



APPLICATION REPORT

Water & Wastewater

Flow measurement of raw biogas

- Supplying a boiler with power for sewage sludge incineration
- Ultrasonic flow measurement of wet gas with corrosive H₂S content
- Integrated calculation of methane content to determine biogas quality



1. Background

The Saur Group supports municipal and industrial customers with development projects in the fields of building, energy and water. In the field of wastewater treatment, the service provider is helping the municipal association of Saint-Etienne Métropole in southwest France implement a modernisation plan to improve treatment processes. Out of consideration for the region's ecosystem, the wastewater treatment plant operated there may only divert purified wastewater loads into the Loire river. The sludge accumulated during cleaning is reused as part of a sustainable economic strategy and sent to a digestion tower for fermentation. The plant operator uses the biogas produced in the process as an energy source to burn the dried sludge.

2. Measurement requirements

To ensure that the biogas can be used as the primary energy for the boiler, the operator needs to know the quantity and quality of the biogas produced. Only when the methane content of the biogas is above 60% vol. can the medium be used as an energy source for the boiler. This requires a technical solution capable of measuring the volume flow (40 Nm³/h / 24.9 SCFM) and calculating the methane content in the raw biogas. The product is difficult to manage. Parameters including low pressure (50 mbar / 0.72 psi), fluctuating temperatures, a high CO₂ content and parts of water and hydrogen sulphide (H₂S) influence the measurement.

3. KROHNE solution

KROHNE recommended the OPTISONIC 7300 Biogas ultrasonic flowmeter (in DN150 as Ex version). The flowmeter is specially designed to measure biogas with a high CO₂ content and small amounts of other gases like H₂S and condensation water. The device features integrated temperature measurement and can calculate methane content. KROHNE Service tested the use of the device on-site once again and a suitable measuring point was selected.

The device was then installed directly behind the biogas filter in a stainless steel DN150 pipeline. KROHNE integrated the measuring point into the customer's process and installed and started-up the measuring device according to customer specifications. The OPTISONIC 7300 was also connected to the OPTIBAR PC 5060 pressure transmitter for the integrated calculation of the standard volume.



Inspecting the measuring point



The OPTISONIC 7300 Biogas installed behind the filter

4. Customer benefits

The OPTISONIC 7300 Biogas now allows the wastewater treatment plant to feed the boiler with biogas at the best possible rate. The customer uses the ultrasonic flowmeter to find out how much biogas he is producing or still has saved in the gasometer. Now the operator can also determine the quality of the biogas and decide whether the methane content is high enough to burn the biogas or whether it still needs to be treated.

KROHNE Service implemented the complete measuring point without the customer having to deal with a prolonged, unplanned process interruption.

5. Products used

OPTISONIC 7300 Biogas

- Ultrasonic flowmeter for biogas, landfill and sewage gas applications
- With integrated temperature sensor and optional integrated pressure sensor
- Integrated standard volume correction and methane content measurement
- Also for use in hazardous areas (Zone 1)
- Lap joint flange: DN50...200 / 2...8", max. PN10 / ASME Cl 150
- 4...20 mA, HART[®], Modbus (optional)



OPTIBAR PC 5060 C

- Pressure transmitter for advanced process pressure and level applications
- Robust design with corrosion and abrasion resistant ceramic diaphragm
- Maximum overload and vacuum resistance
- Extremely short response times
- Modular design: converter platform for all applications



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