

Conductivity Sensor (for EcoLog XL)

DT035A



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

Range:	0 - 20 mS
Accuracy:	± 8% over entire range
Resolution:	0.02 mS
Conductivity Cell Material:	Carbon, 2-Cell
K Cell Value:	1.0
K cell Value Tolerance:	± 20%
Temperature Range:	0 to 80 °C
Minimum Sample Size:	25 mL
Response Time for 95% of Reading:	5 seconds
Default Sample Rate:	10 samples per second
Features:	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 DT035A



Adaptor only DT035



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
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 EcoLog XL and EcoLab Software

1. Connect EcoLog XL to the computer.
2. Connect the Conductivity sensor to the EcoLog XL's sensor input (starting from I/O-1). The sensor is automatically recognized by the EcoLab software.
3. If EcoLog XL is running in one of its stand-alone modes, press the Stop  button on the EcoLog XL Panel.
4. Launch EcoLab.
5. In the **Setup window** deactivate the internal sensors by clicking the button next to the sensors' icon and program the EcoLog XL's sample rate and the recording time.


To begin online recording

1. Click **Run**  on the main toolbar.


2. EcoLab automatically opens a graph window displaying the data in real-time, plotting it on the graph as it is recorded.
3. You can stop recording at any time by clicking **Stop**  on the toolbar.

To conduct a remote recording

For remote logging it is necessary to send the setting to EcoLog XL before disconnecting from the computer.



1. In the Setup window deactivate the internal sensors by clicking the button next to the sensors' icon and program the EcoLog XL's sample rate and the recording time.
2. Click **Send Setup**  on the main tool bar, wait until you will see the following message on the EcoLog XL screen:

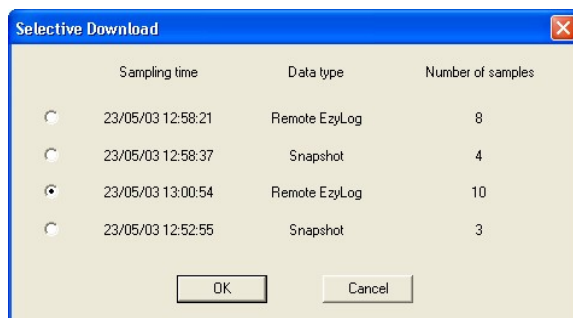
Remote logging
Waiting for Go

3. Disconnect the EcoLog XL from the computer, place the EcoLog XL at the desired recording location and press the **Go**  button on the EcoLog XL front panel.

To download data that was recorded offline

EcoLog XL always stores the last four experiments. To download data that was recorded offline or while EcoLog XL was not connected to the computer:

1. Connect the EcoLog XL to the computer and if EcoLog XL is collecting data, click **Stop**  to end collecting and to return to the main menu.
2. Launch EcoLab.
3. Click **Download**  on the main toolbar to open the **Selective Download** dialog:



The dialog contains details of the stored experiments: the starting time and date, the logging mode and the number of samples taken.

4. Click an option to select the experiment you wish to download, and then click **OK**.
5. This will start the Post-experiment Data Transfer communication mode. Once the transfer is complete, the data will be displayed automatically in the graph window and in the table window.

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.

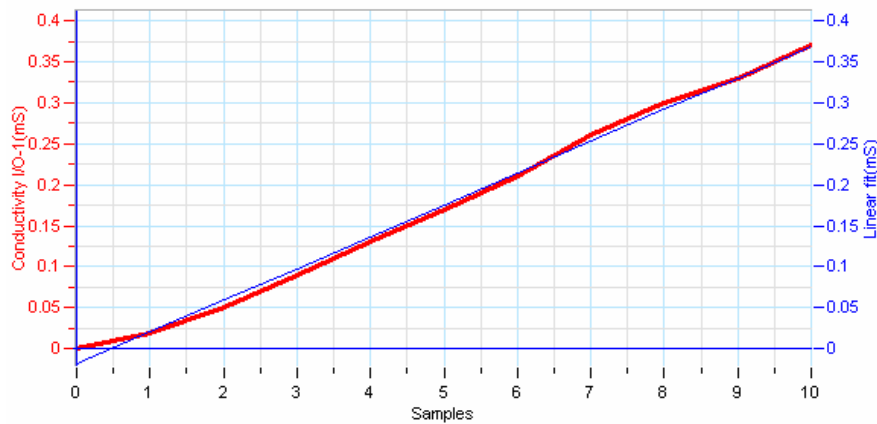


Figure 1: Saltwater Conductivity

Troubleshooting

If the conductivity values are out of 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

Email: support@fourier-sys.com

Consult the FAQs before contacting technical support:

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.