

General Use Guide (GUG)

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

Cairsens

AMBIENT AIR SENSOR

April 2018

AIR POL

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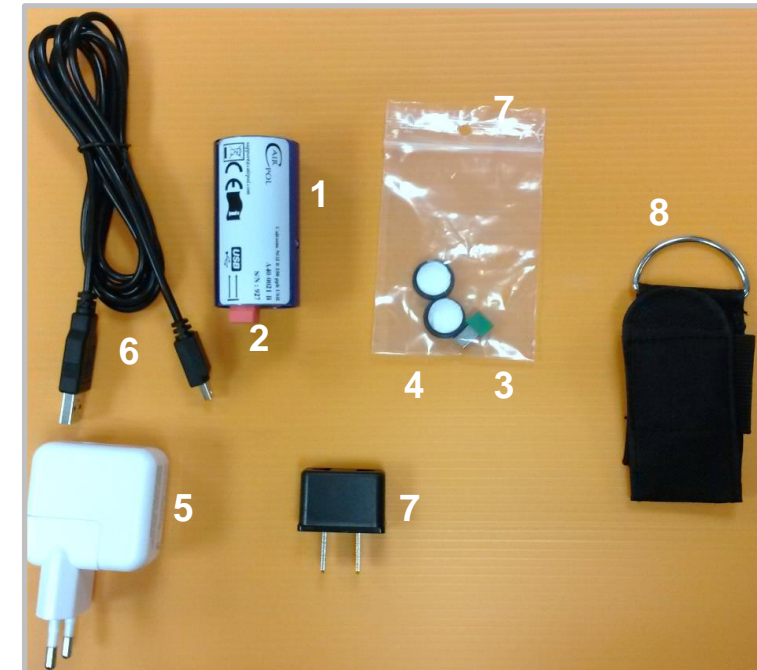
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1. GÉNÉRAL

The Cairsens is a device for measuring the quality of the air. It must be handled with care. It is strongly advised to carefully read the instructions for use described in this manual.

2. ACCESORIES OF CAIRSENS USB (CAIRCLIP)

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



- (1) 1 Cairsens USB version
- (2) 1 dongle USB, red connected to Cairsens
- (3) 1 dongle USB, green.
- (4) 1 set of 2 filters
- (5) 1 charger AC110/220V toward USB 5V/1A.
- (6) 1 USB Cable toward special mini USB type B.
- (7) 1 adapter plug EU / US (option)
- (8) 1 holster.

* Filters of Cairsens gas {CH₂O – CO - NO₂ - NMVOCs} do not contain the white material.

Equipment optional:

- Cairtub 3 sensor: Protective case for sensors with 3 USB batteries to a range of about 21 days.

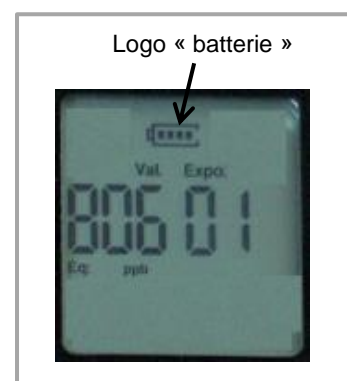
Download tools, configuration, visualization and export data of Cairsens:

- Cairsoft (V4.5.and up) : available on our website www.cairpol.com or by clicking [here](#)

3. COMMISSIONING AND OPERATION CAIRSENS

Power supply and charging:

The Power supply (or recharging) of the internal battery of Cairsens module is done by a charger and a USB-to-mini-USB *type B* cable supplied.



Necessary power supplied to recharge the internal battery:

- Alternative AC: 110 V - 60 HZ / 220 V - 50 Hz. plug type EU.
- Continuous DC: 5 V / 1 A.

Battery specifications:

- 450 mAh capacity
- Lithium Polymer (LIPO with included protection circuit).

Charging the internal battery can be performed:

- Either with the supplied power (the Cairsens continues to measure normally during this phase).
- Either from the USB port of a computer (the Cairsens measure continues normally during this phase).

