



**((•)) ANB Sensors**

## **ANB Sensors, AQ<sup>2</sup> pH Sensor**

### **Calibration-Free pH Monitoring in Flow-Through Seawater Aquaculture**

#### **INTRODUCTION**

pH is one of the most important parameters in aquaculture because it influences both the health of the cultured animals and the performance of the wider production system. Fish and shellfish have specific pH ranges in which they can grow and thrive, while prolonged exposure to unsuitable or rapidly fluctuating pH can cause physiological stress, reduce growth and feed efficiency, and increase susceptibility to disease.

pH also affects the toxicity of ammonia, the availability of essential minerals and the carbonate chemistry that is particularly important for shellfish. In recirculating aquaculture systems (RAS), pH is closely linked to alkalinity and nitrification, with biological filtration naturally consuming alkalinity and potentially causing pH to fall if it is not adequately replenished. pH therefore provides an important indicator of biological stability and can be used to optimise processes such as biofiltration, water treatment, chemical dosing and disinfection.

Continuous pH monitoring can give operators early warning of changing water conditions, enabling corrective action before water-quality deterioration affects animal health, system performance or production yield.

#### **ANB ADVANTAGES**

Traditional pH sensors rely on fragile glass bulbs and liquid reference solutions that drift constantly, require frequent manual recalibration, and suffer from long conditioning times. Glass breakage also creates an ongoing replacement cost and a hazardous contamination risk in active culture tanks.

The ANB solid-state design eliminates the risk of breakage entirely, while integrated real-time drift compensation and passive anti-fouling measures remove the need for continuous cleaning and recalibration. The only required upkeep is a simple, 30-second manual abrasion (rubbing with sandpaper) to refresh the sensor's surface molecules, a task easily completed by untrained site staff. This is significantly faster and easier than glass probe sensor calibration, which takes up to 30 minutes and requires an extensive range of equipment and solutions.

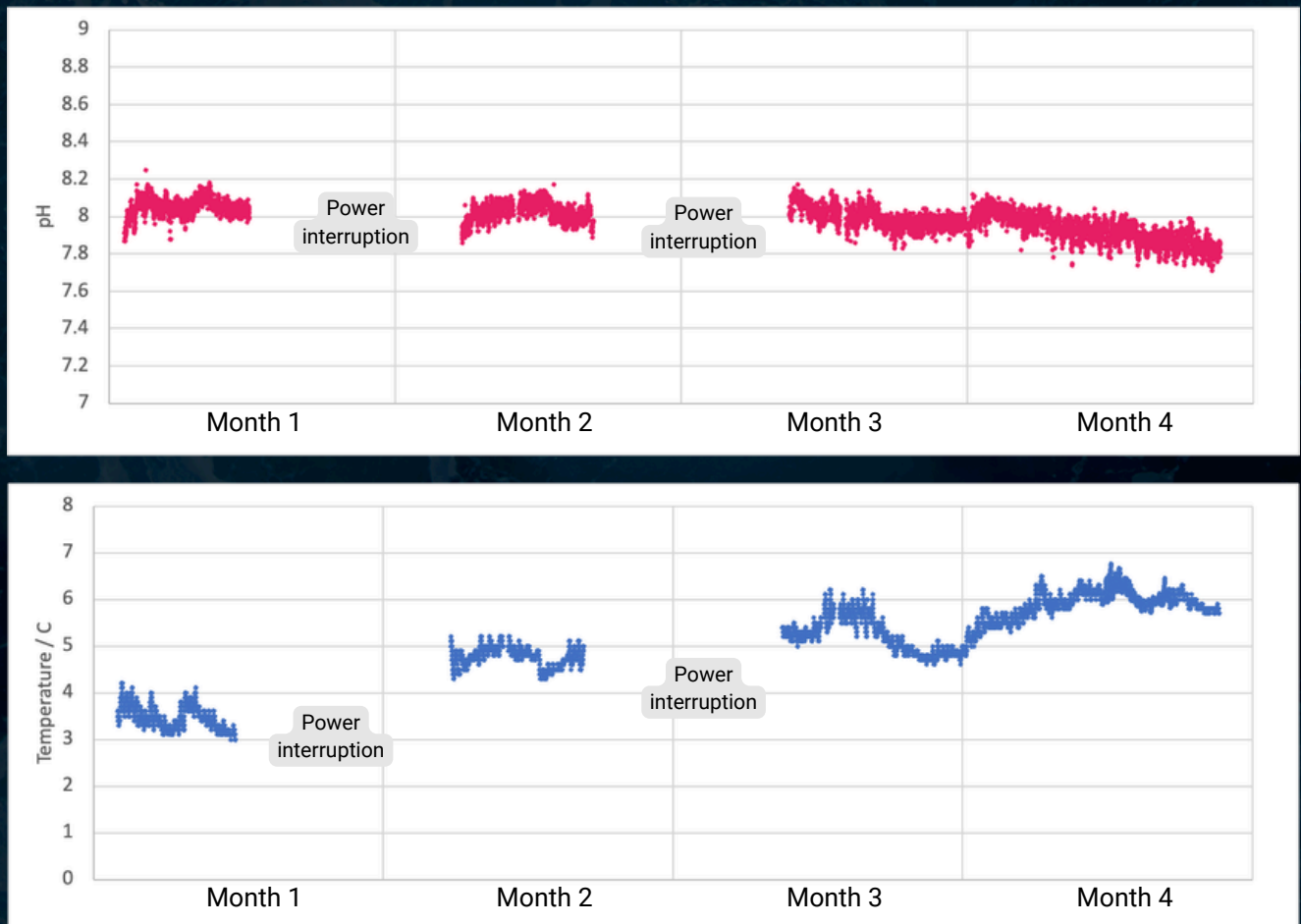
Crucially, the sensor also informs the maintenance staff when maintenance is required. It outputs a live transducer health code, a diagnostic feature missing from glass electrodes, which informs facility staff exactly when an abrasion is needed, completely removing the guesswork.

