

FLUOTOX

WATER POLLUTION BIOSENSOR

Detection of traces of herbicides: atrazin, diuron ...



- * **Biological reagent: Chlorophyllian algae**
- * **High sensitivity to herbicides**
- * **Continuous check of water quality**
- * **Recording and storage of measurements**
- * **Warning in case of pollution.**

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GENERAL

Selective herbicides used in agriculture were previously considered to be without danger for man. However, recent research has shown that, on the long term, they have an oestrogenic effect and cause, for example, breast cancers. We find them today in rivers and ground water tables at concentrations which can sometimes reach several ppb.

It is therefore important to detect them rapidly, at very low concentrations (around 1 µg/l), and continuously.

FLUOTOX, which meets this requirement, is a device which analyses the evolution of biological mechanisms according to variations in water quality.

PRINCIPLE USED

In plants, herbicides block the electronic transfers at the thylakoid membrane so that the solar energy captured by the chlorophyllian antennas no longer participates in the plant's chemistry. Therefore, this energy is converted into heat and into fluorescent radiation. The amplitude of this radiation indicates the plant's photosynthetic inhibition rate.

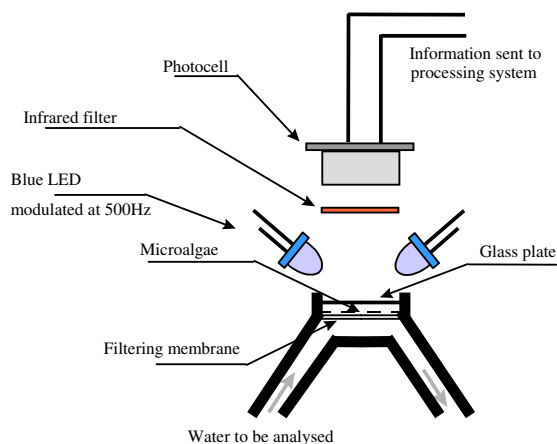
For microscopic chlorophyllian algae, this inhibition rate depends on the types of micro pollutants and their concentrations in the water.

These algae are therefore excited with a constant light source, then the emitted fluorescence is captured and processed.

BIOSENSOR ORGANIZATION

The biosensor excites the microscopic chlorophyllian algae and measures the fluorescence.

The algae such as *Scenedesmus Subspicatus* are illuminated by a blue light, modulated at 500 Hz. These algae immobilized on a filtering membrane placed in the water stream under test emit fluorescence. The fluorescent signal collected by a photocell associated with an infrared filter is sent to the electronic system.



MAN – MACHINE INTERFACE

Display :

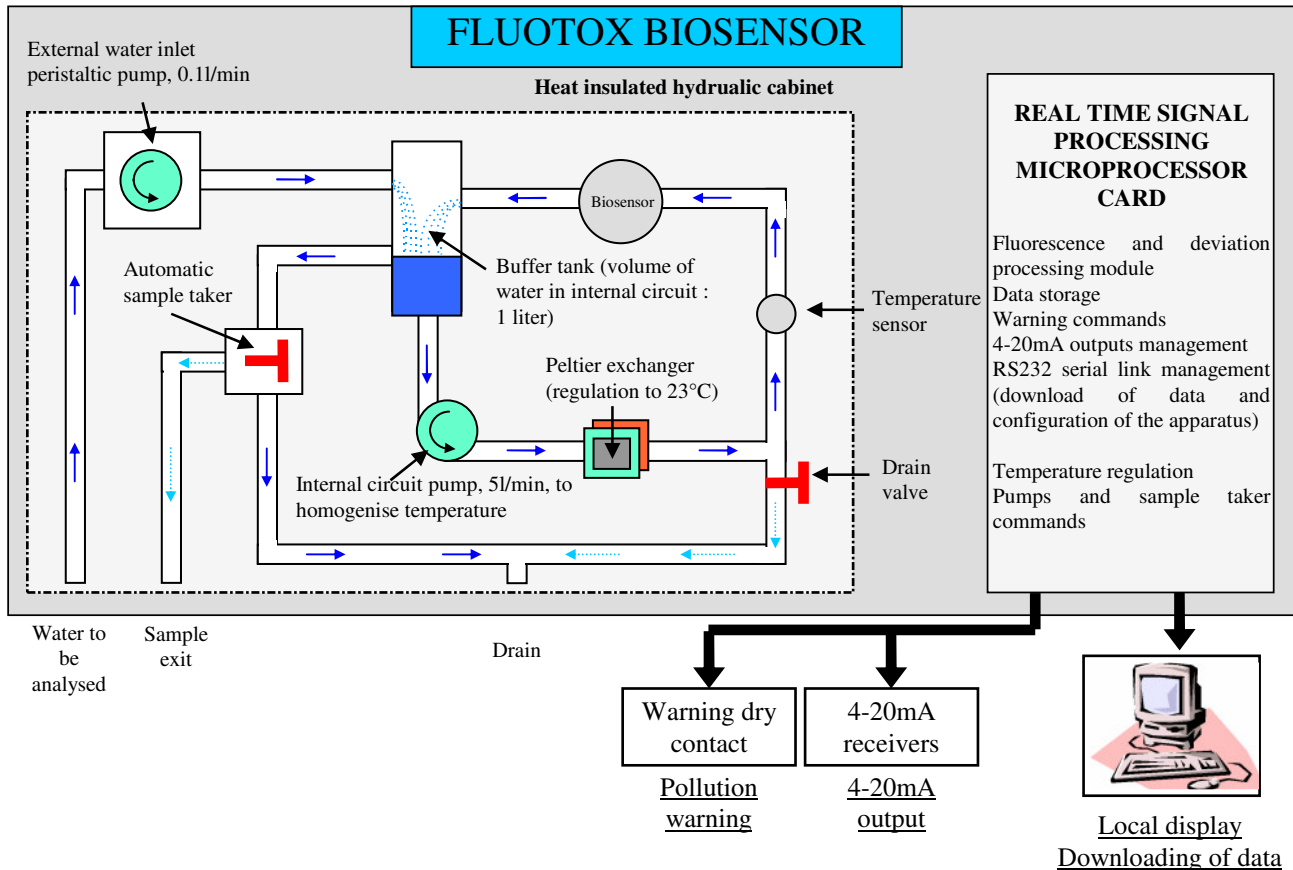
- warning on front face (indicator lights on top of the door)
 - ✓ pollution
 - ✓ water leak
 - ✓ défaut température
- level of pollution thanks to the interface softwares (RS232 serial link)

Outputs :

- a dry contact closes if pollution threshold is exceeded (threshold defined by the user)
- an RS232 serial link allow the load of data and configuration of the apparatus thanks to the interface softwares
- three 4-20mA outputs give fluorescence, its deviation and temperature in real time

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INSTALLATION BLOCK DIAGRAM



ADVANTAGES

Continuous control :

- no systematic and costly analyses
- no blind operations
- processing times limited by real time display of the end of pollution periods
- detection of short lasting pollutions
- easy supervision linking by the 4-20mA outputs

Easy to use :

- dry contact and indicator light signalling presence of herbicides
- automatic taking of samples if pollution detected
- 15 days data storage
- status saved by battery

MAINTENANCE

Bio-substrate :

- transport without specific precautions (by mail)
- can be conserved for 6 months in refrigerator
- replacement made by an operator without specific qualifications

Quick and easy monthly maintenance :

- half a day (2 hours)
- replacement of plastic piping
- change of algae
- cleaning of hydraulic circuits