main menu. There are four sub menus but only two of them are activated by default. The other two items are activated after the PIN code has been entered. Please refer to Chapter 2.3 for the detailed menu structure and, in the following paragraphs which are related to a specific menu or sub-menus.

2.2.3 User Input

Before being able to get the full power of this instrument, the user must understand how he can enter information in the instrument. The picture here under shows you a typical input screen and explains what the different areas are.

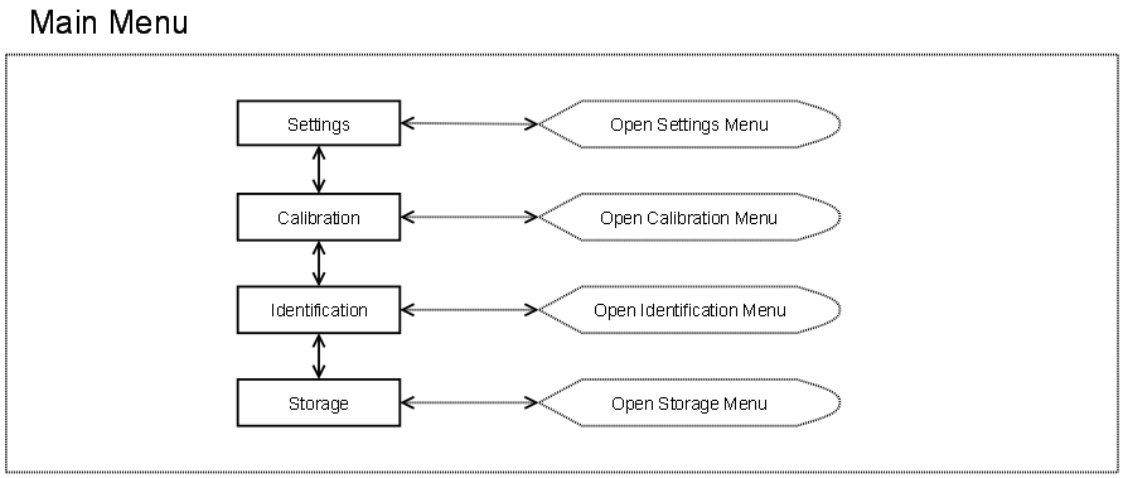
1. Input title.
2. Input help or indication.
3. The part of the input that is being modified.
4. Function attached to the left soft key: Select previous digit or cancel the input.
5. Function attached to the right soft key: Select next digit or validate the input.

When you first enter an input screen, the cursor highlights the left most digit or part of the input. At this time pressing the left soft key cancel the input. You can use the UP and DOWN arrows to modify its value. Once the digit has the expected value, press the right soft key to move the cursor to the next position. Repeat that procedure until you reach the right most position. Now pressing once more the right soft key will validate the input. Take a look to the sequence below that' shows how to change the system date and time.

