

Digester biogas flow monitoring



Water and Wastewater Case Study 304-3

Application

A wastewater treatment plant needed to measure biogas traveling into and out of a gas line leading into a Digester Dystor gas bag. The amount of gas and direction of flow is critical for measurements to meet EPA regulations.

The station receives the information via the primary programmable logic controller (PLC) that communicates back to the Distributive Control System (DCS) with a Dystor quantity value. A real-time running calculation of gas quality contained within the Dystor is calculated at primary and secondary PLC's.

In the event of excessive gas build-up a predetermined Risk Management Plan (RMP) ensures compliance with EPA standards. If the level becomes excessive, an alarm notifies operation staff while the primary PLC issues DCS a command to automatically use the gas in one of several ways:

- › Increase the load of a single on-line power generation station (PGS) engine

- › Start a second PGS engine
- › Increase the load of both on-line PGS engines
- › Start a fire

Challenge

Previously the utility used a Vortex flow meter to measure bi-directional and low flows. The vanes, however, often clogged and stopped functioning. This would result in non-compliance with the EPA's regulation that limits gas storage to 10,000 pounds, resulting in fines and a possible plant shut down. PGS were less energy efficient and continuous maintenance was costly and time consuming.

Project parameters

User	Wastewater treatment plant
Location	Oakland, CA USA
Media	Digester biogas
Flow Range	1.64 to 1640 SFPS [0.5 to 500 NMPS]

Pressure Range	0.8 to 17.6 psig [0.05 to 1.21 bar(g)]
Temperature Range	70°F [21.1°C]

Solution

To solve this problem and comply with the EPA's requirement, the utility installed a VORTAB® flow conditioner with a vertical installation of FCI's GF90 thermal mass flow meter and RF83 bi-directional flow detection switch. The amount and direction of flow transmits electronically into a DCS where it passes into a PLC at the power generator station.

In this installation, the VORTAB flow conditioners ensure accurate flow readings by eliminating swirl and pipeline irregularities with little pressure loss. The GF90 and RF83's feature a no-moving parts design, which is appropriate in "dirty gas" environments where the gas is wet or contains particulates. The no-moving parts design, and low flow sensitivity ensures accuracy and reduces instrument maintenance requirements. The engines now run more efficiently, which conserves energy.

FCI flow meter specifications

Model	GF90 mass flow meter
Media	Digester gas
Flow Range	0.25 to 1600 SFPS [0.08 to 488 NMPS]
Pressure Range	to 1000 psig [69 bar(g)]
Temperature Range	-100° to +850°F [-73° to +454°C]

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