Technical Note 14

HaloSense Zero

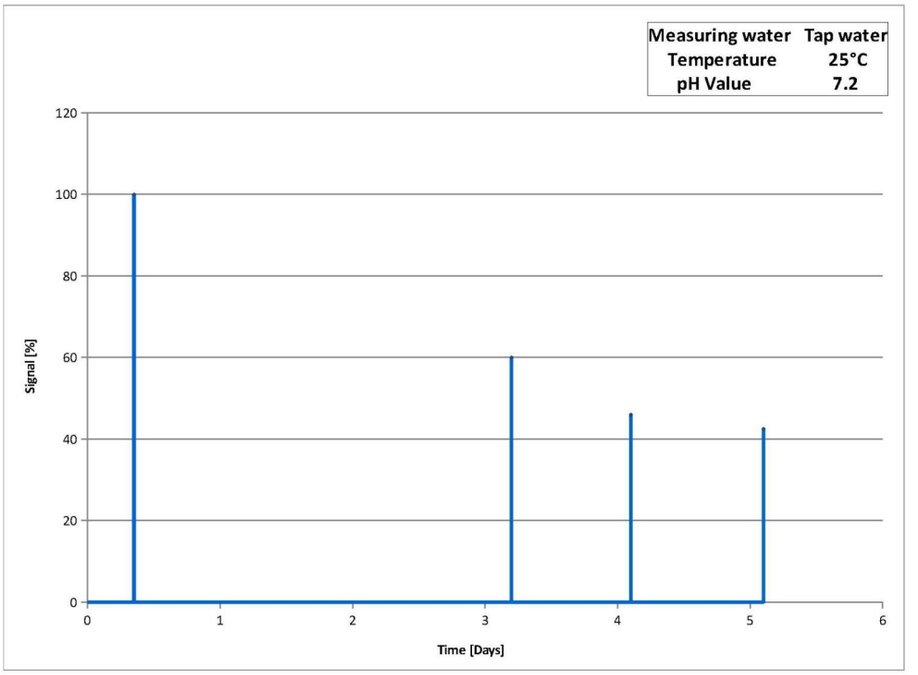
Background

Pi's HaloSense Zero

All amperometric sensors for measuring free chlorine are affected by the same issue; they can only be used for very short periods of time in chlorine free water without a detrimental effect on the signal response slope.

After extended periods of use in chlorine-free water the signal response slope falls dramatically. The response time of the sensor also increases significantly when chlorine returns to the process. This can lead to measurement and process control problems in applications where chlorine may not be present in the water for long periods.

The results below show the signal response slope from a standard free chlorine sensor that was used for several days in chlorine free water. During the experiment chlorine was added for 30 minutes to determine the signal strength. From the table it can clearly be seen that the signal strength deteriorates the longer the sensor is present in the chlorine free water.



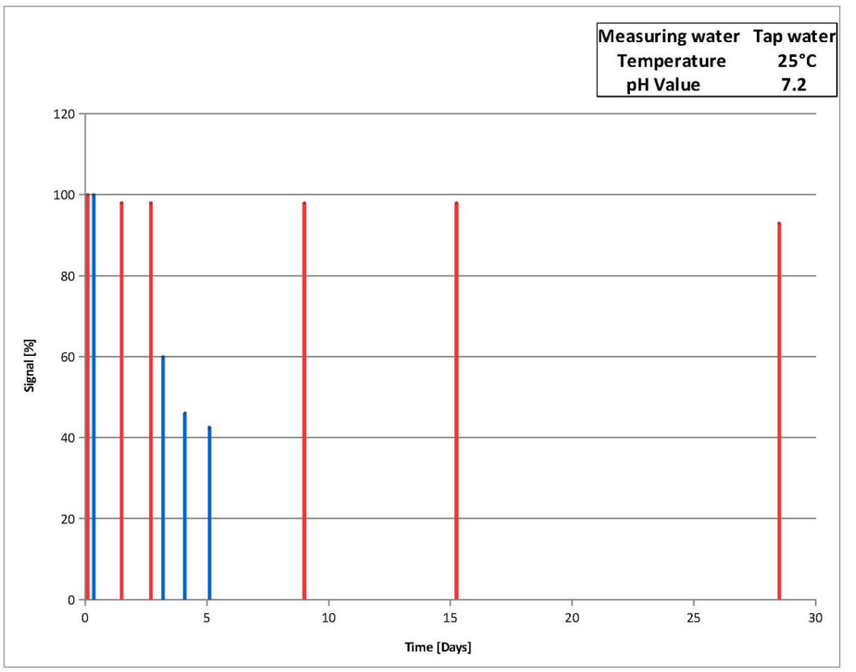
Why does this happen?

The decline in signal strength can be attributed a number of causes, it can be assumed that the lack of chlorine in the water results in oxide films forming on the working electrode and biofilms forming on the membrane of the sensor. The longer the sensor is in chlorine free water the greater the sensitivity loss will be, this can result in a delayed reaction or possibly no reaction at all.

Solution

Process Instruments are now able to offer a solution to this problem using the new 'Zero' chlorine sensor. With this new sensor there is no dramatic signal slope loss when being used for extended periods in the absence of chlorine. Thanks to its unique design the 'Zero' Chlorine sensor is able to quickly deliver a usable signal when chlorine is added to a water sample even after extended periods of time in chlorine free water.

The chart below shows a comparison between a standard free chlorine sensor and the new 'Zero' chlorine sensor. Both sensors were placed in chlorine free water with chlorine being added for 30 minutes to establish the signal strength.



Standard Free Chlorine Sensor

Pi's HaloSense Zero Sensor

It can be clearly seen that the 'Zero' chlorine sensor delivers a clear usable signal that is virtually unaffected over the time period, whereas the standard free chlorine sensor signal deteriorates on a sharp downward slope after only 5 days in the chlorine free water.

Another advantage the 'Zero' chlorine sensor delivers over the standard free chlorine sense is that the response time when chlorine is added to the water is virtually unchanged even after extended periods.

Conclusion

The Zero free chlorine sensor delivers significant performance advantages over the standard amperometric free chlorine sensor when measuring chlorine in applications where the sensor could be left in chlorine free water for extended periods.

The response rate of the Zero chlorine sensor is virtually unchanged even after extended periods of use in chlorine free water.

These two characteristics provide great benefits compared to a standard free chlorine sensor when the sensor is being used in an application where it is necessary to quickly and accurately measure the level of chlorine even after extended periods of exposure to chlorine-free water.

Pi's CRIUS® analyzer

Interferences

- **Like all amperometric sensors the zero sensor also reacts with other oxidising agents for example chlorine dioxide and ozone.**
- **The presence of reducing agents e.g. sodium sulphite results in a reduced signal.**