

KAPTA™ 5000 – Biogas+

Online multi-parameter biogas measurement/regulation Atex probe
CH₄, CO₂, Pressure, Temperature, Valve position

Applications: Biogas measurement/management

- Organic waste energy conversion sites: real-time in situ CH₄ & CO₂ concentration and differential pressure inspection in storage cells
- System management optimisation by providing the biogas regulation valve positioning setpoint directly via an integrated calculation algorithm

Advantages

- In situ measurement through 1-inch 1/8 attachment
- Regulation of the Biogas valve position by 4-20mA output
- Fully integrated sensor
- Simple and quick maintenance

Main characteristics

- Pre-calibrated probe in a defined Biogas environment
- 1-inch 1/8 diameter direct attachment to the pipes
- Simple maintenance requiring only the filters to be changed
- ATEX probe - Zone 0 - Ex II 1 G
- Operation check by 2 Red/Green diodes
- 24VDC power supply - I_{max} = 120 mA
- LCD display: CH₄ [%]; ΔP [mbar]; Valve Opening [%]; CO₂ [%]; Biogas T [°C]; Battery Status [Volt]
- Data storage in EEPROM and/ or data transfer via Modbus RTU RS232
- Regulation parameter modification via Modbus RTU RS232

A NEW SOLUTION FOR BIOGAS QUALITY CONTROL



General description

Waste storage centres produce combustible biogas caused by the decomposition of organic matter using different processes (methanization, aerobic or anaerobic natural decomposition). These waste are, as an example, placed in buried racks called cells. A system of drains enables the biogas produced by its decomposition to be recovered. This may then be turned into energy via turbines and motors to produce electricity and heat. For optimum Biogas conversion, principally when motors are used, the concentration of methane (CH₄) and the differential pressure between the inside and outside of the pipes must be measured precisely.

The KAPTA™ 5000-Biogas+ probe is an innovative measurement system for instrumentation in biogas management. It enables in situ measurement of biogas quality, its pressure and the atmospheric pressure. The CH₄ concentration and differential pressure values enable optimum regulation of the regulation valve. In addition, this probe, which is attached to the pipes, removes the additional costs generated by a derivation/dehydration of the gases needed when standard systems are used.

The KAPTA™ 5000-Biogas+ probe offers a fully integrated in situ ATEX - Zone 0 measurement solution. This single element replaces a whole host of standard measurement elements: gas derivation system with dehydration; CH₄ content measurement system; differential pressure measurement system; control PLC with protection barrier.

**KAPTA™ next generation probes
are the responses proposed by VEOLIA
for online biogas valorization**

With its full range of multiparameters probes, the KAPTA™ offers unique environmental detection solutions to manage drinking water and biogas.

Biogas+ sensor specifications

| | |
|-----------------------------------|--|
| General specifications | <ul style="list-style-type: none"> • Methane CH₄ [%] and carbon dioxide CO₂ measurement [%] • Differential pressure measurement $\Delta P = (P_{\text{biogaz}} - P_{\text{atm}})$ [mbar] • Tbiogaz temperature measurement [°C] • Biogas regulation valve position calculation/management [4,20mA] • Power supply battery voltage check [Volt] |
| Biogas usage range | <ol style="list-style-type: none"> 1. Biogas - CH₄: [0; 60%]; CO₂: [0; 50%] 2. Temperature - [-10°C; 70°C] 3. Relative humidity - [70%; 100%] 4. Absolute pressure - [500; 1'100 mbar] 5. Relative pressure - (Pbiogaz-Patm) between [-200; 50 mbar] |
| Précision de la mesure | <ol style="list-style-type: none"> 1. Biogas - CH₄: $\pm 1\%$ between [35%; 45%]; $\pm 2\%$ across the whole range 2. Biogas - CO₂: $\pm 3\%$ across the whole range 3. Temperature - $\pm 0.8^\circ\text{C}$ within the range [-10°C; 70°C] 4. Absolute pressure - $\pm 1.5\text{mbar}$ at 25°C within the range [750; 1'100 mbar]; $\pm 2.5\text{mbar}$ within the ranges [-20°C; 85°C]; [300; 1'100 mbar] 5. Differential pressure - $< 2.5\text{ mbar}$ between [0 ; 500m]; $< 1.0\text{ mbar}$ above 500m |
| Data transmission | Continuous data transmission by Modbus RTU RS232 protocol. Maximum recording frequency of 1mes/second. |
| Data storage | The system performs 1 mes/second. The microcontroller's EEPROM stores the last 10 measurements. Every 5 minutes, a value corresponding to the average of the last 10 points is stored in the electronics' EEPROM. Storage capacity: 31 days. The user may remove the data at any time via Modbus RTU RS232. |
| Analog output 4-20 mA | Analog output proportional to the regulation valve position. |
| Calculation constant modification | The constant used for the valve positioning may be modified by the user via Modbus RS232. |
| LCD display | <ul style="list-style-type: none"> • Normally off • Activation by push button (0.2sec<time<2sec): - Display No. 1 for 5 seconds: CH₄ [%]; ΔP [mbar]; Valve position [%] - Display No. 2 for 5 seconds: CO₂ [%]; Tbiogaz [°C]; Battery [Volt] |
| Diode control | <ul style="list-style-type: none"> • Green diode on: electrical supply operating check • Green diode flashing: battery level low - Degraded mode • Green diode off: sensor not powered • Red diode off: [CH₄] > LEV1. First alarm level defined by the user (38% by default) • Red diode flashing: LEV2 < [CH₄] < LEV1 • Red diode on: [CH₄] < LEV2. Second alarm level defined by the user (33% by default) |
| Differential pressure offset | Offset setting made during probe installation and when the filters are changed. Activation by push button (time>5 sec) with sensor away from the pipes. Enables to reset in ambient air the differential pressure obtained by 2 pressure sensors. |
| Maintenance | Filter replacement with probe powered down - Frequency to be defined depending on the dirt build-up. |
| Usage time | > 1 year |
| Electrical power supply | 24 VDC. I _{max} : 120 mA |
| Standard | ATEX – Zone 0 – Ex II 1 G – IP68 (upper part of the sensor on the atmosphere side) |
| Sensor materials | Sensor body and upper part in POM-C EC (Electrically Conductive) |
| Cable/Connector | 3m cable (outside Explosive Atmosphere zone) with IP68 6-contact male plug |
| Filters | 316L metal sintered filter + PTFE membrane |
| Sensor attachment | On 1-inch 1/8 pipe |
| Sensor dimensions | Max overall: L= 30.5 cm; \varnothing upper part = 100 mm; \varnothing max sensor body = 42 mm |
| Sensor weight | ~ 1150 g including the 3m cable and the connector |

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