

# Validation of O<sub>2</sub> Sensors in the Process

## Background / problem statement

Many Validations and Comparisons of O<sub>2</sub> process measurements fail.

Typical situations:

- The values from two O<sub>2</sub> sensors at the same location show different values (0.1 - 0.5mg/l difference)
- The FDO® 700 IQ shows 0.0mg/l O<sub>2</sub> and they think 0.2 - 0.3 mg/l is correct.

The main reasons are:

- Different design/technology reacts different to dissolved O<sub>2</sub> concentration and air bubbles (e.g. flat caps captures air bubbles)
- Different sensors have different response times
- Sensors might require flow
- Sensors might need calibration

## Solution

For a sensor comparison the above mentioned reasons have to be addressed.

### Mounting

Different design/technology reacts different to dissolved O<sub>2</sub> concentration and air bubbles (e.g. flat caps captures air bubbles).

We recommend to mount all upside/down to prevent this. (Mounting must be realized locally) Otherwise the result will be +/- 0.1 - 0.5mg/l O<sub>2</sub> difference!

Based on the 45° sensor cap design is it no problem to mount it in the following way, only for comparison it can be useful to mount it upside down.

### Response times

Put all in the same conditions if possible.

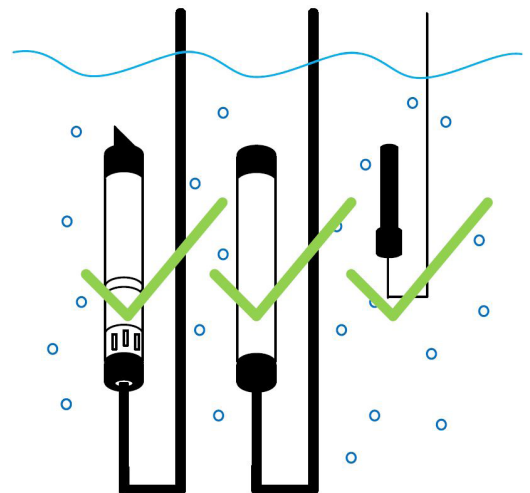
### Incoming flow

Some sensors might require flow.

Put them in a range which covers all.

### Calibration

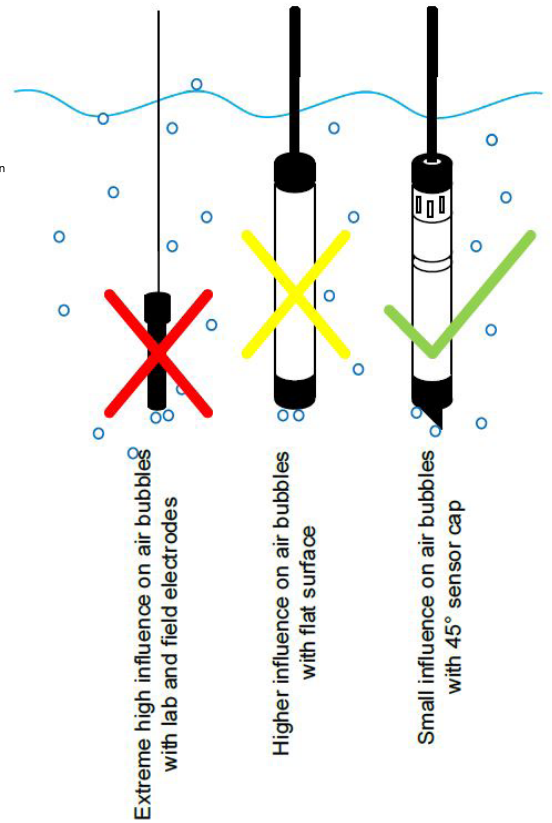
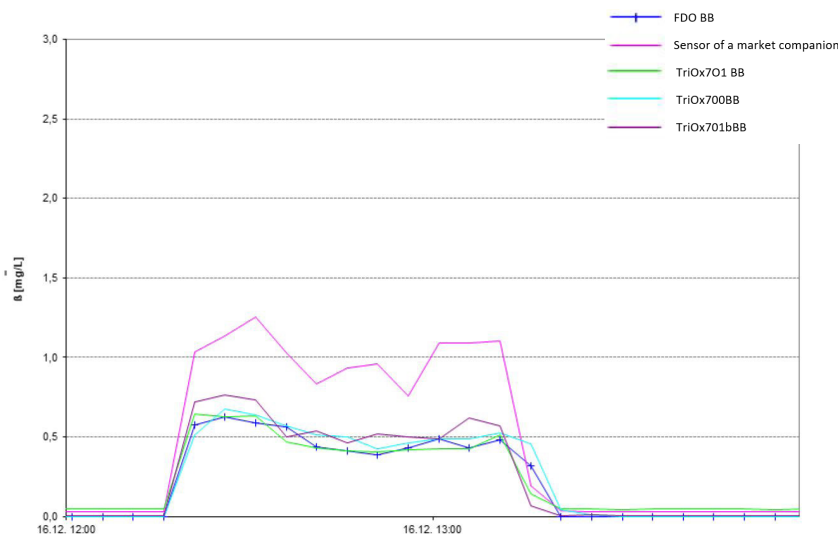
- Calibrate sensors if necessary
- FDO® 700 IQ can be checked with a test



## Solution

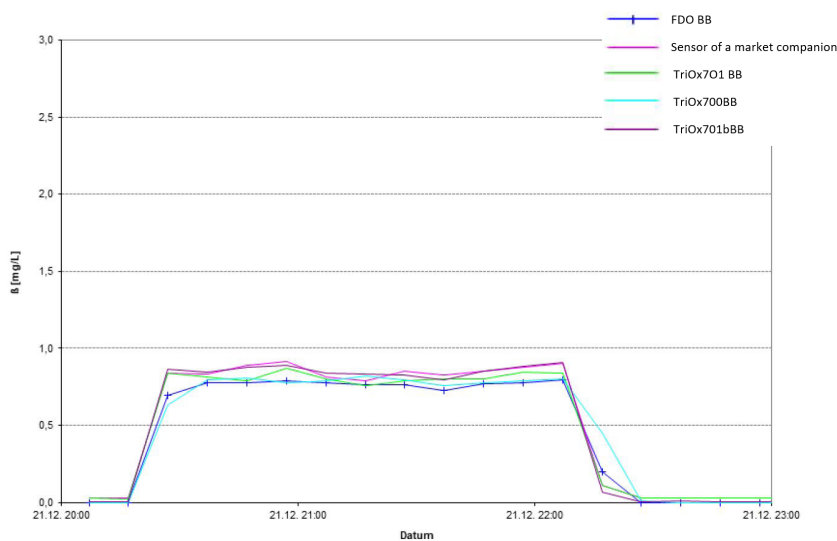
During the first test, most of the sensors were mounted upside down (except TriOx 701 BB):

- » There are clear false high readings of individual sensors



During a second test, all sensors were mounted upside down:

- » Almost identical values of all tested sensors
- » Sensor of a market companion



## Conclusion

The experimental setup showed that especially the design of a flat membrane cap can lead to significant false high readings of the oxygen concentration. This could be proven by an upside down mounting of the sensors, where all sensors gave comparable results.

Do you have further questions?  
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