

## General Use Guide (GUG)

— It is recommended to read the instructions before using the device —

# Cairsens UART AMBIENT AIR SENSOR

April 2018



### Warning

The information contained within Environnement SA document is for information purposes only and is subject to change without notice.

Environnement SA cannot be considered liable for direct, indirect or collateral damages due to non compliant use and/or inappropriate use of the equipment or information contained within this document and our technical manuals.

Environnement SA makes no warranties expressed or implied within this documentation.



111 bd Robespierre, 78300 POISSY – TEL. 33(0)-1.39.22.38.00 – FAX 33(0)-1.39 65.38.08 – www.cairpol.com

## 1. GENERAL

The Cairsens is a device for measuring the quality of the air that must be handled with care.

It is strongly advised to carefully read the instructions for use described in this manual.

## 2. ACCESSORIES OF UART CAIRSENS

The following accessories are essential to the use of Cairsens daily:



- (1) 1 Cairsens version UART
- (2) 1 dongle USB red connected to Cairsens
- (3) one set of two filters \*

\* Filters of Cairsens gas {CH<sub>2</sub>O - CO - NO<sub>2</sub> - NMVOCs} do not contain the white material.

### Equipment optional:

- Cairtub analog converter: the UART Cairsens may be coupled to an analog conversion module in order to obtain a 4-20 mA and/or 0/5 V signal.
- Cairnet: protection enclosure including a battery (recharged by photovoltaic panels) and a wireless communication module (Radio or GPRS), allowing independent measurement with real-time data recovery.

### Download tools, configuration, visualization and export of Cairsens UART data:

Software:

- Suite Cairmap (Cairserveur, Cairmap with core modules and optional Oracle data).
- Caircloud (depending on type Cairnet)

## 3. COMMISSIONING AND OPERATION CAIRSENS UART

The Cairsens comes with a red dongle inserted into the mini-USB connector;



- Removed: it must be removed to be able to power and start it functioning.
- Inserted: it is used only during prolonged storage or non-use of Cairsens. If the Cairsens is not powered, nothing is done, the fan and the display are off.

### Power Supply:

The Cairsens UART must be powered by an external source to operate (it has no internal battery).

Once powered, the Cairsens performs measurements and automatically stores them. This data can be read by the communication with the Cairsens using the UART protocol (3V TTL signal type, contact us for a list of commands and more information).

Power Supply characteristics to use are:

- Voltage DC: 5 V.
- Supply Current DC: 1 A.

**Use and communication with the UART Cairsens:**

The Cairsens UART has an UART output 3V TTL. You can use queries and send them by frames to the Cairsens to obtain multiple data types, as pollutant measurements.

This communication protocol allows developing multiple applications around the sensor. **The Cairsens should not be connected directly to the USB port** (Unless using a UART to USB converter, or FTDI 3V3 to USB).

**Commissioning**



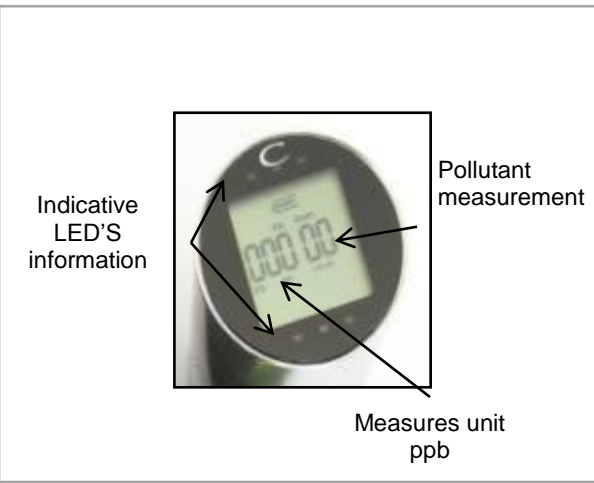
No prior adjustment is necessary: Cairsens unit begins measures since its commissioning, they will be stored and displayed on the screen.

The record of the measures is carried out continuously in Cairsens internal memory.

**Calibration and measurement are guaranteed and certified for 12 months after delivery.**

**Measured by the sensor:**

The measurements displayed on the screen are made as follows:



- A sliding average of sensor readings within one minute.
- This value is stored in memory.
- Refresh this value on the screen every 10 seconds.

The frequency of measurement is 1 minute.

The conditioning of sample is provided by the filter, an essential component for the proper functioning of Cairsens and to handle with care.

