

djb microtech

Conductivity Sensor

Typical activities using our Conductivity Sensor are listed below:

- Allow students to qualitatively see the difference between the ionic and molecular nature of substance in aqueous solution. This can include differences in strength of weak acids and bases, or the number of ions that an ionic substance dissociates into per formula unit.
- Use the probe to confirm the direct relationship between conductivity and ion concentration in an aqueous solution. Concentrations of unknown samples can then be determined.
- Measure changes in conductivity resulting from photosynthesis in aquatic plants, with the resulting decrease in bicarbonate-ion concentration from carbon dioxide.
- Monitor the rate of reaction in a chemical reaction in which dissolved ions and solution conductivity varies with time due to an ionic specie being consumed or produced.
- Perform a conductivity titration to determine when stoichiometric quantities of two substances have been combined.
- Use the Conductivity Probe to determine the rate at which an ionic species diffuses through a membrane, such as dialysis tubing.
- Monitor changes in conductivity in an aquarium containing aquatic plants *and* animals. These changes could be due to photosynthesis *or* respiration. studies of household acids and bases, acid-base titrations, monitoring pH change during chemical reactions or in an aquarium as a result of photosynthesis, investigations of acid rain and buffering, and investigations of water quality in streams and lakes.

Using the Conductivity Sensor with the ALBA Interface and Logger

This sensor is intended for use with the ALBA Interface and Logger and the ALBA software.

The following comments should help you when using the Conductivity Sensor:

- Load the Application software and follow the instructions in the on-screen notes which will direct you to use the appropriate channel.
- If you are using the Investigator software you will have control over the setup for data capture using this sensor.
- Before running an Application you could check the operation of your sensor by selecting the Meter option in the Investigator software.
- The Conductivity Sensor is supplied with a factory calibration which will probably be satisfactory for most experiments. However if very accurate measurements are required the Conductivity Sensor can be calibrated by selecting the *Calibration Manager* from the *Experiment* menu. Further information on calibrating sensors can be found in the Help and in the manual.

Specifications

Range of Conductivity Probe:

- Low Range: 0 to 200 $\mu\text{S}/\text{cm}$: Mid Range: 0 to 2000 $\mu\text{S}/\text{cm}$: High Range: 0 to 20,000 $\mu\text{S}/\text{cm}$
- Accuracy: $\pm 1\%$ of full-scale reading for each range
- Response time: 98% of full-scale reading in 5 seconds, 100% of full-scale in 15 seconds
- Temperature compensation: automatic from 5 to 35°C
- Temperature range (can be placed in): 0 to 80°C
- Cell constant: 1.0 cm^{-1}
- Description: dip type, epoxy body, parallel carbon (graphite) electrodes
- Dimensions: 12-mm OD and 150-mm length

Taking Measurements with the Conductivity Probe

- Rinse the tip of the Conductivity Probe with distilled water. Optional: Blot the inside of the electrode cell dry only if you are concerned about water droplets diluting or contaminating the sample to be tested.
- Insert the tip of the probe into the sample to be tested. **Important:** Be sure the electrode surfaces in the elongated cell are completely submerged in the liquid.
- While gently swirling the probe, wait for the reading on your computer, CBL, or calculator screen to stabilize. This should take no more than 5 to 10 seconds.
- Rinse the end of the probe with distilled water before taking another measurement.
- If you are taking readings at temperatures below 15°C or above 30°C, allow more time for the temperature compensation to adjust and provide a stable conductivity reading.
- **Important:** Do not place the electrode in viscous, organic liquids, such as heavy oils, glycerin (glycerol), or ethylene glycol. Do not place the probe in acetone or non-polar solvents, such as pentane or hexane.

Do I Need to Calibrate the Conductivity Sensor?

For most experiments you should not have to perform a new calibration when using the Conductivity Sensor - the factory calibration will be satisfactory in most situations. However should you require to re-calibrate the Conductivity Sensor then use the Calibration Manager in the ALBA software.

In order to perform a calibration of the Conductivity Probe, or to confirm that a saved calibration is accurate, you need to have at least two solutions of known conductivity. The Conductivity Probe is supplied with 1000 μS sodium chloride solution. This may be diluted by mixing equal volumes of this solution and water to give a solution with a conductivity of 500 μS .

Alternatively, a 0 μS reading can be obtained in air. A second calibration point - 10,000 μS - can be measured by using a solution which contains 5.566 g of Analar sodium chloride per litre of solution made up using de-ionised or distilled water.

djb microtech supply sachets of solution with known conductivity for calibration – the values available are 1,413 μS and 12,880 μS .

Storage and Maintenance of the Conductivity Probe

When you have finished using the Conductivity Probe, simply rinse it off with distilled water and blot it dry using a paper towel or lab wipe. The probe can then be stored dry.

If the probe cell surface is contaminated, soak it in water with a mild detergent for 15 minutes. Then soak it in a dilute acid solution (0.1 M hydrochloric acid or 0.5 M acetic acid works well) for another 15 minutes. Then rinse it well with distilled water. **Important:** Avoid scratching the inside electrode surfaces of the elongated cell.

Using the Conductivity Probe with Other Sensors

It is very important to know that the Conductivity Probe will interact with some other sensors supplied by **djb microtech** if they are placed in the same solution *and* they are connected to the same ALBA Interface and Logger. This situation arises because the Conductivity Probe outputs a signal in the solution, and this signal can affect the reading of another probe.

The Dissolved Oxygen Probe or the pH Probe *must not* be connected to the *same interface* as a Conductivity Probe and placed in the same solution:

Warranty

Our Conductivity Sensors are warranted to be free from defects in material and workmanship for a period of twelve months from purchase provided the probe has been used in accordance with this instruction manual and used under normal laboratory conditions. The warranty does not apply when the probe has been subjected to accident, alternate use, misuse, or abuse in any manner.

The Conductivity Sensor is manufactured by Vernier Software and Technology. **djb microtech** wish to thank Vernier Software & Technology for permission to copy sections of the leaflet that accompanies their Conductivity Sensor.

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