



Multi-stream gas analysis in bio-methane upgrading

Summary

Biogas is increasingly seen as a more renewable source of natural gas for injection into gas networks for home heating, cooking and fuel.

Application

The gas entering in the network must have a high calorific value, and therefore scrubbed of contaminants such as CO_2 , O_2 and H_2S .

Challenge

Oxygen concentration is measured in the gas generated by the decomposition of waste. Methane is a flammable gas, and its flammable limits in air are 5% to 15%. In order to transport the biogas safely through pipelines, it is necessary to ensure that the oxygen content is less than 2%. The hydrogen sulfide must be scrubbed by carbon filters from the gas before entering the networks and needs to be <10 ppm.

Carbon Dioxide is measured as it is separated from the bio-methane and finally, the methane purity of the cleaned biogas needs to be measured before entry into the gas grid.

All of the measurements need to take place in hazardous area environments.

Benefits:

The advantages of using the Panametrics Thermoparamagnetic and thermal conductivity sensors are:

- Continuous measurement of all streams
- The sensors can be calibrated in minutes
- The rugged design means many years of service
- Global hazardous area certifications for all devices



Solution

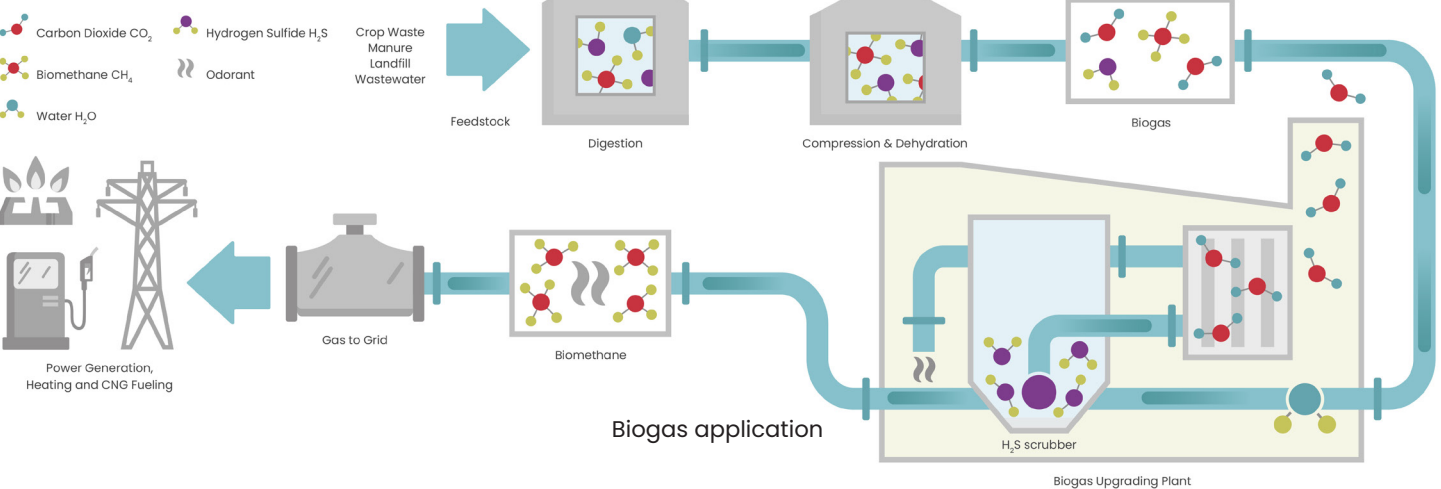
The Panametrics XMO2pro transmitter utilizes thermoparamagnetic technology to measure the oxygen level and the Panametrics XMTCpro transmitter utilizes thermal conductivity technology to measure the carbon dioxide and methane. The H2S is measured using fuel cell technology. These are all incorporated into a single sample system solution that regulates the pressure and flowrates of the gas streams ensuring accurate measurement of;

- Oxygen and Hydrogen Sulfide in the cleaned biogas stream
- Methane content in the CO₂ off gas
- CO₂ impurities in the methane stream
- Methane purity

Specifications

Oxygen content range	0 – 2%
Carbon Dioxide content range	90 – 100% against methane background
Methane content range	90 – 100% against CO ₂ background
Hydrogen Sulfide	0 – 10 ppm
Operating temperature	–5 °C (23 °F) to 50 °C (122 °F)
Operating pressure	Regulated to 14.7 psia (101.3 kPa)

Upgrading process:



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