18.08.2012 | PRESS RELEASE

Binder will show at EUROTIER 2012 reliable and precise biogas flow meter, analyzer and control system for improved feeding cycles for the substrate

For decades now, Binder has been supplying leading plant manufacturers with innovative systems for industrial gas flow measurement. In the last few years, the demand for reliable, precise and cost-effective measuring systems for biogas, sewage gas and landfill gas has increased significantly. Since the composition of these gases changes over time, the linking of flow measurement and gas analysis brings great advantages:

- Always providing the most precise quantity measurement, even in changing conditions
- Cost advantages by avoiding the doubling up of components
- Attractive additional functions by linking the data from both systems.

Modern biogas fermentation plants cannot meet commercial and environmental requirements without appropriate measuring and analysis technique. For the economical operation of the fermentation plant it is likewise necessary to consider the gas composition and quantity of the individual digester stages.

Also the proof of the annually produced biogas quantity can be an important decision criterion for the installation of a qualitatively high-quality and manipulation-protected execution of a biogas flow measurement in combination with gas analysis.

Thermal mass flow meter are suited here compared with all other measuring technologies since they can measure particularly well also at low gas speeds highly precise and determine directly the damp biogas flow in standard cubic meters. It is not necessary to compensate pressure and temperature of the gas as it is necessary with other technologies like e.g. Vortex or mechanical counters. The installation is really simple and at lower costs. To measure the same mass flow, the failure probability of one instrument is much lower than with a combination of three measuring instruments to achieve the same end result and the errors will sum up.

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According to the Standard Paper DIN 1343 the cubic meter at standard conditions is defined as: Standard pressure p_n of 1,01325 bar, relative humidity of 0 % (dry gas) and a Standard temperature of T_n = 273,15 K (t_n = 0 °C). Currently, all available biogas flow meter on the market determine the wet biogas flow including the water-damp portion, i.e. the determined biogas flow even if compensated by gas pressure and temperature does not correspond to the standard conditions described in DIN 1343.

Novelty 1: Binder presents on the EUROTIER Exhibition a new type of device from the proven COMBIMASS® series, which measures additionally the gas temperature in the biogas, computes the dry gas flow internally and then transfers the flow without any additional hardware devices.

Measuring point directly at the top of the digester do not present any problem for the thermal sensor probe as it is made completely from high-grade stainless steel in the affected gas area. At these places, the biogas is 100% water vapour-saturated, i.e. knowing the gas temperature, the water vapour portion of the gas can be computed and corrected. Thus the dry gas mass flow can be determined at standard conditions according to DIN1343.

Every COMBIMASS® mass flow meter is calibrated in the Binder Calibration Lab in consideration of the installation situation and the gas composition (with certificate). A varying gas composition can reduce the accuracy of the mass of gas measurement. Only by the combination with the COMBIMASS® gas analysis station, this deviation from the basis of the current gas composition can be corrected. Correction characteristic diagrams are stored in the PLC of the analyzer station.

In solid waste fermentation plants or biogas plants with varying composition of substrate, the produced gas flow as well as gas composition can change substantially. The methane concentration can vary from 15 to 75 Vol. - %. A combination of the flow measurement and the gas analysis is inevitable, in order that the final flow values should achieve a reasonable accuracy.

Prices of raw materials increased a lot in the last years as well as decreasing feed-in tariffs to the electrical grid require an improved process control in order to be able to operate the plant economically. So the optimization of the feeding cycles of substrate into the digester is inevitable. Fermentation process fluctuations can be balanced and the gas yield can be increased. In addition, fermentation gas production can be adapted (within certain limits) to the need of the fermentation gas consumers and the “waste” heat distribution can be regulated. So the level / filling grade of the gas storage tank must be controlled and regulated.

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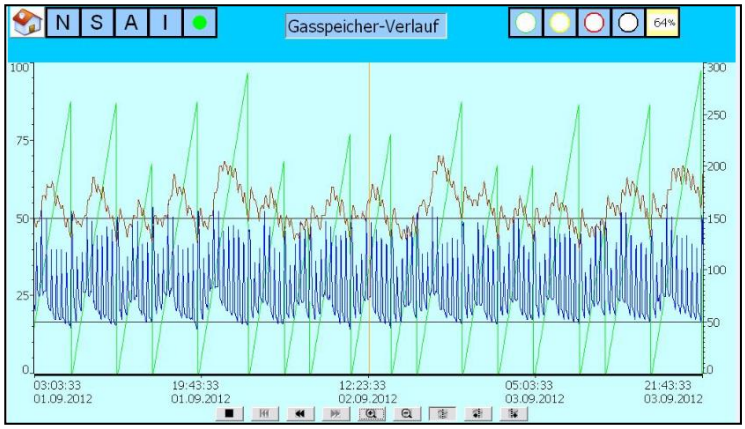
To realize the process control, data from the process e.g. biogas flow and composition are required. Only then can the fermenter be fed on load-depending.

Novelty 2: On the basis of the well-known process parameters like all current biogas flow, methane concentration, gas consumption and the filling degree of the gas storage tank, a SPC-based software could be developed, which is integrated in the analyzer station and controls the load-depending feeding cycle into the digester.



On a biogas plant, where software was installed, the full-load time of the CHP could be increased from 92% to more than 98%. Besides this, still more additional favorable raw materials (increase of the grass quantity and the solid manure portion) could be used and the biogas yield per assigned raw material quantity can thus be improved (10% feedstock savings).

Consumption of electricity of the plant could be reduced by further optimization of agitating cycles in the individual digester. The produced biogas quantity could be adapted in such a way that the flare never runs in normal operation time. Using the software, planned maintenance work was also improved, i.e. the feed into the digester could be adapted to planned service schedules whereby the gas flare running times is able to be minimized.

See you in Hannover!

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