

## Measurement technologies making a difference during the pandemic



### Supporting pharmaceutical quality, safety, and efficacy

Even before the coronavirus pandemic, health and well-being featured highly in the priorities of many organisations, governments and citizens. This drove technology companies such as Vaisala to develop products that meet the demands of increasingly health conscious societies. Good Health and Well-Being is also one of the United Nations Sustainable Development Goals (SDG 3), which seeks to improve people's health, increase life expectancy, reduce maternal and child mortality, and fight communicable diseases.

Vaisala has integrated the UN SDGs into its strategic planning in order to contribute to sustainable development and find inspiration for the development of new business and sustainable business practices. Many of Vaisala's

products and systems provide a major contribution in the fight against diseases, and in the following article we outline some of the ways that our measurement technologies are helping to end the COVID-19 pandemic.

### Ensuring optimal conditions for COVID-19 vaccine development

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the cause of COVID-19. The word COVID-19 represents Corona (CO) Virus (VI) Disease (D) and 19(2019) is the year that the first cases were detected in China's Wuhan City. Coronaviruses are enveloped viruses, first isolated in the 1960s from the nasal cavities of patients suffering from colds. It is believed that Coronaviruses are responsible for 10-15% of colds worldwide, and have a seasonal pattern.

As a new variant virus, SARS-CoV-2 spread quickly and easily around the world, resulting in large numbers of deaths and causing enormous economic damage. The race is on to develop diagnostic tools, treatments, and a safe, effective vaccine for COVID-19. Vaisala provides multiple technologies in support of that mission.

In March 2020, Vaisala received an order from Wuhan, China for the rapid delivery of GMP231 carbon dioxide transmitters to monitor CO<sub>2</sub> levels in incubators. These incubators are used for the cultivation of microorganisms, such as viruses. The cultured virus is then used to help develop a vaccine. The main role of the GMP231 probes is to ensure that carbon dioxide levels inside incubators maintain the optimal pH level for cultivation.



## Effective $\text{H}_2\text{O}_2$ bio-decontamination

Innovative Vaisala measurement technology is used in frontline bio-decontamination work to kill harmful organisms, such as viruses, on surfaces. For example, Cleamix Oy performed hydrogen peroxide vapor bio-decontamination work in South Korea's Center for Disease Control during the coronavirus outbreak in early 2020. The Cleamix portable hydrogen peroxide vapor generators use Vaisala's HPP270 series probes to monitor and control  $\text{H}_2\text{O}_2$  vapor output during bio-decontamination.

Hydrogen peroxide vapor destroys even the most resistant microorganisms, which is why it is used to disinfect critical spaces. Decontamination requires specific concentrations for specific periods of time. Furthermore, hydrogen peroxide is an unstable gas that requires monitoring.

In the absence of hydrogen peroxide vapor, the relative humidity of air predicts condensation, typically at 100%RH. However, when vaporized hydrogen peroxide is injected into an area, the condensation point of the air mixture changes. Similar to relative humidity, relative saturation is a parameter that indicates the humidity of the air caused by *both* hydrogen peroxide vapor and water vapor. When relative saturation reaches 100 %RS, the vapor mixture starts to condense. Knowing the relative saturation value during a process is therefore crucial, because it indicates the saturation point of the combined  $\text{H}_2\text{O}$  and  $\text{H}_2\text{O}_2$  vapors.

The unique Vaisala PEROXCAP® hydrogen peroxide sensor inside the HPP272 probe is the only technology that provides the relative saturation value. The probe guarantees stable, reliable, and precise hydrogen peroxide measurements throughout decontamination cycles, even in high humidity. The probe is now used by manufacturers of bio-decontamination equipment around the world.

## Environmental monitoring for quality and GxP compliance

Monitoring, alarming and reporting is essential in pharmaceutical, vaccine, and medical device production processes, which must occur in strictly controlled environmental conditions. Vaisala's measurement technologies are used in research, manufacturing, cleanroom, processing, distribution and storage environments for vaccines, drugs, blood, biologics, and medical devices.

One of the Vaisala's key technologies is the viewLinc Continuous Monitoring System, which was designed for GxP-regulated applications such as laboratories, warehouses, and cleanrooms. By monitoring critical parameters, valuable products are safeguarded for human use. For example, when a pharmaceutical manufacturer created mobile clinical trial units for COVID-19 studies in long-term care facilities, they chose viewLinc as the monitoring solution.



## Liquid concentration measurements for drug, vitamin and influenza vaccine manufacturing

The Vaisala K-PATENTS® Pharma Refractometer PR-43-PC is used in viral vaccine development and manufacturing, for diseases such as influenza and swine flu, as well as in other drug development processes, to ensure safety and efficacy.

Process refractometers determine the concentration of dissolved solids by measuring a solution's refractive index (RI) and temperature. Monitoring

RI improves the understanding of process conditions, reduces drug development time, increases production capacity and stability, ensures product quality, and can help demonstrate compliance with regulations. Pharmaceutical manufacturers are required to demonstrate process validation from drug discovery to production, and this can be attained by RI measurements.

For example, Vaisala's refractometers measure sucrose densities during the influenza virus purification process. After centrifugation, the viruses band to a specific sucrose density gradient.

By measuring that density with a refractometer, viruses can be safely and efficiently collected. With these reliable measurements, influenza vaccines can be developed as quickly and as safely as possible without compromising quality.



## Summary

By monitoring critical environments and conditions in healthcare, pharmaceutical, and biotechnology applications, Vaisala solutions are ensuring patient and personnel safety as well as the efficacy of medical devices, drugs, and vaccines. These technologies are making a significant contribution to the fight against the COVID-19 pandemic and will continue to support the United Nations Sustainable Development Goals in the future.

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