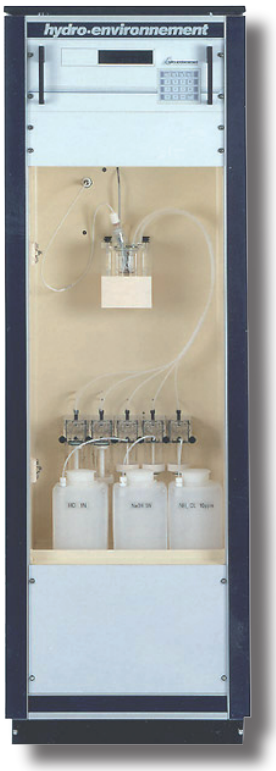
Ions Analyzers in Water (NH_4^+, NO_3^-, NO_2^-, F^-, Cl^-, CN^-) Series ES 9010

Water Quality Monitoring



Use of the Standard Addition method

Auto-validation of measurement results

No sample filtration required

Warning station

Main applications :

- Surface water quality monitoring
- Drinking water (waterworks)
- .....

Exclusive features:

- Operation on an unfiltered sample
- Fully automated measuring, calibration and cleaning sequences
- Electronic compensation of all variations in the measurement process
- Electrochemical measurement rather than colorimetric (no interferences due to color or suspended solids)
- Validity criteria calculated for each measurement before result transmission
- Large volume measuring cell for increased reproducibility
- Use of high precision pneumatic dozers

Ions Analyzers in Water - Series ES 9010

Specifications:

- Programmable measurement ranges:
  - ES 9010 NH_4^+ : 0-2 / 0-10 / 0-100 / 0-1000 mg/l
  - ES 9010 NO_3^- : 0-10 / 0-100 / 0-500 / 0-1000 mg/l
  - ES 9010 NO_2^- : 0-10 / 0-100 / 0-500 / 0-1000 mg/l
  - ES 9010 CN^- : 0-0,2 / 0-1 / 0-10 / 0-100 mg/l
  - ES 9010 Cl^- : 0-10 / 0-100 / 0-1000 mg/l
  - ES 9010 F^- : 0-1 / 0-10 / 0-100 / 0-1000 mg/l
- Lower detectable limits:
  - ES9010 NH_4^+ : 0.05 mg/l
  - ES9010 NO_3^- : 1 mg/l
  - ES9010 NO_2^- : 1 mg/l
  - ES 9010 CN^- : 0.003 mg/l
  - ES 9010 Cl^- : 0.1 mg/l
  - ES 9010 F^- :0.01 mg/l
- Display resolution: 0.01 mg/l
- Average response time: 10 minutes
- Sample volume: 50 ml
- Minimum sample flowrate: 100 l/h
- Display: 2-line alphanumeric
- Control keyboard: 16 keys
- Power supply: 220 VAC +/-10 %, 4 A , 50 Hz
- Power consumption: 100Wh
- Temperature of use: + 5 to + 30°C
- Dimensions: 600 x 600 x 1870 mm (W x D x H)
- Weight: 120 kg

Utilities

- Tap water consumption: 1 to 2 l per cycle
- Compressed air: 0.15 Nm^3/h, 5 bars
- Réactifs :
  - ES9010 NH_4^+ : sodium hydroxide, ammonium chloride, chlorhydric acid
  - ES9010 NO_3^- : ammonium sulfate, sodium sulfate, sulfuric acid
  - ES9010 NO_2^- : sodium sulfate, sodium nitrite, sulfuric acid, potassium hydrogenophtalate
  - ES 9010 CN^- : sodium hydroxide, potassium cyanide, nitric acid
  - ES 9010 Cl^- : sodium nitrate, sodium chloride
  - ES 9010 F^- : acetic acid, sodium acetate, sodium fluoride, sodium hypochlorite

Communication

- Serial: 1 RS 232 (mode J BUS possible)
- Analog output: 4-20 mA (option)
- Dry contacts: default, alarm

Options

- Cryothermostat for closed loop cooling

Operating principle:

Each analyzer from Series ES9010 measures a specific ion by means of a selective electrode, and uses the standard addition method. Subsequently, it performs sequential analysis.

This measuring principle is unaffected by the possible color variations and by the turbidity of the sample, thus authorizing the introduction of the raw sample in the analyzer, with no filtration or ultra-filtration.

The sequential method both allows to perform automatic calibration of the electrode and to get rid of the sensor drifts. It also shows many other advantages for ions measurement.

A built-in micro-presssor controls all measurement and re-calibration automated procedures, calculates all parameters required for the determination of the final concentration, and detects eventual dysfunctions.

ES 9010 analyzers systematically calculate a specific parameter (Ø), which takes into account all possible variations in the electrode response during the measurement period and check them against the results of the previous calibration.

This parameter gives valuable information about the good operation of the analyzer, and is used to validate the measurements.

Ø equals 1 when all conditions are identical between measurement and calibration: temperature, sample volume, reagents volumes...

When $Ø < 0.7$ or $Ø > 1.3$, the analyzer detects a default and initiate a new calibration sequence. If the default appears again during the next measurement, the analyzer stops and displays the following message «Ø out of range».

This «validity» parameter can be used to correct the measured concentration according to the calibration data.

Example of measurement cycle for ammonium ions (NH_4^+):

In solution, the chloride exist in two forms: NH_3 and NH_4^+.

The ionic power depending of pH of the solution, with prevailing of ion of ammonium NH_4^+ at the values of pH below 10.

In order to measure chloride in a solution precisely, all the chloride forms must be convert in free form. The measurements in the cell are therefore taken with a pH near to 13, with NaOH solution addition for calibration and measurement.

This indicating electrode is composed of a glass electrode plunged directly into the solution chloride ammonium, separate of the solution containing the chloride to be measured with one hydrophobic diaphragm selective. The NH_3 dissolved in the diffuse solution, thought the diaphragm, into the internal electrolyte for the partials pressures stability result of this gas between electrolyte and the middle analyzed.

During the diffusion in the internal electrolyte, the following stability is obtained:

$$NH_3 + H_2O <-> NH_4^+ + OH^-$$

This stability cause at the proximity of diaphragm of the gas electrode increase the pH with protons capture (OH^- liberated).

The electrode response follows the Nernst law:

$$E=Eo + (RT/nF) \log [OH^-]$$

Environnement S.A
111, boulevard Robespierre - BP 4513 - 78304 POISSY Cedex - FRANCE
Tel. : +33 (0)1 39 22 38 00 - Fax : +33 (0)1 39 65 38 08
Web : www.environnement-sa.com - e-mail : info@environnement-sa.com