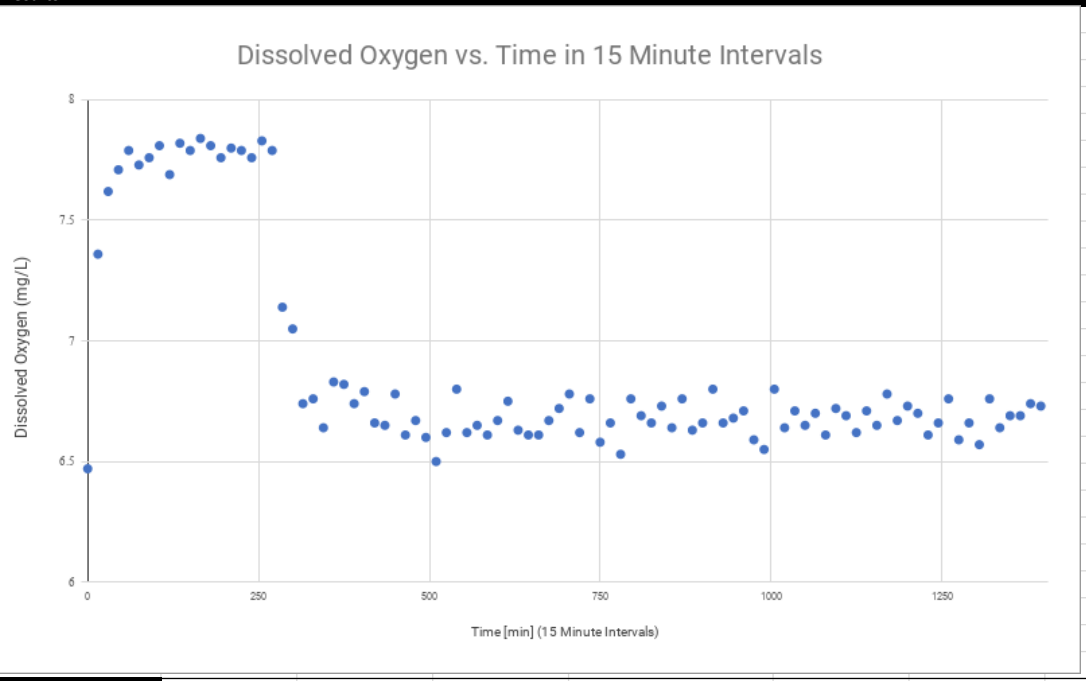
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Subsystem/ Function/ Feature Name: | | Oxygen Sensor | | | | | | | | |
| Date Completed: | 3/12/18 | | | | | | | | | |
| Performed By: | Nate | | | | | | | | | |
| Tested By: | Nate | | | | | | | | | |
| | | | | Green - Passed | Red - Failed | Yellow - Not Completed | | | | |
| Concluded Condition of meeting Engineering Specification | | | | | | | | | | |
| **I. TESTING SPECIFICATION** | | | | | | | | | **IV. Raw Data** | |
| Specification Number | Importance | Source | Function | Specification | Unit of Measure | Ideal Value | Acceptable Range | Comments | Time | Oxygen |
| S3 | 3 | PRP | System | Dissolved Oxygen | PPM | 8 | 4.5-8.3 | 8.3 is theoretical maximum at 77F in distilled water | 0 | 6.47 |
| **II. EQUIPMENT REQURIED** | | | | | | | | | 15 | 7.36 |
| Specification Number | Equipment or Instrumentation required | | | | | | | | 30 | 7.62 |
| S3 | Water Resovoir, Air Pump, Oxygen Sensor, Arduino Mega, Computer | | | | | | | | 45 | 7.71 |
| **III. DATA COLLECTION STRATEGY** | | | | | | | | | 60 | 7.79 |
| Specification Number | Data acquisition strategy | | | | | | | | 75 | 7.73 |
| S3 | Take oxygen reading of sensor when not placed in any substance (air) and ensure reading is close to 9.1. Take oxygen reading of known liquid (distilled water at 77F) to ensure the sensor is reading close to 8.3. Take oxygen readings of water with pump off for extended period of time, then turn pump on for a few hours, then turn pump off. This ensures we can sense the change in oxygen both from aerating and the decay from a simulated air pump failure. Compare fully saturated water sample at known temperature to reference charts to ensure it is below the theoretical maximum. | | | | | | | | 90 | 7.76 |
| **V. Results** | | | | | | | | | 105 | 7.81 |
| | | | | | | | | | 120 | 7.69 |
| | | | | | | | | | 135 | 7.82 |
| | | | | | | | | | 150 | 7.79 |
| | | | | | | | | | 165 | 7.84 |
| | | | | | | | | | 180 | 7.81 |
| | | | | | | | | | 195 | 7.76 |
| | | | | | | | | | 210 | 7.8 |
| | | | | | | | | | 225 | 7.79 |
| | | | | | | | | | 240 | 7.76 |
| | | | | | | | | | 255 | 7.83 |
| | | | | | | | | | 270 | 7.79 |
| | | | | | | | | | 285 | 7.14 |
| | | | | | | | | | 300 | 7.05 |
| | | | | | | | | | 315 | 6.74 |
| | | | | | | | | | 330 | 6.76 |
| | | | | | | | | | 345 | 6.64 |
| | | | | | | | | | 360 | 6.83 |
| | | | | | | | | | 375 | 6.82 |
| | | | | | | | | | 390 | 6.74 |
