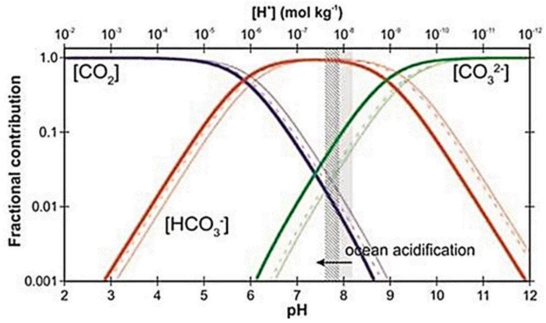
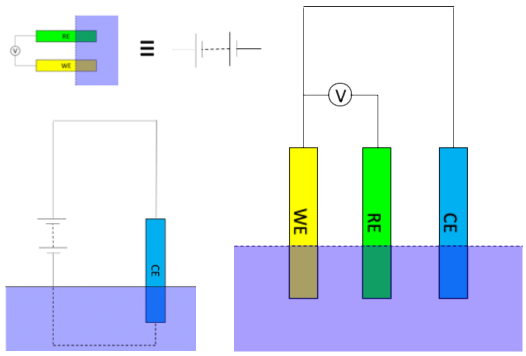
Valeport Ltd is a family owned company based in Devon that designs, manufactures and distributes oceanographic and hydrographic sensors to a worldwide customer base. Established in 1969, Valeport's ambition is set out in their mission statement: "strive to exceed their customers' expectations". The business works with and supplies many different markets including some of the following: environment, defence, energy, construction, dredging and civil engineering. Their most popular products include their market leading speed of sound sensor, tide gauges and current meters.

During my time at Valeport I have been working with ANB Sensors; a start-up company based in Cambridge. The collaboration revolves around a new solid-state ion-selective electrode system developed by ANB Sensors. The system is similar to a standard three electrode electrochemical sensor but utilises a fourth electrode to track the drift of the system. This essentially makes the sensor calibration free. Valeport hopes to utilise the sensor in their future products to replace the current glass electrodes. The main advantage of new sensor is that given its calibration free nature it can be used on long deployment thus allowing accurate data to be collected without the need for frequent recalibration. In addition to this, given that it is a solid-state sensor rather than a glass electrode system means that overall the device is much more robust. This is especially important in industries such as gas and oil.

ANB are unique in that they use an additional fourth electrode. This electrode keeps a completely fixed potential/doesn't drift. Therefore the RE in the first system can be run with the additional electrode to determine how far the potential has shifted. The results can then be adjusted.





My main body of work whilst at Valeport was based around designing a calibration procedure for new batches of arrays. Unlike most pH calibrations, which use standard buffer solutions with a known pH, the arrays have to be calibrated in saltwater and the pH controlled by changing the concentration of dissolved carbon dioxide. This is problematic as the pH of saltwater is dependent on the partial pressure of carbon dioxide at the solution surface. Consequently, pumping carbon dioxide into the solution will only temporarily change the pH as the excess carbon dioxide leaves the solution to re-achieve equilibrium as governed by Henry's law. The first iteration of a calibration rig tried to solve this problem by simplistically pumping carbon dioxide into the solution at the same rate as it left, thus creating a kind of pseudo partial pressure. Although this worked as a method for achieving different pHs at different temperatures it was very difficult to predict the final pH from the gas flow rate. Further to this it required a large supply of gas and consequently wasn't cost effective. As a result of these issues the new and current calibration rig was designed. In this rig saltwater was contained in a pressurised chamber. The chamber allows the partial pressure of the carbon dioxide to be controlled directly by changing the total pressure of the system and thus the pH can be controlled more precisely and reliably.