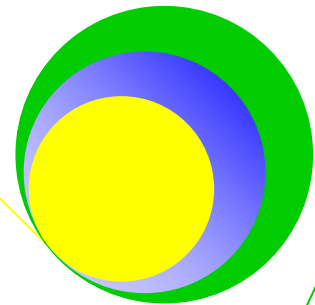
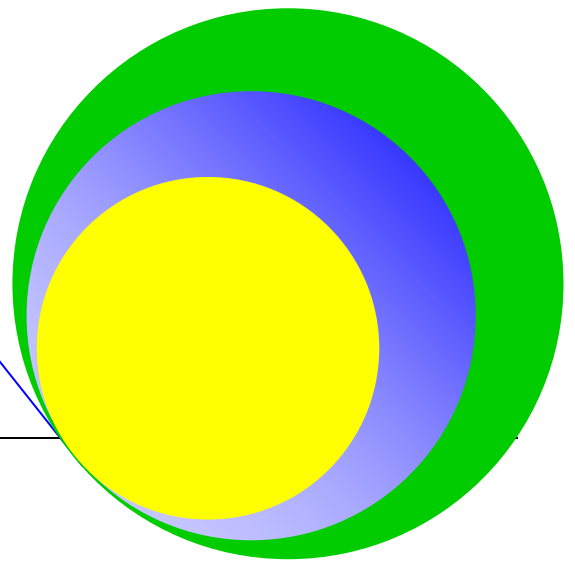


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**RENEWABLE ENERGY
ENERGY MANAGEMENT
CDM AUTOMATION**



Case Study - Reference

CDM Re-Calibration AWITE Gas Analyzer

Ref: 0023

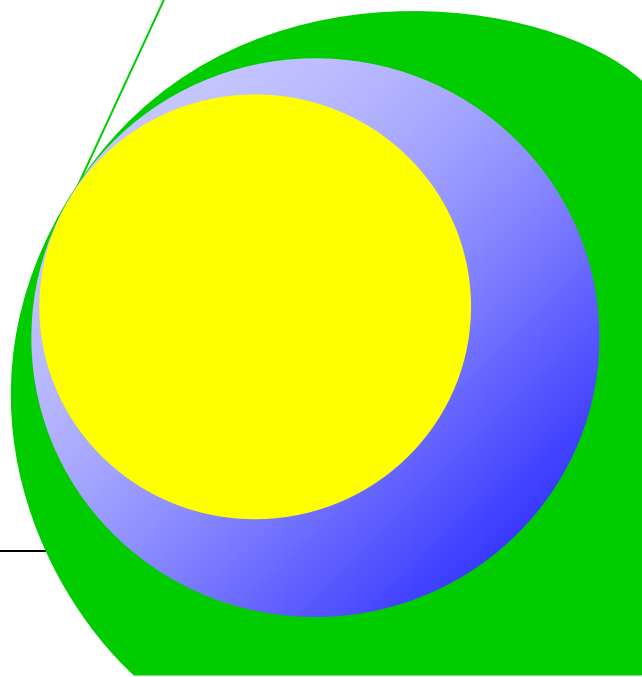
Request for periodical Re-Calibration after 1 year operation according CDM and manufacturers requirements. Successful executed with amazing results.

