



APPLICATION NOTE

Power Generation

Flow measurement of manure for biogas production

- Feed control of substrate intake for maximum biogas yield
- Cost-effective electromagnetic flowmeter for dosing liquid manure into fermenters
- Standard flow instrumentation for a challenging, nutrient-rich medium with varying composition

1. Background

An operator of fermenters (digesters) in Lithuania produces biogas for combined heat and power generation, with the option of further upgrading to methane quality. The company mainly uses manure from nearby farms as its substrate.

2. Measurement requirements

The dense, viscous manure is collected on-site, mixed with water, and pumped into the digesters. To maximise biogas yield, it is essential to measure the flow rate of the liquid manure before it enters the digesters. To ensure accurate monitoring of the manure intake, the operator was searching for reliable and robust flowmeters.

From both a performance and cost perspective, electromagnetic flowmeters (EMFs) are typically the preferred instrumentation for measuring biogas substrates. However, the solid content of the organic material used for anaerobic digestion can vary significantly depending on its source. Solids present in the medium can generate considerable electrode noise and may damage the electrode coating and the flow sensor liner, which can in turn severely impact EMF performance.

Only flowmeters with a bespoke design, capable of providing repeatable and long-term stable measurements, were considered suitable for the intake of the biogas fermenters. The plant operator required the flow instrumentation to have a proven track record in liquid manure measurement and to deliver stable readings regardless of variations in the feedstock used.

3. KROHNE solution

The biogas producer decided on the OPTIFLUX 1100 electromagnetic flowmeter for measuring manure intake at various plants. The KROHNE EMF has proved itself in numerous liquid-manure applications, both on tank spreaders and in biogas plants.

The cost-effective meter features the robust construction needed to cope with the challenges associated with biogas substrate measurement. Its full-bore design prevents extensive sensor clogging. Given the quality of the manure in this application and the moderate noise caused by solids in the medium, the EMFs were supplied with standard Hastelloy® electrodes and a PFA liner.

The OPTIFLUX 1100 flowmeters feature a flangeless “wafer” design that allows for simplified installation between existing pipe flanges. They were supplied with wall-mounted flow converter, enabling the operator to check all readings on-site, even when the flowmeters are installed in hard-to-reach locations such as manholes or wells. The meters fully meet the customer’s accuracy requirements and provide a wide range of diagnostics and additional information, including totalised volume, electrode clogging, and manure conductivity.



OPTIFLUX 1100 flowmeters measuring liquid manure at a biogas plant



KROHNE electromagnetic flowmeter for manure intake measurement, installed in a well



Conductivity and totalised volume flow of manure displayed on the flow converter of a KROHNE EMF

4. Customer benefits

The customer stands to gain from a cost-effective flowmeter that precisely meets the manure application requirements. The OPTIFLUX 1100 ensures long-term stable flow measurement, enabling the operator to feed exactly the required amount of manure into the digester to maintain optimal fermentation conditions and maximise biogas yield. The robust design of the OPTIFLUX 1100 is a particular benefit in the rough environment of biogas plants. KROHNE electromagnetic flowmeters use hermetically sealed housings that ensure long-term sensor integrity instead of split case aluminium housings, which are prone to moisture ingress and can lead to corrosion and meter failure.

Flow measurement of manure represents a significant cost factor, yet the medium itself is highly challenging due to its variable properties. Drawing on its broad portfolio of flowmeters and extensive experience in agricultural and biogas applications, KROHNE recommended the most suitable electromagnetic flowmeter (EMF) – a solution that balances price and performance in the highly cost-sensitive biogas industry.

KROHNE can provide the most appropriate and economical instrumentation for each biogas substrate. For more complex feedstocks or manure applications with substantially higher noise, abrasion, and signal disturbances, customers can select from a tailored range of KROHNE mag meters equipped with low-noise electrodes and wear-resistant liner materials. These capabilities also extend to the flow converter, which is available in various versions as needed – including high-end electronics for maximum accuracy, extended diagnostic coverage, and advanced signal processing with optimised noise filtering.

5. Product used

OPTIFLUX 1100

- Electromagnetic flowmeter for liquid manure applications
- Lightweight, compact wafer-style (“sandwich”)
- Pipe cross-section without restrictions for slurries with non-abrasive solid particles
- Reinforced PFA liner: Excellent chemical resistance



Contact

Would you like further information about these or other applications?
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