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Feb 2024

# Ammonium Sealed Electrode Sensor Bundle

**Product Number: ENAMN020A**

## Overview

Ammonium ions ($NH4^+$) can be found in fertilizer, cleaning products, processed meats and in the waste of animals. In water, at high concentrations, it can be a dangerous pollutant. The Ammonium sensor measures the concentration of ammonium ions in aqueous solutions.

The Ammonium Sealed Electrode Sensor can be connected to all einstein™ Tablets, einstein™Labmate™, and einstein™ Labmate+™.

# Typical experiments

**Water Quality**

- Testing the concentration of ammonium ions in the irrigation water
- Testing the concentration of ammonium ions in drinking water
- Investigate correlations between ammonium ion concentrations and other water quality parameters, such as pH, temperature, or dissolved oxygen.
- Conduct field studies to explore spatial variations in ammonium ion concentrations in different water bodies.
- Monitor landfill leachate to ensure that ammonium levels are within acceptable limits and do not pose a threat to groundwater or nearby surface water.

**Chemistry**

- Effectiveness of Fertilizers
- Level of Ammonium in Processed Meat
- Corrosiveness of Ammonium in Canned Foods

# How it works

The Ammonium sensor contains a Permafil (non-refillable) electrode containing a certain concentration of ammonium ions inside a membrane. When inserted into a solution containing Ammonium ions the Ammonium ions in the solution are attracted to Ammonium ions inside the membrane. By measuring the electrical potential of this attraction, the sensor can determine the level of Ammonium in the solution. Because they only attract other Ammonium ions sealed electrode sensors work well even in solutions containing numerous other ions.

# Sensor specification

| | |
|---|---|
| Concentration Range: | 1x10-6 to 1 M<br>(0.014 ppm to 14,000 ppm $NH_4^+$ as N) |
| Resolution (12-bit): | 0.15 mV |
| Minimum Sample Size: | 5 mL |
| Default Sample Rate: | 10 samples per second |
| pH Range: | 4 to 10 pH |
| Temperature Range: | 0 to 50 °C |

| | |
|---|---|
| Reproducibility: | ± 4% |
| Electrode Resistance: | 1 to 4 MΩ |
| Interfering Ions: | $K^+$, $Na^+$ |

# What's included

The Ammonium Sealed Electrode Sensor comes equipped with:

- The Ammonium Sealed Electrode Sensor
- ISE (Ion Selective Electrode) Amplifier
- 1 oz. $NH4^+$ Ionic Strength Adjuster (ISA) (AJNH41)
- 1 oz. $NH4^+$ 10 ppm as N Standard (SD2052)
- 1 oz. $NH4^+$ 1000 ppm as N Standard (SD2002 / SDNH42)

Note: Sensor cables sold separately

# Experimental set up

## Solutions

| | |
|---|---|
| ISA 1M NaCl: | 58.443g NaCl in 1000mL distilled water |
| 10ppm $NH4^+$ as N Standard (0.0714 M NH4+): | 38.19 mg NH4Cl in 1000 mL distilled water |
| 1000 ppm $NH4^+$ as N Standard (0.0714 M NH4+): | 3.819 g NH4Cl in 1000 mL distilled water |

In addition to the mentioned contents, you will also need:

- Wash Bottle with Distilled (DI) or deionized water.
- Several clean beakers.
- 1mL, 10mL pipettes.

## Electrode Preparation

1. Remove the plastic protective vial from the tip of the electrode and gently shake the electrode downward like a thermometer to remove any air bubbles trapped inside. Caution: Do not touch the PVC membrane with your fingers.
2. Rinse the electrode with distilled water, blot dry. Do not rub dry.
3. Condition the electrode in the provided 10 ppm $NH4^+$ as N standard solution for **30 minutes**.

4. After the conditioning period, rinse the tip of the electrode with distilled water and blot dry.
5. The electrode is now ready to use.

**This sensor must be calibrated before use** (see the **Data Logging, Calibrating and Analysis** below).

Two solutions of different concentrations (depending on the range of measurements) are used to calibrate the electrode. ISA is added to all solutions to ensure that the samples and the standards have the same ionic strength.

