# INSTRUMENTS FOR ANALYSIS IN THE FIELD

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Why are the pH, redox, EC and $O_2$ measured directly in the field?

- The release or sorption of carbon dioxide causes the pH (= acidty) of groundwater to change.
- Precipitation of hydroxides changes the conductivity of groundwater.
- When sampling groundwater the oxygen content rapidly increases.
- The availability of oxygen causes the redox potential to shift rapidly.
- Direct availability of results.
- Less costly than when carried out in a laboratory.

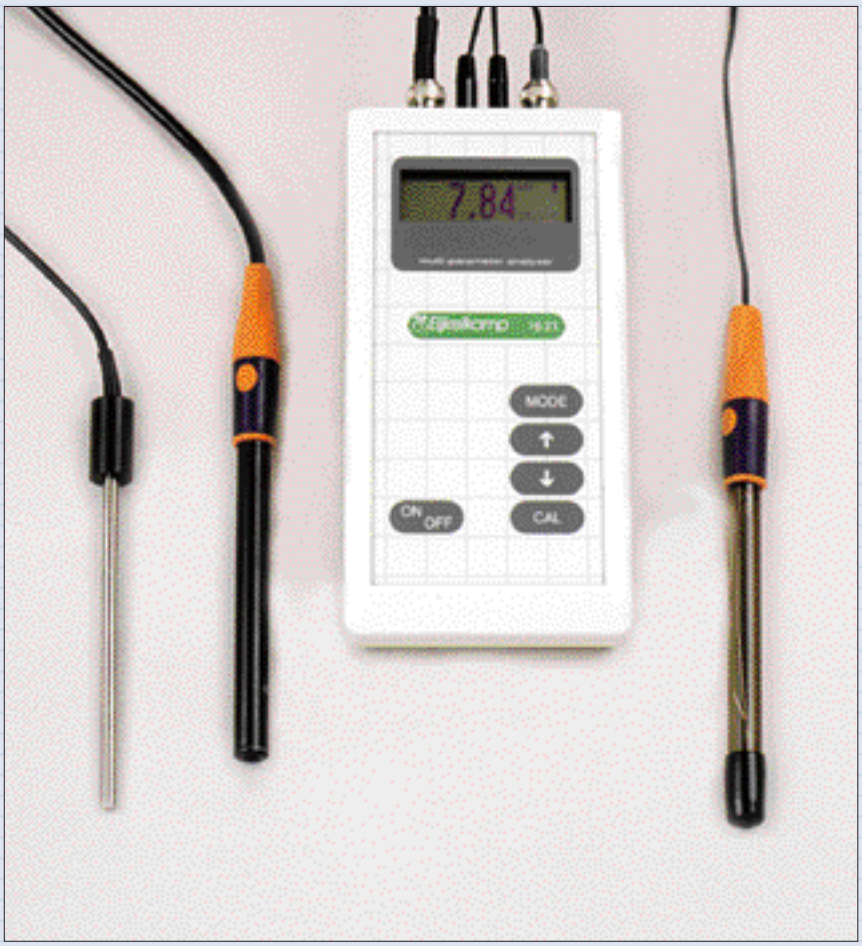
Reduction indicates lower oxidation levels in a medium. Better: the Redox potential is a measure of the capacity of a substance to absorb or release electrons. The **EC** is an indication of the amount of salts dissolved in water. As the concentration of salt may be a limiting or stimulating growth factor, or an indication of soil pollution, it is essential to establish the electrical conductivity.

The measurement of **$O_2$** refers to the amount of oxygen dissolved in water. It is measured in mg/l of water or indicated as a percentage of saturation. The presence of oxygen is not only of crucial importance to the open water flora and fauna but also to aerobic processes of degradation in the soil.

The interaction of various acids, bases and salts determines the **pH.** The pH of soil and groundwater are important criteria in the selection of plant material, the amount of fertilizer to apply, or the environmental measures to be taken.

**Redox** is short for Reduction-Oxidation potential. Oxidation stands for an increase of bound oxygen.

Eijkelkamp Agrisearch Equipment has a varied delivery programme of (multi-)meters and accessories. These CE-approved instruments are specially designed for the purpose of analytic measurements under field conditions or in a demanding laboratory environment. All meters are supplied as complete sets, incl. electrodes.




Multimeter with electrodes

**Measuring the pH (acidity) of the water in a sample bottle.**

**After drilling a small hole in the soil and putting water and a pH electrode in it, an impression of the pH can be obtained.**

Eijkelkamp Agrisearch Equipment
www.eijkelkamp.com

# INSTRUMENTS FOR ANALYSIS IN THE FIELD

Eijkelkamp Agrisearch Equipment
ISO 9001-CERTIFIED
manufacturer of environmental research equipment

**Determination of the electrical conductivity in flowing water.**

## Multimeters

- Watertight ABS housing.
- Simultanous measurement of several parameters possible.
- Measuring in accordance with 'Good Laboratory Practice'.
- Display of measurements, temperature and battery status.
- Menu-driven instructions in Dutch, English, French of German.
- Automatic adjustion.
- Polarisation time not required ($O_2$).
- Programmable automatic switch-off.
- Complete in case.
- Optional: rechargeable batteries and AC adapter, 12 V car connection.

### 18.21.SA pH/mV/EC/T meter

Standard meter measuring acidity, redox, conductivity and temperature.

- Measuring range:
  - pH 0-14 pH
  - mV ± 1200 mV
  - °C 0-100°C
  - EC 0-100 mS/cm
- Resolution: 0.01 pH, 0.1°C, 0.1 µS.
- No memory.

### 18.26.SA pH/mV/$O_2$/T meter

Meter measuring oxygen, acicity, redox and the temperature.

