

Vapor recovery system monitoring



Chemical Case Study 103-1

Application

Constantly changing liquid tank levels at oil and chemical terminals result in enormous amounts of vapor emissions.

To comply with increasingly more stringent emission rules, a vapor recovery system is typically installed to recover and clean the vapors before releasing into the atmosphere.

A Dutch company has developed a compact and modular vapor recovery system that uses the vapors as fuel for a gas engine. The gas engine drives an electrical power generator providing electricity to pumps, heating systems and other plant equipment. This VPS system is a self operating system with all components located in one compact container.

Challenge

To operate the turbine gas engine efficiently, the vapor gas inlet flow must be continuously and accurately monitored. The Dutch company

initially installed rotary flow meters that created several problems.

Vapor contaminants and high-pressure drop over the rotary meters caused operating problems. Also the limited turndown of the rotary flow meters caused control problems while the vapor inlet volume varies from 100 tons/hour during the unloading of one truck to 10,000 tons/hour for a large oil carrier.

Project parameters

User	Various tank terminals
Location	Various locations
Media	Hydrocarbon gases
Flow Range	2 to 50 SFPS [0.6 to 15 NMPS]
Pressure Range	0.8 to 15 psig [0.05 to 1.1 bar(g)]
Temperature Range	40° to 140°F [5° to 60°C]

Solution

FCI's ST98 FlexMASter thermal mass flow

meters were selected to replace the rotary flow meters after an extensive test program on five different vapor recovery systems. The highly precise ST98 mass flow meters simplified engine control, dynamic flow patterns and provided ease-of-use with the standard 100:1 turndown ratio.

Pressure drop was calculated at less than 1 milliBar and the no-moving parts design provided maintenance free installation. The ST98's direct mass flow measurement was critical to control the gas engine independently from the fluctuating line pressure and media temperature.

FCI flow meter specifications

Model	ST98 FlexMASter®
Media	Hydrocarbon gases
Flow Range	1 to 100 SFPS [0.3 to 30 NMPS]
Pressure Range	0 to 250 psig [0 to 17 bar(g)]
Temperature Range	-40° to +500°F [-40° to +260°C]

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