

APPLICATION NOTE A073-OG02 - CONTROLLED SUPPLY OF ODORANT TO NATURAL GAS

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CONTROLLED SUPPLY OF ODORANT TO NATURAL GAS

You might think that natural gas has a typical pungent smell by itself. But nothing could be further from the truth, as natural gas is virtually odourless. The typical smell originates from THT, which is a compound that has been added artificially to commercial natural gas. Its aim is to act as a 'warning agent' in case of a leakage of this highly flammable gas during transport or use.

THT, short for tetrahydrothiophene, is under ambient conditions a colourless volatile liquid with an unpleasant smell. Commercial natural gas in the Netherlands has to contain at least 18 mg of THT per cubic meter gas. Natuurgas Overijssel B.V. generates biogas from anaerobic decomposition of organic matter, which is upgraded to natural gas quality for injection into the Dutch natural gas mains. Natuurgas Overijssel requested Bronkhorst for a solution to supply THT to their biogas in a controlled way.



Natuurgas Overijssel B.V.

Application requirements

Traditionally, THT is added pulse-wise to the gas on a regular basis, using a pump with a fixed stroke volume. Especially for small gas flow - for biogas installations in the range of 40-50 m³/hour - such a batch-wise injection may lead to liquid THT remaining in the gas lines. In this way, THT may not be mixed well with the gas, it might have the wrong concentration and there is no control on supplying. These lacks of guarantee for continuity and accuracy have to be overcome with the new solution.

Important topics

- Continuous and accurate dosing of odorant
 - Homogeneous distribution in the natural gas
 - Solution gives operational reliability
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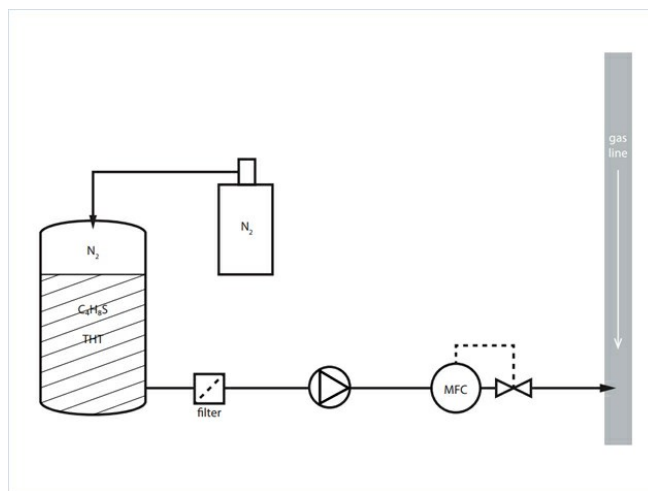
Process solution

The heart of the new process solution is a Bronkhorst Coriolis mass flow controller (M12 mini CORI-FLOW series) that injects a small but continuous liquid THT flow into the biogas flow. A master mass flow meter measures the biogas flow and sends a signal to the mass flow controller via a PLC. The flow controller - acting as a slave - has been set to a dosing value of typically 18 mg of THT per cubic meter gas. Hence, this mass flow controller continuously injects the correct amount of THT, based on the actual biogas flow.

In this configuration, a 40 liter THT storage tank is pressurised by means of nitrogen gas. A pulsation damper is incorporated to remove pressure surges and to guarantee a stable control. This results in a precharge pressure upstream of the flow controller of 10 to 13 bars. Downstream of the device, in the biogas flow, the pressure is typically 8 bars. The full scale of this flow controller is occasionally set to maximum dosing value of 40 mg/m³.

Using this solution, THT can be dosed very accurately, within a bandwidth of 1-2%, which is a major improvement compared with the traditional batch-wise method. Furthermore, the continuous dosing results in a homogeneous THT/biogasmixture, which is a more efficient way of dealing with the amount of odorant as overdosing is avoided.

Another important aspect is the operational reliability of this solution - the ability to supply to the natural gas mains. Prior to entering the mains, the biogas composition is analysed by GC. If the biogas contains not enough THT, the grid operator will shut off the supplier from the natural gas mains. By default, the monitoring of the dosing occurs by PLC, but it can also be done by means of the mini CORI-FLOW itself. In this solution, it is exactly known how much THT has been dosed - and an alarm will be given when no odorant is detected. Moreover, a prediction can be made when an empty THT storage tank has to be replaced.



Flow scheme

Recommended Products



MINI CORI-FLOW™ M12V14I

Min. flow 0,1...5 g/h
Max. flow 2...200 g/h
Pressure rating 100 bar
Independent of fluid properties
High accuracy, fast control



MINI CORI-FLOW EX D XM14

Min. flow 0,03...1 kg/h
Max. flow 0,3...30 kg/h
Pressure rating 107 bar
IECEX and ATEX Zone 1 approved
Independent of fluid properties



BRONKHORST NEDERLAND

Lunet 10c

3905 NW Veenendaal

Tel. [+31 \(0\)318 55 12 80](tel:+31(0)318551280)

info@bronkhorst.nl