**Relative humidity reading:**

The Cairsens measure the temperature and relative humidity and stores them at the same frequency as that of the measurement of the concentration of pollutant:

- The temperature [T°C] of the air sample is expressed in ° C.
- The relative humidity [RH%] of the air sample is expressed in%.

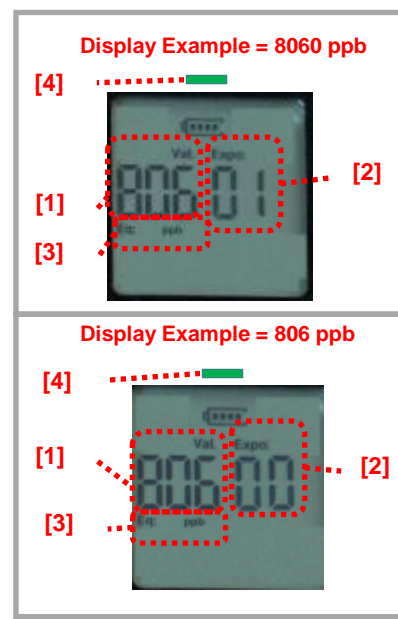
**Timestamp measures:**

The measures timestamp is not available in version Cairsens UART.

**4. DISPLAY MODE AND OTHER INFORMATION MEASURING SHOWN ON THE SCREEN**

**Measurement display:**

This display mode in addition to the icon "battery" is the default view of Cairsens.



It done measures of the concentration of pollution continuously by the left 3 digits of [1] and the two digits of [2] exponent of the first 3 digits [1] is:

**Value measured by the sensor = [XXX] \* 10^ [xx].**

For example:

- Sensor Measurement = 806 ppb → Display on screen = [806] [00] (ppb).
- Sensor Measurement = 8060 ppb → Display on screen = [806][01] (ppb).

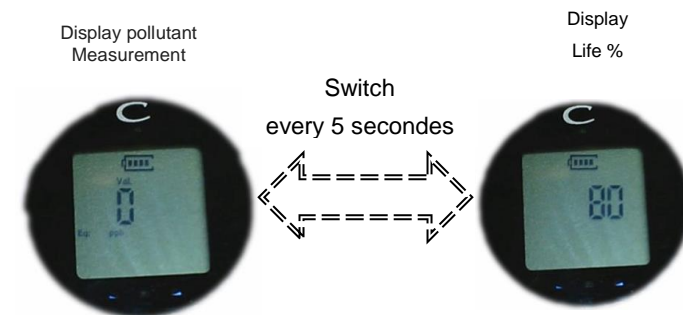
The unit is ppb, and is represented by 3 characters [3] under the 3 left digits of [1].

The green LED [4] flashes regularly to indicate the proper functioning (continuously measures mode) of Cairsens.

When a malfunction is detected by the Cairsens it will be displayed on the screen alternating with measurement every 3 seconds.

The "battery" icon is present only as an indication; there is no function of Cairsens (used by Cairsens versions USB)

**Viewing the aging state (life %) of the electrochemical cell of Cairsens:**



The display changes every 5 seconds between the measurement of the pollutant and the remaining useful life of the electrochemical sensor (see [photo cons](#)).

The state of sensor Life Aging% read, resulting in the following manner.

- 100 = 100% = 0 months of operation.
- 50 = 50% = 6 months of operation.
- **00 = 00% = 12 months of operation. Beyond this period, measures of Cairsens are not certified, then it is strongly recommended to renewal** (Prices on request from your usual sales contact or email info@cairpol.com)

## Showing malfunctions:

Three types of detectable defects will be displayed alternating every 3 seconds with the measurement of pollutant:



- **cAL** (see photo-cons): The sensor has reached its lifetime of 1 year. Once this deadline is passed, measurement and calibration of Cairsens are not certified. It is advisable to renew the Cairsens (Rates on request from your usual sales contact or email info@cairpol.com).



- **SEr** (see photo-cons): The electrochemical cell is defective, contact the usual service department, or email support@cairpol.com.



- **FRn** (see photo-cons): The Cairsens fan is defective, contact the service department or by regular mail to @cairpol.com support.

**! CAUTION: This feature is under development and is not yet available in the current version**

## Measures Recording Time:

The measurement period recordable by the Cairsens directly depends on the selected measuring frequency (using the UART protocol).

