COMBIMASS®

Technical Data

COMBIMASS® GA-s hybrid premium

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ANALYZER COMBIMASS® GA-s hybrid premium

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 **agricultural anaerobic digestion 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 to control feeding cycles load-depending. Beside this analysis is often used for **monitoring and control of desulphurization stages** in front of the CHP´s. In **biomethane upgrade plants** analysis is used to monitor and control each single stage of process.

While the gas composition (except during on and driving off phase) in liquid fermentation plants changes usually only very slowly between feeding cycles, the gas flow is subject to certain short term fluctuations, as they are caused for example by the agitator or different humidity content under variations in temperature. Therefore it is appropriate that at each digester a thermal mass flow meter is installed firmly and connected with the analyzer station. Gas flow will be corrected automatically by changing gas composition. In **solid waste fermentation stages** the measuring cycle must be if necessary adapted. Here not only the gas flow but also the gas composition changes substantially more strongly. The methane concentration can from 15 to 70 Vol.-% vary. A combination of the measurement of volume with the gas analysis is inevitable, if the values are to exhibit an acceptable accuracy.

In **sewage treatment plants** analysis is used to monitor digester gas quality and control of H_2S-filter in front of the CHP, to reduce the wear and increase maintenance cycles. Often the manufacturer of the CHP stations limit their warranty if the gas quality is not monitored sufficiently well.

Long-time monitoring of gas quality of single dwells in **landfills** is often measured with portable instruments. For monitoring of gas quality in collector pipes as well as in front of CHP-stations usually analyzer stations are used. Because gas quality becomes worse with the age of the landfills, the gas from dwells (poor gas) is mixed with other methaneous gases (good gas), coming from e.g. anaerobic digestion of green cuttings or composting plants to meet minimum requirements on methane concentration in the mixed gas. Also in this application gas analyzer can monitor the quality of gas mixes.

The design of the analyzer station GA-s hybrid premium is completely modular. All pumps and valves are mounted on small DIN-rail-plates for easy service and replacement. The gas cells and its required electronics are mounted in modules for DIN-rail assembly inside the cabinet.

So it becomes possible to measure several gas streams with different gas concentration in time cycles or continuously. Furthermore the flexibility of configuration details regarding gas ways and sampling sequencies increases too. Several parallel gas circles can be built up and so also more than one gas stream can get analyzed continuously. Beside typical NDIR-technologies also electrochemical as well as heat conductivity sensors can be used.

Using a special electronic, even electrochemical oxygen cells can be used for continuously analysis if required, these cells can regenerate themselves. If the application has a safety function in the back, identically gas circles can be built up and operated in parallel.

Gas pump and valves can analyze the biogas of several gas streams in time cycles (valve type NC) or continuously (valve type NO). Data can be stored internally and/ or transferred to the main PLC via various standard interfaces. There are some further options for an external access available, for monitoring of operation/ alarms, maintenance monitoring and data transmission. A life-bit can be sent out to a central server to monitor operating ability (option only). An uninterruptible power supply unit (UPS) can be used to keep the station in operation for a while when power supply is interrupted to send out an alarm message (option only).

The inner cabinet as well as the gas streams are monitored for pressure and temperature. Measuring data can be checked for plausibility for systems with improved requirements on manipulation safety (option only).

A hardware key or a password can be used to secure the configuration settings.

Gas analysis stations require a high technical expenditure, which settles in the long run also in the purchase price and in maintenance costs, to achieve long-term accuracy and reliability. An auto-calibration function with a precise span gas will keep accuracy at best level. If several instruments (portable and stationary) must be bought, the total costs for investment and maintenance become high, but also measuring errors can rise up.

The gas cells and modules can be recalibrated easily. Long-time accuracy of analysis is kept at a high level. Beside manual calibration mode also an auto-calibration mode is available, if a spangas bottle(s) is (are) connected permanently with the analyzer cabinet.

The actual situation of the gas modules is displayed on the screen using traffic light colours: green – okay, yellow – recalibration recommended, service required soon, red – recalibration was not finished successfully, service now. The plant operator can define acceptable deviations of each gas module on his own customized (based on the nature of the project). If this defined accuracy cannot be achieved any more after recalibration, gas module shall be sent to the manufacturer for refurbishment. Due to the use of the traffic light system for maintenance monitoring, service frequencies can be adjusted on frequency of use respectively on the requirements on accuracy. Fixed cycles are not necessary any more.

If an analyzer station must be sent completely to the manufacturer for service (to keep travel costs for local service low), the process data are not available in the meantime. Due to the special modular design, all typical spares and wearing parts can be replaced by the operator or a service company.

If the requirements on the availability of process data is very high, a second set of gas modules can be stored at site for the use in emergency cases or times when the „old“ modules are at Binder for refurbishment.

SMART FEATURES OF THE SYSTEM

- Automatic analysis of up to 7 gas components with various operation ranges, using different technologies: NDIR, electrochemical, heat conductivity, in time cycles or continuously (with an additional gas cooler), compensated for gas pressure and temperature
- Analyzer station with automatic sampling of one gas stream (can be expanded)
- High-performance PLC with a 4.3” colored touch panel display (standard) or a big 7” graphic display with history and further graphic functions (option)
- Cabinet material: plastic or steel, for indoor/ outdoor installation, with/ without heating/ cooling, monitored for ambient temperature and pressure
- Combination of various gas modules mounted on DIN-rails, compensated for gas temperature and pressure
- Strong biogas pump mounted on small DIN-rail plates
- Gas filter for easy replacement
- Plausibility check of gas parameter (option)
- Implementation of thermal dispersion gas flow meter (with integrated humidity correction for the measurement of dry biogas flow in m^3/h at standard conditions according to DIN 1343, if the gas is waterdamp-saturated based on gas temperature - option)
- Automatic correction of gas flow based on actual gas composition
- Implementation of humidity probes for calculation of dry gas flow as an option (if the biogas is not waterdamp-saturated - option)
- Maintenance diagnostics using traffic light colours – improves safety for the operator and reduces costs for maintenance to the really required level
- Manual recalibration of gas modules by connecting a span gas bottle (standard) or several bottles (option) via touch screen or autocalibration-function (option) to keep long-time accuracy high
- Due to the special modular design, all typical spares and wearing parts are mounted on the DIN-rails, can be replaced by the operator, a local service company or the manufacturer

