



# FAQ - Things you MUST KNOW about pH/ORP Sensors

Document Revision 1.4

<b>Things you MUST KNOW about pH/ORP Sensors</b> .....	<b>2</b>
<b>Other Considerations</b> .....	<b>2</b>
Sensor Lifespan .....	2
Sensor Performance.....	3
Cleaning & Maintenance.....	3
CLEAN IN PLACE (CIP) Installations .....	4
Proper Installation.....	4
SENSOR RATINGS and HAZARDOUS AREA APPROVALS.....	5
<b>Guidelines for Handling and Commissioning Sensors</b> .....	<b>5</b>
Inspect Upon Receipt.....	5
Bench Testing .....	6
Report Malfunctions .....	6
<b>Self Integration of Digital Smart Sensors</b> .....	<b>6</b>
<b>Consultation with Turtle Tough:</b> .....	<b>7</b>

## Things you MUST KNOW about pH/ORP Sensors

Before proceeding with the installation of pH/ORP sensors, it is essential to be aware of the following important factors:

1. **Sensor Selection:** Choose a pH/ORP sensor suitable for your specific application. Consider factors such as the measurement range, chemical compatibility, and environmental conditions to ensure optimal sensor performance.
2. **Calibration:** pH/ORP sensors require regular calibration to maintain accuracy. Familiarize yourself with the calibration procedure and ensure you have the necessary equipment and standards for proper calibration.
3. **Installation Location:** Select an appropriate location for sensor installation. Factors to consider include process dynamics, chemical exposure, and accessibility for maintenance. Ensure the sensor is positioned correctly for direct contact with the measured liquid.
4. **Installation Guidelines:** Adhere to the manufacturer's installation guidelines. Follow recommended immersion depths, mounting techniques, and sealing methods to ensure secure and accurate sensor placement.
5. **Electrical Considerations:** Properly wire and ground the pH/ORP sensor to minimize electrical noise and interference. Follow electrical safety guidelines and consult with professionals if needed.
6. **Maintenance and Care:** Establish a routine maintenance schedule for cleaning, calibration, and inspection. Use recommended cleaning agents and techniques to prevent sensor damage and maintain accurate readings.
7. **Training and Support:** Familiarize yourself with the sensor's operation and consult manufacturer documentation. Seek training or support from experts to ensure proper installation and operation.

By considering these factors and following best practices, you can ensure successful pH sensor installation, accurate measurements, and reliable performance in your specific application.

## Other Considerations

### Sensor Lifespan

A pH/ORP sensor is considered a consumable in the sense that its lifespan is finite and it deteriorates over time due to exposure to chemicals. The more a pH/ORP sensor is exposed to chemicals, the faster its performance and functionality will degrade, eventually leading to its failure.

Chemical exposure can have detrimental effects on the various components of a pH/ORP sensor. The sensitive glass membrane, which is responsible for sensing changes in pH, can experience erosion, etching, or dissolution when exposed to aggressive chemicals. This can result in a compromised membrane, leading to inaccurate pH measurements.

In addition to the glass membrane, other parts of the pH sensor, such as the reference electrode and junction, can also be affected by chemical exposure. Chemical reactions can lead to the depletion or poisoning of the reference electrode, disrupting the reference potential and further impacting the accuracy of pH measurements.

The severity of the impact depends on the nature and concentration of the chemicals encountered by the sensor. Strong acids, alkalis, oxidizing agents, or reducing agents can accelerate the degradation process. Additionally, extended exposure to chemicals can result in the formation of deposits, coatings, or fouling on the sensor's surface, further impeding its performance.

To mitigate the effects of chemical exposure, proper maintenance and cleaning procedures are essential. Regular cleaning and calibration, as well as using protective measures such as chemical-resistant coatings or guard solutions, can help extend the lifespan of pH/ORP sensors. However, it is important to acknowledge that, despite proper maintenance, a pH sensor will eventually reach the end of its lifespan and require replacement due to the cumulative effects of chemical exposure.

The lifespan of pH sensors exhibits significant variability based on the specific application, ranging from shorter durations of weeks or months in demanding environments to longer durations of months or years in less challenging conditions. Without prior experience, accurately predicting or estimating the longevity and performance of a sensor is impractical. Sole reliance on theoretical analysis cannot provide comprehensive insights into its behaviour. To enhance understanding of the factors influencing sensor lifespan, we recommend consulting our guide on comprehending sensor history and performance.