The following table gives the maximum stored period based on the frequency of measurements:

Frequency Measurement	1 minute	15 minutes	1 hour
Maximum recording time measures	10.8 days	151 days	19,5 month

**! Warning: when the maximum is reached, the oldest measurements are deleted to continue the recordings of new measures.**

## 5. SPECIAL CONDITIONS OF USE AND STORAGE

### Terms of use:

- Temperature Range: - 10 ° C to 50 ° C.
- Relative humidity range (% RH): 10% to 90% (non-condensing).

### Storage conditions:

- Temperature Range: 5 ° C to 50 ° C.
- Relative humidity range (% RH): 10% to 90% (non-condensing).
- **Maximum storage period without use: 3 months.**

## Commissioned following a lengthy storage:

Prolonged storage (more than 4 weeks) directly affects sensor performance during the first days of use following its return to service. The sensor needs to be reconditioned to regain its accuracy. It is therefore highly advisable to perform a full reconditioning of the electrochemical sensor, according to one of 2 available methods:

### (1) Reconditioning accelerated using a standard gas bottle containing a mixture of the test gas with reconstituted air (20.9% oxygen):

- (a) Use a sealed volume \* (a "nalophan" pocket for example).
- (b) Putting the Cairsens in this volume for 10 minutes.
- (c) For new next 10 minutes, Injecting a concentration:
  - Maximum range for a Cairsens which the measuring range is equal to or less than 0/1 000 ppb.
  - Equivalent to 1 / 20 of the maximum range for Cairsens whose range is greater than 1000 ppb.
- (d) Empty volume of content (open or extract the gas still present) until the gas concentration is close to "zero" ppb.
- (e) Reiterate again from step (b).

**! \* WARNING: a minimum of 10% of RH% humidity must be present in the volume.**

### (2) Reconditioning air on site:

- In these conditions, the electrochemical sensor of Cairsens will recondition in ambient air. This method requires much more time than the last.
- It is highly recommended to use the measures after a period of at least 24 hours (needed for optimal reconditioning).

## 6. SAFETY INSTRUCTIONS

- Use only accessories provided (specific USB cable, USB power adapter, record EU / US, USB dongle, filter ...).
- Do not block the filter or the fan.
- Do not hold it in the hands during measurements.
- Do not use in dusty, corrosive, explosive environment.
- Do not use in the presence of other gases (combustion gases, solvents, chlorine, acid fumes and basic ...).
- Observe the operating conditions (see Specifications).
- Due to the small size of some components, the Cairsens not suitable for children under 36 months.

## 7. MAINTENANCE CAIRSENS

- To prevent a wrong timestamp (see Chapter 3)
  - Avoid complete discharge
  - Recharge regularly. Recommended every 24 hours.
- To change the filter (recommended 2 times a year or if the filter, when present, is considered improper)
  - Insert the red dongle.
  - Remove the old filter by avoiding contact with the white central part.
  - Insert the new filter by its edge by avoiding contact with the white central part.
  - Following this change, 12 hours are needed to stabilize measurements.
- Do not store it in a polluted atmosphere.
- If necessary, clean it only with a clean and dry cloth.
- Perform any maintenance operation free from dust and splashing water.

## 8. CUSTOMER SERVICE - WARRANTY

- The Cairsens and accessories are guaranteed 12 months (parts and labor) from the date of delivery (available in the delivery).
- Beyond 12 months, the measures may not be precise enough and it is advisable to renew the unit.
- CAIRPOL cannot be considered responsible for any damage made to Cairsens, resulting from improper, erroneous and / or irrational (disassembly, introduction of objects inside ...) by unauthorized personnel, and canceling done warranty.
- If damage of Cairsens and / or accessories, contact CAIRPOL at the following address:

CAIRPOL – ENVIRONNEMENT-SA  
111 Boulevard Robespierre  
78300 Poissy

[support@cairpol.com](mailto:support@cairpol.com)

## 9. WASTE DISPOSAL



In accordance with European Directive 2002/96 / EC on electrical and / or electronic waste, power tools and accessories, which can no longer be used, must be separated and undertake appropriate way of recycling.

This device contains a lithium battery, do not discard with household waste, but return it to CAIRPOL or in a suitable recycling deposit.

\* The name Cairpol, the Cairpol logo, the name of the products in its range and slogans and the technology developed by Cairpol are, unless otherwise indicated, trademarks and patents. Any reproduction, use and / or modification made without the prior written consent of Cairpol is likely to constitute an infringement and is liable to prosecution.