

# Heavy Metals Monitor

## *EcaMon 10*

The continuous process analyser for heavy metals in waters, *EcaMon*, enables the monitoring of tap water, sea water, river waters, mineral waters, some waste waters and cleaned waste waters for metals such as As, Hg, Pb, Cu, Bi, Tl, Cd, Zn, Se, Mn, Fe, Ni, Cr down to the  $\mu\text{g/l}$  concentration levels as well as for some non-metals ( $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{S}^{2-}$ ,  $\text{PO}_4^{3-}$ ,  $\text{NH}_3$ , EDTA, ascorbic acid).



### Operational principle

*EcaMon* makes use of the electrochemical determination of metal species either after their preliminary enrichment on a long-living non-mercury electrode or through their direct electrochemical conversion. Most metals are determined by making use of the former procedure which facilitates the analyses in the  $\text{mg/l}$  down to sub- $\mu\text{g/l}$  concentration range.

### Technical description

The *EcaMon* system built in a 19" construction consists of the following units:

*Sample Preparation Unit (option)*: Ensures the continuous sampling and sample preparation through sedimentation and/or filtration.



*Analytical Unit*: Serves for the measurement of metals in the continuously delivered pre-treated sample solutions. It consists of the electronic control system, pumping system, fine filtering unit, flow-through electrochemical cell with a long-living working electrode, injection ports for the carrier electrolyte and standard solutions. The analytical unit is controlled by the Control Unit equipped with microprocessor, electronically switchable potentiostat/galvanostat, fast A/D and D/A converters. The measurements and signal evaluation are controlled by the user program specially designed for the type of water being monitored.

The *Analytical Unit* enables the monitoring of a selected group of elements (see below). However, it is possible to built more than one *Analytical Unit* into one *EcaMon* system and hence to monitor a large number of metal species simultaneously.



*Control and Evaluation Unit*: The *Control and Evaluation Unit* consists of an industrial PC with LCD monitor and integrated keyboard. The *Control and Evaluation Unit* controls the sampling, sample pre-treatment and determination as well as the automatic evaluation of the signals. The obtained data are stored on the HD and can be transmitted to any other control system.

The system enables an automatic self-test and periodical checking of the operational functions by making use of the in-built standardisation system.



The reservoirs for the electrolytes and standard solution are placed in the lower part of the monitor or in the side .

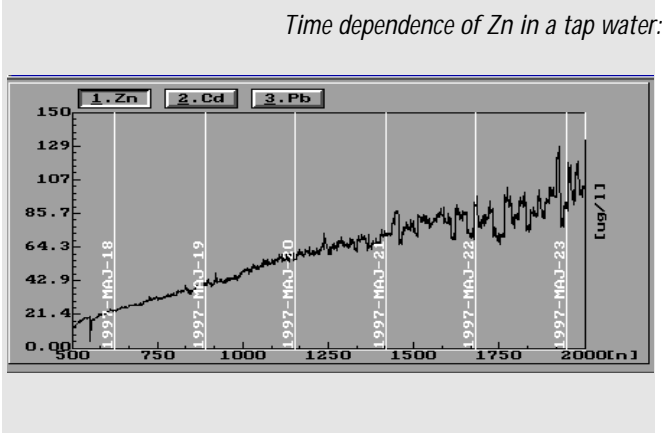
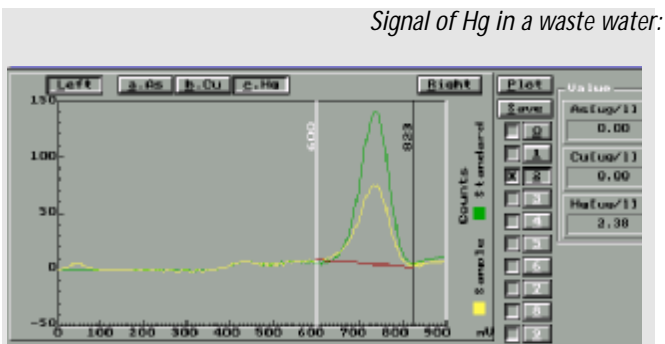
### Determined species

The following groups of elements can be simultaneously determined in an analytical unit:

- Zn, Ga, Cd, Pb, Cu
- Cd, Sn, Pb, Cu
- As, Hg, Se
- As, Cu, Hg
- Pb, Cu, Bi
- Pb, Sn
- Ni, Cu
- Ag
- Mn
- Fe
- NO<sub>3</sub><sup>-</sup>
- Cr(VI)
- PO<sub>4</sub><sup>3-</sup>
- Cl, Br, I, S<sup>2-</sup>, EDTA...

The elaboration of the methodologies for the determination of other species may be available on request.

### Outputs



### Metrological data

Detection limits are in the µg/l range for most of the above elements. The upper concentration limits are virtually unlimited.

The accuracy of the results is ensured by automatic standardisation by making use of the in-built standard addition technique.

The precision of the results is usually about 2-5 %.

### Sampling throughput

The average sampling and measurement rate is 10-20 measurements in an hour. For metals with expected concentrations above 10 µg/l, 30-40 measurements can be performed in an hour.

### Operation duration and maintenance

The system operates unattended and automatically for at least one week not demanding any service. After this period, the working electrode, fine filter and reagent solutions should be replaced and refilled, respectively.

### Working place requirements

The *EcaMon* system operates under the following conditions:

Temperature: 15 to 35 °C

Relative humidity: up to 90 % (not condensating)

### Advantages over other systems

Compared to other monitoring systems such as spectrophotometric and atomic spectrometric systems, the *EcaMon* system exhibits the following advantages:

- Simple flow system with minimum possibilities for leakage, plugging.
- Minimum amount of reagent solutions
- Available and cheap reagents
- Environmentally compatible reagent solutions
- No environmentally harmful waste materials
- Extremely low maintenance costs
- Simple maintenance

### Technical parameters

*Cell:* EcaCell or EcaJet with three electrodes

*Software:* Programmable starting and finishing dates, measuring and validation frequencies, automatic evaluation and archivation.

Digital IN/OUT interface

4-20 mA outputs

Modem connection (option)

*Weight:* 50 – 80 kg, configuration dependent

*Dimensions:* 500x450x1100 mm.

#### Producer

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