

Application note

Measuring oxygen in methane gas producing waste to energy landfills

Benefits:

- Rugged weather proof design
- Explosion Proof
- No moving parts
- Recovers from entrained liquids



Summary

The oxygen concentration in the gas generated from landfills and biodigesters is critical to safety. For combustion to occur there must be fuel, oxygen and an ignition or heat source present. By limiting the oxygen, combustion cannot occur. Landfill gas consist of 40 – 60% methane, which is forced to the surface by water injection. The gas is compressed as used as a fuel source for district heating, co-generation and for electrical power generation.

Application

Organic waste in landfills and biodigesters decomposes to generate methane gas. In biodigesters enzymes are added to the waste to accelerate the decomposition. To transport landfill gas safely, it is necessary to ensure that the oxygen concentration is less than 2%. Oxygen analyzers applied to methane or natural gas must be explosion proof or intrinsically safe.

Landfills are divided into several zones. A series of vent holes are fitted with perforated pipe that are bored into the ground. Each zone can be monitored independently. When a large volume of gas is collected underground, the gas is forced to the surface by displacing the gas with water. The gas collected from the vents is compressed and used as a fuel source. When the gas from a certain zone is temporarily depleted, the extraction is rotated to the next zone.

If a leak develops in the vents or in the control piping, or due to ingress of oxygen into the compressor itself, and oxygen exceeds the flammable limit, a dangerous situation would exist.

Application specifications

- Oxygen Concentration: <2%
- Explosion Proof
- Outdoor installation

Challenge

Safety is the paramount requirement. Water treatment plants operate today with less reliance on personnel and more automated controls. The maintenance and calibration of process instruments comes at a premium cost. Panametrics XMO2pro provides does not use a depleting sensor and is easily field calibrated via automation resulting in a rugged and reliable solution. The XMO2pro has all necessary explosion-proof certifications for continuous oxygen measurement at the landfill facility.

The solution

To assure safe operation, two XMO2pro thermoparamagnetic oxygen transmitters are used: one upstream of the compressor and one downstream. The analog output from each transmitter is sent to the customer's SCADA system. The SCADA is configured with interlocking relays to provide an alarm and shut down the compressor if the oxygen concentration exceeds the safety limit.

The XMO2pro is ideal for this application:

- Non-depleting sensor
- Does not fail low, as with galvanic fuel cells
- Rugged sensor - no moving parts, as with dumbbell paramagnetic oxygen sensor
- Explosion-proof certification and weather proof enclosure
- Fast response per EN 50104 available
- RS232/485 with PanaView software for remote graphing, display, set up and diagnostics.

Panametrics, a Baker Hughes business, provides solutions in the toughest applications and environments for moisture, oxygen, liquid and gas flow measurement.

Experts in flare management, Panametrics technology also reduces flare emissions and optimizes performance.

With a reach that extends across the globe, Panametrics' critical measurement solutions and flare emissions management are enabling customers to drive efficiency and achieve carbon reduction targets across critical industries including: Oil & Gas; Energy; Healthcare; Water and Wastewater; Chemical Processing; Food & Beverage and many others.

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