The battery of Cairsens is initially charged to 100% at the factory, however, a natural discharge can occur and be recognized upon delivery. **Upon receipt, it is asked to recharge it completely, in order to benefit from 3 months of shelf storage without use.** By the way, thank you for not forgetting to reconnect the red dongle from this moment

The charge level is given by the icon "battery" whose filling is the real autonomy as illustrated by the following table:

Battery Level	100 %	< 50 %	< 10 %	0 %
State Icon				No display
Operating mode/ Alert	Normal operation	Normal operation	<p>Trigger mode 'standby': means any display off except logo 'battery'.</p> <ul style="list-style-type: none"> • No measurements. • Time stamp maintained. <p>Tip: Charge the battery for 4 hours minimum.</p>	<ul style="list-style-type: none"> • Battery empty • Cairsens off. • Time stamp stopped. <p>Tip: charge the battery for 4 hours minimum.</p>

The optimal charging time is 4 hours, a full charge every 24 hours (8 hours for COVNM sensors) is recommended.

Commissioning

The Cairsens commissioning is done by removing the red dongle Mini USB connector. The screen displays 'StArt' (see photo below).

No prior adjustment is necessary, at the inception of the function begins Cairsens measures, automatically will be stored and displayed on the screen.

The memorizing of the measures is done continuously in internal memory of Cairsens.

Measures are exploitable in graphical format and / or in .XLSX file on computer with the software CAIRSOFT V4.5 (and more).

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

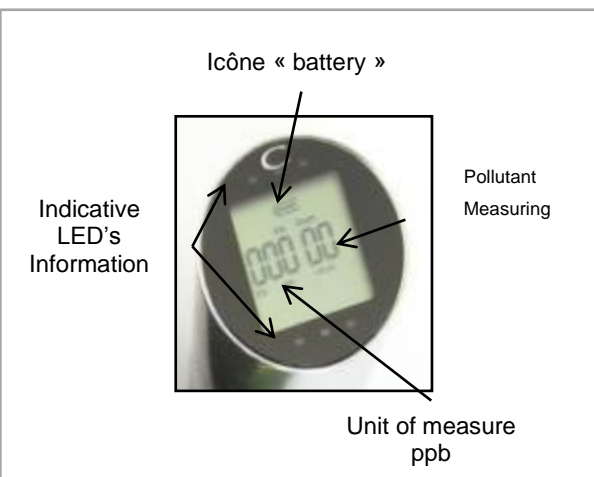
Measurement made by the sensor:

The measurements displayed on the screen are made as follows:

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

The frequency measurements may be either (using Cairsoft) for 1 minute, 15 minutes or 1 hour.

Warning, this parameter directly affects the amount of storable data and storage duration (see "Download of the measures").



The sample conditioning is ensured by the filter, an essential component for the proper functioning of Cairsens and must be handled with care.

Humidity and temperature readings:

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

- Temperature [T °C] of the air sample is expressed in ° C.
- Relative humidity [RH%] of the air sample is expressed in%.

These two statements are included in the same table that measurement of the pollutant, with downloadable Cairsoft.

Metering and monitoring the autonomy of Cairsens:

The Cairsens measure the battery voltage [Bat (mV)] and store it at the same frequency as that chosen for the measurement of the concentration of pollutant. This measurement is transcribed as follows:

- Bat (mV) = 4700 mV: the Cairsens is charging / connected to a power supply.
- 4200 < Bat (mV) < 3300 mV: Normal use of Cairsens on battery only.

The Bat measures (mv) are integrated in the same table that measures the concentration of pollutant, with downloadable Cairsoft. The [battery] logo on the LCD screen also allows to follow this trend (see "Power supply and Charging" chapter).

Time, date and time stamping of measured data:

The internal clock is factory set. Before use or measurement campaign, check its setting.

The loss of autonomy can alter the timestamp (see Table 1 above), the Cairsens record the date and time of last analyzed sample.

At reboot:

- The display indicates the Cairsens alert 'dAtE' with a lower 3 LED flashing every 5 seconds (see photo cons).
- Proceed to set the time and date using the Cairsoft software. Once the adjustment, the time stamp measurements will resume from the new date and time.