#### **APPLICATION AREAS**

|                  |                               |
|------------------|-------------------------------|
| Hatcheries       | Eggs, larvae & nursery water  |
| RAS              | Culture & recirculation loops |
| Biofilters       | Nitrification control         |
| Shrimp ponds     | Pond-water chemistry          |
| Shellfish        | Carbonate chemistry           |
| Marine cages     | Environmental monitoring      |
| Freshwater ponds | Daily biological variation    |
| Aquaponics       | Fish/bacteria/plant balance   |
| Water treatment  | Treatment optimisation        |
| Disinfection     | Process control               |
| Broodstock       | High-value animal systems     |
| Live transport   | Water-quality protection      |
| Quarantine       | Animal-health protection      |
| Effluent         | Environmental compliance      |

## RESULTS & OBSERVATIONS

ANB sensors were installed in separate flow-through seawater tanks, stocked with halibut. The sensors were configured for autonomous deployment, logging pH in real-time at 15-minute intervals directly to a local PC with live data displayed on ANB's Graphical User Interface.



The sensors demonstrated stable and accurate baseline performance, delivering pH readings consistent with the site manager's expected values for local seawater over the four month period. They required minimal conditioning time and successfully captured natural, minor fluctuations in water chemistry, including changes of approximately 0.2 pH units, demonstrating responsiveness to live tank conditions. Throughout the monitoring period, the sensors operated without manual cleaning or recalibration. The sensor also demonstrated autonomous operation, automatically resuming monitoring following power outages once power was restored.

## CONCLUSIONS

Overall, the sensors delivered reliable pH monitoring over four months, requiring minimal conditioning, cleaning or recalibration while responding to natural changes in water chemistry. Their ability to automatically resume monitoring after power outages further demonstrates their suitability for continuous, low-maintenance operation. To meet customer requirements for farm-ready installation, ANB offers a ruggedised local display and controller, enabling local sensor configuration and integration with existing SCADA systems via standard 4–20 mA or digital outputs.