



# APPLICATION REPORT

Power Generation

## Redundant level monitoring in condensate tanks

- Instrumentation for numerous measuring points in the steam cycle of a power plant
- Maintenance and drift-free measurement of condensate levels using magnetic bypass level indicators with guided radar (TDR)
- Accuracy and reliability due to two independent technologies in one measuring device
- Only one process connection for installation



thyssenkrupp

### 1. Background

ThyssenKrupp Steel Europe, one of the world's leading suppliers of high-quality steel products, operates two power plants in Duisburg, Germany. The power plant in the city's district of Ruhrort supplies an adjacent steel factory with condensate and process steam. The company uses the furnace and coke oven gas created during the manufacturing of steel and coking to produce energy. Three units with capacities of 64, 100 and 180 MWel are operated at the Ruhrort site. The first power plant units date back to 1955. The plant has been gradually modernised and automated to achieve state of the art technology standards. The availability, efficiency and output of the power plant have thus continuously increased.

### 2. Measurement requirements

There are numerous measuring points in the steam cycle of the power plant at which the level is monitored and controlled. These points are located, among others, at the steam drum, the condenser, the deaerator and the feedwater heater.

Previously, the customer had primarily used differential pressure transmitters to determine the level of hot water and feedwater tanks or of additional tanks on the condensate/steam boundary. For availability reasons, many measuring points were traditionally designed to be double or triple redundant so there were also even older pneumatic measurements and sight glass level indicators in use.

As part of the modernisation, the company decided to renew the instrumentation. The goal was to reduce maintenance requirements while increasing the accuracy and availability of measurements.



Power plant

**KROHNE**

## 3. KROHNE solution

The customer replaced the existing level indicators and differential pressure transmitters at several measuring points in the steam cycle with a redundant measuring solution featuring the BM 26 A magnetic bypass level indicator and the OPTIFLEX 2200 guided radar (TDR). In addition, new KROHNE instrumentation replaced the sight glasses on the oil tanks for the feedwater pumps. The conversion was carried out in a very cost-effective way. Both measuring devices were installed using the existing process connections.

The solution combines two measuring principles in one. The BM 26 A mechanical magnetic flap indicator works without power. It is controlled using the position of a magnetic float in the bypass and visually indicates the level. The bypass tube in the measuring device functions as a "communicating tube" that shows the level of the respective condensate tank. In addition, the mechanically measured level is converted and transmitted via a 4...20 mA current output signal by a signal converter (LT40).

The OPTIFLEX 2200 guided radar (TDR) level transmitter provides level monitoring independent of the mechanical measurement. It is mounted on the BM 26 A bypass chamber and enables continuous measurement including transferring the level to the control room.



Bypass measurement with BM 26 A and OPTIFLEX 2200

## 4. Customer benefits

The customer benefits from a solution with two independent measuring principles (LT40 and TDR radar) and thus two electrical signals that are independent from one another. It was possible to make use of the existing infrastructure for installation. Expensive conversion measures were not necessary.

Thanks to its multi-functionality, the solution corresponds to the operator's requirements in terms of both accuracy and availability. The plant is now controlled primarily via TDR radar measurement. It is accurate and drift-free. The LT40 electronic signal converter creates redundancy. Thus, all requirements are fulfilled with one single installation.



Measurement redundancy



TDR radar signal converter (above) and LT40 electronics

Maintenance efforts are significantly reduced. In comparison, the differential pressure transmitters connected via impulse lines required intensive maintenance and regular manual intervention.

## 5. Products used

### BM 26 A

- Magnetic bypass level indicator for liquid applications and liquid-liquid interface applications (up to +300°C / +572°F and max. 100 barg /1450 psi)
- No auxiliary power supply; optionally available with LT40 signal converter

### OPTIFLEX 2200

- Guided radar (TDR) level transmitter for storage and process applications
- Continuous measurement of level, distance, volume, mass or dielectric constant



## Contact

Would you like further information about these or other applications?

Do you require technical advice for your application?

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