3B SCIENTIFIC® PHYSICS

Conductivity Sensor U11335

Instruction sheet

11/07 Hh

1. Safety instructions

- The electrode may only be used with dilute acid and alkali solutions (max. 10%).
- Do not allow the sensor to come into contact with viscous organic liquids such as oils, glycerine or glycols.
- Do not let the test surfaces of the electrode (graphite rings and discs) come into contact with hard objects.
- Do not allow the electrode housing to come into contact with organic silicones.

The electrode must always be stored at temperatures in the range between +10°C and +35°C.

2. Description

Sensor box including conductivity electrode for measuring conductivity in aqueous solutions in the units mS/cm.

Conductivity electrode with integrated Pt100 temperature sensor.

The sensor box is designed to be detected automatically by a 3B NET*log*™ unit.

3. Scope of delivery

1 Sensor box

1 Conductivity electrode with mini-DIN connecting cable, 6-pin, 150 cm long

1 Plastic bottle containing about 30 ml of standard conductivity solution, 1413 µS/cm (25°C)

1 Mini-DIN connecting lead, 8-pin, 60 cm long

4. Technical data

Measurement ranges:	0.2 mS/cm, 2 mS/cm, 20 mS/cm
Sensor type:	4-cell graphite electrode ("Bull's Eye" four-wire design), integrated Pt100 temperature sensor
Cell constant:	K = 0.45/cm
Max. operating temperature:	80°C
Housing:	epoxy resin, 120 mm x 19 mm diam.

5. Operation

5.1 General instructions

- Rinse the lower end of the electrode thoroughly with distilled water, shake off any remaining water and dry with filter paper.
- Select the expected measurement range for the test liquid by pressing the appropriate measuring range button.
- Immerse the end of the electrode with the slot at its tip into the liquid to be tested. Important: the graphite cell surfaces must be completely immersed in the test liquid.
- Stir the liquid gently with the electrode, and after 5 to 10 seconds read the measured value.
- When switching over to show the temperature of the test liquid, the chosen measuring range button must be held down for at least 2 seconds.
- Wait for a new display to appear on the 3B NETlog™ unit ("Probe Detect") and read off the temperature.
- Press the appropriate measuring range button again to return to conductivity measuring mode.
- Before making another measurement in a different liquid, wash the electrode again in distilled water and repeat the steps described earlier.
- The measurement system is suitable for a temperature range from 15°C to 35°C. The calibration temperature is about 25°C.

5.2 Calibration

The electrode is supplied pre-calibrated and ready for use. Recalibration can only be carried out at present by the manufacturer 3B Scientific GmbH.

5.3 Cleaning and care of the electrode

- If electrodes get polarised or dirty they must be cleaned using hot water and a mild detergent.
- Organic substances should be removed with acetone. Algae, bacteria, mould or mildew should be removed with a solution of sodium hypochlorite.
- Do not use abrasives or objects that can scratch the surface.
- Finally, wipe the electrode with a cotton cloth.

6. Experimental applications

Distinguishing qualitatively between substances with ionic or molecular structures in liquids, e.g. dilute solutions of acids and alkalis.

Demonstrating the direct relationship between conductivity and ion concentration in liquids. Measuring ion concentrations in unknown solutions.

Measurements of conductivity for photosynthetic processes in a basin containing aquatic plants, and observing the simultaneous reduction of bicarbonate ion concentration.

In-situ measurements of total quantities of dissolved solids (TDS, in mg/l) in lakes or streams.

Observing rates of chemical reactions involving the uptake or release of a conducting substance.

Conductivity changes in titrations with two substances in stoichiometric quantities.

Measurements of the rate of diffusion of one type of ion through a membrane (osmosis).

Measurements of conductivity and total dissolved solids in an aquarium containing aquatic plants and animals such as fish. Distinguishing between photosynthesis and respiration

7. Sample experiments

The increase in the conductivity of distilled water when common salt is added.

Equipment required:

1 3B NET*log*™ unit	U11300
1 Conductivity sensor	U11335
1 Glass beaker, 600 ml, shallow form	U14210
1 Set of Scout Pro electronic scales, 200 g	U42048

1 Carton of table salt (500 g approx.)

1 Petri dish

1 Teaspoon

300 ml distilled water

- Pour 300 ml of distilled water into the beaker.
- Immerse the conductivity electrode (which must first have been thoroughly cleaned) in the water so that it reaches the bottom of the beaker.
- Select analogue input A of the 3B NET*log*™ unit and activate the experiment template, “Increase in conductivity of distilled water due to addition of common salt” in the 3B NET*lab*™ software. This contains all the necessary measuring functions, settings, and additional information for determining the conductivity of aqueous solutions.
- Carry out the experiment and calculate the results.

Fig. 1 Set-up for increase in conductivity of distilled water due to addition of common salt

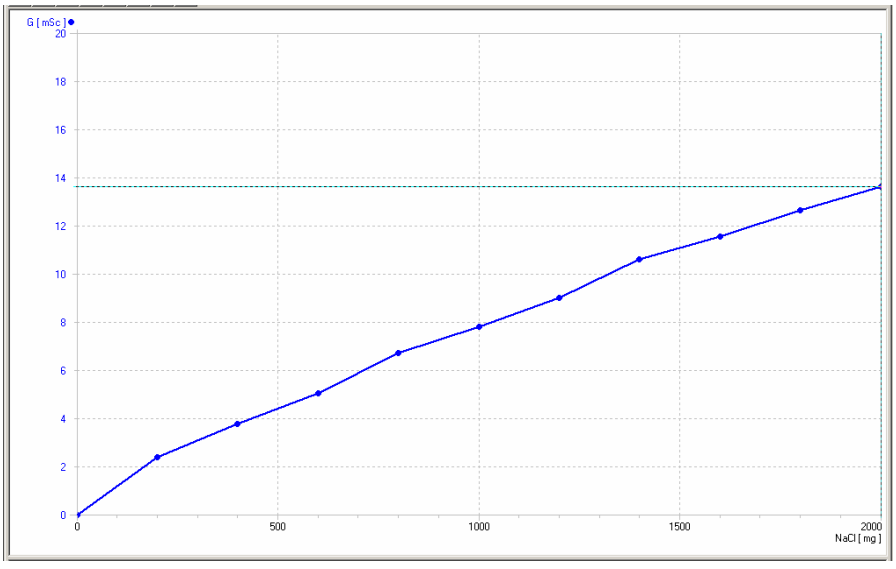

Fig.2 Graph of the increase in conductivity due to addition of common salt