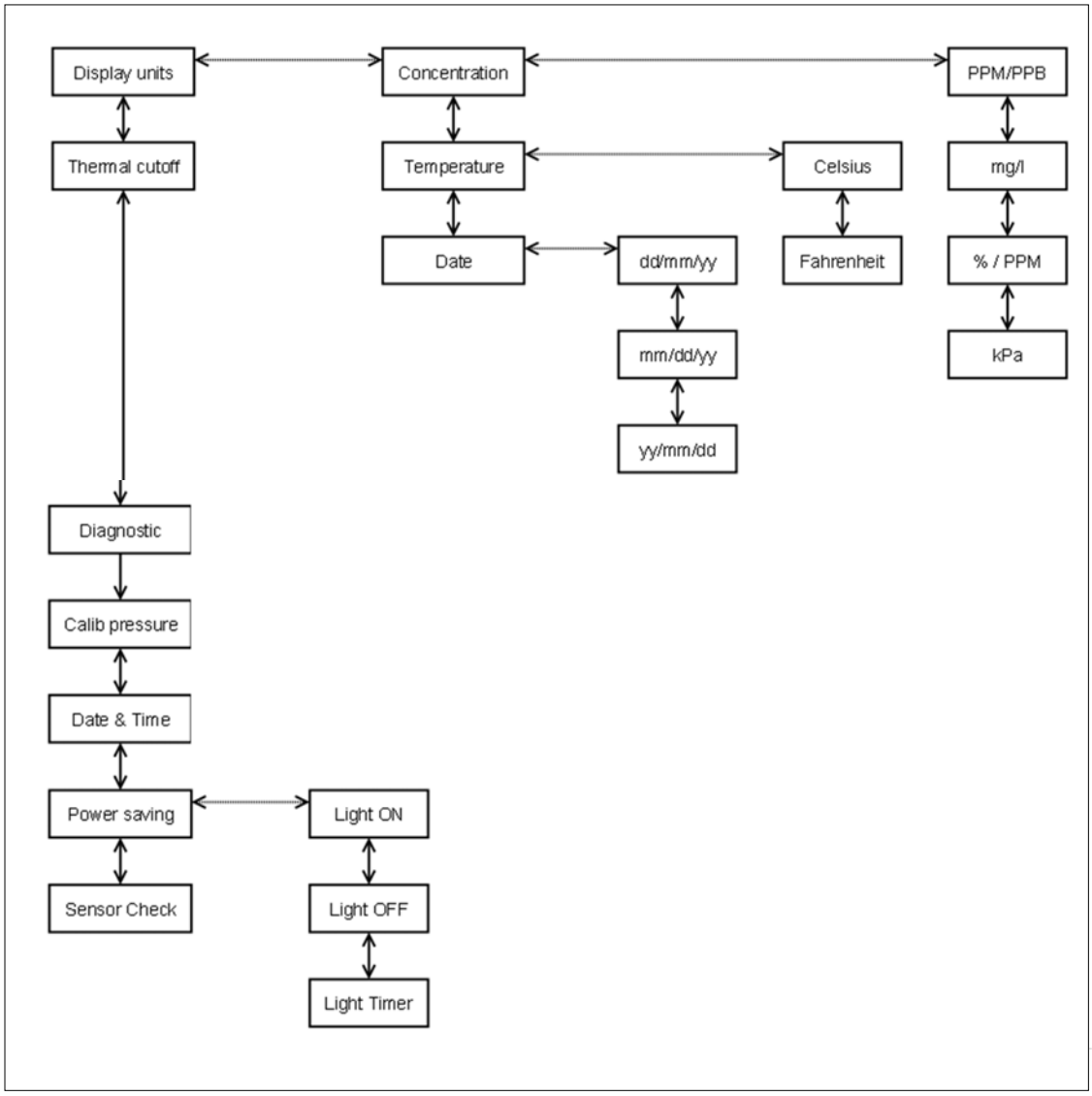


2.3 Menu Organization

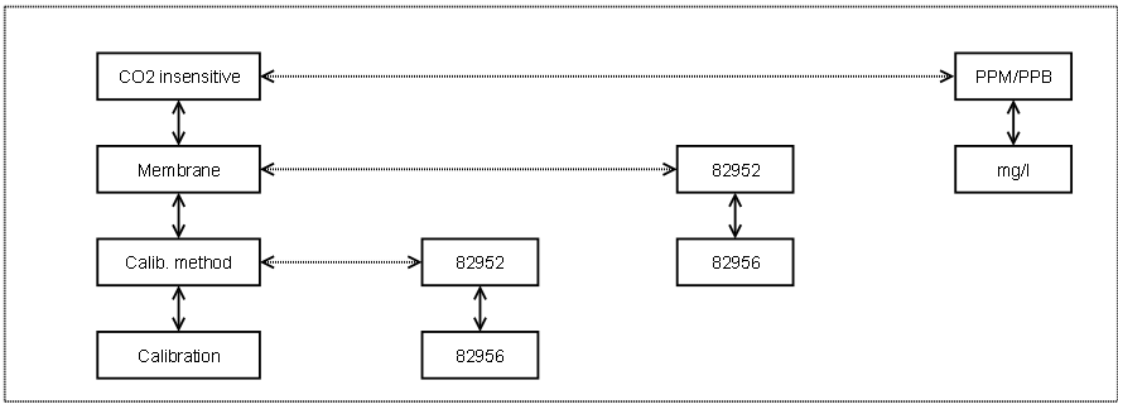
The following diagrams show how the functions are organized in the menus.



