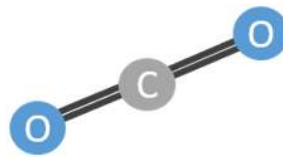


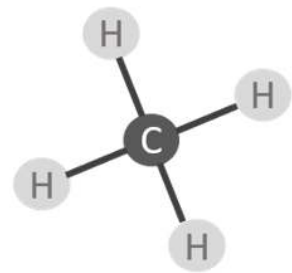
COMBIMASS[®]

Data Sheet

COMBIMASS[®] GA-s hybrid premium
N₂O monitoring



Carbon dioxide | CO₂



Methane | CH₄



Nitrous oxide | N₂O

COMBIMASS® GA-s hybrid premium N₂O monitoring

For several decades, Binder has been supplying worldwide innovative systems for industrial gas flow measurement. Over the past two decades, the demand for reliable, accurate and economical measuring systems for various gas analysis applications has increased significantly. The reasons for this are safety, emission-related measurements, and requirements for economically justified operational optimizations.

Typical applications are in field of biogas plants, biomethane plants, sewage treatment plants, landfills, and solid waste treatment plants. The quality and quantity of the gas produced, gas treated and utilized are monitored here. A lot of these plants are not operated economically and in an environmentally friendly manner without the use of measurement and analysis technology.

Another application is the gas analysis of air and exhaust gases, such as the monitoring in double-walled membrane roofs of the biogas storage tanks for ageing and permeability, as well as for cracks and the associated undesirable methane leakages and emissions. A third application is the monitoring of exhaust gases from rooms (e.g. screen) or covered basins that are extracted and cleaned. It may contain traces of methane and hydrogen sulphide. Measuring ranges and measuring cycles are adapted to the measuring task.

A new innovative application developed by Binder is the analysis of nitrous oxide (N₂O) emitted in sewage treatment plants. Nitrous oxide has a significantly higher global warming potential than methane or carbon dioxide. Preventing the formation of nitrous oxide and the associated emissions is therefore of particular importance. Measuring nitrous oxide in the gaseous phase is challenging, as its concentrations are relatively low in large air flow rates. Both values must therefore be measured as precisely as possible for an accurate emission analysis. For this application, special gas cells with adapted measuring ranges were developed.

Measuring the concentration in the liquid phase gives an information about dissolved nitrous oxide, but it is hard to analyze actual emission because there are different factors (e.g. the alpha-value of the wastewater) influencing the stripping effect.

For analysis of open, uncovered tanks in sewage treatment plants the gases are collected utilizing a hood. The collection hoods in aerated zones (e.g. nitrification tank and aerated grit chamber) can be connected directly to air flowmeter. In addition to the sample gas concentrations, the air flow rate at standard conditions is also measured using thermal mass flow sensors of COMBIMASS® eco series to subsequently quantify the escaping gas flows by mass for the balance.

In the non-aerated zone (denitrification tank, sludge storage tank and similar) only the gaseous nitrous oxide leaving the liquid phase by interface renewal can be measured under the hood. A small exhaust fan is used to renew the air under the hood, concentration in the escaping gas is measured.

The gas to be analyzed is fed through hoses to the gas analyzer station. The gas analyzer station is built on a modular design principle. All pumps and valves are individually mounted on top-hat rails for easy replacement. The gas cells are installed in modules, which are



COMBIMASS® GA-s hybrid premium N₂O monitoring

mounted also on a top-hat rail. NDIR is used to measure the concentration of N₂O. Even if NDIR technology provides a long-term stable signal with low maintenance, a cross sensitivity with CO₂ was detected. Therefore, CO₂ must be measured too to eliminate the effect of its appearance in the gas.

In addition to these gaseous components, methane (0-2,000 ppm) and oxygen (0-Vol.-30 %) can be measured in the collected gas. The first gas is measured to provide a complete greenhouse gas emission analysis and the second can be used to monitor the long-term oxygen transfer efficiency of the diffusers.

The data collected can be used for long-term monitoring of emission of greenhouse gases. Transmitting the values to Binder's VACOMASS® flexcontrol aeration controller, an improved and intelligent aeration control strategy can be realized, to lower or prevent the formation of N₂O.

