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FAQs

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HPP270 Series probes for vaporized hydrogen peroxide measurement: Frequently Asked Questions

The Vaisala PEROXCAP® HPP270 series probes (HPP271 and HPP272) are designed for demanding vaporized hydrogen peroxide bio-decontamination applications. The probes provide repeatable, stable, and accurate measurements and are ideal for VH_2O_2 bio-decontamination in environments such as isolators, material transfer hatches, and rooms. In this technical note we answer common questions on the HPP270 series vaporized hydrogen peroxide probes.

Measurement conditions

Q: Does the probe withstand condensation?

A: Yes. When powered on, the PEROXCAP® sensor is heated, which permits use in condensing VH_2O_2 conditions. The heating maintains measurement performance and lengthens the probe's lifetime. The probe must always be powered on with H_2O_2 present. Exposing the probe to H_2O_2 condensation is not recommended with the power off.

Q: Can the probe measure liquid H_2O_2?

A: No, the HPP270 probe is designed to measure vaporized hydrogen peroxide only.

Q: Can the probe be used in vacuum conditions?

A: The probe is not designed to be used under vacuum conditions. Vacuum conditions will cause the measurement to drift and could harm the humidity sensors.

Q: Can I use this probe in over / under pressure?

A: The HPP270 probe is designed for normal atmospheric pressure only. While the probe can withstand slight over/under pressure, pressure influences the ppm calculation. The probe does not have on-board pressure measurement, but a pressure reading from an external source can be used as a setpoint value for limited range compensation. You can configure the pressure compensation parameters using Vaisala Insight software, Modbus configuration registers, or an Indigo 200 or 500 transmitter.

Q: What happens if the probe reads above 2000 ppm?

A: The HPP272 probe withstands concentrations greater than 2000 ppm but higher H_2O_2 concentrations will negatively impact the probe's lifespan and increase sensor drift.

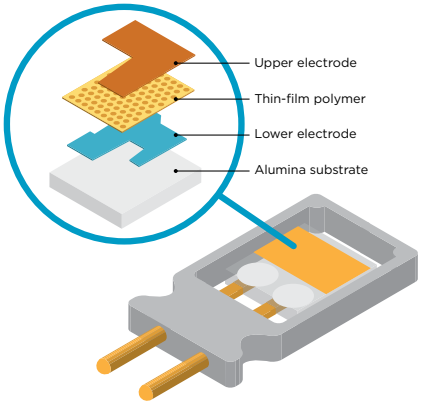
Q: What are the acceptable flow rates for the probes?

A: The white filter on the probe covers the PEROXCAP® sensor. This porous PTFE filter allows ambient air to reach the PEROXCAP® sensor while protecting the sensor. We have tested different airflows for RH measurement only, but do not predict any negative effect on the H_2O_2 ppm readings.

Measurement

Q: What benefit does Vaisala traceable factory calibration bring to the HPP270-series probes?

A: Traceability: a traceable measurement can be linked to appropriate national or international standards through a documented, unbroken chain of comparisons. Vaisala's calibration laboratory has a world-class H_2O_2 vapor calibration station. The calibration station's H_2O_2 ppm value can be traced to international standards. This means that we can rely on the ppm concentration value it generates.



Q: How are relative humidity and relative saturation measured by the HPP270-series probes?

A: The PEROXCAP® sensor contains two different HUMICAP® sensors: A standard HUMICAPR2 and a HUMICAPR2 with a catalytic layer. The catalytic layer on one of the humidity sensors decomposes the H_2O_2 vapor into water and oxygen. This prevents any H_2O_2 measurement by one of the HUMICAP® sensors. Relative saturation is a calculated value based on the different measurements from the two humidity sensors, one with and one without a catalytic layer. Calculated RS% is derived from the different relative humidity, ppm and temperature measurements of both sensors.

Q: What is the lowest ppm that the probe can measure?

A: The measurement scale is from 0 to 2000 ppm with the accuracy of 10 ppm or 5% of the reading (whichever is greater) at 25 °C. The accuracy specifications are stated from 10 ppm onwards. The HPP270 series probes are not designed for low level or sub-ppm level measurements.