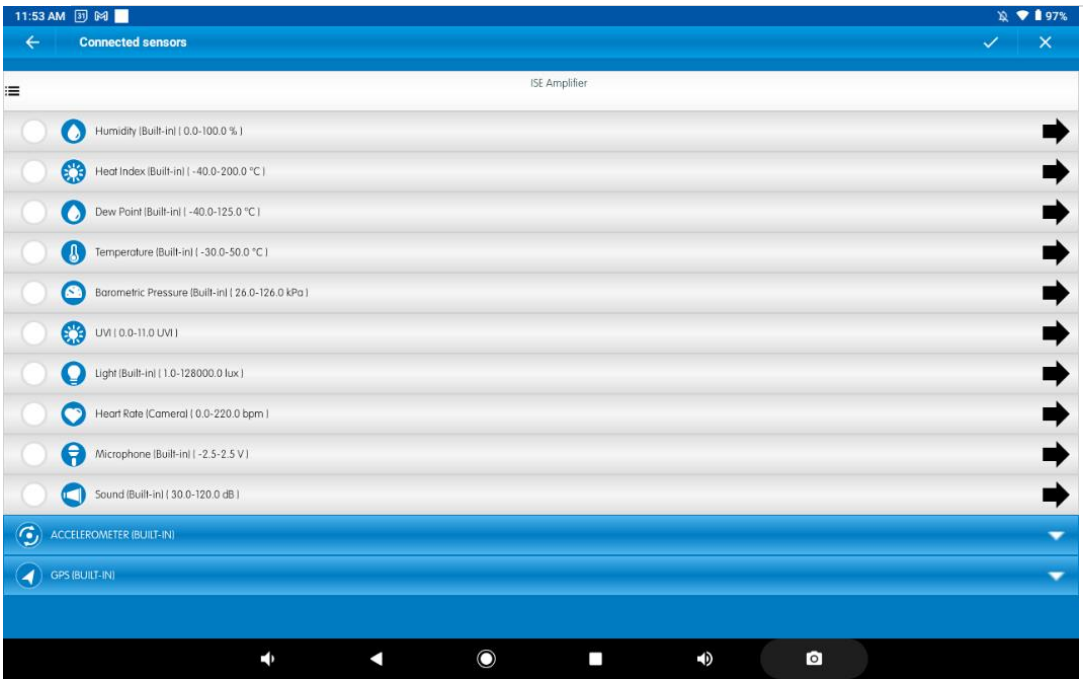
# Data logging, Calibrating and Analysis

## MiLABExTM Android & IOS

1. Take your einstein™ Tablet and open MiLABEx
   Or open MiLABEx with your android/iOS device, go to LAB and "Connect a device" selecting your einstein™ LabMate™
2. Insert the electrode into the ISE amplifier

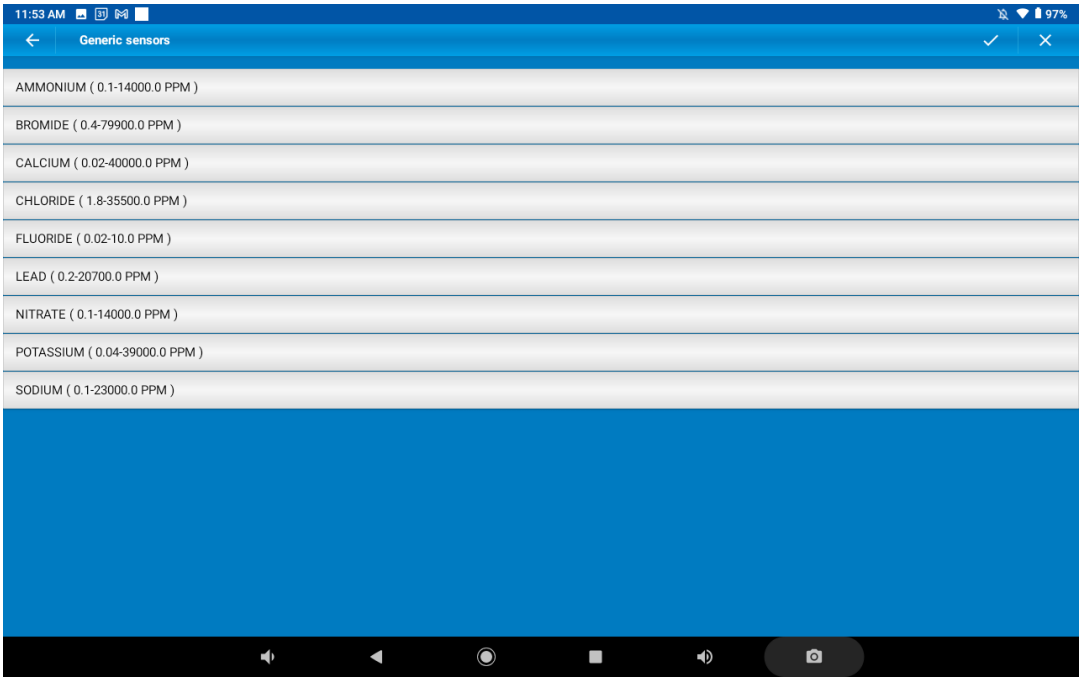
3. Insert the ISE amplifier cable into one of the sensor ports
4. MiLABEx will automatically detect the ISE amplifier and show it in the Launcher View

