

Online measurement technology for continuous filter monitoring and safe drinking water quality

Stadtwerke Eutin relies on the WTW drinking water panel as a compact multi-parameter measurement technology solution

Customer:

Stadtwerke Eutin GmbH – Eutin Waterworks

Requirements:

TrinkwV-compliant, continuous condition assessment of two gravel filter systems, as well as monitoring and documentation of the pure water quality at the plant exit.

Results:

Online measurement technology continuously monitors pH, oxygen and turbidity at the filter outlets and at the plant outlet. The measurement data helps to optimize the filter process and monitor it in compliance with the German Drinking Water Ordinance, as well as to ensure excellent pure water quality at the plant outlet.

1. Introduction

The drinking water of the Eutin municipal utilities comes directly from the surrounding groundwater and supplies around 17,000 inhabitants of the northern German city of Eutin, as well as parts of the surrounding communities. It is pumped from a total of five raw water wells. In the waterworks, the raw water is treated, temporarily stored and pumped into the distribution network.

Part of the treatment process is a filtration system consisting of two open gravel filter systems (see Figure 1). Two WTW drinking water panels have recently been used to monitor the filter systems, enabling continuous turbidity, pH and oxygen measurement. A third WTW drinking water panel also monitors the pure water quality at the plant outlet. Read on to learn more about the background and benefits of this measurement technology installation.

2. Monitoring of the filter system

According to § 24 of the German Drinking Water Ordinance, operators of a central water supply system applying a filtration process must test the filtrate for the operating parameter turbidity. Common practice here is the continuous measurement of turbidity with an online turbidity meter. Xylem Analytics offers the WTW



Fig. 1: View of the gravel filter system at the Eutin waterworks

drinking water panel with continuous turbidity measurement for this purpose. The WTW drinking water panel is a configurable measuring panel solution and enables simple multi-parameter measurement with the parameters pH, conductivity, redox/ORP, oxygen, chlorine and turbidity.

The continuous turbidity monitoring on the filter is used to immediately detect a filter breakthrough. If the measured turbidity value increases, particles pass through the filter, which can be the case, for example, in the event of an overload. Operators can react immediately before critical turbidity values are exceeded.

Continuous filter monitoring thus makes it possible to optimize operating processes such as maintenance intervals of the filter system and backwash processes. This increases process reliability and reduces operating costs.

3. Optimization of operational management

At the Eutin waterworks, the additional measurement of the pH value and dissolved oxygen at the filter outlets supports process optimization. Both parameters are used to monitor and control an upstream gas exchange system, in which the raw water is deacidified by removing free carbon dioxide and enriched with atmospheric oxygen. Deacidification serves to adjust the pH value to the 6.5 to 9.5 pH specified for drinking water ^[1]. Dissolved iron and manganese are oxidized by the introduced oxygen and thus converted into insoluble compounds. These are separated during the subsequent gravel filtration, which means that their legal limits can be complied with. The complete treatment process at the Eutin waterworks includes the following steps:

1. Raw water extraction from five raw water wells
2. Deacidification and aeration in a gas exchange unit
3. Filtration via two open gravel filter systems
4. Storage in pure water tanks and distribution into the network by pumps

By measuring the pH, oxygen content and turbidity, the treatment process can now be continuously monitored and controlled. The pH value indicates that deacidification is working, the oxygen reading provides an indication of sufficient oxidation conditions for iron and manganese removal, and the turbidity value serves as an indicator of the effectiveness of particle separation in filtration as well as possible filter breakthroughs. Figure 2 shows one of the two measuring panels at the filter outlet. The blue module on the panel is a self-mounted display for flow monitoring from another manufacturer.

A third drinking water panel was installed at the plant outlet. It also measures turbidity, pH and oxygen. Through continuous data collection, it ensures traceability and supports reporting obligations for compliance with legal regulations. Overall, the three measuring panels thus ensure increased quality assurance and facilitate

Guideline and limit values for turbidity measurements are defined in Annex 5 Part 1 of the German Drinking Water Ordinance, with:

- a. 0.3 Nephelometric Turbidity Units (NTU) on 95 percent of the samples, and
- b. No sample shall exceed the measured value of 1.0 Nephelometric Turbidity Units (NTU). ^[1]



Fig. 2: WTW drinking water panel at the outlet of the gravel filter systems for monitoring turbidity, pH and oxygen

operational management.

4. Good consultation, instruction and joint commissioning

According to the operator, the WTW drinking water panels impress with their compactness, reliability and a competitive price-performance ratio. In addition, the customer service is also praised:

“From the inquiry to the preparation of the offer and delivery to commissioning and support in the event of operational disruptions, only positive experiences have been made so far. Support is not only provided by telephone, but also by field staff on site if required.”

Nico Mohr, water master technician Stadtwerke Eutin

The maintenance effort is manageable and is carried out by the operator himself. This results in costs only for new measuring probes, buffer solutions and spare parts. Specifically, the maintenance of the measurement technology at the Eutin waterworks includes the following points:

- Calibration of pH electrodes every 8 to 10 weeks (two-point calibration with buffer solutions)
- Replacement of pH electrodes as required (previously after approx. 13 to 18 months)
- Dry bag change of turbidity measurement as required (approx. 1 time a year)
- Checking the oxygen sensor for measurement accuracy according to the oxygen saturation table (2 to 3 times a year)

“The calibration and replacement of a probe is very simple.”

Nico Mohr, water master technician Stadtwerke Eutin

5. Summary

The installation of the WTW drinking water panels enables Stadtwerke Eutin to continuously and reliably monitor central process parameters. This allows treatment processes to be controlled in a targeted manner, deviations to be detected at an early stage and legal requirements of the German Drinking Water Ordinance for filter monitoring to be reliably complied with. In addition to improved process reliability, the solution impresses with its easy handling, low maintenance costs and economical operation – a clear added value for an efficient and future-proof drinking water supply.



Fig. 3: In the pump station, the treated drinking water is pumped into the distribution network

Key Takeaways

- Continuous measurement of turbidity, pH and oxygen enables immediate detection of deviations in the drinking water treatment process, e.g. in the event of a filter breakthrough. Operators can thus intervene at an early stage before limit values are violated.
- At the Eutin waterworks, the real-time data can be used to control filtration, deacidification and aeration in a targeted manner. Maintenance and backwashing can be carried out as needed instead of rigidly according to intervals, which makes processes more efficient and reduces operating costs.
- Continuous data collection supports compliance with the German Drinking Water Ordinance and facilitates verification and reporting obligations.

Products used:

- IQ Controller MIQ/TC 2020 3G
- DW/P drinking water panel with turbidity analyzer Turb PLUS 2120 (according to DIN EN ISO 7027) and module MIQ/IDS-2 for connecting 2 IDS sensors
- IDS sensors SenTix® 945 and FDO® 925



Sources:

[1]] Drinking Water Ordinance (TrinkwV): Ordinance on the Quality of Water for Human Consumption, last amended on 20.06.2023
https://www.gesetze-im-internet.de/trinkwv_2001/



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