

# DynamiQ-X BG2300

Gas chromatograph for on-line biogas and biomethane analysis



# DynamiQ-X BG2300

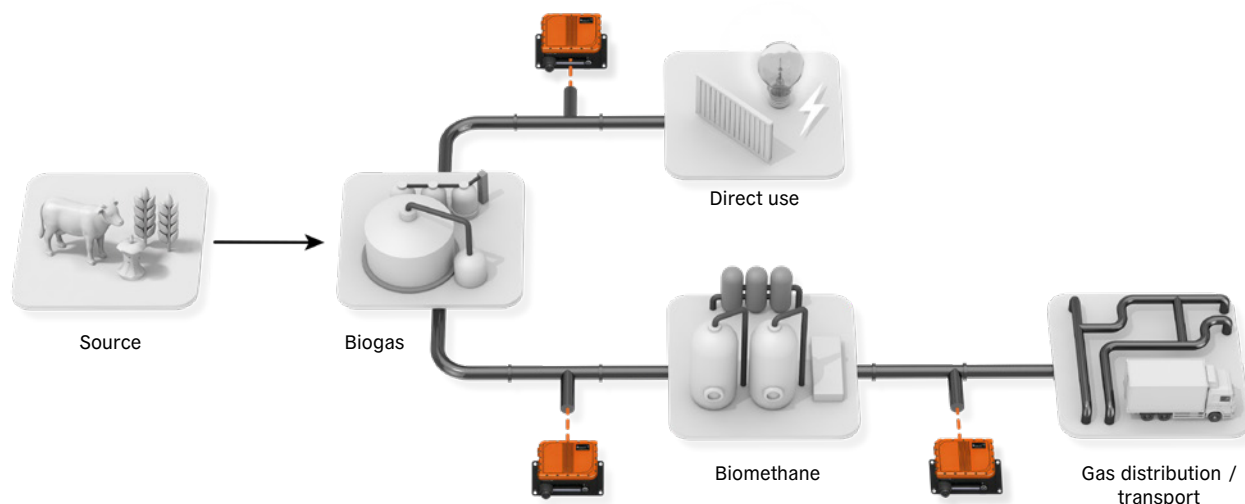
## Gas chromatographs

The **DynamiQ-X BG2300** provides fast and accurate on-line monitoring of gas quality, from raw biogas to grid-quality biomethane.

The analyzer is extremely compact, while its capabilities are massive. Its micro GC chips enable analysis times of less than a minute.



# Areas of application



Reliable operation of biogas upgrading plants and biomethane facilities depends on accurate, continuous gas analysis. The **DynamiQ X BG2300** gas chromatographs are customized specifically for biogas and biomethane (also known as renewable natural gas or RNG) applications and provides detailed insight into gas composition.

- Process optimization and operational control
- Pipeline injection and utility specifications
- Vehicle fuel quality requirements
- Energy billing, custody transfer and reporting
- Documentation and reporting for regulatory compliance

## Gas composition and quality

The DynamiQ-X BG2300 measures the key gas components required to assess both raw biogas and upgraded biomethane, including combustible and non-combustible constituents.

## Calorific value and Wobbe index

Gas composition data generated by the analyzer is used to determine the calorific value and Wobbe index of biomethane. Accurate calorific value and Wobbe index determination supports compliance with applicable specifications and consistent energy delivery.

## Hydrogen sulfide

The analyzer is engineered for reliable hydrogen sulfide (H<sub>2</sub>S) analysis across a wide concentration range. An inert coating prevents H<sub>2</sub>S adsorption, allowing accurate measurement from the percentage levels found in raw biogas down to the low ppm concentrations required for biomethane quality verification.

# DynamiQ-X microGC gas analyzers

## Very short analysis times

The DynamiQ-X BG2300 micro GC gas analyzers accommodate two gas chromatograph (GC) units working in parallel, each performing a different GC analysis under individually optimized conditions. Each GC unit contains a state-of-the-art microchip-based injector and a thermal conductivity detector (TCD) combined with a proven microbore GC column and is set with optimal chromatography conditions. This enables a compact instrument as well as a short analysis time of 45 seconds.

