

Technical Note

Date: August 10, 2010

Subject: Conductivity vs. TDS measurements using the Hydra Water Quality Meter

To Whom It May Concern:

It has come to the attention of Mesa Laboratories Inc. that there are questions concerning the use and calibration of the Hydra Water Quality Meter (from hereon known as simply 'Hydra'). The Hydra was designed primarily as a conductivity meter with the additional function of being able to display the conductivity reading as TDS (ppm or ppt). While this is true, it seems some clarification is needed as to the nature of a Conductivity reading vs. a TDS reading.

While similar in some ways, there is not a directly proportional relationship between Conductivity and TDS. Conductivity is a measurement that represents how much resistance the solution TDS on the other hand, is a measurement of the dissolved solids that are present in the solution. This is determined in the same way, by measuring the solutions resistance. The difference lies in the interpretation of the data. Conductivity is just a straight resistance reading where TDS need to be determined by not only knowing the resistance of the solution being measured, but one must also know what the solids are that are dissolved in the solution.

The reason for this is that different solids when dissolved into a solution may give different conductivity readings with equal amounts of each. For example: if a Hydra measures 30 μ S, this could be equivalent to 100 ppm of salt type A, or 80 ppm of salt type B, or 60 ppm of salt type C, where A, B and C are such things as NaCl, KCl, sodium bicarbonate, potassium acetate... The inverse is also true, that if one were to dissolve these same chemicals into solutions each having a TDS of 100 ppm, then the conductivity of each would vary.

So, as one can see, there is no 'universal' conversion between Conductivity and TDS. Having stated that, we can now explain the TDS function of the Hydra a little more clearly. The meter is designated as a 'Water Quality Meter'. The TDS reading on the Hydra is derived from the Conductivity measurement. The Conductivity reading is converted using a mathematical formula based on what is known as 442, which is a mixture of sodium sulfate (40%), sodium bicarbonate (40%) and sodium chloride (20%). The 442 mixture is designed to mimic the ions often present in natural fresh water systems.

While the Hydra programming does allow it to be put into the TDS calibration mode, the varying electrical properties of the different TDS standard solutions available on the market make it extremely difficult to calibrate while in this mode. There is not a TDS standard specified for use in calibrating the Hydra. The Hydra should be calibrated using the specified Conductivity standard solutions while the meter is in the Conductivity mode; in other words, the Hydra MUST be calibrated per the instructions in the Test Instrument Users Guide.

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While there is much information about TDS measurement available on the internet, one website site that is particularly helpful is this:

<http://www.reefkeeping.com/issues/2004-04/rhf/feature/index.php>

There is a very good description of TDS measurement and the issues discussed in this document. If there are further concerns or question they can be directed to:

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