

# Aquatic Technical Bulletin

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## DCM5 Sensor Accuracy

The purpose of this document is to review a number of items that can affect residual measurement and accuracy, and offer tips on how to improve the calibration and tracking of ProMinent residual sensors.

Items discussed are:

- DPD Tests and amperometric residual sensor accuracy
- Combined chlorine readings and how they are affected by accuracy
- DPD testing conditions that reduce accuracy



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## Accuracy of DPD tests and Amperometric Sensors

The published accuracy of ProMinent residual amperometric sensors is the same as the published accuracy of the residual test being used to calibrate them (+/- 0.04 ppm for typical DPD colorimeter). Essentially, you can only be as accurate as the tool used to calibrate the instrument. That means under perfect conditions for both measurements, if they each have an error of 0.04 ppm, the next reading, after a perfect DPD calibration could still have as much as 0.08 ppm difference. If the DPD test is not using an electronic colorimeter the errors can be as much as 0.2 or higher using the human eye as the color comparator.

## Accuracy Effects on Combined Chlorine Readings

We've all seen the situation, especially during UV operation, where the DPD Total Chlorine measurement is less than the Free Chlorine measurement, with a perfectly calibrated DPD tester and reagents. When seen on a DPD test kit, it is either shrugged off or a retest is done to get a better reading. If this is seen on the DCM5, the typical assumption an operator makes is that there is some sort of sensor error. Keep in mind that the DCM5 uses the same simple formula to calculate the combined chlorine residual ( $\text{Total Cl}_2 - \text{Free Cl}_2 = \text{Combined Cl}_2$ ), and cannot be more accurate than the standard used to calibrate it. Using the accuracy example above, if all the errors of both the Free and Total Chlorine residual are added, the error for the combined chlorine reading may differ as much as 0.16 ppm. By definition, Free Chlorine cannot exceed Total Chlorine, but measuring accuracy limits can cause this. Another phenomenon seen with real time residual readings is the chemical and sensor reaction times which occur faster with Free chlorine than Total. This can be seen immediately after chlorine feed events [especially dry chlorine products], when Free residual readings temporarily register higher than Total residual readings. The Total residual species reactions are completed and Total residual sensor readings catch up in a few minutes and the readings then return to normal. This is another good reason to not attempt hasty calibrations while chemistry is changing.

## Conditions that cause DPD test inaccuracy

- Human eye as color comparator
- Poor cleanliness of sample vial
- Inadequate rinsing of sample vial between samples
- Variable total chlorine reaction times
- Varying sample volumes
- Varying reagent metering
- Aging reagents
- Contaminated reagents
- Aging or dirty comparator
- Colorimeter calibration/alignment

**Your DPD tester will have instructions for how to properly use and maintain your instrument to obtain optimum results. Read these instructions carefully and follow them to the letter, including the newest sequences of reagent first, then water sample introduction, vial cleaning, reagent storage and shelf life.**

**Call ProMinent Customer Service with any questions.**

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