Martin Schmidt, Diploma Physicist

7 February 2011

File: 0023-Case Study CDM Recalibration

Pages: 03



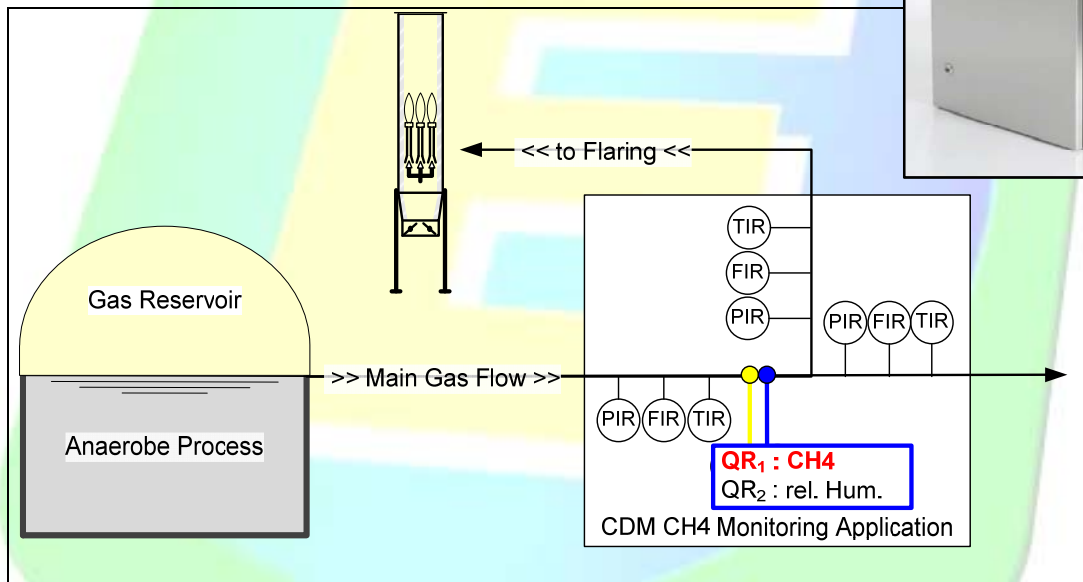


1 Analyzer and Application Details in CDM Monitoring Operation

Gas Analyzer: AwifLEX with 2 Beam NIR Sensor for CH4 (compensated)
 Manufacturer: AWITE Biogas GmbH, Germany
 Operation: since April 2010 at site, > 10 month operation without problem
 Calibration: 1st traceable calibration at factory January 2010

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Application Details: Biogas
 Humidity 90-99% rel.
 2000-3000ppm H2S
 60-75% CH4 composition
 Rest CO2



2 Status of the Gas Analyzer before Re-Calibration

Reference Gas: 59.99% CH4 with +/- 2% uncertainty (manufacturer certificate traceable)

Table 2: Measuring Value of Calibration Gas (BEFORE Re-Calibration)

Measuring-Points Sensor	Biogas	Air	Time	Deviation
CH4 – 1 st test	59.3 %	0.0 %	08:54	0.69 %
CH4 – 2 nd test	59.0 %	0.0 %	09:08	0.99 %

GREAT !!! ... after 10 month operation with NO services & maintenance !!!

This Case Study has following status:
 > Original Application
 > CH4 Monitoring Validated
 > No Client Name Disclosure

Reference / Contact:

Case Study WITHOUT client disclosure

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Ref: 0023



The Gas Analyzer did not show any sign of dirt, corrosion or other aging effects after more than 10 month operation at the biogas plant.

No error message was listed in the history file as well as the measured values are inside the expected ranges.

After connecting the certified reference gas for recalibration, the Gas Analyzer showed a deviation less than 1%, which is extraordinary good result due to expected drifts and aging of sensor modules and compensation.

All following procedures for recalibration were done according manufacturers SOP's and CDM regulations.



(Analyzer picture from site)

3 Verification of Re-Calibration and Adjustment Result

After Re-Calibration procedure and following adjustment of the sensor, the results have to be verified again with the direct measurement of the certified calibration gas in normal measuring mode.

Table 4: Measuring Value of Calibration Gas (AFTER Re-Calibration)

Measuring-Points Sensor	Calibration Gas	AIR	Time	Deviation
CH4	59.9 %	0.0 %	10:10	0.0%

The achieved deviation is 0.0% !!! ... even if a deviation according sensor uncertainty of 0.4% would be acceptable and within the manufacturer declaration and certificates.

ENERBON Final Result ...

AwiFLEX is praxis proven and state of the art Gas Analyzer Technology for process gas analysis as well as it is compliant as CDM Monitoring Gas Analyzer in Biogas, Landfill Gas and Coal Bed Methane applications. It is highly stable, reliable, sustainable solution and offer best results with lowest uncertainties for absolute measurement requirement.

Re-Calibration at site is possible without interrupting the process and in compliance to CDM regulations.

Please feel free to contact ENERBON and myself directly in case of questions and for further information.

This Case Study has following status:

- > Original Application
- > CH4 Monitoring Validated
- > No Client Name Disclosure

Reference / Contact:

Case Study WITHOUT client disclosure

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