Metering gas in biogas plants with the ABB Swirl flowmeter FS4000

The company
An Australian based, international provider of safe, clean, low greenhouse gas (GHG) emissions energy and remote energy solutions.

Introduction
This document outlines the basics of the metering system design that this energy provider proposes to fit to all their Landfill Gas (LFG) and Coal Mine Methane (CMM) fuelled power generating sites. A description of the metering systems installation and operation, details of the equipment utilized and supporting information for ruling on the accuracy of the system has been included.

Design Description
The consumption metering design consists of a methane analyser to measure the methane content of the gas supply by volume, a gas meter installed in the gas supply piping to the engines to measure volumetric flow rate, and a pressure and a temperature sensor installed immediately downstream of the gas meter to allow conversion to standard cubic metres per hour (SCMH). A dedicated flow computer is utilised to perform the required calculations for total consumption in energy units (Giga-Joule) and to store totalised values.

Product Description
The ABB swirl flowmeter FS4000-ST was selected to measure the quantity of gas flowing to the gas engines. This flowmeter measures actual volume flow rate of LFG and CMM, independent of composition, at an accuracy of +/- 0.5 % and over a large range of flow. This specialized item of equipment, using proprietary technology, was identified to meet not only the accuracy and flow range requirements of the application, but also due to its lack of sensitivity to many external factors and thus robust operating characteristics. The volume flow rate is communicated to the flow computer via a pulsed signal output.

Application and Requirements
- Low pressure volumetric flow measurement of biogas (55 % Methane, CH4 and 45 % Carbone Dioxide, CO2)
- Very limited up and downstream pipe diameters
- Accuracy and repeatability at all flow rates, across the total flow range
- Required accuracy for instruments < 1 % of measurement
- IEC Ex (zone 1) certification – flameproof Ex d and Ex ia
- Wet gas with some solid particles in it
- Stable pressure measurement at low pressure conditions < 15 kPa

Specified Products
- Swirl flowmeter FS4000-ST in various sizes DN 100 to DN 400 (4 inch to 16 inch)
- Pressure transmitters 265AS for absolute pressure
- SensyTemp TSP121 temperature sensor assemblies
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