Q: Why is the absolute hydrogen peroxide unit mg/m³ and not mg/L? What is the conversion?

A: We have chosen to use mg/m³ because it is an SI unit, and mg/L is not. Absolute H_2O_2 mg/m³ (milligrams per cubic meter) can be converted into mg/L (milligrams per liter) by using this formula:

$(H_2O_2) = M\ H_2O_2 \cdot P \cdot H_2O_2 ppm / T$

Where:

$M\ H_2O_2$ = Molecular mass of H_2O_2

P = Pressure

$H_2O_2 ppm$ = Measured H_2O_2 concentration in ppmv

T = Measured temperature

Q: Why does the HPP271 only output ppm, but not relative humidity and relative saturation?

A: The HPP271 probe contains a PEROXCAP® sensor that is warmed in order to provide stable, accurate and repeatable VH_2O_2 measurement in condensing environments.

The HPP272 probe can provide values for relative humidity and relative saturation because it comes with an additional temperature sensor. Relative humidity and relative saturation are temperature-dependent parameters. The HPP271 does not have this required additional temperature sensor and therefore can only measure H_2O_2 ppm. With the temperature probe, the HPP272 probe can output ppm, %RH and %RS.

Q: Why does the analog ppm output not always go to zero with no H_2O_2 present?

A: The PEROXCAP® sensor consists of two humidity sensors that have a minor difference in behavior when the humidity level changes. Because of this difference, the H_2O_2 concentration reading may vary slightly (typically 0 ... 3ppm) even when the probe is not exposed to H_2O_2 .

If necessary, the variation in low level output can be hidden by enabling the low H_2O_2 threshold feature that forces the output to 0 when the measurement falls below a set level (for example, 3 ppm), and the configured activation delay ends.

The output returns to normal operation after the measurement has remained above the set deactivation level (for example, 10 ppm) for a set time. You can configure the low H_2O_2threshold activation and deactivation levels and the activation and deactivation delays with Vaisala Insight PC software and Modbus registers.

Q: What kind of heating functions do the sensors have?

A: When powered on, the PEROXCAP® sensor is heated. This prevents condensation from forming on the sensor and provides reliable measurement even in condensing environments. Heating also helps to maintain measurement performance and lengthens the probe's lifetime.

In addition, the probes feature a chemical purge cycle that heats the sensor at certain intervals. The chemical purge causes the rapid evaporation of chemical contaminants that may have been absorbed by the polymer. This chemical purge feature cleans the sensor internally, maintaining its stability and accuracy.

Chemical purge

Q: When does the chemical purge cycle occur?

A: The purge cycle is initiated in three ways:

- Automatically when the probe is powered on.
- When manually triggered, which then re-sets the purge interval.
- At regular intervals (the default purge cycle is every 24 hours, but purge cycles are configurable between one hour and one week using Vaisala's Insight software, Modbus, or Indigo 200 and 500 transmitters.

Q: How can I ensure the chemical purge doesn't occur during the bio-decontamination cycle?

A: The chemical purge is automatically performed at intervals, however, the purge cycle is postponed by 30 minutes if H_2O_2 is present or the relative humidity has not stabilized.

The purge cycle is essential for the accuracy and long-term performance of the probe in demanding H_2O_2 environments. During a purge cycle, H_2O_2 and H_2O measurements are not available.

Q: How often is the chemical purge recommended?

A chemical purge is recommended at least every 24 hours of powered-on time, even if the probe has not been continuously exposed to H_2O_2. If triggered purge is used, we recommend implementing the purge prior to a bio-decontamination. Note, that it takes approximately nine minutes to get accurate results after a purge. Increased exposure to H_2O_2 will warrant more frequent purges. The maximum purge interval is once a week.

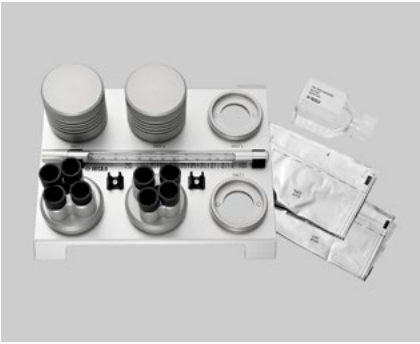
Calibration and maintenance

Q: Can a user replace the PEROXCAP® sensors?

