

# Conductivity Sensor

# DT035A



The Conductivity sensor can be connected to the Nova5000, MultiLogPRO or TriLink data loggers.

The Conductivity sensor is designed to measure conductivity of liquids and solutions capable of measuring the entire range of 0 - 20 mS.

This sensor is used for various experiments in Biology, Chemistry and Environmental Science.

Conductivity is one of the easiest environmental tests of aquatic samples; it determines the total concentration of ions in samples due to the direct relationship between conductivity and the concentration of ions in a solution.

The Conductivity sensor (DT035A) consists of the Fourier Systems adaptor (DT035) and the Conductivity electrode (DT050).

## Typical Experiments

- Conducting environmental studies
- Measuring conductivity when dissolving salts in water
- Comparing conductivity of different water samples
- Determining the concentration of ions in the solution

## How it Works

In solution, the current flows by ion transport. An increasing concentration of ions in the solution will result in higher conductivity values.

The Conductivity sensor measures the ability of a solution to conduct an electric current between two electrodes.

A potential difference is applied to the two carbon electrodes in the Conductivity sensor. The resulting current is proportional to the conductivity of the solution. This current is converted into a voltage and adjusted to a range of 0-5 V accepted by the



Analog-Digital converter of the data logger. The result is then stored into the logger's memory.

### Sensor Specification

<b>Range:</b>	0 - 20 mS
<b>Accuracy:</b>	± 8% over entire range
<b>Resolution (12-bit):</b>	5 µS
<b>Conductivity Cell Material:</b>	Carbon, 2-Cell
<b>K Cell Value:</b>	1.0
<b>K cell Value Tolerance:</b>	± 20%
<b>Temperature Range:</b>	0 to 80 °C
<b>Minimum Sample Size:</b>	25 mL
<b>Response Time for 95% of Reading:</b>	5 seconds
<b>Default Sample Rate:</b>	10 samples per second
<b>Features:</b>	Equipped with an offset calibration screw

### Technical Notes

- Before using a Conductivity sensor, soak the probe in DI water for about 20 minutes for better results.
- If other electrochemical type sensors (Oxygen and pH) are placed in the same solution at the same time and connected to the same data logger, they can interfere with each other's signals. Keep the sensors as far apart as possible - the distance required will depend on the conductivity of the solution. If there is still a problem, try connecting the sensors to different data loggers or take readings using one sensor at a time.
- During measurement, avoid particulate matter. Allow it to settle. Do not let sediment build up on the sensors.
- Rinse the electrode after measurements with DI water.

## Equipment List

*Adaptor & electrode set DT035  
DT035A*



*Electrode only DT050*



## Equipment Setup

1. Connect the electrode to the adaptor.
2. Connect the adaptor to the data logger's input.

## Calibration

The Conductivity sensor is shipped fully calibrated.

For experiments that require very accurate calibration, however, the Conductivity sensor is equipped with an offset calibration screw. The screw is located at the back of the adaptor case.

1. Make sure the Conductivity sensor is clean.
2. Connect the sensor to the data logger.
3. Dip the sensor in a 0.01 M KCl solution or other standard with a known value according to the chart below at the corresponding temperature. The cell portion of the probe must be totally immersed in the known solution.
4. Stir the probe to get rid of any air bubbles trapped within the cell chamber - no air bubbles can be present in the cell chamber. Start recording.
5. Insert a flat screwdriver to the calibration hole and slowly turn the calibration screw until the reference value is reached.

## Standard Conductance of 0.01 M KCl

Temperature °C	Standard Conductance (MicroSiemens)
0	776
5	896
10	1020
15	1147



Temperature °C	Standard Conductance (MicroSiemens)
16	1173
17	1199
18	1225
19	1351
20	1278
21	1305
22	1332
23	1359
24	1386
25	1413

### Using the Conductivity sensor with Fourier Data Loggers and MultiLab Software

1. Launch the MultiLab software (from either your PC or Nova5000).
2. Connect the Conductivity sensor to the data logger's first sensor input I/O-1.
3. The Conductivity sensors is automatically recognized by the MultiLab software.
4. Click **Setup** on the main toolbar and program the data logger's sample rate and number of samples. Click **Run** on the main toolbar to start the measurement.