- Measuring range:
  - pH 0-14 pH
  - mV ± 1200 mV
  - °C 0-100°C
  - $O_2$ 0-20 mg/l, 0-200%
- Resolution: 0.01 pH, 1 mV, 0.1°C, 0.01 mg/l, 0.1%.
- Memory: 200 values.
- No polarisation time required ($O_2$).
- Calibrates only to the air ($O_2$).

### 18.28.SA pH/mV/EC/Sal/T/$O_2$ meter

This meter combines all parameters mentioned earlier and has a huge conductivity measuring

**By connecting a temperature probe automatic temperature compensation is possible. Otherwise you risk a measuring error of 3%/°C when measuring the EC.**


Multimeters with electrodes

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range (up to 1000 mS/cm) and immediate reading of salinity (the salt content in grams per litre).

- Measuring rang:
  - pH 0-14 pH
  - mV ± 1200 mV
  - °C 0-100°C
  - EC 0-1000 mS/cm
  - Sal 0-100 g/l
  - $O_2$ 0-20 mg/l, 0-200%
- Resolution: 0.01 pH, 1 mV, 0.1°C, 0.01 µS/cm, 0.01 mg/l, 0.1%.
- Memory: 200 values.
- Cell constants (EC) 1, 10 and 0.1 $cm^{-1}$.

### 18.39.SA pH-meter, desktop

pH/mV/T meter with extensive data storage (up to 7200 values, including date and time) and data reading-, alarm- and control functions. Measuring range from 0-14 pH (0.01 pH resolution), 0-100°C (0.1°C resolution). The redox potential-/ion-selective measuring range is from -2000 to +2000 mV (1 mV resolution). Can be connected to a recorder, printer of PC.

## Accessories

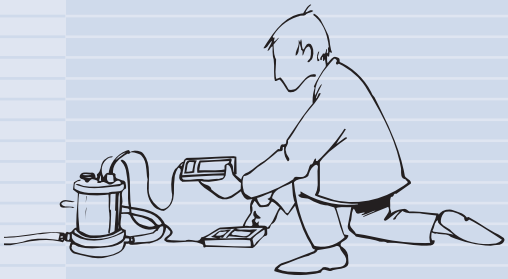
Various electrodes are available for all meters, such as: temperature probe Pt 1000, pH or EC electrodes in glass or synthetic, oxygen electrodes with built-in temperature sensor, and redox electrodes. Various buffer liquids, storage liquids, calibration solutions etc. are available for maintenance. The offered sets do include the appropriate electrodes and accessoiries.

### 18.55 Flow-through cell

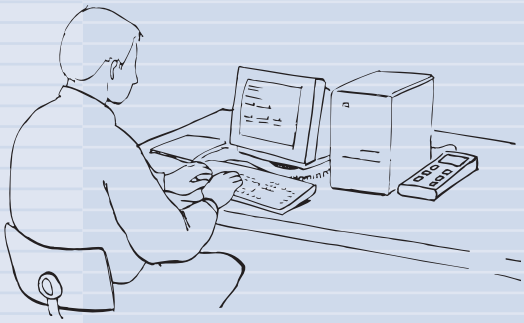
To improve the comfort and precision of in-line measurements of pH, EC, T, $O_2$, etc. a flow-through cell is used. The flow-through cell consists of a transparent chamber through which water flows in a constant flow from the bottom to the top. The electrodes measure in water that has not yet been in touch with the air. Various electrodes can be placed in the flow-through cell. The flow-through cell can be demounted and cleaned easily.

Flow-through cell with electrodes

**In order to improve the comfort and precision of in-line field measurements a flow-through cell is used in which the electrodes are placed.**



**The measuring data are read and processed on the PC.**



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**The waterproof meters allow operation under rough field conditions.**

## 18.30 pH-Meter, type WTW pH330i

This robust, waterproof (IP66/67 to IEC 529) pH/mV/T-meter with built-in datalogger, real time clock and GLP-supporting functions is supplied inclusive pH-electrode. Automatic calibration with buffer recognition. The meter can store 500 data sets (measurement, temperature, date/time, identy number). Time-controlled storage of the measurements at intervals from 5 sec. till 60 min. (non-volatile data storage; even when changing batteries). The instrument is provided in a strong synthetic case with integrated measuring-spot with stand, buffers, KCl-fluid, electrode and batteries (for up to 3000 hours of measurements). Measuring range for pH -2 to +19.99 pH (resolution 0.01). A temperature measuring range of -5°C to 105°C (resolution 0.1). The measuring range in mV covers -1999 up to + 1999 mV (resolution 1 mV).

Data can be transmitted to a PC. For application under rough conditions the meter can be fitted with a robust, impact resistant field armoring with integrated electrode container and carrying grip.

## 18.31 EC-meter, type WTW 315i

The robust, low-energy consumption EC/T-meter in dust- and waterproof housing (IP66/67 to IEC 529) is provided inclusive EC-electrode (4-electrode measuring technology) with integrated temperature sensor (K=0.475 cm-1). The instrument is capable of simultaneous temperature measurement and automatic temperature compensation. Reference temperature 25°C (ISO and NEN).

The meter has a conductivity measuring range of 0 - 500 mS in 5 measuring ranges.

For temperature measurement the measuring range -5°C to 105°C is valid (resolution 0.1°C).

The instrument has a cell constant of 0.475 cm-1.

The meter is provided in a strong synthetic case with integrated measuring-spot with stand, buffers, KCl-calibration fluid, measuring can and batteries (for up to 3000 hours of measurements).

For application under rough conditions the meter can be fitted with a robust, impact resistant field armoring with integrated electrode container and carrying grip.

pH-meter WTW pH330i with electrode

EC-meter WTW 315i with electrode

pH-meter with field armoring

EC-meter, complete set