Conductivity

What is it?
Conductivity is the water's ability to conduct an electrical current. The sensor works by running an electrical current through the water between two metal electrodes. In distilled water the current does not have a medium in which to flow easily, but when ions (from dissolved salts) are present in water the electrical current can easily pass through. When the electricity uses these substances to pass through the water, the water is said to conduct electricity.

Electrical conductivity (EC) is measured in microsiemens per centimeter (µS/cm). Since conductivity increases as the temperature of water increases, EC values are automatically corrected to a standard value of 25°C and the values are then referred to as *specific* electrical conductivity or specific conductance.

Note: Total Dissolved Solids in ppm can be obtained by multiplying EC (µS/cm) by 0.67. (This measurement is different from total solids because it does not include suspended material.)

Why do we measure it?
Conductivity is used to help assess the health of a waterway. Aquatic organisms need a fairly constant concentration of major dissolved ions in the water. If concentrations are too high or too low, it could impact the growth, reproduction, etc. of certain organisms. Also, in normal conditions conductivity is fairly constant, therefore any large changes from a waterway's baseline level can potentially indicate discharge or runoff of some kind of pollution.

What affects it?
The geology of a lake or river strongly influences its conductivity. The composition of minerals in the lake or river bed and their tendency to ionize (i.e., readily erode or breakdown) can impact the conductivity. For example, waterways with granite bedrock will have a lower conductivity than those that flow through limestone. Temperature also affects conductivity; warmer water conducts electricity better than cooler water.

Humans can impact conductivity too. Wastewater from sewage treatment plants and septic systems can increase conductivity, as well as urban runoff from roads (especially road salt). In addition, agricultural runoff can increase conductivity. Water draining from the fields can have high levels of dissolved salts.

Type of Waterway	Conductivity Measured
Distilled water	0.5 to 3 µS/cm
U.S. rivers	50 to 1500 µS/cm
U.S. streams supporting good mixed fisheries	150 and 500 µS/cm
Industrial waters	Up to 10,000 µS/cm

Source: US EPA