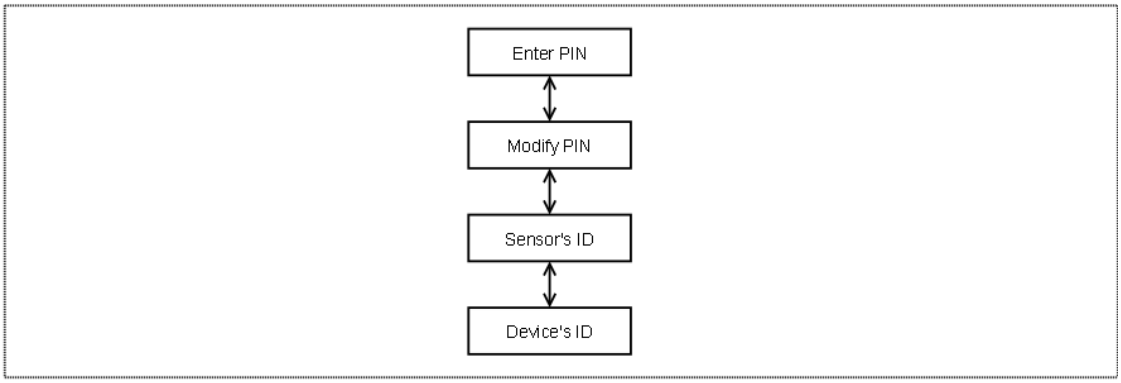
Settings Menu



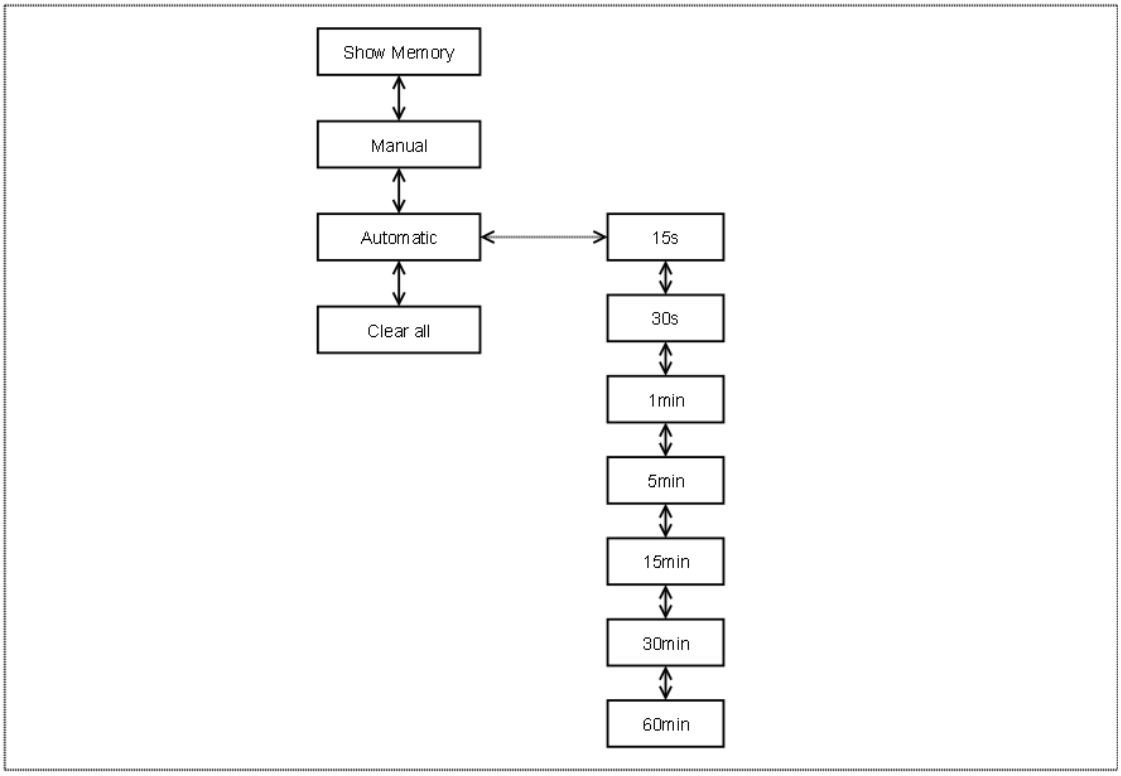
Calibration Menu



Identification Menu



Storage Menu



2.4 Identification

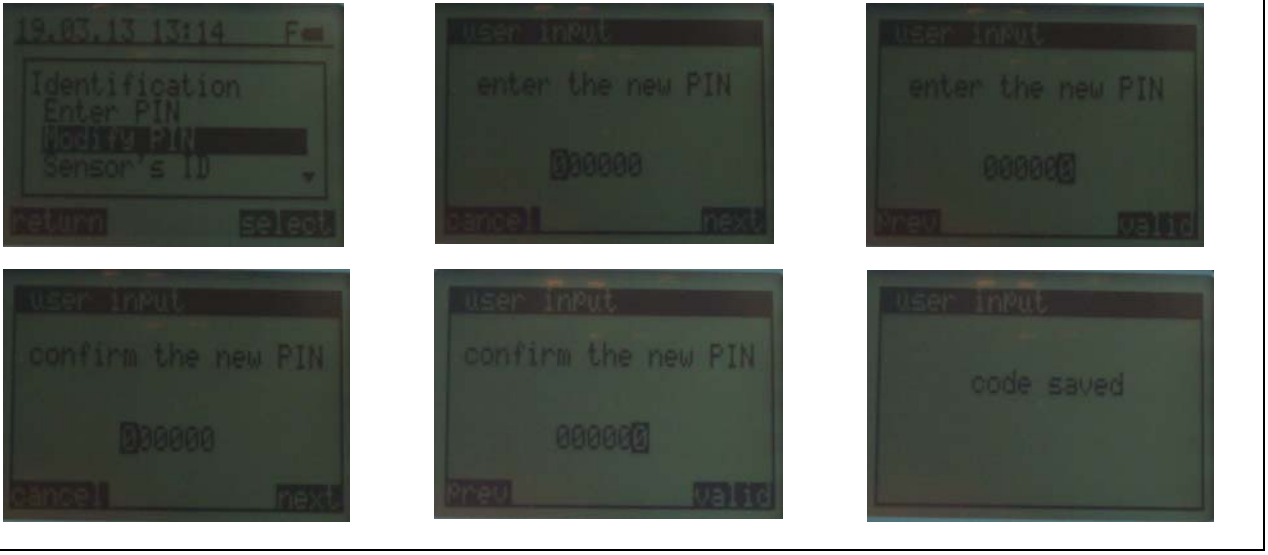
The identification menu groups the function related to the user, sensor and instrument identification.

2.4.1 Enter PIN

To secure the use of the instrument, some functions (settings and calibration) are enabled only if the user enters a secret code, also called PIN code. The purpose of this menu item is to let the user enter its PIN code to unlock the restricted functions of the instrument. Once the PIN code is entered, it will remain valid for 10 minutes. After that delay, the user needs to enter again the PIN code. All instrument shipped by Dextens have the same default PIN code: **000000**

2.4.2 Modify PIN

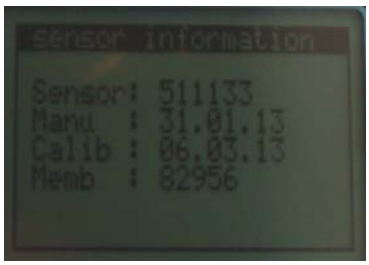
This is a restricted function. To unlock it, the user needs to enter the current PIN code (cf. §2.4.1). To make sure the entered value is the expected one, the instrument asks the user to enter the new PIN code twice. Of course the two values must be equal to save the new PIN code. The picture shows you the complete input sequence.



In case you forgot your PIN code, Dextens provides a small software tool working on any personal computer (with windows XP) which lets you restore the factory default PIN code.