Android



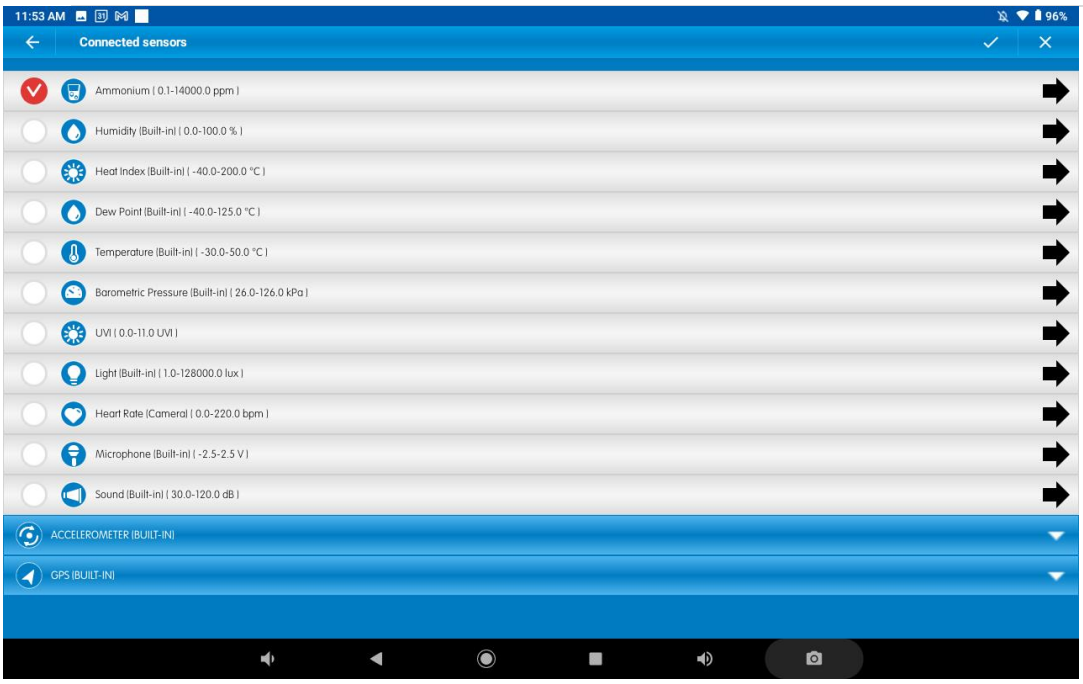

5. Tap ISE amplifier and select the Ammonium electrode and then press V (android) or select (iOS)

Android



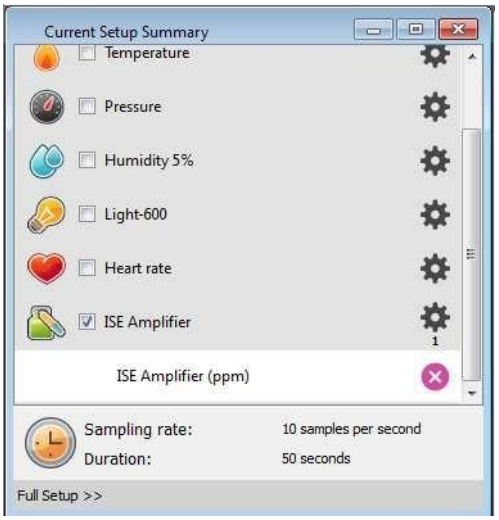

6. Make sure the icon is checked ( ) to enable it for logging

Android:

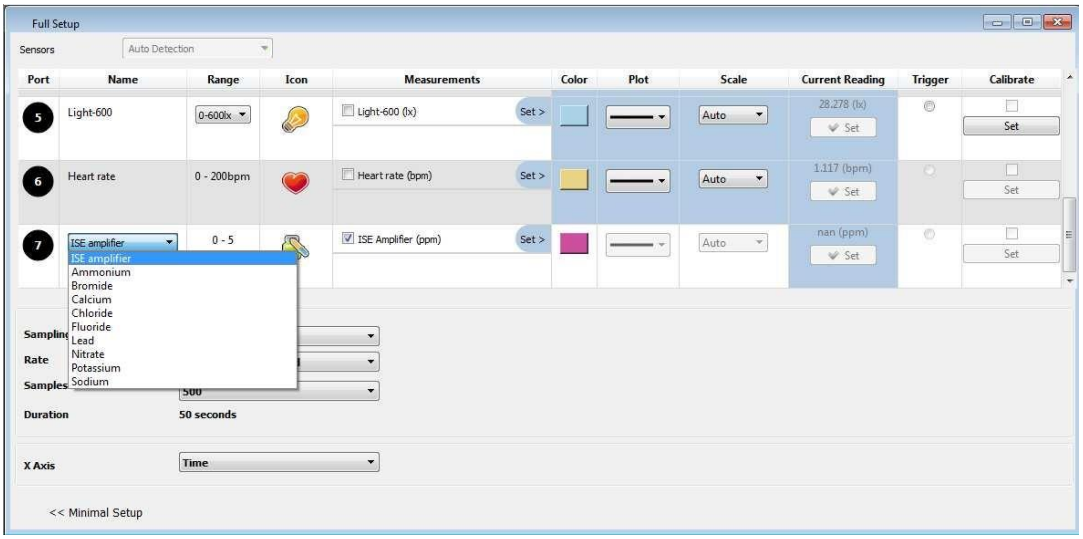



## Desktop

1. Connect your einstein™ LabMate™ to your PC with cable or pair it with Bluetooth
2. Insert the electrode into the ISE amplifier
3. Insert the ISE amplifier cable into one of the sensor ports
4. Launch MiLABEx
5. MiLABEx will automatically detect the ISE amplifier and show it in the **Current Setup Summary** window




6. Click **Full Setup**, located at the bottom of the **Current Setup Summary** window to set which ISE electrode you are using and to program the data logger's sample rate, number of samples, units of measurement, and other options




