



# APPLICATION REPORT

Water & Wastewater

## Measurement solution for monitoring and controlling water amounts discharged from a storm overflow basin

- Overflow protection for a sewage treatment plant during heavy rainfall
- Flow measurement of wastewater loads in the partially filled pipeline of a combined sewer
- State-of-the-art rainwater management with coordinated measuring, control and drive technology



### 1. Background

Heavy rainfall increasingly poses challenges for operators of sewer systems and sewage treatment plants. Soil sealing due to sustained urbanisation increases existing risks. In combined systems, wastewater loads can lead to hydraulic overloading in the sewage treatment plants as inflow conditions change. The result is an increase in water pollution.

Stormwater tanks are used to temporarily store stormwater in sewer systems and to regulate the continuous inflow to sewage treatment plants. New legal framework conditions and the structural challenges facing many operators increasingly require these buildings to operate automatically to prevent overload and guarantee the reliability of treatment processes even during extreme rainfall. However, many smaller and mid-sized sewage treatment plants in particular are not designed to operate this way.

The German municipality of Schlangen, also faced this challenge. By way of the public utility company GWS, the municipality operates a combined system with a storm overflow basin in the downstream sewer system of the local sewage treatment plant. In the past, an intake control had been put into place to limit the amount of wastewater sent on to the sewage treatment plant via the sewer system. The excess amount of water is treated in the storm overflow basin. This prevents an overload of the sewer system in the undercurrent of the basin and restricts the inflow to the sewage treatment plant to the permissible amount.

**KROHNE**

## 2. Measurement requirements

The retention basin was equipped with a mechanical flow regulator during start-up. However, it was not possible to calibrate this regulator and it thus no longer satisfied the requirements of the regular inspections according to the self-monitoring ordinance regarding wastewater of the federal state of North Rhine Westphalia. The responsible water authorities required the discharge facility to be modernised accordingly.

The water utilities decided on intelligent rainwater management. Flow measurement, a control unit and a slide valve were to help completely automate the control of the water discharge into the sewer. The inlet sewer to the sewage treatment plant is an unpressurized gravity pipeline so using a typical flowmeter for process lines was out of the question. The measuring technology installed to replace the mechanical flow regulator did not comply with operating safety requirements and did not meet the legal requirements for the self-monitoring ordinance over the long term. For this reason, the operator was looking for a suitable alternative.

## 3. KROHNE solution

The operator relies on a measuring solution from partner companies KROHNE, PHOENIX CONTACT and VAG. The measuring solution was specifically developed and designed to meet the requirements of a state-of-the-art stormwater management system. It includes measuring technology (by KROHNE), instrumentation and process control (by PHOENIX CONTACT) and drive technology (by VAG).



Underground storm overflow basin in the Municipality of Schlangen



Ventilation shafts and control cabinets above the stormwater basin



Installation of the measuring technology



Measuring solution including flowmeter and slide valve

KROHNE's TIDALFLUX 2300 provides the required control variable for the automation. The electromagnetic flowmeter (EMF) features integrated level measurement and can thus measure even in partially filled pipelines - unlike usual EMFs.

The measuring tube of the TIDALFLUX 2300 comes with a polyurethane (PUR) liner for abrasion and chemical resistance. Its smooth surface prevents the build-up of fat and other deposits, reducing the need for regular cleaning to a minimum.

The control variable is the maximum flow set by the operator. The EMF transmits the currently measured flow to the control unit via 4...20 mA signal.

### KROHNE



TIDALFLUX 2300 – Flowmeter for gravity pipelines

The small control system from the modular type ILC150 inline automation system by PHOENIX CONTACT regulates the outflow and transmits the data from the building to the superimposed control technology in the sewage treatment plant. Each measured flow value (actual value) is compared to the target value specified by the operator. If necessary, the slide position is adapted so that the target value is not exceeded and a continuous inflow is guaranteed, even during heavy rainfall.

### PHOENIX CONTACT



Transfer of measuring signal to the control cabinets

The ZETA control knife-gate valve by VAG is used as an actuator. The knife-gate valve is controlled from the control room by way of an electric control actuator (for 1200 control commands per hour) via analogue signal (4...20 mA).

### VAG



ZETA knife-gate valve

## 4. Customer benefits

The operator benefits from a tailored solution that significantly increases overload protection during heavy rainfall. The amount of discharged water as well as the capacity of the stormwater overflow basin can be permanently monitored and the inflow to the sewage treatment plant regulated accordingly. This ensures that the treatment process runs smoothly. This way, the measuring solution makes an important contribution to sustainable sewer system management and active water protection. It should be emphasized that the water amount released from the stormwater overflow basin can be reduced, lessening the burden on the recipient.

Another advantage for the customer: simple start-up. It paid dividends that the measuring, control and drive technology complement each other completely. The "Waterworx" library by PHOENIX CONTACT made integration simple because each KROHNE and VAG component is already stored in the system as a finished component.

In addition, the operator can largely avoid manual effort and service calls for the sewer system. Thanks to the networking with the control technology of the sewage treatment plant, all process data is gathered and recorded. All parameters can be adapted from the sewage treatment plant, optimising the cleaning performance of the systems.

The measuring solution is future-proof for the user. As an option, it can be expanded to include other measuring and control technology. For example, with a conductivity measurement both the quality of the stormwater and its load can be monitored. The industry solution of the three partner companies is thus already designed for future analytical measuring requirements. As a full-service provider for the water and wastewater industry, KROHNE can supply all of the necessary sensors.

## 5. Product used

### TIDALFLUX 2300

- Electromagnetic flowmeter for applications with partially filled pipes and sewers
- With integrated capacitive level measurement for flow measurement of water, wastewater and sludge ( $\geq 10\%$  pipe fill level)
- Accurate ( $\pm 1\%$ ) and cost-saving alternative to open channel systems
- Flange: DN200...1600 / 8...64"
- Also for use in hazardous areas
- On-site verification of flowmeter with OPTICHECK service tool
- Integrated conductivity measurement
- PROFINET communication optional



### Contact

Would you like further information about these or other applications?  
Do you require technical advice for your application?  
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