2.4.3 Sensor ID

This function shows the sensor manufacturing and calibration information for a short time then it returns to the measurement screen. The information provided on the screen are:

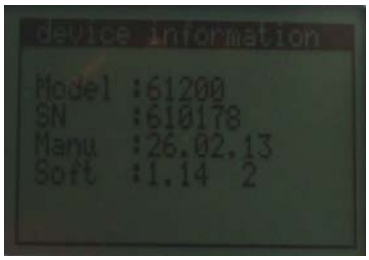


- **Sensor**: Sensor serial number.
- **Manu**: Manufacturing date.
- **Calib**: Date of the last calibration.
- **Memb**: Type of the used membrane.

If you have questions about a specific sensor, please copy the information on this screen. It will greatly ease the communication with your local distributor.

2.4.4 Device ID

This function shows the instrument manufacturing information for a short time then it returns to the measurement screen. The information provided on the screen are:

	• **Model**: Instrument model identification. • **SN**: Instrument serial number. • **Manu**: Manufacturing date. • **Soft**: Software revision.

If you have questions about a specific instrument, please copy the information on this screen. It will greatly ease the communication with your local distributor.

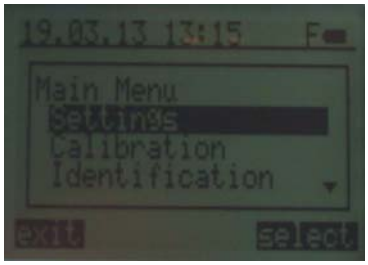
2.5 Settings

The access to this menu is protected by the PIN code. This means that the menu will appear only after a valid PIN code has been entered.

2.5.1 Display Units

This sub-menu lets you customize the display units for the ozone concentration, the temperature and the date.