## Ready for the field

Pre-calibrated at the factory, the DynamiQ-X BG2300 micro GC gas analyzers are field-ready, delivering calorific value accuracy better than 0.5%.

## Comprehensive biogas analysis

Two GC units provide full biogas composition analysis, including precise hydrogen sulfide quantification. The first unit measures methane, carbon dioxide, ethane, and hydrogen sulfide, while the second unit measures hydrogen, oxygen, nitrogen and carbon monoxide.

## DynamiQ's micro gas chromatography

The gas analysis is realized by means of gas chromatography, a proven method for determining the chemical composition of a gas mixture. A small volume of the sample gas is injected into the carrier gas and this mixture flows through a "GC column," where the gas components are separated and individually detected, resulting in a chromatogram. From this chromatogram, the components' concentrations and the heating value are calculated.

## Dual carrier gas configuration

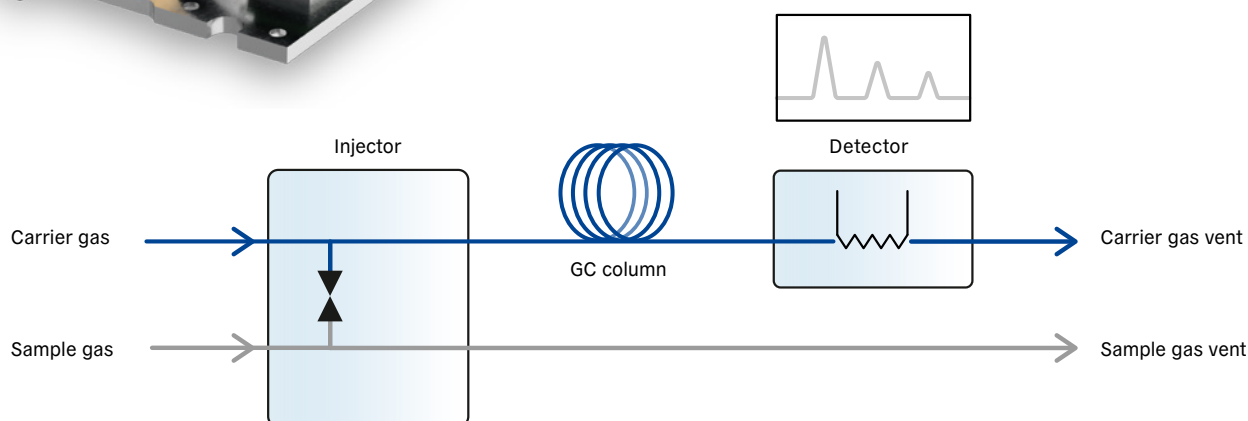
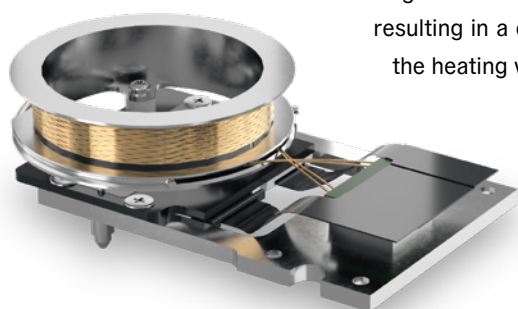
Each GC unit is connected to a dedicated carrier gas line. Helium is used as a carrier gas for the first GC unit to achieve optimal sensitivity, while argon is used for the second GC unit to ensure reliable hydrogen quantification.

## Continuous monitoring

The instrument is designed for continuous monitoring and therefore works in a stand-alone configuration using the integrated processor on a future-proof operating system based on Linux RT, without the need for a separate controller to input commands. In addition, dedicated DynamiQ PC software can be used to analyze the collected data in further detail and to change operating settings. The PC can be connected to the analyzer at any location via a network connection.