The modular design and high-performance PLC with graphic display offers a user-friendly easy-to-adjust system that is also flexible in terms of measuring cycles for individual gas flows. All stations have a software-integrated maintenance diagnosis, which indicate recalibration requirements via a pre-alarm and service requirements via a main alarm. Some models use traffic light colors for visualization.

All spares and wearing parts in COMBIMASS® analyzer station can be easily replaced via Click-OUT! / Click-IN! on the top-hat rail by the operator himself or a service company without affecting the warranty. This takes less than 15 minutes. Only the gas modules should be serviced by the manufacturer or a local service center.

ADVANTAGES OF COMBIMASS® SYSTEMS

- Delivery as a plug-and-play system possible, incl. hosing, gas pre-treatment and measuring hood(s) for aerated and non-aerated zones and tanks
- further accessories: weather protection hood, rack for indoor/ outdoor installation can be supplied
- full set of GHG gases can be analyzed: N₂O, CH₄, CO₂ (if considered here too)
- additionally, O₂ concentration in the exhaust air from aeration tanks can be measured too
- data from analyzer station can be transmitted to VACOMASS® flexcontrol aeration controller, to
 - monitor long-term the oxygen transfer efficiency of the diffuser elements
 - adjust settings in the aeration controller load-dependending, particularly the DO-SET concentration, if inlet nitrogen load increases to reduce formation of N₂O in the aeration tank due to higher volumetric ammonia load and a lack of dissolved oxygen
 - adjust settings in the aeration controller to lower DO-concentration at the inlet of denitrification tanks (prevent carry-over of dissolved oxygen) and adjust dosage of an external C-source in case of nutrient deficiency
 - adjust settings in the aeration controller to run the plant in a compromise of energy efficiency and low-emission operation

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DATASHEET ANALYZER STATION

Details analysis cabinet	Indoor installation: min. 600x600x200 (plastic)/ 600x600x210 (SS), IP22, 24 VDC Outdoor installation /EX-version: 800x1000x300 (plastic or SS), IP 54, 230 VAC STANDARD: Wall mounting, OPTIONAL: with stand und weather protection incl. SPS and 4.3"or 7"(Option) color touch graphic display in the door with protection window, with connections for plastic hoses or stainless-steel pipes incl. 2-10 pcs. of solenoid valves NC/ 3-way on top-hat rail plates, 1-3 sample gas pumps (option: low-wear brushless pump) on top-hat rail plate incl. integrated maintenance diagnostics for gas modules (traffic light colors) OPTIONS: Transmission of data & alarms: 4-20 mA, digital or relay outputs, standard bus systems, internal data storage on USB or SD, remote dial-in for data transmission/ service/ troubleshooting OPTIONS: High temperature version (HT), EX version (for EX zone 2 with manufacturer's declaration)
Installation site	Indoor: room externally ventilated and monitored, +5 to + 40°C, humidity < 80% rel., non-corrosive Outdoor/ EX: -25 to + 45°C OPTION: Sea/desert climate version (+55°C)
Gas quality	+5 to +40°C, < 90% rel. humidity, OPTION: gas cooler
Protection class	IP22 (indoor area), IP54 (outdoor area, EX)
Number	
Gas measuring points	Standard: 1 (expandable up to 5)
Test gas	Standard: 1 (expandable up to 3)
Gas modules	COMBIMASS® N ₂ O – IR-hybrid 0 – 2,000 ppm
N ₂ O monitoring	COMBIMASS® CO ₂ – IR-hybrid 0 – 10 Vol.-%
	COMBIMASS® O ₂ – EC-hybrid 0 – 30 Vol.-%
	COMBIMASS® CH ₄ – IR-hybrid 0 – 2,000 ppm or bigger
Weight	In the basic version from 12 kg (depending on the valves, pumps and gas modules fitted)
Energy consumption	50 W for the analysis cabinet (standard indoor) Energy consumption with climate chamber depending on design
Gas treatment	Fine filter, coalescence filter with condensate trap and manual drainage/ with automatic drainage,
Connections	STANDARD: for plastic hoses, recommendation Norprene Ø 6.4 mm/ Ø 3.2 mm; OPTION: Tygone Ø 6.0 mm/ Ø 4.0 mm OPTION: Stainless steel Ø 6.0 mm/ Ø 4.0 mm