2.5.1.1 Concentration

This menu lets the user change the display unit for the ozone concentration. In all cases the instrument measures the partial pressure of ozone in the tested medium. That partial pressure is then converted in the requested unit. The instrument has four possible choices:	
1. **PPM**: This unit is used for dissolved measurements. It displays the ratio between the number of ozone molecules and the number of water molecules. It is well suited to measure the ozone concentration in beverages, water in power plant and ultra-pure water. 2. **mg/l**: This unit is used for dissolved measurements. It displays the weight of the ozone dissolved in one liter of liquid. It is well suited to measure the ozone concentration in beverages, water in power plant and ultra-pure water. 3. **%**: This is used for gaseous measurements. The displayed value is the ratio between the number of ozone molecules and the number of gas molecules. To compute this value, the instrument uses a measure of the atmospheric pressure. Therefore this display unit is only valid if the measured medium is at atmospheric pressure. 4. **kPa**: This is used for gaseous measurements. The displayed value is the partial pressure of ozone in the measured medium. This display unit is well suited for measures in gas at variables pressures.	

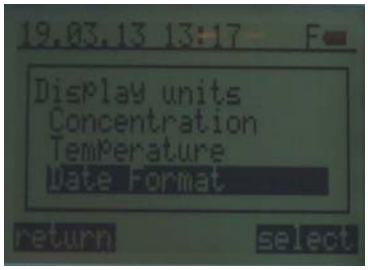
2.5.1.2 Temperature

This menu lets the user change the display unit for the temperature. The instrument has two choices: 1. **°C**: Shows the temperature in Celsius degrees. 2. **°F**: Shows the temperature in Fahrenheit degrees.	

This measurement is also used internally for compensating the effect of the temperature on the membrane and on the tested medium. To get the best accuracy and time response the temperature sensor has been placed as near as possible from the membrane inside of the ozone sensor. Nevertheless, depending on your application (liquid or gas, flow rate, ….) it may take a little time to the temperature to stabilize.

2.5.1.3 Date Format

This menu item lets the user select his preferred date format. This choice only modifies the date display format (in the title bar and when displaying the stored measurements). But it has no effect on the date and time input (cf. §2.5.5). There are 3 choices:



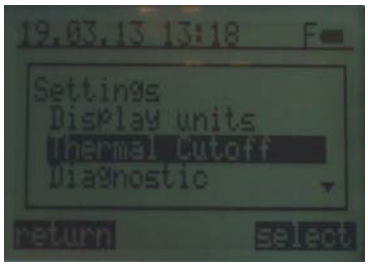
1. **DD/MM/YY**: European date format (day / month / year)
2. **MM/DD/YY**: American date format (month / day / year)
3. **YY/MM/DD**: ISO date format (year / month / day)

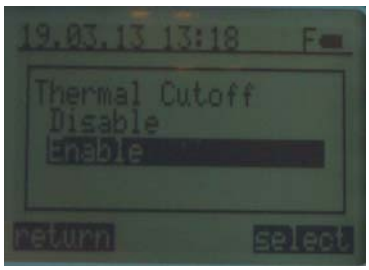
2.5.2 Thermal Cutoff

This menu lets you select whether the thermal cutoff is enabled or not and select the cutoff temperature.

Thermal cutoff is an important feature because it increases time between maintenances. When enabled, the thermal cutoff function switches off the sensor polarization when the measured temperature rises above a fixed limit. Its main purpose is to prevent the sensor from measuring during the Clean-In-Place (CIP) or Sterilize-In-Place (SIP) phases and ozone monitoring is not useful.

To avoid oscillation on the polarization, the thermal cutoff has a hysteresis. It means that the instrument switches off the polarization when the temperature is higher than a specified value, and only switches on when the temperature drops below the specified value minus 2.5°C.



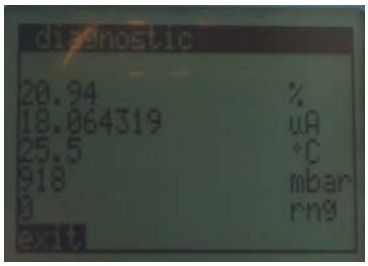


When the user decides to enable the thermal cutoff, he will be prompted to enter the requested cutoff temperature. The factory default is 45°C.

2.5.3 Diagnostic

This menu groups in one screen all the measurements done by the instrument. It is useful to diagnose some sensor problems. The available information are:

- Ozone concentration and its unit.
- Sensor current (in micro-ampere).
- The sensor temperature measurement and its unit.
- The atmospheric pressure (in milli-bar).
- The measurement range (0 to 3)



2.5.4 Calibrate Pressure

This function lets the user calibrate the barometric pressure sensor that is used for the in-air sensor calibration (cf. §2.6.3) and for the gaseous display unit in percent (cf. §2.5.1.1).

