



APPLICATION REPORT Power Generation

Ultrasonic flow measurement in a district heating network

- Integration of a biomass CHP plant into a sustainable heating network
- Hot water flow measurement for heat supply in accordance with Power and Heat Act
- Energy billing according to MID MI-004



1. Background

HVC group is responsible for sustainable waste management in the cities of Alkmaar and Dordrecht, the Netherlands. The company collects, separates, processes and recycles waste. In addition, HVC is an innovator in the area of sustainable energy produced from waste management processes. This also applies to the "100% green" project, in which HVC supplies over 6000 homes and businesses with hot water. Since 2017, the hot water network has been fully sustainable by connecting it to the biomass CHP (combined heat and power) plant, where biomass is burned to generate heat.

2. Measurement requirements

The biomass CHP plant burns 170,000 t of wood waste per year at a temperature of +800°C / +1472°F for the heating of the hot water network. The challenge for the heat withdrawal is the high temperature in combination with high pressure, which can reach +130°C / +266°F at a pressure of 15 bar / 217.5 psi in the network. The customer wanted the energy exploitation to be as high as possible.

The customer previously used flowmeters with internal obstructions to measure the quantities of heated water fed into the grid. These flowmeters were able to measure successfully within the specifications but caused immense pressure loss that turned out to be a significant cost factor in terms of energy and pump capacity. As the company uses low conductivity water in their heating network, ordinary electromagnetic flowmeters were not an option due to the low conductivity of the medium and the negative effects of magnetite on the electrodes.

Aiming at minimal maintenance costs and a most efficient process, the customer was looking for a flowmeter with a full-bore design suitable for low conductivity water. For invoicing purposes, the flowmeters were also required to comply with the Measuring Instruments Directive (MID) MI-004 in order to meet the requirements of the local Verification Act.

KROHNE

3. KROHNE solution

The OPTISONIC 3400 District Heating proved to be the flowmeter of choice. The 3-path ultrasonic flowmeter for thermal energy measurement is dedicated to flow measurement in district heating networks complying with class 1 accuracy within the metering directive. Various versions with field mounted signal converter were installed at the customer's site (up to line sizes DN400).

The OPTISONIC 3400 District Heating is certified as meeting the requirements of the OIML R75 (accuracy classes 1, 2 and 3) and the MID MI-004. It can thus be used as part of a heat metering system in combination with a temperature sensor and a heat calculator. A special calibration required for this was provided by the certified KROHNE facility in Dordrecht, the Netherlands.

Based on the transit time method, the ultrasonic flowmeter allows bi-directional measurement (virtually from zero flow) independent of flow profile and without creating any flow restriction in the pipe. Thus, it does not create any pressure loss and increases the energy efficient use of the pump power. It is also independent of water conductivity and is not susceptible to (magnetite) scaling.



OPTISONIC 3400 District Heating ultrasonic flowmeters

4. Customer benefits

KROHNE's standard flowmeter meets all HVC's specifications without customisation making specifically produced equipment for the heating network unnecessary. KROHNE provided the required calibration and tamper-proof sealing of the flowmeters in accordance with local metrological regulations. As the ultrasonic flowmeter meets the MI-004 requirements and is suitable for heat billing, it can be used within the European Union for subsidised projects in accordance with the Power and Heat Act as implemented in the Netherlands.

By using the OPTISONIC 3400 District Heating, HVC also reduces maintenance costs and energy consumption compared to measuring devices with internal obstructions. Given the flow rate of more than 500 m³ of water per hour, the full-bore flowmeter without pressure loss saves a lot of energy and pumping capacity.

The integration of the CHP plant into the heating network is just one field of applications where KROHNE's ultrasonic flowmeter portfolio contributed to the customers "100% green" project. Other ultrasonic flowmeters have also been provided within this project, including condensate meters, flowmeters for the return flow as well as flowmeters for larger line sizes at the pumping stations to pressurise the hot water network.

5. Product used

OPTISONIC 3400 District Heating

- Ultrasonic flowmeter for district heating applications
- 3-path meter for thermal energy measurement and heated water
- CT: OIML R75, MID MI-004 (Class 1, 2, 3)
- Flange: DN25...2000 / 1...80", max. PN40 / ASME Cl 300
- Max. +180°C / +356°F

Contact

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