

sonicclean: an ultrasonic cleaner for accurate sensor measurements in industrial environments!

When PAT-probes get dirty, measurements are distorted.

sonicclean is an ultrasonic device to take care of a probes' cleanness and prevent layers influencing measurements and increasing the risk of error.

Have you experienced fouling on sensors before?

The influence of contaminations on the pH-probes' measured data is widely unknown. Contaminations and layer formation block the ion's pathway through the sensors sensitive membrane of pH- and dissolved oxygen-electrodes or hinder light from passing through optical windows of NIR probes. The effect is commonly mistaken for a drift in measurement values due to internal reasons, as for e.g. pH-electrodes. The sensor is simply recalibrated as a counter measure, or the actual process-values are estimated based on the measured ones, however, the influence of these layer-formations is often not properly considered or acknowledged.

A clean probe ensures accurate and reliable process information at a continuous level and in real-time.

This leads to potential gain of:

- time
- process control
- quality
- yield & downtime
- worker's safety

Combining sonicclean with PAT-probes enables:

stability

- probe stays in place: less or no time-consuming cleaning maintenance cycles, which often leads to production downtimes
- ultrasound acts on the entire pH-electrode tip and diaphragm (figure 2)

sensitivity

- continuous acquisition of the true state of the process medium
- the sensitive sensor membrane is not harmed – ultrasound acts out of the liquid directly into the layer/contamination
- measurement values are not influenced by the application of ultrasound

Application example sonicclean with pH-probe

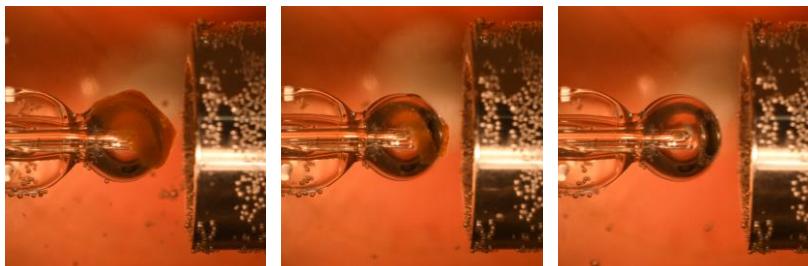


Figure 3: ultrasound cleaning effect: removing a contamination from the **pH-probe**



Figure 1: An ultrasonic cleaning technology for **real-time** data providing **in-line** sensors



Figure 2: Making the ultrasound field visible with the help of suspended particles: the pattern they form on the **pH-probe** reassembles the ultrasound force's active area and indicates the range of the cleaning effect



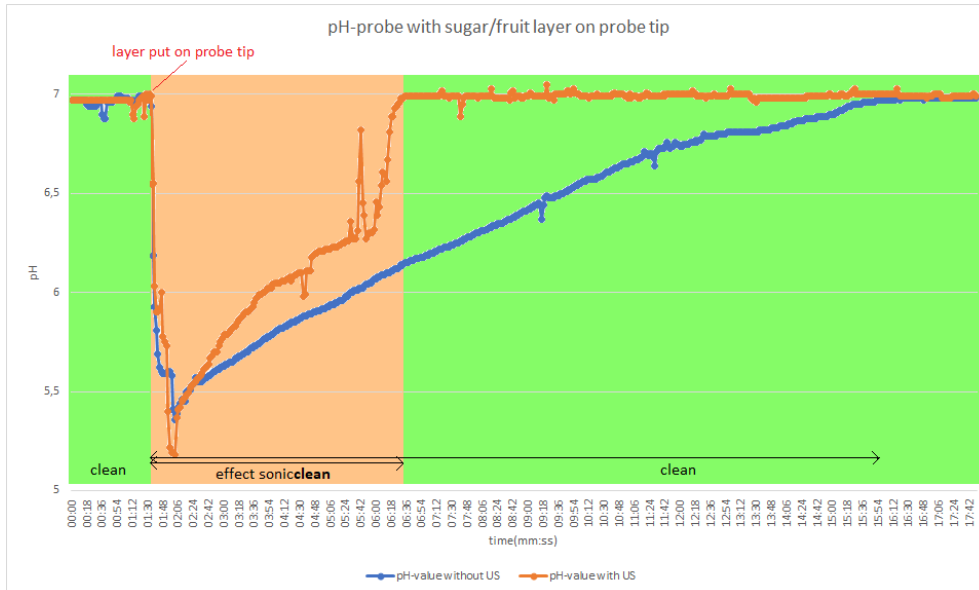


Figure 4: Application of ultrasound to keep a pH-probe's tip clean, comparison to the case without ultrasound

A layer of sugar/fruit mixture was applied to the tip of the pH-probe. On contact with the contamination, the pH-value adjusted to the value of the layer and blocked the information from the process medium. Cleaning the pH-probe using ultrasound emitted by sonicclean restored the measured pH to the actual values (orange). The duration of the cleaning process strongly depends on the layer thickness. Therefore, when used in a production process, a regular protocol for ultrasonic cleaning prevents the growth of a coating (duty cycling). After removal of the coating, the sonicclean was not switched off to show that there is no effect on the ion selectivity of the membrane; pH-values remained stable.

The comparison with a measurement without sonicclean (blue) underlines the effect. Due to the solubility of sugar in water, the original pH-value is restored as well, but much more. The acceleration of the process by ultrasound is evident (arrows graph 4 bottom).

Want to implement ultrasonic cleaning in your process?

sonicclean is also available for other probes!

Oxygen-probe

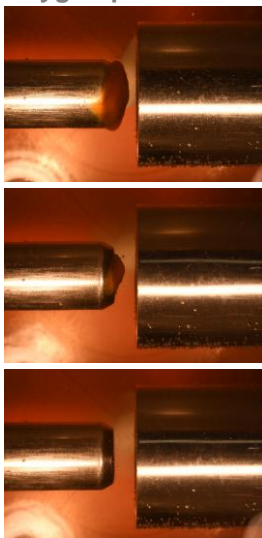


Figure 5: Oxygen-sensor - ultrasonic cleaning effect to remove contamination from the membrane.

NIR-probe

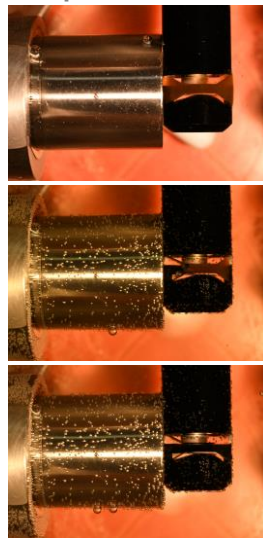


Figure 6: NIR-probe - ultrasonic cleaning effect to remove contamination from the transmission slit.

Datasheet:

Length: various lengths possible

Modell: 12 mm diameter for standard pH electrodes; can be mounted in pipes as well as tanks – sonicclean is placed opposite the sensor or tilted. Other product variants according to customer requirements on request.

Max. process-temperature: upper limit 150°C

Max. pressure (inactive): tested 3 bar @ 130°C for 30 minutes (autoclaving), CIP/SIP possible

Materials: current standard: 1.4404 stainless steel (316 L) - possible after consultation: Viton, glass, ceramics, Macor, Hastelloy X, Hastelloy C276

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