SHORT TECHNICAL NOTE HS 11-25

WHY DPD3 AND ONLINE CHLORINE MONITORS DON'T ALWAYS MATCH

1 Introduction

Online total chlorine monitors all need to be calibrated, this is almost always done using a handheld DPD3 test. The problem is that *DPD3* and *online monitors* of different measuring principles *do not measure the same things* in the same way.

2 The Key Points

2.1 Online total chlorine monitors only measure two things:

- Free chlorine
- Monochloramine

These are the fast-reacting forms of chlorine that matter most for disinfection.

2.2 DPD3 (the handheld test) measures more things — but slowly

The DPD3 test can also pick up slow-reacting organic chloramines, but only if you wait long enough. If you leave the test too long (e.g., several minutes), the reading keeps increasing.

2.3 This means:

- A DPD3 test left too long will measure more species than any online monitor measures.
- The online monitor may then look "wrong" or "too low", even though it is actually correct especially if it has been previously calibrated using a long delay DPD3 and the organochlorine content of the water has now gone up.

2.4 Timing is critical

A DPD3 reading must be taken exactly at e.g 60 seconds for calibration. Different timing leads to different result which can lead to calibration mismatch**.**

2.5 This is not a fault with the monitor

- Differences are usually caused by:
- Timing errors
- Slow-reacting chlorine species
- Cold water slowing reactions
- What each method is detects

3 Perfect agreement is impossible

- DPD3 measures things that online sensors cannot AND
- Online sensors respond much faster than DPD3 can.

The two methods will never match exactly — and shouldn't be expected to.

4 Good practice

- Always read DPD3 at 60 seconds when ***calibrating***.

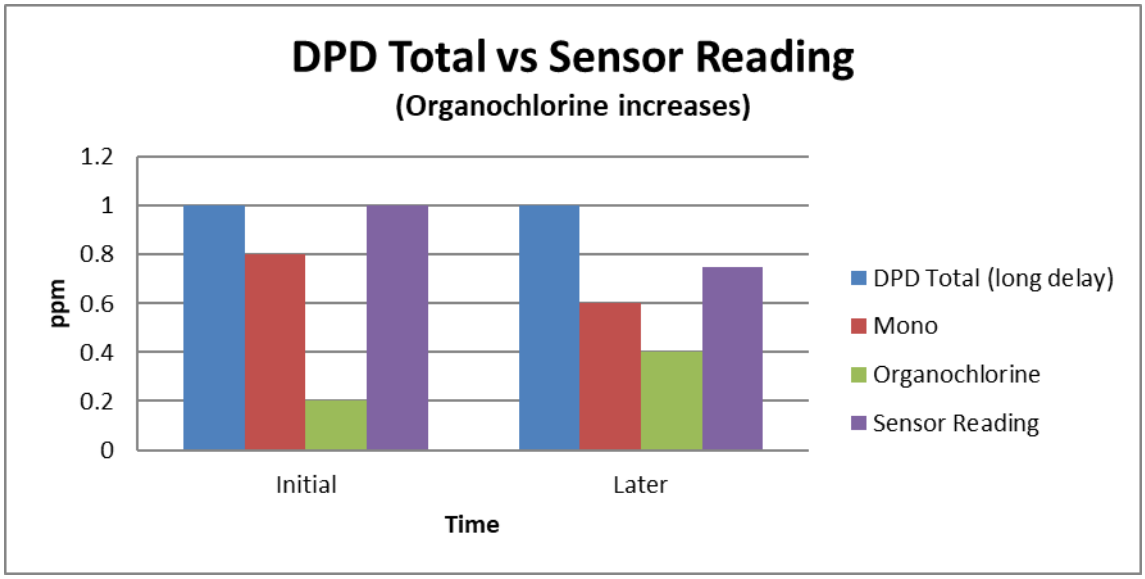
For investigations, you may compare:

- 60-second DPD3 (free + mono)
- 3 to 8 minute DPD3 (adds slow organochlorine species)

The difference tells you how much organic chloramine is present.

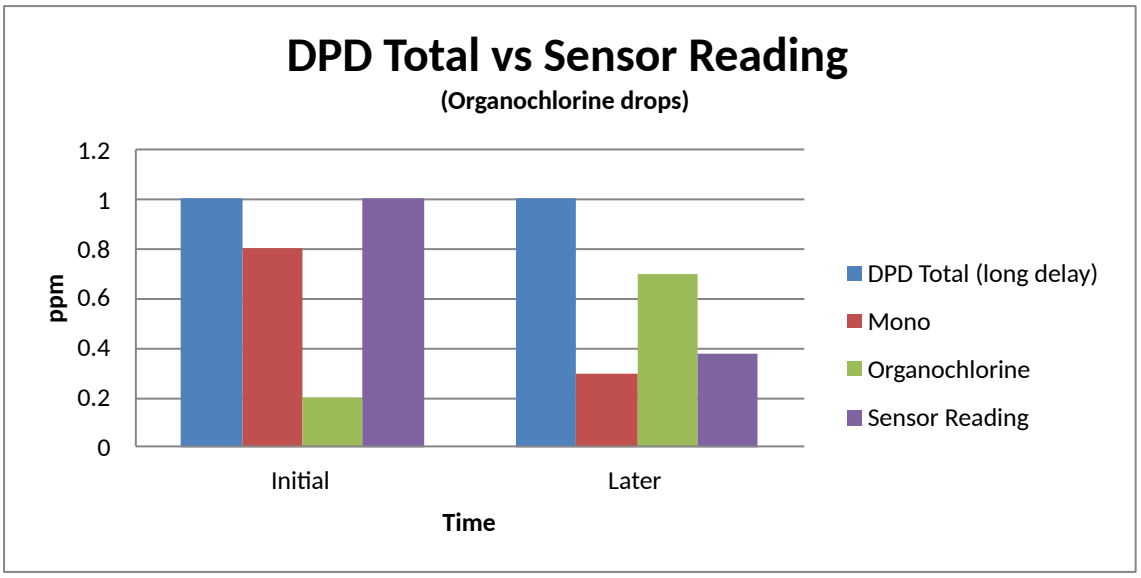
5 Graphical example

Consider a total chlorine monitor calibrated to 1ppm using long delay DPD3. Mono is 0.8 and organochlorine is 0.2ppm. At the next validation the DPD3 still shows 1.0ppm BUT critically the ratio of mono to organochlorine has changed. Mono has dropped to 0.6ppm and organochlorine has risen to 0.4ppm. The monitor will now read **low** as the thing it measures has decreased although the total measured by DPD3 has stayed the same.



Time	DPD Total (long delay)	Mono	Organochlorine	Sensor Reading
Initial	1	0.8	0.2	1
Later	1	0.6	0.4	0.75

If the ratio changes further, for example longer into a distribution system with a higher water age the apparent errors are more pronounced.



Time	DPD Total (long delay)	Mono	Organochlorine	Sensor Reading
Initial	1	0.8	0.2	1
Later	1	0.3	0.7	0.375

6 In One Sentence

DPD3 and online monitors measure chlorine differently and at different speeds, so they will not always match, consistent timing is the key to getting reliable reproducible calibration results.

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NOVEMBER 2025