[Understanding Sensor History & Performance | General | Support | Turtle Tough \(turtletoughsensors.com\)](#)

## Sensor Performance

Sensor performance is influenced by various factors that need to be considered for optimal operation. These factors include the location of the sensor, plant stability, temperature effects, start-up/shutdown procedures, maintenance and care, and human factors. Each location should be assessed separately, taking into account the forces and chemicals present. Maintaining plant stability is important to ensure accurate measurements. Understanding temperature effects and managing them appropriately is crucial for reliable sensor performance. Incorrect management during start-up or shutdown can lead to sensor deterioration or failure. Proper maintenance techniques, including regular cleaning and calibration, are essential for optimal performance. Human factors, such as variations in handling and servicing sensors, should also be considered. Consulting with professionals and giving attention to these factors can optimize sensor performance, improve longevity, and enhance the overall measurement program, ensuring reliable and accurate readings in industrial settings.

## Cleaning & Maintenance

Regular cleaning and maintenance of pH and ORP sensors are essential, following the guidelines provided by the manufacturer. The frequency of cleaning can vary depending on the difficulty level of the application, ranging from daily, weekly, fortnightly, to monthly intervals. Challenging applications typically necessitate more frequent cleaning, while less demanding applications require less frequent attention. Neglecting proper cleaning procedures, including the use of appropriate cleaning agents and methods, will inevitably lead to a shortened sensor lifespan or even complete failure. **The importance of adequate care should not be underestimated.** For a comprehensive understanding of your specific cleaning requirements, we recommend consulting a Turtle Tough representative and referring to our Sensor Care and Maintenance Guide

[Sensor Care and Maintenance | Maintenance | Support | Turtle Tough \(turtletoughsensors.com\)](#)

## CLEAN IN PLACE (CIP) Installations

The Clean-in-Place (CIP) process can have various effects on pH sensors, depending on the specific conditions and procedures used. It should always be recognised that a pH/ORP sensor is an electrochemical device and the more a pH/ORP sensor is exposed to chemicals, the faster its performance and functionality will degrade, eventually leading to its failure. Here are some potential effects:

- **Exposure to Cleaning Agents:** During the CIP process, pH sensors may come into contact with cleaning agents or chemicals. These substances can potentially affect the performance and accuracy of pH sensors. Strong acidic or alkaline solutions used in the cleaning process may cause deterioration or damage to the sensor's sensitive glass membrane or other components.
- **Fouling or Coating:** If the CIP process involves substances that can deposit or coat the sensor surface, it can lead to fouling. Deposits on the sensor can create a barrier, affecting the diffusion of ions and thus altering the pH readings. This can result in slow response times or inaccurate measurements.
- **Temperature Effects:** CIP processes often involve high temperatures to enhance cleaning effectiveness. Extreme temperature changes can impact the performance and calibration of pH sensors. Thermal stress can affect the integrity of the sensor's construction, alter the properties of the reference electrolyte, or cause shifts in the sensitivity of the sensor.
- **Mechanical Stress:** CIP processes typically involve vigorous flow rates and pressures. Strong flows or pressure fluctuations can subject pH sensors to mechanical stress. Excessive stress or physical impacts may damage the sensor or affect its calibration, leading to inaccuracies in pH measurements.
- **Sensor Contamination:** If the CIP process does not effectively remove residues from the cleaning agents or other substances, the sensor may become contaminated. Contaminants can interfere with the sensor's performance, resulting in inaccurate pH readings.

To mitigate these effects, it is important to consider the compatibility of pH sensors with the cleaning agents and conditions used in the CIP process. Selecting pH sensors specifically designed for CIP applications, following manufacturer guidelines for sensor maintenance and cleaning, and regularly calibrating the sensors after the CIP process can help minimize potential issues and ensure accurate pH measurements. It may be necessary to completely remove the pH sensor during the CIP process if it is sufficiently aggressive and leads to unacceptable sensor life.

## Proper Installation

Proper installation of a pH/ORP sensor is a critical factor in achieving accurate and reliable operation. It encompasses two key aspects: correct hardware selection and proper electrical installation. By addressing both, optimal sensor performance can be ensured, and potential issues such as measurement errors, electrode damage, signal disruptions, and maintenance difficulties can be mitigated.

The first aspect, hardware selection, involves choosing the right equipment for the specific installation requirements. This includes considering factors such as the process environment, compatibility with existing systems, and the desired level of performance. Adhering to manufacturer guidelines and consulting with professionals can help in selecting the most suitable pH/ORP sensor for the application.

