



APPLICATION REPORT Food & Beverage

Multiparameter biogas measurement

- Measurement of methane content, flow, pressure and temperature
- Increased accuracy, maintenance-free installation
- All-in-one measuring device provides full process control



1. Background

Häagen-Dazs is a luxury ice cream produced in France. The North American company General Mills owns the brand and manufactures ice cream and sorbet in Tilloy-lès-Mofflaines in the district of Arras in Northern France. The products contain natural ingredients with no artificial colours or flavours and very little air, providing them with a thick consistency.

2. Measurement requirements

The customer made the decision to invest in a new biogas plant to effectively utilise the production residue treated in its own wastewater treatment plant. This makes it possible to extract methane and use it as a source of energy in cogeneration.

The plant consists of two digestion towers. At the end of the production process, the biogas is treated and water and hydrogen sulphide (H₂S) are removed. The biogas is then used in cogeneration. The biogas powers 3 gas engines. The electricity produced is then sold to EDF. A heat exchanger uses the heat produced by the turbines to heat the fermenters.

Biogas composition	
Methane (CH ₄) content	70% (vol.)
Carbon dioxide (CO ₂) content	26% (vol.)
Oxygen content	4% (vol.)

The biogas must be measured because it is being used to generate heat and power. In order for the process to be as controlled as possible, the flow, pressure and methane content of the medium must be as stable as possible. For this reason, the customer needed to measure the flow of biogas with different gas compositions at the outlet of two digestion towers in two separate pipes. The flowmeters also needed to compensate for changing operating conditions via integrated temperature measurement.



3. KROHNE solution

The methane content in the biogas can be calculated using the sound velocity and temperature. This makes it possible to monitor the performance of the biogas plant. The OPTISONIC 7300 Biogas ultrasonic flowmeter determines the flow of biogas using the differential transit time method. The measuring device also measures the sound velocity at the same time. On this basis and taking into consideration the gas temperature, adiabatic index and the universal gas constant, the flowmeter also calculates the molar mass, which it can then use to determine the methane content with an accuracy of $\pm 1\%$ of the measured value. KROHNE recommended equipping the outlet pipes of both digestion towers with OPTISONIC 7300 Biogas ultrasonic flowmeters. One of the devices was installed in the hazardous area of the plant. This flowmeter features an integrated temperature sensor. It was connected to the OPTIBAR PM 5060 pressure transmitter at the measuring point to calculate the volume flow to standard conditions.



OPTISONIC 7300 Biogas ultrasonic flowmeter and OPTIBAR PM 5060 pressure transmitter installed at the outlet of the digestion tower

4. Customer benefits

The customer has the benefit of an all-in-one device that is capable of taking various measurements (current flow, methane content/ CH_4 , pressure, temperature and total flow). This information enables the company to manage its biogas process accordingly. Based on this multiparameter measurement, Häagen-Dazs decided on KROHNE. The integrated calculation of the methane content in the biogas makes it possible for the operator to accurately determine the energy production of the process. The flowmeter provides measuring results with an accuracy of $\pm 1\%$ of the measured value. The customer benefits from reliable measurements at variable operating pressure, regardless of gas composition. In addition, the device requires no maintenance and features outstanding long-term stability.



Measuring device start-up carried out by a KROHNE service technician

5. Products used

OPTISONIC 7300 Biogas

- Ultrasonic flowmeter for biogas
- Integrated standard volume correction and methane content measurement
- Integrated temperature measurement, integrated pressure sensor optional
- Insensitive to moisture and variable gas composition
- No pressure drop; offers high accuracy and long-term stability
- Also suitable for use in hazardous areas (ATEX Zone 1)



OPTIBAR PM 5060

- Pressure transmitter for pressure and level applications
- Rugged design with metallic diaphragm
- A variety of thread, flange and other connections



Contact

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

Please visit our website for a current list of all KROHNE contacts and addresses.