APPLICATIONS VERSATILITY

- Methaneous gases from biogas fermentation plants (liquid as well as solid waste fermentation, composting)
- Sewage gas from digester at wastewater treatment plants
- Landfill gas

TECHNICAL DATA ANALYZER STATION GA-s hybrid

COMPONENTS OF THE ANALYZER CABINET

- Analyzer cabinet for wall mounting:
  400x600x200 (plastics) or 380x600x210 (stainless steel), IP22, 24 VDC with a PLC and 4.3“ or 7“ colored touch-display or a bigger cabinet, depending on No. of gas modules and further configurations, IP 22, 230 VAC with a PLC and 4.3“ or 7“ colored touch-display for indoor wall mounting in a safe and frost-free, non-corrosive ambient (+5 to + 40°C), with connectors for hose or stainless steel pipes
- encapsulated solenoid valves NC/ NO/ 3-way mounted on DIN-rail plates
- strong biogas pump mounted on a DIN-rail plate (stand-by pump on request)
- power supply of the analyzer and the gas modules for one gas stream (can be expanded as an option)
- DIN-rail gas modules of the hybrid-series
- Test gas connectivity for calibration of gas cells in the analyzer station with a manual or automatic calibration function
- Maintenance diagnostics function for gas modules using traffic light colours (customized requirements on long-time accuracy of analysis can be defined)
- hard- and software for gas sampling and flushing of gas cells after each sampling cycle
- data transmission: 4-20 mA, digital signals, Profibus DP, Profinet, Modbus RTU, Ethernet Modbus TCP/IP, GSM/ GPRS, Ethernet
- External power supply box 230 VAC/24 VDC, UPS as an option
- Automatic correction of all gas flows based on actual gas composition, calculation of dry biogas flow at standard conditions according to DIN1343 (if biogas is not waterdamp saturated a special humidity sensor can be used)
- Definition of customized concentration limits, which shall lead to alarms
- Multi-lingual menus via touch-screen or buttom operation
- Implementation of room monitoring & control with a separate LEL sensor (option)
- Gas feed-back to the process pipe (option)
- Special components for outdoor installation: heating, cooling, cabinet-in-cabinet version for desert/ sea climate (fully climatized and ventilated)
- Mounting on a rack

TECHNICAL DATA

No. of gas sampling points	Standard: 1 (can be expanded)
No. of analog inputs	Standard: 4 (can be expanded)
Standard-sizes	400 x 600 x 200 (standard plastic cabinet for 1-4 gas modules and up to 2 sampling points) 380 x 600 x 210 (stainless steel cabinet for 1-4 gas modules and up to 2 sampling points)
Installation place	Indoors, room monitored and ventilated by separate means, +5 to + 40°C *Option:* fully climatized and ventilated cabinet IP54 for outdoor installation, incl. internal LEL-control and alarm, special versions for sea and desert climate are available too *Option:* with heater elements only up to – 25°C
Ambient temperature	+5 to +40°C, rel. humidity < 80% rel., non-corrosive
Gas properties	+5 to +40°C, 10 - 90% rel. humidity
Protection class	IP22
Weight	Basic version starts at 12 kg
Energy consumption	50 W/h for analysis only Energy consumption for climatized cabinet depends on design details
Data storage *(option))*	USB-stick/ SD-card (daily, weekly or monthly file storage)
Data transmission *(option)*	Ethernet Modbus TCP Modbus RTU (RS 485) Profibus DP Profinet Analog signal 4-20 mA Digital signals
External access	*Option*: using a direct wire connection, a safe www-connection or GSM/GPRS
Power of the gas pump	500 ml/min (during sampling)
Gas pre-treatment	Depending on the application, if necessary: Coalescence filter with housing for water, pressure controller, flaming arrestor, gas cooler, fine filter
Size of pipe connection	standard: plastic hoses with Ø 6 mm / Ø 4 mm (1 mm wall thickness, material: Norprene Ø 6.4/ 3.2 mm, option: PVC or Tygone) *option:* stainless steel pipes Ø 6.0/ 4.0 mm

OVERVIEW GAS MODULES

Gas	Available Operation Ranges
CH_4	0-5 Vol.%/ 0-30 Vol.%/ 0-100 Vol.-%
CO_2	0-5 Vol.%/ 0-30 Vol.%/ 0-100 Vol.-%
H_2S	0-50 ppm/ 0-200 ppm/ 0-500 ppm/ 0-2,000 ppm/ 0-5,000 ppm/ 0-10,000 ppm
O_2	0-30%
NH_3[1)]	0-100 ppm/ 0-500 ppm/ 0-1,000 ppm/ 0-5,000 ppm
H_2	0-1,000 ppm/ 0-4,000 ppm/ 0-10,000 ppm/ 0-40,000 ppm

[1)] with automatic H_2S-compensation of the signal

IMPRESSUM

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COMBIMASS GA-s hybrid premium