# Calibration

## Preparing the calibration solutions

### First point of calibration

1. Add 10 mL of the 10 ppm solution into a 50 mL beaker.
2. Add 0.2 mL of ISA and stir thoroughly.

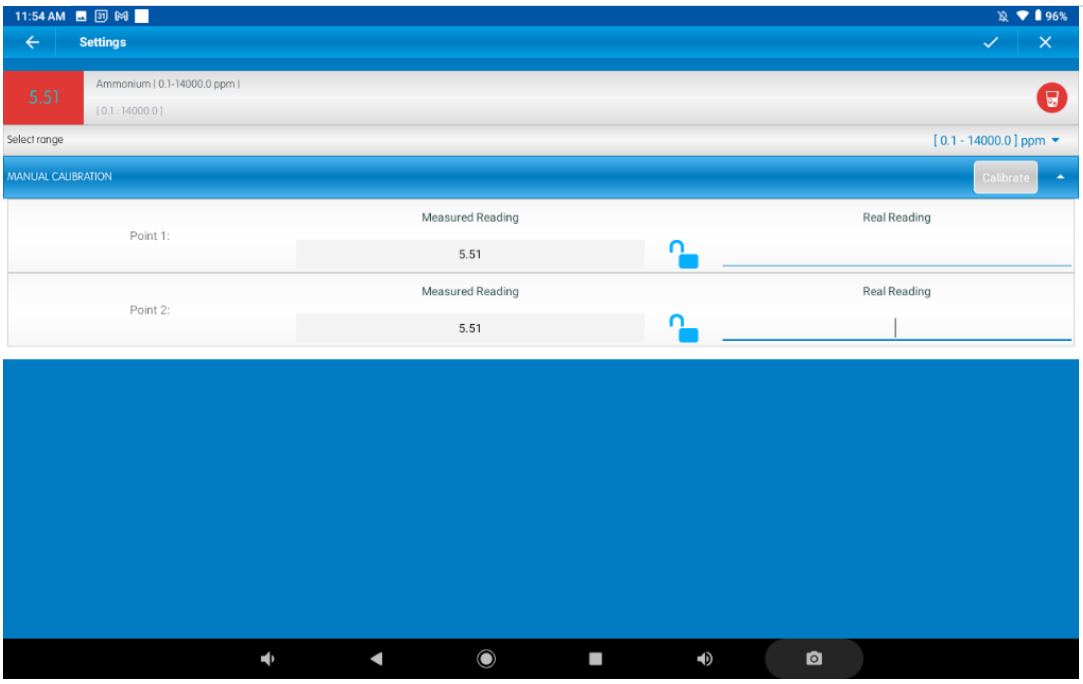
### Second point of calibration

1. Add 10 mL of the 1000 ppm solution into a 50 mL beaker.
2. Add 0.2 mL of ISA and stir thoroughly.

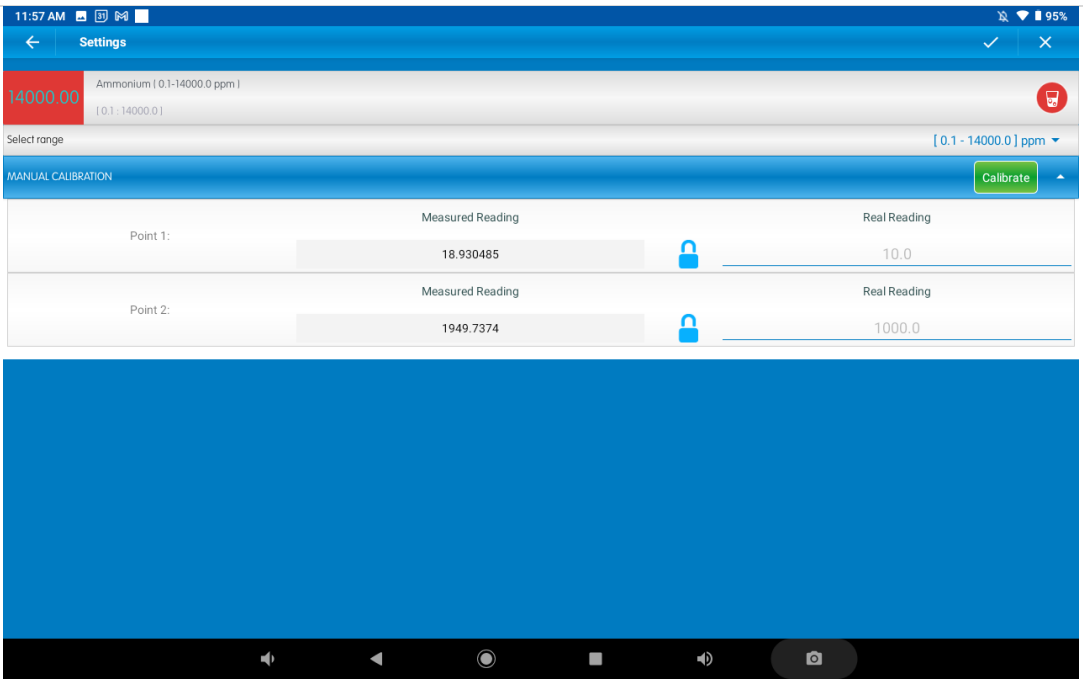
## Calibrating the sensor

### Android

1. Tap the Settings button next to the sensor's name and then Manual Calibration




2. Prepare the electrode as described in “Electrode preparation” above
3. Tap the “Real Reading” box of Point 1
4. Enter the value “10”
5. Rinse the electrode with DI water, blot dry and place in the beaker with the 10 ppm solution. Wait for
   a stable reading, and then tap the “Lock” icon
6. Tap the “Real Reading” box of Point 2
7. Enter the value “1000”
8. Rinse the electrode with DI water, blot dry and place in the beaker with the
   1000 ppm solution. Wait for a stable reading, and then tap the “Lock” icon



