

## Redox Sensor U11337

### Instruction sheet

01/09 Hh



### 1. Safety instructions

To avoid permanent damage to the redox electrode, it must always be kept in the storage solution that is provided!

- Do not allow it to become contaminated by:
  - mineral deposits
  - organic oils or greases
- Do not allow the electrode covering to come into contact with organic silicones!
- The electrode must be stored at a temperature in the range between +10°C and +35°C

### 2. Description

The redox (**re**duction/**oxi**dation) electrode, also called the ORP (**O**xidation-**R**eduction **P**otential) electrode, consists of an outer platinum half-cell, which measures a property of the solution that is being tested, and an inner half-cell containing an Ag/AgCl gel as a reference.

The platinum electrode is capable of either taking up electrons (reduction) or releasing electrons (oxidation). It does not itself react with the medium.

The sensor box together with the redox electrode is used for the measurement of redox values in aqueous solutions.

A storage solution (not a buffer solution!) is supplied with the redox sensor.

A reference solution consisting of a saturated buffer solution of quinhydrone with a pH value of 7.00 is available separately (item number U11352).

The redox sensor box is recognised automatically by the 3B NETlog™.

### 3. Apparatus supplied

- 1 Redox sensor box
- 1 Redox electrode with storage solution
- 1 Instruction sheet for U11337
- 1 miniDIN 8-pin connector cable, 60 cm long

#### 4. Technical data

Measurement range:	-450 mV to +1100 mV
Sensor type:	Combination electrode containing Ag/AgCl gel, not refillable
Cable:	1 m coaxial cable with BNC plug
Accuracy:	$\pm 4.5$ mV in range from 20°C to 25°C
Resolution:	0.9 mV
Reaction time:	$\leq 1$ s to reach 95% of final value

#### 5. Operation

- Remove the storage flask from the electrode by unscrewing the cap, and slide the cap off the electrode.
- Rinse the lower end of the electrode in the region of the glass sphere thoroughly with distilled water, shake off the surplus water, and dry the electrode with filter paper.
- Measure the temperature of the solution under test, e.g., by using the temperature sensor Pt100 U11330.
- Measure the pH value of the solution under test, e.g., with the pH sensor U11350.
- Dip the rinsed redox electrode into the solution under test and make the measurement.
- When the reading has remained constant for about 1 minute, note the value.
- In some circumstances it may take as long as 30 minutes to reach this condition.
- Round the final reading up or down to the nearest multiple of 5 mV, and record this value together with the pH value and the temperature.
- After completion of the measurement, rinse the electrode with distilled water and give it the same treatment as before the measurement.
- Push the cap back onto the electrode and screw it onto the storage flask.

#### 6. Testing the electrode

- Connect the electrode to the sensor box and the sensor box to the analogue input A or B of the 3B NET/og™.
- Wait for the 3B NET/og™ to recognise the sensor by showing "Probe Detect".
- Rinse the lower end of the electrode in the region of the glass sphere and platinum ring thoroughly

with distilled water, shake off the surplus water, and dry with filter paper.

- Dip the redox electrode into the saturated quinhydrone buffer solution with pH 7.00 (U11352) and stir the solution a few times.
- After a few minutes the reading at 25°C should be in the range  $80 \text{ mV} \pm 20 \text{ mV}$ .
- Finally, take the redox electrode out of the buffer solution, rinse it thoroughly again with distilled water, and dry it with filter paper.

#### 7. Cleaning the electrode

- When the electrode has been in use for a long time, clean it in dilute hydrochloric acid (HCl, 0.1 mol) for about 10 minutes, rinse it with distilled water, and regenerate it by dipping it into the saturated quinhydrone buffer solution with pH 7.00 (U11352).
- After completing the cleaning of the electrode, rinse it with distilled water and give it the same treatment as before the cleaning operation.
- Push the cap onto the electrode and screw it onto the storage flask.
- Keep the redox electrode in the storage solution for 8 hours and then use it again.

#### 8. Examples of use

Monitoring chemical reactions.

Monitoring the decontamination of water by electrochemical reduction of chromate or oxidation of cyanide.

Checking swimming-bath water that has been sterilised by the addition of free chlorine; typical redox values found in such measurements are in the region of 700 mV.