A: No, you cannot replace the sensors. They are not sold separately and a factory-level calibration and adjustment needs to be performed after a sensor replacement. This ensures the measurement performance of the PEROXCAP® probe.

Q: Can I replace the filter by myself? Can I order the filter as a spare part?

A: Yes, you can replace the filter. The part number is DRW246363SP.



Q: Can I do an on-site calibration and adjustment?

A: Yes, the HPP270 series probes can be calibrated in the field in a couple of ways.

Because the PEROXCAP® sensor is composed of two HUMICAP® humidity sensors with the H_2O_2 measurement based on calculations from both sensors, a field calibration and adjustment can be performed using a humidity standard reference, such as our HMK15 Humidity Calibrator. Vaisala's Insight software is required for calibration and adjustment. Additional details for this procedure can be found in the HPP270 series probe User Guide.

Another option is a calibration using a recently calibrated HPP270 series probe. With the calibrated H_2O_2 measurement, calibrations and adjustments can be made through the Insight PC Software, or with an Indigo transmitter. These calibrations are difficult due to the challenge of producing a stable H_2O_2 environment. It is recommended that this type of calibration be performed by one of Vaisala's calibration labs.

Q: How do you know if the catalytic layer is still ok?

A: We have performed extensive, long-term testing on the catalytic layer in a vaporized H_2O_2 environment. These tests indicate that the catalytic layer is durable.

You can spot-check the catalytic layer by comparing the H_2O_2 ppm values to those of a calibrated and adjusted HPP270 series probe.

Q: How often do I need to calibrate the probe?

A: The HPP270 series probes do not have a specified calibration interval. The typical calibration interval is one year, however the need for calibration is based upon the duration and concentration of H_2O_2 exposure and the reqirements of your internal quality management system. The Vaisala Insight software allows you to perform sensor diagnostics and view information on sensor function, called "Sensor Vitality". Sensor vitality is displayed as a percentage. We recommend replacing HPP270 series probes when the sensor vitality value reaches ≤ 40%.

Q: What does the Sensor Vitality percentage mean?

A: Due to the stresses of the VH_2O_2 environment, the PEROXCAP® sensor will lose some functionality over time. In less demanding conditions, the sensor can remain functional for many years. In environments with higher H_2O_2 concentrations and longer exposure periods, it is recommended to monitor the condition of the sensor regularly.

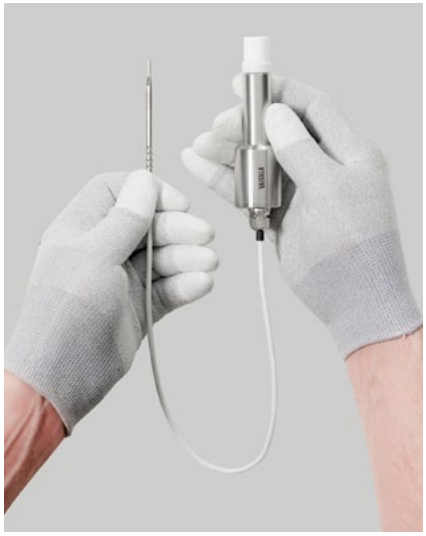
Within the Vaisala Insight software, the status of the sensor can be viewed in **Diagnostics Data**. **>Devices > [probe name] > Diagnostics**. In the **Diagnostics Data** view, the condition of the sensor is shown as a percentage (0 ... 100 %) on the **Sensor Vitality** row. A new sensor will have a sensor vitality of 100 % and a sensor at the end of its life cycle will have a sensor vitality of 0 %. If you are using the probe in a demanding environment, contact Vaisala to arrange sensor replacement once the sensor vitality value reaches 40 %.

Q: Can I customize the output (measurement scale)?

A: Yes, the analog output scale can be customized for all of the available parameters. This can be performed using the Insight software, Modbus registers, or through the Indigo 200 and 500 configuration interface.

Q: Can changes to the probe be made in the field?

A: Yes, you can change the output parameters, output scaling, and chemical purge intervals. Make these changes using Vaisala's Insight software, Modbus registers, or through the Indigo transmitter's configuration interface.