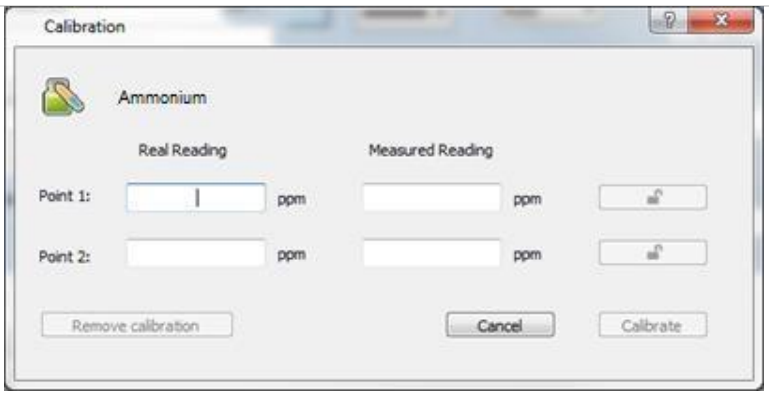

9. Tap “Calibrate”
10. You are ready to run your experiment

**Note**: It is best to calibrate the electrode with one Real Reading below your expected reading and one reading above your expected reading. For example, if you expect a reading of around 100 ppm it is best to calibrate with one Real Reading below 100 ppm and one Real Reading above 100 ppm

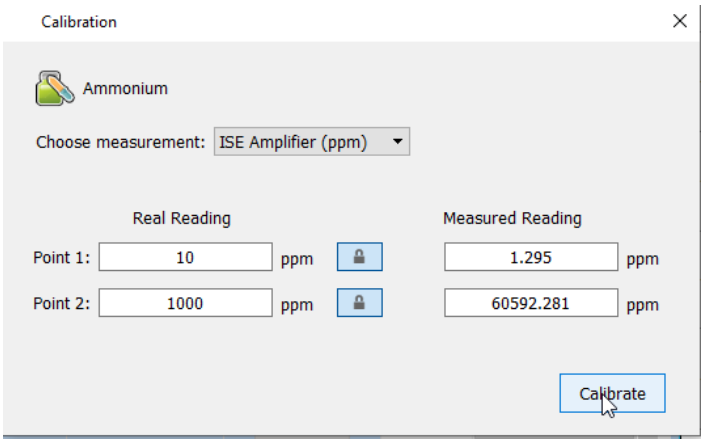
**Note**: You can prepare your own ppm solutions for calibration, using the strength of your solution as the “Real Reading”

### Desktop

1. Start MiLABEx™ ( ) and select the Ammonium electrode as described above.
2. Under the Calibrate column tap “Set” to bring up the Calibration menu




3. Prepare the electrode as described in "Electrode preparation" above.
4. Tap the "Real Reading" box of Point 1
5. Enter the value "10"
6. Rinse the electrode with Distilled water, blot dry and place in the beaker with the 10 ppm. Wait for a stable reading, and then click the "Lock" icon
7. Tap the "Real Reading" box of Point 2
8. Enter the value "1000"




9. Rinse the electrode with Distilled water, blot dry and place in the beaker with the 1000 ppm solution. Wait for astable reading, and then click the "Lock" icon
10. Click "Calibrate"
11. You are ready to run your experiment

**Note**: It is best to calibrate the electrode with one Real Reading below your expected reading and one Reading above your expected reading. For example if you expect a reading of around 100 ppm it is best to calibrate with one Real Reading below 100 ppm and one Real Reading above 100 ppm

**Note**: You can prepare your own ppm solutions for calibration, using the strength of your

solution as the "Real Reading"

### Maintenance and Electrode Storage

**Short Term:**

Rinse the electrode thoroughly with Distilled water and place the tip in a diluted standard solution 10ppm between measurements.

**Long Term:**

Rinse the electrode thoroughly with DI water, blot and store dry. Replace the cap to protect the sensing element.

Follow procedures in the sections **Electrode Preparation** before using the electrode again.

## Troubleshooting

If the electrode reading is not within the normal range, the following procedure may restore the electrode.

1. Soak the electrode in the 10 ppm $NH4^+$ as N standard solution for 2 hours before use.
2. Repeat the procedure outlined **Electrode Preparation** again.

## Technical support

For technical support, you can contact the Fourier Education's technical support team at: Web: www.einsteinworld.com/support
Email: support@fourieredu.com

## Copyright and Warranty

All standard Fourier Systems sensors carry a one (1) 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.