| | | | | | | | | | 405 | 6.79 |
| | | | | | | | | | 420 | 6.66 |
| | | | | | | | | | 435 | 6.65 |
| | | | | | | | | | 450 | 6.78 |
| | | | | | | | | | 465 | 6.61 |
| | | | | | | | | | 480 | 6.67 |
| **VI. Conclusions** | | | | | | | | | 495 | 6.6 |
| | | | | | | | | | 510 | 6.5 |
| Results indicate the oxygen sensor yields accurate readings. When in air the meter gave the expected 9.1 ml/L and also yielded reasonable values for dissolved oxygen in water. With | | | | | | | | | 525 | 6.62 |



Results indicate the oxygen sensor yields accurate readings. When in air the meter gave the expected 9.1 ml/L and also yielded reasonable values for dissolved oxygen in water. With the air pump on the readings never went higher than the theoretical saturation of water with oxygen at room temperature of ~8.5 mg/L. This is expected even with the air pump saturating the water because the water is not pure, it has nutrients dissolved lowering its total ability to hold oxygen. The chart above shows the oxygen levels increase rapidly from not aerated water at time zero to fully oygenated in under an hour. Also the decrease in oxygen past the ~250 mintue mark when the pump was shut off shows a decay in the oxgen to its initial level as expected. This change longer ~4 hours to reach its baseline. The oxygen sensor is found to be adequately acurate as indicated by these results.

| | |
|---|---|
| 540 | 6.8 |
| 555 | 6.62 |
| 570 | 6.65 |
| 585 | 6.61 |
| 600 | 6.67 |
| 615 | 6.75 |
| 630 | 6.63 |
| 645 | 6.61 |
| 660 | 6.61 |
| 675 | 6.67 |
| 690 | 6.72 |
| 705 | 6.78 |
| 720 | 6.62 |
| 735 | 6.76 |
| 750 | 6.58 |
| 765 | 6.66 |
| 780 | 6.53 |
| 795 | 6.76 |
| 810 | 6.69 |
| 825 | 6.66 |
| 840 | 6.73 |
| 855 | 6.64 |
| 870 | 6.76 |
| 885 | 6.63 |
| 900 | 6.66 |
| 915 | 6.8 |
| 930 | 6.66 |
| 945 | 6.68 |
| 960 | 6.71 |
| 975 | 6.59 |
| 990 | 6.55 |
| 1005 | 6.8 |
| 1020 | 6.64 |
| 1035 | 6.71 |
| 1050 | 6.65 |
| 1065 | 6.7 |
| 1080 | 6.61 |
| 1095 | 6.72 |
| 1110 | 6.69 |
| 1125 | 6.62 |
| 1140 | 6.71 |
| 1155 | 6.65 |
| 1170 | 6.78 |
| 1185 | 6.67 |
| 1200 | 6.73 |
| 1215 | 6.7 |
| 1230 | 6.61 |
| 1245 | 6.66 |
| 1260 | 6.76 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 1275 | 6.59 |
| | | | | | | | | | | 1290 | 6.66 |
| | | | | | | | | | | 1305 | 6.57 |
| | | | | | | | | | | 1320 | 6.76 |
| | | | | | | | | | | 1335 | 6.64 |
| | | | | | | | | | | 1350 | 6.69 |
| | | | | | | | | | | 1365 | 6.69 |
| | | | | | | | | | | 1380 | 6.74 |
| | | | | | | | | | | 1395 | 6.73 |