! If the setting is not made, the measures will be stamped from 01/01/2030.



Manual control of startup and shutdown steps:

The Cairsens is, by default, continuous measurement mode. Dongles provided allow you to change this feature manually:

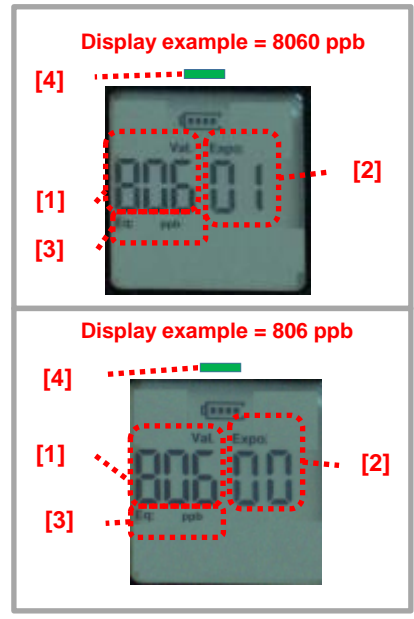


- **The Red dongle:**
 - **Inserted:** The Cairsens is in "sleep" mode. No action is made; the fan and display are turned off. Use during storage or prolonged Cairsens of non-use.
 - **Removed:** The display shows 'StArt' (see "commissioning"), the measure in continuous mode resumes.
- **The Green dongle:**
 - **Inserted:** Enables the use of Cairsens on a flat surface (eg a desktop) without closing the inlet sample. Also provides protection from the USB port while using the Cairsens.
 - **Removed:** no action.

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

Measurement display:

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



It done a measure of the concentration of pollution in continue by the 3 left digits [1] and the 2 right digits [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 3 left digits [1].

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

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

Display of malfunctions:

Detectable defects are:



• **cAL** (see photo cons): The sensor has reached its lifetime of 1 year. This timeout, measurement and calibration of Cairsens are no longer certified. It is advisable to renew the Cairsens (Prices on request from your usual sales contact, or email info@cairpol.com).

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

• **FAn** (see photo cons): The Cairsens fan is defective, contact the customer service department or by email to support@cairpol.com.

! WARNING: This feature is under development and is not available in the current version!

5. CONFIGURATION CAIRSENS, DOWNLOADING, VIEWING AND EXPORT OF MEASURED DATA.

The configuration of certain parameters of Cairsens (Clock Set, name it, etc.) is possible using the CAIRFOT software (V4.5 and more).

CAIRSOFT download software:

- The Cairsoft is available on our web site " www.cairpol.com " under " Download " then " Software " or by clicking on this [link](#).
- The instruction manual is directly available from the icon of Cairsoft home page or by clicking on this [link](#).
- Install the software "Cairsoft" on your computer (see the conditions and prerequisites in the instructions of Cairsoft).

Setup and configuration of Cairsens:

- Connect the Cairsens to the PC using the specific USB to mini-USB cable provided (Do not use a commercially cable).
- Follow the instructions of the User Guide of Cairsoft for its use.
- The main features configurable in Cairsens are:
 - Date & Time (EU or US mode).
 - The name of Cairsens.
 - The choice of the measurement sampling rate (1 minute, 15 minutes or 1 hour) (note the induced shelf life).

! Refer to Cairsoft User Guide for more details

View and export measurements to a PC:

	A	B	C	D	E	F
1	Equipment number	Eq. H25 (TRS) Level (ppb)	Bat.(mV)	Temp. hygro °C	Hygro. %	Life (%)
2	Time					
3	08/11/2015 08:41:00	1	4710	25	35	
4	08/11/2015 08:42:00	1	4710	25	35	
5	08/11/2015 08:43:00	0	4711	25	35	
6	08/11/2015 08:44:00	1	4709	25	35	
7	08/11/2015 08:45:00	1	4710	25	35	
8	08/11/2015 08:46:00	1	4710	25	35	
9	08/11/2015 08:47:00	1	4711	25	35	
10	08/11/2015 08:48:00	1	4709	25	35	
11	08/11/2015 08:49:00	1	4711	25	35	
12	08/11/2015 08:50:00	1	4711	25	35	
13	08/11/2015 08:51:00	1	4708	25	35	
14	08/11/2015 08:52:00	1	4710	25	35	
15	08/11/2015 08:53:00	0	4710	25	35	
16	08/11/2015 08:54:00	1	4711	25	35	
17	08/11/2015 08:55:00	1	4711	25	35	
18	08/11/2015 08:56:00	1	4709	25	35	
19	08/11/2015 08:57:00	1	4711	25	35	
20	08/11/2015 08:58:00	1	4711	25	35	
21	08/11/2015 08:59:00	1	4710	25	35	
22	08/11/2015 09:00:00	0	4710	25	35	
23	08/11/2015 09:01:00	1	4710	25	35	
24	08/11/2015 09:02:00	1	4711	25	35	
25	08/11/2015 09:03:00	1	4710	25	35	
26	08/11/2015 09:04:00	1	4709	25	35	
27	08/11/2015 09:05:00	1	4710	25	35	
28	08/11/2015 09:06:00	2	4710	25	35	
29	08/11/2015 09:07:00	1	4710	25	35	
30	08/11/2015 09:08:00	0	4710	25	35	
31	08/11/2015 09:09:00	1	4710	25	35	
32	08/11/2015 09:10:00	1	4710	25	35	
33	08/11/2015 09:11:00	0	4709	25	35	
34	08/11/2015 09:12:00	2	4711	25	35	
35	08/11/2015 09:13:00	0	4711	25	35	
36	08/11/2015 09:14:00	1	4710	25	35	
37	08/11/2015 09:15:00	1	4710	25	35	
38	08/11/2015 09:16:00	1	4711	25	35	

Tableau 1: Export mesures example Cairsens O3/NO2

The "graphic" option of Cairsoft allows you to view and export in .XLSX file all data stored by the Cairsens since its commissioning.

The choice of the viewing and export period is possible from a few days to several months.

The data of Table ".XLSX" are the following:

- [1] - {Cell B1} : Internal Reference of Cairsens
- [2] - {Cell E1&F1}: Life sensor aging state in% translated as follows.
 - 100% = 0 month of operation.
 - 50% = 6 month of operation.
 - **00% = 12 months of operation. In this case the corresponding measures cells for in the table are red and the outline of the graphic Cairsoft change from green to red (see the User Guide of Cairsoft).**
- {Column A2 to Ax}: Date and hour.
- {Column B2 to Bx}: The pollutant measurements expressed in ppb (Or in µg/m³).
- {Column C2 to Cx} : Battery voltage in mV translated as follows:
 - ≥ 4700 mV = External power supply connected operation.
 - 4200 <mV<3300 = Operation on battery without charging.
 - 4200 mV = the battery is fully charged.
 - 3300 mV = the battery is empty and must be recharged.
- {Column D2 to Dx}: Temperature measurements inside the Cairsens (near the electrochemical sensor) in ° C.
- {Column E2 to Ex}: Relative humidity Measurements in the Cairsens (near the electrochemical sensor) expressed in RH%.

Measures Recording Time:

The measurement period memorized by Cairsens directly depends on the selected measurement frequency (see "Commissioning").

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

Measuring frequency	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 record of new measures.

6. 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 time without use: 3 months.

Commissioning after a lengthy storage:

Prolonged storage (more than 4 weeks) directly influences the sensor performance for the 1st day of use following its return to service. **It is strictly recommended to keep the Cairsens constantly recharged or powered by applying the storage conditions.**

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).

7. 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.

8. MAINTENANCE CAIRSENS

- To prevent a wrong timestamp (see Chapter 3)
 - Avoid complete discharge
 - Recharge regularly. Recommended every 24 hours (8 hours for the COVNM sensors).
- 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.

9. 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 FRANCE

support@cairpol.com

10. 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.

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