The second aspect, electrical installation, focuses on establishing a robust electrical connection that minimizes potential problems like stray currents and ground loops. Proper wiring techniques,

grounding, and shielding measures should be followed to reduce noise and interference that could affect the accuracy of pH/ORP measurements. Consulting electrical experts or following industry standards can ensure a reliable electrical installation.

Overall, it is important to carefully assess the challenges and requirements of the installation and follow recommended guidelines. By doing so, the pH/ORP sensor can be installed correctly, leading to accurate measurements, prolonged sensor lifespan, stable signal transmission, and efficient maintenance processes.

<https://www.turtletoughsensors.com/support/installation/recommendations-for-installing-sensors>

## **SENSOR RATINGS and HAZARDOUS AREA APPROVALS**

It is important to note that our sensors do not possess hazardous area or any other intrinsically safe certification. This primarily results from the bespoke nature of our manufacturing processes, making type testing for each sensor financially challenging.

However, this does not necessarily restrict our sensors from being deployed in hazardous or potentially explosive environments. Our sensors are employed extensively in such areas globally, demonstrating their practical robustness. While the sensors contain low-current-draw electronics (a pH sensor, for instance, draws less than 20mA), these components are thoroughly encased within several inches of resin and silicone. This process effectively isolates the electronics from both the liquid and atmospheric influences. Furthermore, our sensors are often fully submerged in a liquid medium, further insulating them from potential atmospheric exposure. Although these measures would likely meet testing standards, the sensors are not formally rated.

We do offer Hazardous Area Approved and EX-rated transmitters and controllers. These transmitters often satisfy our customers' needs as the power supply to the sensor is typically of greater concern than the sensor itself. The sensors are often seen as passive devices powered by the head unit. Some customers choose to use an Intrinsically Safe (IS) barrier between the sensor and the transmitter, which can be a suitable approach if it meets your needs.

Frequently, our end users engage independent hazardous area certification consultants to assess our systems and acquire external approval. In the majority of cases, these assessments do not inhibit the installation of our sensors. However, it's crucial to clarify that this practice doesn't constitute a declaration that our sensors are intrinsically safe, but rather that they have been assessed for use in hazardous areas by competent authorities and have been found safe for use. It is recommended that you obtain independent advice before using our sensors in hazardous area locations.

## **Guidelines for Handling and Commissioning Sensors**

Although Turtle Tough sensors are designed to be rugged, they still contain delicate elements that require careful handling. Treat the sensors with caution to avoid any impacts or mishandling that may result in breakage.

### **Inspect Upon Receipt**

Upon receiving a sensor shipment, conduct a thorough inspection to ensure there is no visible damage. If any damage is observed, report it to Turtle Tough immediately and return the sensors to the supplier.

## Bench Testing

Before installing the sensors into the process, it is essential to perform bench testing in a stable environment, such as a laboratory or workshop. Connect the sensors to equipment on a test bench and verify their operation against calibration standards to ensure proper functionality.

## Report Malfunctions

If any sensor malfunctions or abnormalities are detected during bench testing, promptly report them to Turtle Tough. Providing detailed information about the issue will assist in troubleshooting and resolving any problems.

By following these guidelines, you can ensure that the handling and commissioning of Turtle Tough sensors are conducted with care, minimizing the risk of damage and ensuring their reliable performance in industrial processes.

## Self Integration of Digital Smart Sensors

TURTLE TOUGH DIRECT SMART SENSORS (DSS) are fully supported by a comprehensive range of factory hardware solutions, enabling reliable connectivity and sensor management. Our ecosystem includes SMART Analysers, Handheld Field Communicators, PC Communication tools, junction boxes, extension leads, and power supplies, providing a complete solution.

However, it is important to note that integrating TURTLE TOUGH sensors directly into your industrial network requires a moderate to high level of onsite expertise in system integration. This task should only be undertaken by individuals with the necessary experience. While direct integration offers significant benefits, it also carries a higher degree of risk due to potential unexpected issues when integrating with third-party hardware.

Third-party hardware refers to any device or component not supplied by Turtle Tough, such as PLCs, SCADA systems, DCSs, data loggers, and power supplies/isolators. We strongly recommend carefully reading the sensor implementation guide to fully understand the installation requirements.

**IMPORTANT:** Our products offer incredible value and flexibility, including the ability to be directly integrated with your MODBUS RTU and into your PLC or data acquisition system. We're aware that this direct integration can seem an enticing option due to the potential cost savings associated with bypassing the purchase of additional controllers.