The user is prompted to enter the absolute atmospheric pressure for its location. If you get this information from a weather forecast internet site, make sure it is an absolute pressure and not a value reported to the sea level pressure. In the latter case, use the following formula to compute an approximated value:

$$P_{abs} = P_{sea} - 0.11 \cdot H$$

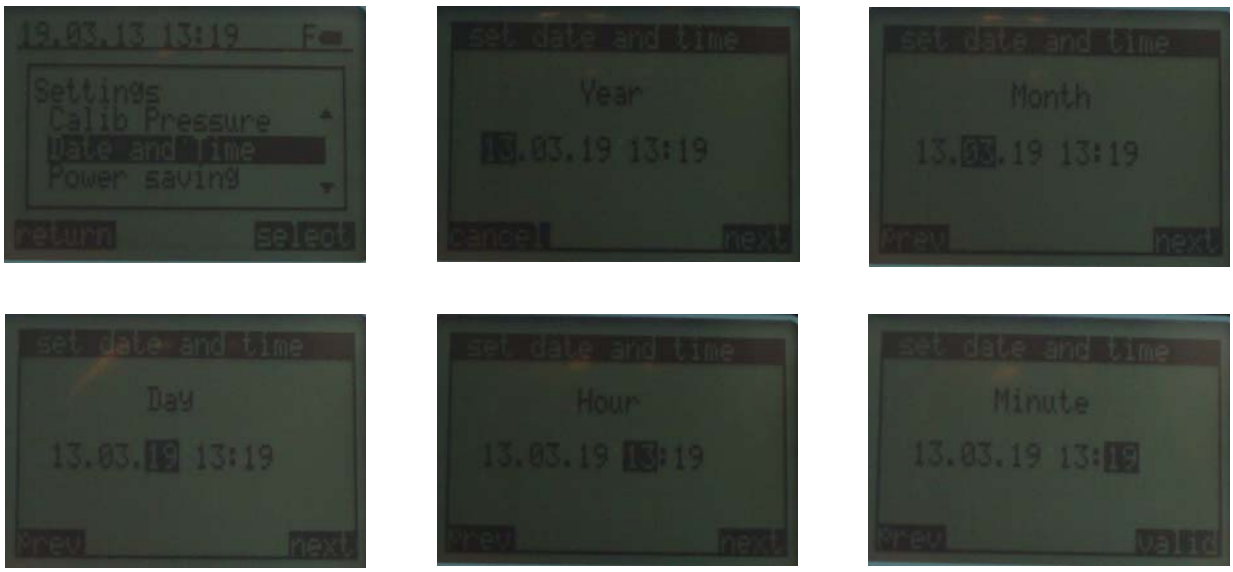
Where:

- P_{abs} = the absolute pressure
- P_{sea} = the value reported to the sea level
- H = the altitude in meter of your location

Please note that it is not useful to calibrate the pressure sensor more than once a year.

2.5.5 Set Date and Time

The user can set the system date and time with this menu.



2.5.6 Sensor Check

By default, the instrument checks that the connected sensor has a valid tag. This ensures that the measurement shown on the instrument screen uses the right sensor calibration value. The drawback of this approach is when you want to use the instrument with sensors without tag (sensors from competitors) you will need to calibrate the sensor every time the instrument is restarted.
To resolve this problem the customer can switch off the sensor check at startup. *Doing so, the customer has to make sure the sensor has been calibrated on the same ozone analyzer.*

2.5.6.1 Enable

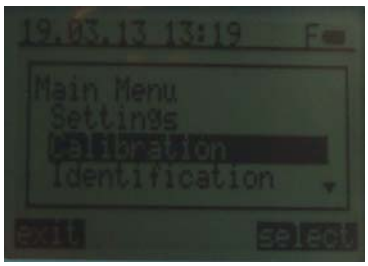
The sensor checking is enabled. In case the instrument can not read the tag, he will prompt the user for calibrating the sensor or use the last calibration done with this instrument.

2.5.6.2 Disable

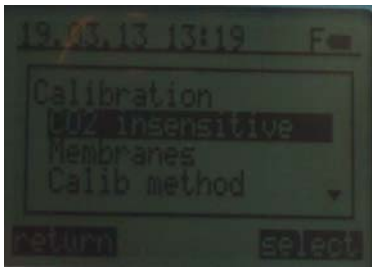
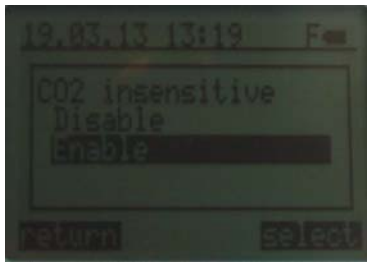
The sensor checking is disabled. When the instrument can not read the tag, it will automatically use the last calibration done without any question to the user.