## Compact device

The compact instrument has a volume of only 10 liters and weighs less than 15 kg, so it is easy to transport and deploy anywhere that local power and gas bottles are available.



## Standard measurement range

Component	Measurement range biogas (mole %)	Measurement range biomethane (mole %)	
Methane (CH <sub>4</sub> )	40-100 %	40-100 %	GC Unit 1
Carbon dioxide (CO <sub>2</sub> )	10-50 %	0-20 %	
Ethane (C <sub>2</sub> )	0-15 %	0-15 %*	
Hydrogen sulfide (H <sub>2</sub> S)	1ppm-1%	1-50 ppm %*	
Hydrogen (H <sub>2</sub> )	0-5 %	0-5 %	GC Unit 2
Oxygen (O <sub>2</sub> )	0-5 %	0-5 %	
Nitrogen (N <sub>2</sub> )	0-30 %	0-30 %	
Carbon monoxide (CO)	0-3%	0-1%	

\* Optional

### Calculated values \*\*\*

- Normalized components
- Unnormalized sum
- Superior and inferior heating value
- Wobbe index
- Relative density and density
- Molar mass
- Compressibility \*\*\*\*

\*\*\* According to ISO 6976; GPA 2172, ASTM D3588

\*\*\*\* also according to AGA8



### Easy-connect and universal options

ATEX / IECEx-certified DynamiQ-X easy-connect analyzers feature an Ex connector, while the ATEX / IECEx / cQPSus-certified DynamiQ-X universal analyzers come with a fixed Ex cable. Both models are securely encased in a marine-grade aluminum IP65 enclosure, ensuring explosion safety and making them ideal for harsh environments.

### Tubeless analyzer

A one-piece manifold replaces tubing found in traditional GCs. This adds to the robustness and performance of the analyzer, as fewer connections reduce possible sources of leakage. In fact, the GC column is the only “tube” inside the instrument.

### Fast exchange of cartridges

The cartridge, which contains the GC units, can be replaced by the end user. The replacement is simple and can be done within 10 minutes. Approximately two hours after cartridge replacement, the DynamiQ-X analyzers are fully operable again.

### Stream selector

The analyzer has a built-in stream selector to connect up to four streams and/or calibration gas bottles. This integrated stream selector switches between the different gas inlets, so only one stream is introduced into the analyzer at a time. The stream selector has a double block and bleed design, so there are virtually no history or cross-contamination effects between the different gas streams. After the stream selector, the selected sample gas, together with the carrier gas, is led in parallel through all GC units. In addition, an external (VICI) 16-port multi-stream selector can be connected and controlled from the instrument’s software.

### Injector

Time-controlled injection is used, with an integrated array of pneumatically controlled micro membrane valves. This makes injection extremely accurate and reproducible and provides short analysis times.

### Detector

The in-house-fabricated detector chip is a thermal conductivity detector (TCD), a robust device featuring simplicity, a large dynamic range, a general response to both organic and inorganic species, and a non-destructive character. The temperature-controlled micro TCD—with 2×24 bit digital detector electronics—automatically adapts for different gases and is protected against overheating.

Qmicro's microchip TCD technology results in low detection limits. The limit of quantification of hydrogen sulfide is below 1 ppm.

