

Permitted Outfall pH Monitoring



Success in this application can be applied to a variety of applications with similar challenges

Facts about Permitted Outfall:

- Pharmaceutical wastewater contains chemicals such as acids, bases, proteins, sulfates, as well as low ionic Water for Injection (WFI) from production suites.
- Wastewater produced in the pharmaceutical industry requires constant pH monitoring to ensure proper treatment of the liquid before being released from the facility to avoid the risk of violating environmental regulations.



Automated System: Unical 9000
Retractable Holders: SensoGate WA 130
pH Sensors: SE 571

The Importance of Accurate Permitted Outfall pH in WWT

In a pharmaceutical plant, there are multiple steps in treating wastewater created during drug manufacturing. There are three pH-dependent stages: Equalization, Neutralization, and Final Effluent. These are all critical processes and require accurate pH measurements to treat the wastewater produced by the facility. A failure of one of these measurements can cause upsets in the treatment process. Upsets create the potential for permit violations leading to financial penalties such as fines and costs to repair damage to the environment and municipal wastewater treatment infrastructure.

Equalization

Equalization is usually the first step in the wastewater treatment process. The wastewater from various production suites is collected in "equalization tanks" before moving further into the treatment process. Process tank cleaning produces pharmaceutical wastewater after production runs of different products. Cleaning tanks that contain various compounds create variability in the wastewater quality. The equalization step balances the pH and any temperature fluctuations. In addition, this step helps optimize chemical usage for downstream pH adjustments.

Neutralization

The process of adding an acid or base to wastewater from the equalization tank to achieve a target pH value is called neutralization. The target pH range is typically 6.5-7.5 to ensure additional downstream treatment processes are effective. This treatment step is critical to maintaining environmental compliance, ensuring the final effluent pH meets the water permit requirements.

Final Effluent / Permitted Outfall

The National Pollution Discharge Elimination System (NPDES) program monitors the final effluent from wastewater treatment. Federal and state environmental regulatory agencies use a permitting process to ensure water quality. Pretreatment requirements in the permit protect Publicly Owned Treatment Works (POTWs) and reduce pollutants discharged by industrial processes into the environment. Accurate reporting is mandatory, and following the procedures contained in the permit is required to avoid a potential violation.

The Challenge for Static pH Measurements

Because of the critical nature of these measurements, pharma plants use redundant pH measurements, especially in the neutral-

ization and final effluent stages. In most cases, plants use static pH loops, which require isolation of the process line to access the probes for maintenance. Furthermore, because of the different chemicals in the wastewater, the pH probes suffer from wear, thus producing inaccurate readings, and require frequent cleaning to maintain responsiveness. Technicians must also perform more frequent calibrations to maintain accuracy. This requires physical handling of the pH probes and increases the chance of damage to the sensor.



Unical 9000 Automated pH Calibration and Cleaning System

The Unical 9000 cleaning, calibration, and diagnostic system helps address pH sensor performance issues in permitted outfall. When paired with the Protos transmitter and a Sensogate or Ceramat pneumatic retractable holder, the Unical 9000 is the ideal engineered solution for the automatic retraction, cleaning, calibration, and insertion of inline process sensors. The system has a direct user interface



and can communicate through a digital bus network for remote operation and diagnostics, giving the user information about both the system's health and the pH electrode. An automated system offers several immediate benefits, including a positive impact on the maintenance budget, increased plant safety, and assurance of compliance.

Hands-off Cleaning and Calibration

A Knick Unical 9000 automated system handles the cleaning and calibration functions with a user-configurable schedule. If needed, technicians can manually activate a cycle. An automated solution eliminates the need for the technician to physically enter the process unit to calibrate or clean the sensor, creating a safer work environment. In addition, this increases the measurement uptime and significantly decreases the maintenance time needed to support the measurement.

Reduce your Sensor Replacements = Lower Maintenance Costs

A primary reason for implementing an automated system is to reduce pH sensor usage. This lessens the strain on maintenance budgets. Harsh process conditions such as extreme pH swings, elevated temperature, or abrasive slurry will shorten sensor life. Depending on the application, sensor replacement can be required monthly, weekly, or even daily.

In addition, the manual cleaning and handling of pH probes can lead to accidental sensor damage. Automatic systems eliminate unnecessary sensor handling. Customizable maintenance schedules perform the retraction, cleaning, calibration, and insertion for you. The program will also clean the pH probe more frequently. As a result, the system is increasing the probe's life and reducing the chance of sensor damage.

Ensure Compliance = Reduced Risk

Pharmaceutical facilities must meet the requirements of their environmental permits. Noncompliance can result in a permit violation. These violations are very costly to the company due to fines and the possibility of a complete shutdown until the facility can resolve the issue. Operators can monitor the diagnostics of the system remotely to know the condition of the measurement. The calibration reports can also be stored remotely to satisfy permit reporting requirements. The automated cleaning and calibration functions ensure the pH measurement is accurate. An automated system increases visibility through remote diagnostics. Accurate and continuous recording of calibrations will meet water permit reporting requirements and lower the risk of noncompliance.

What was this Customer's Return on Investment?

- Reduced Maintenance Costs**
 Through automation, technicians can reduce the number of trips for cleaning, calibration, and sensor usage. Additionally, predictive maintenance analytics give better control over the maintenance schedule with fewer interruptions to conduct manual calibrations and cleaning.
- Accurate and Reliable Measurement**
 The Unical 9000 automatically performs the proper cleaning and calibration of the pH probe, which ensures the highest accuracy and maximum uptime for the measurement.
- Safer Work Environment**
 The Unical 9000 system automatically retracts the pH sensor from the process to perform the cleaning and calibration, which reduces the potential for technicians to encounter toxic, pressurized, or high-temperature liquids.
- Increased Permit Compliance**
 An automated system eliminates potential human errors during the calibration process, and remote diagnostics provide high visibility of the system performance to ensure uninterrupted reporting of the measurement values in order to meet permitted outfall requirements.