2.6 Calibration

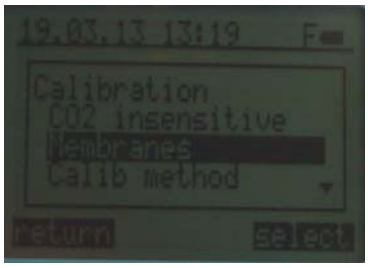
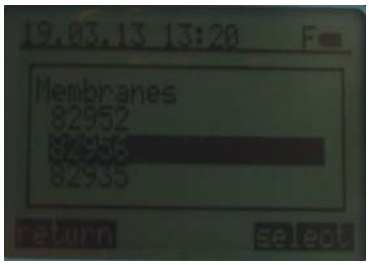
This paragraph explains the content of the calibration menu and how the user should proceed to get a good calibration. The Dextens sensors are sold pre-calibrated and there should be no need to calibrate them between services. As our sensor have an integrated memory, it is also possible to calibrate a sensor on one instrument in your laboratory and then place it in line on another instrument without needing to re-calibrate it.

When entering the calibration menu, the user has to walk through all sub-menus to select the application specific parameters.	

2.6.1 CO2 Insensitive

This sub-menu must not be used for ozone measurement and is only necessary for oxygen measurement.	
	

2.6.2 Membrane

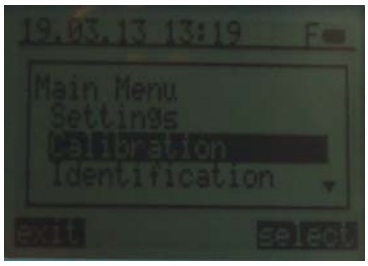
This sub-menu lets you select the installed membrane.	
Dextens currently provides only two different membranes: 1. **82952**: The less permeable membrane. It is used for measuring higher concentration of ozone. 2. **82956**: The most permeable membrane. It is used for measuring trace level.	

2.6.3 Calibration Method

The instrument provides two ways for a single point calibration. This sub-menu lets you select the one you need:

1. **In air**: This is the preferred method. It lets you calibrate the sensor accurately in water saturated air. The main advantage of this method is that it does not need any calibrated reference gas.
2. **Direct**: This method can be used when removing the sensor from the monitored medium is not possible. When selecting this kind of calibration. The user must provide the expected concentration of the medium. Note that doing direct calibration in a low concentration reference medium will reduce the accuracy of the measurement. Thus we strongly discourage the calibration with concentration below 0.1PPM (dissolved).

2.6.4 Start Calibration

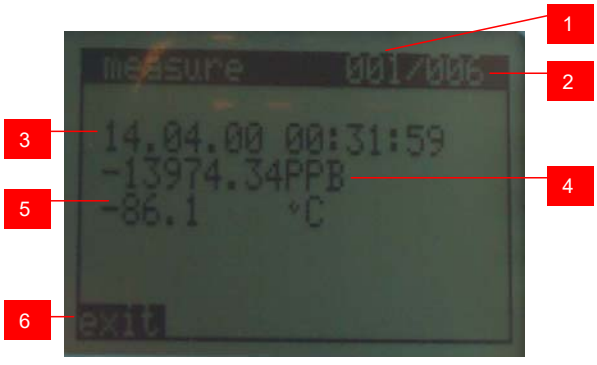
When selecting this item, the instrument starts its calibration procedure (using the previously defined parameters).	

1. Screen Title
2. Sensor efficiency. This value shows the percentage of generated current compared to a standard value.
3. Membrane type
4. CO2 insensitivity flag. When the text “CO2 insens” is displayed, the sensor will not be affected by the presence of CO2. Otherwise there is nothing at this place.
5. Left soft key to abort the current calibration. Nothing will be saved.
6. Right soft key to valid the current calibration. That key will be activated after 5 seconds and it is up to the user to wait enough time for stabilization of the calibration.

2.7 Storage

The user has the possibility to store up to 255 measurements in the instrument’s memory. It can be done either manually or automatically. In the manual mode, the main screen shows in the lower left corner the "Store xxx" label. Pressing the left contextual key saves the current measure. In the automatic mode, the instrument saves the measurements periodically. The left contextual key becomes inactive and the lower left corner shows “Log xxx”

2.7.1 Show Memory



1. Current sample
2. Total number of samples
3. Date and time stamp.
4. Sample’s ozone concentration and measurement unit
5. Sample’s temperature measurement
6. Leave the measurements

The navigation from one point to another point is done with the up and down keys.