However, our experience has demonstrated that direct integration often proves to be a challenge for many of our customers. The complexities involved in this process require a high level of skill and technical knowledge, which, if lacking, can inadvertently lead to difficulties with the product. These technical difficulties, unfortunately, could result in an unfavourable experience with our pH sensors, which is certainly not the impression we want to leave.

To ensure that our customers have the best possible experience with our products and to mitigate the potential for unforeseen technical issues, we strongly recommend purchasing our controllers when initially trying our sensors. These controllers are designed to guarantee an optimal and hassle-free operation of our pH sensors, enabling you to fully appreciate their capabilities.

Additionally, please be aware that due to the constraints of remote support, it can be challenging for our team to provide comprehensive assistance with system-specific issues without being physically present to assess your set-up.

In line with this, our policy allows for support on direct integration in large-scale applications where 10 or more sensors are being used. For initial trials and evaluations, however, we insist on using our controllers and analyser to ensure a smooth operation and accurate appraisal of our products.

When integrating with third-party hardware, Turtle Tough Pty Ltd and its representatives can provide only limited factory support. Any unexpected behaviour or damage resulting from third-party hardware is not the responsibility of Turtle Tough. Our product support is limited to the information provided in our field implementation notes and guidelines, specifically related to our product. We are unable to address issues related to third-party hardware due to the infinite range of possibilities available. It is the sole responsibility of the end-user to test and verify compatibility with their equipment.

To mitigate risks and ensure a smooth integration process, we recommend:

- Reading the Field Installation Guide and Sensor Implementation Guide, seeking clarification or further information from us if needed.
- Consulting with your third-party hardware provider to ensure their equipment meets our minimum specification requirements outlined in our support documentation.
- Purchasing a handheld field communicator (HFC) from Turtle Tough, which self-powers the sensor, provides diagnostics, and allows independent testing to identify any sensor performance or field installation issues.
- Alternatively, using a factory-supplied and tested Windows PC interface box for reliable communication with the sensor, independently testable from your system.

## **WARNING!!**

Please be aware that removing or modifying our quick connect plugs in any way will void the warranty. Only use Turtle Tough factory interface leads or panel mount connectors when interfacing with your hardware.

## **Consultation with Turtle Tough:**

At Turtle Tough, we request that all customers complete a detailed application questionnaire found on our website to facilitate effective product selection for their specific needs. This questionnaire serves as an initial step in understanding the fundamental characteristics of your application, providing us with essential information.

It is important to emphasize that the questionnaire does not constitute personalized professional advice. We do not offer engineering consultation services, and without comprehensive knowledge of your specific process, we are unable to provide tailored recommendations for equipment selection. Instead, any advice or recommendations we offer are of a general nature and are based on the information you provide via phone or email.

As a manufacturer, we heavily rely on the accuracy and completeness of the information you share to guide our product selection process. The questionnaire serves as a guide for equipment selection, but it does not replace a professional consultation.

We must emphasize the significance of disclosing detailed information about your process. Failure to do so may lead to critical factors being overlooked, resulting in improper equipment selection. It is ultimately the responsibility of the end user to ensure that the chosen equipment is suitable and fit for their intended purpose.

We value your cooperation in completing the application questionnaire and appreciate your understanding of the limitations of our guidance.

## **DISCLAIMER:**

The information provided by Turtle Tough, inclusive but not limited to care recommendations and procedures, is of a general nature and is intended solely to furnish users with product information. It should not be interpreted as professional advice tailored to your specific needs, nor should it be considered as an endorsement or assurance of the suitability of our products for your particular application.

While we strive to provide accurate and useful information, we do not guarantee that our products or recommendations will be appropriate for your specific purpose or application. It remains the end user's responsibility to assess and ensure the suitability of our products and/or procedures for their own needs and safety requirements.

Please note that Turtle Tough shall not be held liable for any damages, losses, or inconveniences that may arise from the use or misuse of our products, or from any reliance on the information we provide. This disclaimer applies to any potential liabilities, including but not limited to, direct, indirect, incidental, consequential, or special damages.

Users are strongly advised to conduct their own independent evaluations and tests to ascertain the suitability and performance of our products within their specific circumstances.

**For further information, clarifications or queries, please do not hesitate to contact us on +61 3 9872 5055 or email us at [info@turtletoughsensors.com](mailto:info@turtletoughsensors.com).**

**For more information visit**  
**[www.turtletoughsensors.com](http://www.turtletoughsensors.com)**