



# APPLICATION REPORT

Water & Wastewater

## Measurement of free chlorine in a drinking water system

- Adding chlorine to disinfect drinking water from wells
- Monitoring the chlorine content prior to network supply
- Automated disinfection control using a control system

### 1. Background

The Association for Water Supply and Sewage Treatment Geiseltal (ZWAG) operates a water supply network for around 10,000 households in Mücheln, Saalekreis, Germany. The company abstracts the drinking water through regional filtration wells from a surface spring. From there it is pumped into a central high-level tank and then fed into the network as needed. Compared to groundwater from deep wells, spring water has a slightly higher, natural bacteriological makeup and must thus be disinfected. As this application requires an extended disinfecting effect (sustained efficacy) right up to the supply point into the drinking water system, free chlorine is the only permitted disinfectant. Unlike UV and ozone which according to the Drinking Water Ordinance are only permitted for spot disinfections, free chlorine ( $\text{Cl}_2$ ) can kill off the organic material contained in untreated water along the entire transportation route.

### 2. Measurement requirements

To disinfect, the company adds chlorine bleach (sodium hypochlorite) at the outlet of the well at 0.3 mg/l. The upper limit for free  $\text{Cl}_2$  prescribed in the Drinking Water Ordinance is 0.3 mg/l and is not to be exceeded at the supply point. The ZWAG thus depends on reliable chlorine content control downstream from the high-level tank. At the same time the measurement proves a sustained effect after the high-level tank ( $\text{Cl}_2$  content above the lower detection limit of 0.1 mg/l).

The operator had so far measured free chlorine photometrically by way of random checks. This process requires labourious manual sampling. To automate chlorine analysis and the transfer of measurements to a control system in the future, the ZWAG decided to retrofit the existing infrastructure using appropriate measurement technology.

## 3. KROHNE solution

The ZWAG decided on the OPTISYS CL 1100, a completely pre-installed measuring system used to determine the amount of free chlorine in the drinking water. It consists of the membrane-free OPTISENS CL 1100 sensor in combination with a MAC 100 converter, a flow controller, valves, a temperature sensor and a pH sensor.

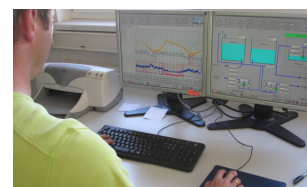
The product to be measured is taken downstream from the high-level tank and transported to the measuring system via a copper bypass line. The OPTISYS CL 1100 takes the measurements and then makes them available via a 4...20 mA output in the ZWAG control system. As samples may not be returned to the drinking water circuit, they are disposed of in a sink behind the measuring circuit. To keep the measuring cell free of deposits such as algae, the measuring system is connected to a flushing circuit. Shock cleaning is carried out using a chlorine bleach solution. In addition, the sensor is automatically cleaned once a week thanks to the self-cleaning function. The customer can use a relay output at any time to control when the cleaning of the sensor takes place.



OPTISYS CL 1100 with measuring and flushing circuit

## 4. Customer benefits

The ZWAG is now in a position to monitor chlorine analysis fully automatically using the control system, significantly reducing manual effort. With the help of the OPTISYS CL 1100 the supplier ensures that a constant average free chlorine content of about 0.1 mg/l is maintained even at the supply point. This allows the customer to guarantee reliable and economic operation of the drinking water system. The legally prescribed limit is observed and/or not exceeded.



Automated transfer of measurements to control system

When operating the OPTISYS CL 1100, the ZWAG also benefits from the standardised user concept of the MAC 100 converter. Since the customer is already using several KROHNE measuring devices, he already knew how to operate the device. There was thus no need for staff training and he could start using the fully operational measuring system immediately.

Should future measurements be required to directly regulate the dosage of free chlorine, use of a chlorine sensor with integrated transmitter technology (SMARTSENS) is also feasible. This sensor communicates directly with the control system without a transmitter.

## 5. Product used

### OPTISYS CL 1100

- Ready-to-operate measuring system for free chlorine, chlorine dioxide and ozone in water applications
- Membrane-free sensor with 2 gold electrodes for long-term stability and easy maintenance
- Optionally available with automatic sensor cleaning (ASR) and pH compensation



### Contact

Would you like further information about these or other applications?  
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