2.7.2 Manual Storage

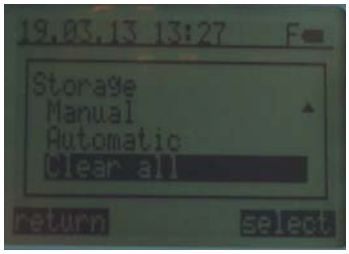
This menu point selects the manual storage mode.

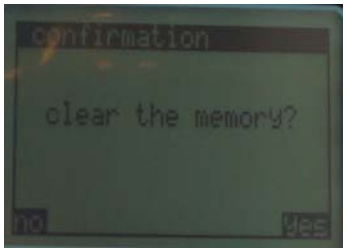
2.7.3 Automatic Storage

This menu point opens a sub-menu with the choices of storage period from 15[s] to 60[min].

2.7.4 Clear Memory

This menu point is only visible after a PIN code has been entered. It let the user clear all measurements from the instrument memory.





3 Data connection

3.1 General Information

Dextens can provide programs that work on standard desktop or laptops computers. The program can be used by the end user to to get access to the instrument's data and to restore the pin code through the external USB connection. In the following part of this chapter, theses programs will be called the "user tools".

3.2 Requirements

Before you can start using the user tools, please check that you meet all the following requirements:

- A working computer with at least Windows XP or Windows 2000.
- A cable with a lemo connector (connection with portable instrument) and a USB connector (connection) with computer (provided on request by Dextens).

3.3 Using the Programs

3.3.1 Driver Installation

To avoid the need to install drivers on your computer, we based the communication with the instruments on a standard transport protocol. This means that the first time you connect an ozone analyzer to a computer. Windows will show you that new hardware has been detected and it will install automatically the standard driver. You do not have anything to do for it.

3.3.2 Program distribution and installation

These tools are distributed to the end user or local distributors by e-mail or on a CD shipped with the instruments. They are packaged as a set of small programs especially designed to work as is. They *do not need to be installed* on the computer, thus making your life easier.

To use these tools on a regular basis, we recommend creating a directory on the computer's hard disk. Then copy all the programs in there and finally create shortcuts on your desktop to access them quickly.

3.3.3 Restoring PIN Code

The program called "**usr_clear_pin.exe**" returns the instrument's PIN code to the factory default setting (987654). To do that, just start the program and follow the instruction given on the computer's screen.

3.3.4 Reading Data

The program called "**usr_read_data.exe**" lets you save the data saved in the instrument in you personal computer. The resulting file can be imported in spreadsheet programs like Excel. When you start, please follow the instruction given on the computer's screen.
At one time in the wizard, you will be prompted to enter the name for the target file. Select carefully the destination on the hard disk to make sure you will find the file later. The easiest way to do that is to press the "…" button which will open a file selector.

3.3.5 Updating firmware

The program called "**usr_update_xyy.exe**" will update the instrument's firmware to version x.yy. As this program modifies the instrument's internals it might be dangerous if not targeted to the right instrument. Therefore read carefully the instruction in this manual and on the computer screen.
This program is *available only on request* and to avoid manipulation errors; it should be deleted after use.

3.3.5.1 Feedback

During the execution, the program generates a configuration file "xxxx.mcs", where the xxxx is the serial number and manufacturing date of the instrument, as shown in the picture below. **It is very important to us that you send back this file**. It proves that the updating program behaved well and gives us important information about the instrument version and calibration data. Thanks in advance.

4 Technical Specifications

Power	Input voltage 5VDC, rechargeable battery
Operating Limits	0 ºC to +45 ºC (32 ºF to 113 ºF)
Enclosure	IP 65 Stainless steel / Nemax, paint coating
Dimension WxHxD	(W x H x D) 240 mm x 180 mm x 180 mm
Weight	3.4 kg
Logging	255 measurement points Date and time stamp Ozone and sample temperature Atmospheric pressure Logging can be manual or periodic
Dissolved display units	Ppm, ppb, mg/l Resolution 0.01 ppb
Gaseous display unit	%, ppm, kPa Resolution 0.01 ppm

Range O3 dissolved	0.1ppb – 200 ppm
Range O3 gaseous	0.5ppm (v/v) – 100%
Supported membranes	82952, 82956
Thermal cut-off	Adjustable by the user.
Logging	Automatic or manual data storage
Calibration	Single point air calibration - direct calibration
Digital output	USB cable with lemo connector
Sensor options	O3 sensors 51300 or 51301