### Cleaning the Electrode

- **General Method:** Use 1/2 teaspoon of liquid soap per 200 mL warm water, soak the electrode for a few minutes and then gently wipe the element with a cotton swab. Rinse thoroughly with DI water.
  - **Inorganic Build-up Method:** Soak the electrode tip in 0.1 M HCl for 10 minutes, then rinse thoroughly with DI water.
  - **Greasy Films Method:** Rinse the electrode tip with acetone or methanol (do not soak), then wash with the general method above. Rinse thoroughly with DI water.
- After cleaning with any and all of the above methods, soak the electrode in DI water for 20 minutes prior to calibration.

## Maintenance

- Make sure the measuring cells are clean.
- Do not touch the probe cell surface with any hard object. If the probe cell surface is contaminated, clean the electrode (see **Cleaning** above).
- Store the electrode dry.

## An Example of using the Conductivity Sensor

### *Saltwater Conductivity*

In this experiment we will study the effect of increasing sodium chloride concentration on water conductivity.

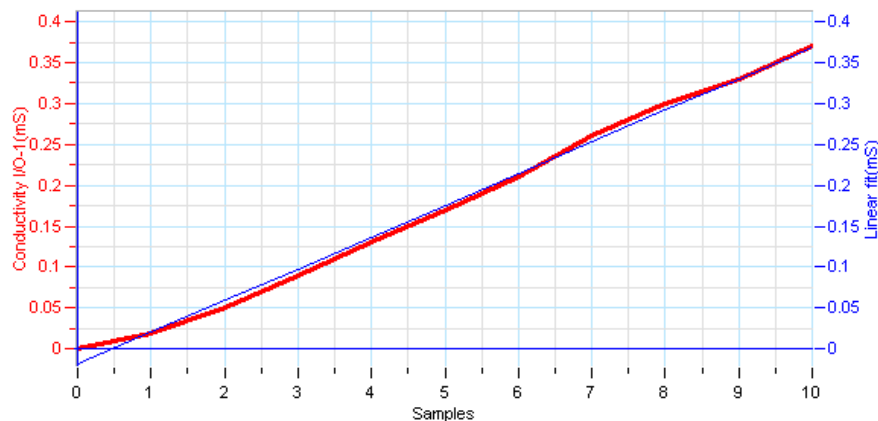


Figure 1: Saltwater Conductivity

## Troubleshooting

If the conductivity values are out of the range, are drifting, or generally are inaccurate:

- Verify cell constant compatibility with standard
- Use fresh standards or glassware
- Calibrate with standards at the same temperature as the sample
- Tap the cell against the container bottom to dislodge air bubbles
- Clean the electrode
- Condition the electrode in DI water overnight

**Note:** Attempt each suggestion in the order listed above and then attempt calibration.



## **Technical Support**

Please contact Fourier technical support as follows:

Web: [http://www.fourier-sys.com/support\\_support.html](http://www.fourier-sys.com/support_support.html)

Email: [support@fourier-sys.com](mailto:support@fourier-sys.com)

Consult the FAQs before contacting technical support:

[http://www.fourier-sys.com/support\\_faq.html](http://www.fourier-sys.com/support_faq.html)

## **Copyright and Warranty**

All standard Fourier Systems sensors carry a one-year warranty, which states that for a period of twelve months after the date of delivery to you, it will be substantially free from significant defects in materials and workmanship.

This Warranty does not cover breakage of the product caused by misuse or abuse.

This Warranty does not cover Fourier Systems consumables such as electrodes, batteries, EKG stickers, cuvettes and storage solutions or buffers.