Sea-Bird identified the causes of known Clark cell problems and developed solutions for each one in the SBE 43

Electrochemical drift non-detectable, << 1 µmol/kg/yr

With negligible electrochemical drift, biofouling becomes the main challenge in coastal estuarine environments

Plumbing isolates SBE 43 from continuous exposure to external fouling environment

Other benefits of plumbed environment:
- Water is trapped and goes anoxic, minimizing electrolyte effects
- Anti-foulant concentration is held in place between samples
- Black tubing and plenum block light, reducing in situ algal growth
- No moving parts that will foul
The SBE 43 calibration changes in slope, not offset

SBE 43 calibration changes in slope due to fouling, but the sensor voltage at zero remains stable.

Oxygen (ml/L) =
\[ SOC \times V \times [T_{cor}(T) \times P_{cor}(P,T) \times O_{xsol}(T,S)] \]

where
- \( SOC \) = Linear slope scaling coefficient; changes with fouling
- \( V \) = Sensor voltage
- \( T_{cor} \) and \( P_{cor} \) = Model of Temperature and Pressure response of sensor
- \( O_{xsol} \) = Oxygen solubility

Fouling affects the slope only. Therefore, a single reference value can be used to correct the slope term (SOC) in the calibration.

Reference Winkler DO (ml/L) | SBE 43 DO before cleaning (ml/L) | Residual (SBE-Wink) (ml/L) | Correction factor to multiply SOC in calibration equation
--- | --- | --- | ---
6.80 | 6.75 | -0.05 | 6.80/6.75 = 1.007
4.20 | 4.17 | -0.03 | 4.20/4.17 = 1.007
1.20 | 1.19 | -0.01 | 1.20/1.19 = 1.008

5 months in restricted coastal lagoon, < 5% fouling drift observed at sensor swap (Cockburn Sound, W. Australia)

4 months in coastal urban marina (Shilshole Bay, Washington)

The SBE 43 is proving an excellent performer on long-term moored applications

http://www.venus.uvic.ca/data/mainpage.html

1 year on Venus Project, sample rate 1 minute.
SBE 43 measures true environmental variability in DO due to faster response time.
No Electrochemical Drift,
No Fouling Drift, No \( H_2S \) Poisoning!