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TDS Monitor (DM-1/DM-2) General Usage and Calibration Instructions

Proper Usage

- The DM-1 and DM-2 are designed to be used with flowing water. Due to nature of mobile charged ions in electrical conductivity and flowing water, it is normal to experience discrepancies and fluctuations within 2% of the readings.
- Make sure the sensor is properly inserted into the fitting.
- Make sure to align the dot on the sensor with the dot on the fitting. If there is no dot on the fitting (this may happen if you received a non-standard fitting or replaced the fitting), then align the metal probes parallel to the direction of the fitting (once the sensor has been inserted into the fitting, look through it – you should only see one metal probe).
- Always wait 10-20 seconds for more accurate readings.
- Rinse in de-ionized water or alcholol after prolonged use to ensure proper readings.
- The base of the DM-1 is not waterproof. The DM-2 is splash proof. Do not drop or submerge either unit in water.
- Do not store either unit in high temperature or direct sunlight.

Calibration

- HM Digital monitors are factory-calibrated at 342ppm NaCl and designed to stay consistent.
  - *However, you may need to recalibrate your meter from time to time, or for certain applications. TDS meters are most accurate when calibrated as close as possible to the sample to be tested. For best results, calibrate at 25 ^{o}C (77 ^{o}F)*
- To ensure accuracy and consistency, recalibrate your meter using a commercial standard solution. This can be done prior to usage and should be done after prolonged usage.
- For drinking water, we recommend calibrating in a range of 90ppm to 700ppm
- On the DM-1 and DM-2, calibration is done for both sensors simultaneously.

What you will need:

1. Calibration solution
2. A tube/hose that is the same size as the fittings
3. A bucket or basin
4. A pump

Step 1: Attach the IN and OUT sensors to the tubing that you will use for the calibration. It will be necessary to cut the tube in two places so that the same solution will be running through both sensors and so that the sensors are not too far apart from each other.
Step 2: Configure the tube within a bucket or basin, using a pump so that the calibration solution will be cycled through the tube. In other words, the calibration solution needs to be flowing over both sensors to calibrate properly.
Step 3: Once everything is set-up, turn on the unit and measure the calibration solution. If the monitor does not read within 2% of the solution (on either the in or out), adjust the reading by inserting a mini screwdriver into the trimmer pot (small hole on the rear of the monitor). Gently turn the trimmer clockwise to increase the reading and counterclockwise to decrease the reading.

- *It does not matter if IN or OUT is selected. Both sensors are calibrated simultaneously and calibrating one side will automatically calibrate for the other side.*
- *Make sure the screwdriver fits evenly into the groove of the screw.*
- *Note that the trimmer pot is very sensitive! Remove the screwdriver carefully.*

Step 4: Once the meter reads within 2% of the solution, gently release pressure on the screwdriver and remove from the trimmer pot.

- *If the screwdriver is retracted abruptly, the reading may jump.*

Step 5: Turn the monitor off and on. Verify the readings for both sensors. If the readings are accurate with 2%, calibration is complete. If not, repeat the procedure.

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TDS

Total Dissolved Solids correlates to the ability of water to conduct electricity. It is also an index used to determine the concentration of dissolved minerals. The more minerals that are dissolved, the more conductive the water will be. A TDS meter is calibrated to read in parts per million (PPM). TDS is the concentration of a solution as the total weight of dissolved solids. (1 ppm = 1 milligram/litre. TDS is a mass estimate and is dependent upon the mix of nutrients as well as the concentration.

Conductivity

Electrical conductivity is a measure of the ability of a solution to carry a current anddepends on the total concentration of ionized substances dissolved in the water. (the electricity flows by ion transport). Although all ions contribute to conductivity, their valences differ, so their actual and relative concentrations affect conductivity. When the concentration of ions is high, conductivity is high, and the resistance to electrical passage is low. No meters have the ability to distinguish between different types of ionic salts. Conductivity measurements are also complicated by the fact that not all salts conduct an electric current equally

How the TDS meter works

TDS meters are, in reality, conductivity meters. They work by applying a voltage between two or more electrodes. Positively charged ions will move toward the negatively charged electrode, and negatively charged ions will move toward the positively charged electrode. Because these ions are charged and moving, they constitute an electrical current. The meter then monitors how much current is passing between the electrodes as a gauge of how many ions are in solution. This measure of conductivity, µS/cm is then converted to ppm by a factor of approximately 0.5, on a curve ranging from 0.47 to 0.55, depending on the level. The factor is related directly to the level of conductivity. This meter is built and calibrated according to an NaCl standard. Other meters may be calibrated to either a KCl standard (0.51 conversion) or the 442 standard.(0.7 conversion)

What the TDS meter actually detects

Since TDS meters are often used to test water "purity," it is important to understand what they do not detect. As conductivity meters in disguise, TDS meters will only detect mobile charged ions. They will not detect any neutral (uncharged) compounds. Such compounds include sugar, alcohol, many organics (including many pesticides and their residues), and unionized forms of silica, ammonia, and carbon dioxide. These meters also do not detect macroscopic particulates, as those are too large to move in the electric fields applied. So if you see "rusty" looking water from iron oxide particulates, that won't be measured. Neither will anything else that makes the water look cloudy. Bacteria and viruses also won't be detected.

Total charged ions" is likely a much better term for what the meter measures. Fortunately, a measurement of total charged ions is good enough for most purposes.

Temperature Compensation:

The conductivity of ions in water depends upon temperature. The ions are naturally moving around faster as they get warmer. When the same numbers ofions are moving faster, the apparent conductivity is increased.

Our meters are capable of compensating for temperature by simultaneously measuring the conductivity and the temperature. The internal electronics then take the temperature into account, and normally provide a value that is "corrected" to what the conductivity would be at a standard temperature (25°C).

How external factors may affect readings

While pure water has a TDS well below 1 ppm, uncertainties from carbon dioxide in the air (which gets into the water and ionizes to provide some conductivity) and the TDS meter itself may yield results of 1 or 2 ppm even from pure water

The entire electrode assembly must be submerged in the sample without a lot of bubbles or solids present between the electrodes. So, for example, you cannot typically get a good reading by holding it in a stream of tap water because air often gets between the electrodes that way (resulting in an artificially low reading).