

TKSAGE Technology Group Provides Advanced Bio-decontamination with Vaporized Hydrogen Peroxide

TKSAGE (Shenzhen) Technology Group Co., Ltd. provides R&D, equipment, and installation of cleaning and sterilization technology and is committed to providing state-of-the-art solutions for customers in life science and healthcare. Since its establishment in 2008, TKSAGE has always regarded product quality as top priority. However, with accelerating customer demand, TKSAGE faced the challenge of further upgrading its products and services to meet the needs of more demanding application environments, more complex use scenarios, and higher measurement accuracy requirements.

The COVID-19 pandemic brought new challenges to bio-decontamination applications in hospitals, laboratories, and bio-pharmaceutical applications. Clean equipment and sterilization processes play a pivotal role in addressing these challenges. After careful research, TKSAGE chose Vaisala's HPP270 vaporized hydrogen peroxide probes as part of their bio-decontamination systems used in isolators, material transfer chambers, and other areas. Using the HPP270 probes has allowed TKSAGE to improve the adaptability and stability of their bio-decontamination solutions by increasing the sensitivity and accuracy of vH_2O_2 measurement and solving condensation control issues.



Enhanced technology for vaccine production

In biopharmaceutical applications, the biosafety transfer chamber is a crucial environment used to move materials from lower-level clean areas to higher-level clean areas. During the transfer process, the chamber is injected with vaporized hydrogen peroxide to decontaminate the surfaces of the materials. This mitigates microbial contamination, for example, in the preparation process of COVID-19 vaccines.

During the preparation of COVID-19 vaccines, the virus is cultured in what is called a "protective zone". To avoid contamination, any material entering or leaving this zone must be decontaminated. The cleanliness requirements of the vaccine ampoule filling environment are also extremely

high and any material entering the environment needs to be thoroughly decontaminated.

"It is the very high cleanliness level requirement that provides an 'application scenario' for the vaporized hydrogen peroxide aseptic transfer chamber, and the Vaisala HPP270 sensor further strengthens the quality and functionality of the transfer chamber," says Zhu Zhengcai, Technical Director of TKSAGE.



"Compared with traditional electrochemical sensors, the HPP270 features higher measurement sensitivity, a wider measurement range, and innovative functions, while ensuring effective bio-decontamination."

Zhu Zhengcai, TKSAGE Technical Director

In terms of sensitivity, the HPP270 sensors are designed to maintain accuracy in high ppm hydrogen peroxide bio-decontamination environments. As the $\nu\text{H}_2\text{O}_2$ concentration gradually decreases, the HPP270 performs dynamic measurements and provides feedback, neither of which is possible with electrochemical sensors. Additionally, the measurement range of the HPP270 probes is wide. Finally, the HPP270 provides a unique measurement in the Relative Saturation (RS) value.

“We can control condensation using the relative saturation value, which allows us to reduce the risk of corrosion. Before we had the HPP270 probes, we needed to use complex calculations to figure out the condensation point,” says Zhu Zhengcai. “The HPP270 can directly output this value, a function that is not available in other sensors.”

High tolerance and excellent product quality

In vaporized hydrogen peroxide bio-decontamination, a given concentration of hydrogen peroxide is vaporized, converting the disinfectant from liquid to a gaseous state. In this way, $\nu\text{H}_2\text{O}_2$ destroys microorganisms that are oxidized by hydrogen peroxide. $\nu\text{H}_2\text{O}_2$ bio-decontamination is effective at killing a broad range of microorganisms, including bacteria, fungi, molds, viruses, and spores, etc. Once the bio-decontamination is complete, $\nu\text{H}_2\text{O}_2$ quickly degrades to H_2O and O_2 , making it verifiably non-toxic.

However, $\nu\text{H}_2\text{O}_2$ has some side effects. First, as a strong oxidizing agent, it can be corrosive to certain materials and equipment.



Installed HPP270 probes

“Previously, there were no vaporized hydrogen peroxide-tolerant temperature and humidity sensors on the market. Vaisala developed a robust product with a variety of test functions... the HPP270 that we are now using.”

Zhu Zhengcai

When a TKSAGE customer in Hainan needed to disinfect a high-temperature/high-humidity environment, their sensors could only be used for three months before they expired.

“Vaisala’s HPP270 gives our systems a unique condensation control capability. This helps us safeguard materials,” says Zhu Zhengcai. “We went to the customer’s site to test the probes. We found that the HPP270’s capabilities, combined with its corrosion-resistant stainless-steel housing (IP65), allowed the customer to use the probes normally for much longer than three months. In the end, the customer adopted our system.”



Vaisala's HPP270 probe series have also enhanced TKSAGE's transfer chamber applications. To date, TKSAGE's market share in transfer hatch vH₂O₂ bio-decontamination solutions has been far ahead of its competitors, reaching about 70%.

"At the very beginning, [2019] we contacted a Vaisala salesperson who impressed us as practical and realistic. From contact and communication, to understanding of our solutions, to testing the HPP270 within our systems, the whole process was smooth."

Zhu Zhengcai

User-friendly bio-decontamination

In addition to the pragmatic spirit of Vaisala sales, after-sales support created a sense of trust. "In 2020, one of our customers encountered a problem that required urgent support," says Zhu Zhengcai. "Even though it was a weekend, Vaisala's technicians serviced the sensors and delivered them to the application site on the same day. The problem was quickly resolved. Vaisala's speed of response is second-to-none in industry."

With robust measurement solutions backed up by responsive support TKSAGE looks forward to future endeavors with Vaisala.



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