INDIGO 200 & 500 series transmitters

Q: Are the HPP271 and HPP272 probes compatible with Indigo 200 and 500 Series?

A: Yes, connecting the probe to an Indigo transmitter provides a range of additional options for outputs, measurement viewing, status monitoring, and configuration.

Additional features with Indigo transmitters:

Indigo 200 Series

- 3.5” LCD color display or non-display model with LED indicator
- Digital output or 3 analog outputs (depending on the transmitter model)
- 2 configurable relays
- Wireless browser-based configuration interface for mobile devices and computers (IEEE 802.11 b/g/n WLAN)

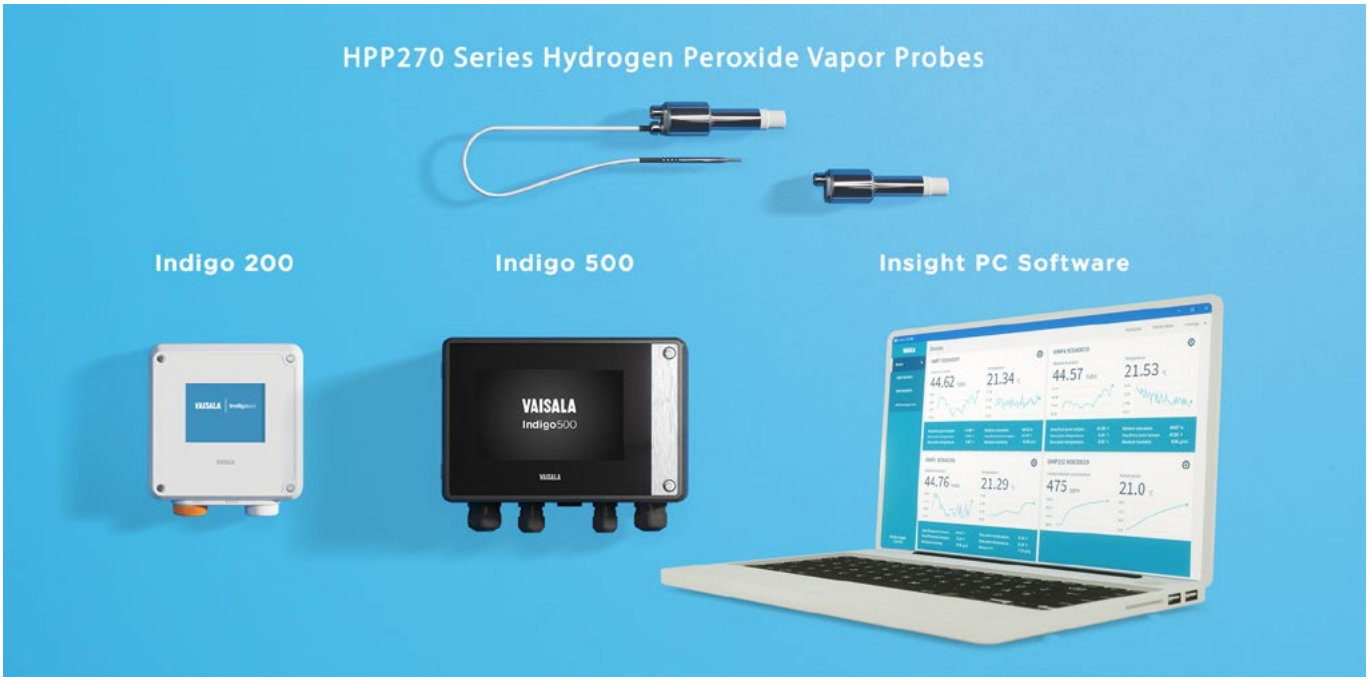
Indigo 500 Series

- Dual probe support
- Touchscreen display
- Digital output or 4 configurable analog outputs and 2 configurable relays
- Power over Ethernet option

Q: Can the purge function of the HPP272 be triggered by the Indigo?

A: Yes, you can trigger and modify the purge function by using the Indigo 200 and 500 transmitters.

Learn more at
www.vaisala.com/hpp270



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