### Back-flush-to-vent

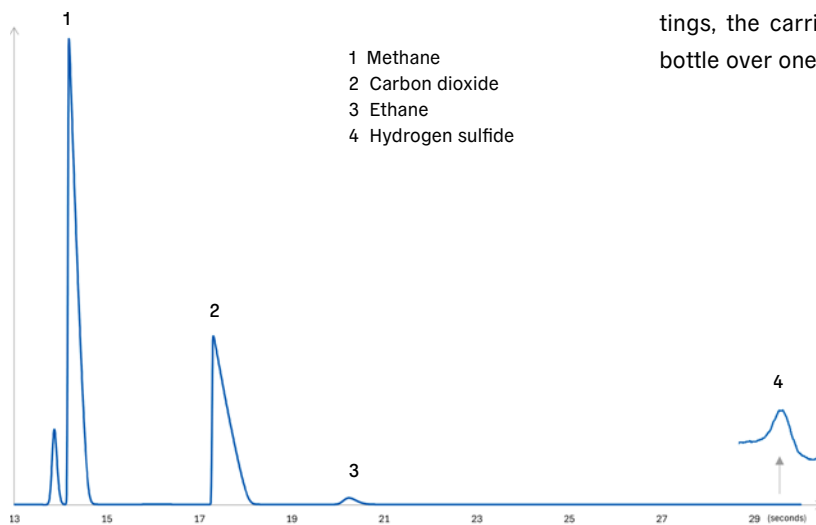
The DynamiQ-X analyzers are equipped with back-flush-to-vent technology. This increases the analytical column's lifetime because polluting or reactive components are prevented from entering the column and shortens the analysis time even more. A standard biogas or biomethane analysis is conducted in 45 seconds.

### Fastloop

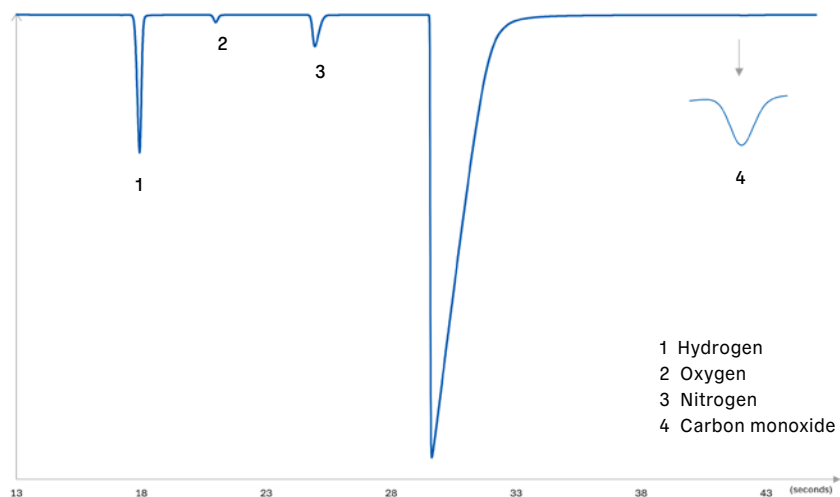
To be able to follow changes in the gas composition in near real-time, the DynamiQ-X analyzers feature a fast-loop. For sample flow refreshment, the fastloop increases the incoming sample flow by connecting a parallel gas channel which reduces the overall resistance of the sample's flow.

### Low carrier gas consumption

The gas port connections are 1/16" VICI Valco fittings. Typical carrier gas consumption is less than 15 ml/min during analysis. By applying optimal measurement settings, the carrier gas usage can be limited to one gas bottle over one year.



Chromatogram GCU1



Chromatogram GCU2

# Operation and data processing

## Stand-alone operation

DynamiQ-X analyzers are designed for on-line continuous monitoring and therefore operate stand-alone and unattended.

## Data processing and communication

The detector data is processed by an integrated processor. The autonomous running instrument generates data that is further communicated to the outside world by MODBUS or TCP protocols using RS485, RS232, Ethernet or Digital I/O ports. The DynamiQ-X analyzers can be connected to supervisory systems (such as SCADA) using these ports.

## DynamiQ PC software solutions for enhanced performance

The DynamiQ-X analyzers come with two powerful software packages. DynamiQ Explorer offers efficient troubleshooting with easy-to-use tools for quick issue resolution, saving time and effort. It also provides advanced features for method optimization. DynamiQ Process, which is WELMEC 7.2 certified, enhances security with password management and limited access levels. Its user-friendly interface simplifies workflows, reduces errors, and saves time.

### The DynamiQ PC software is able to:

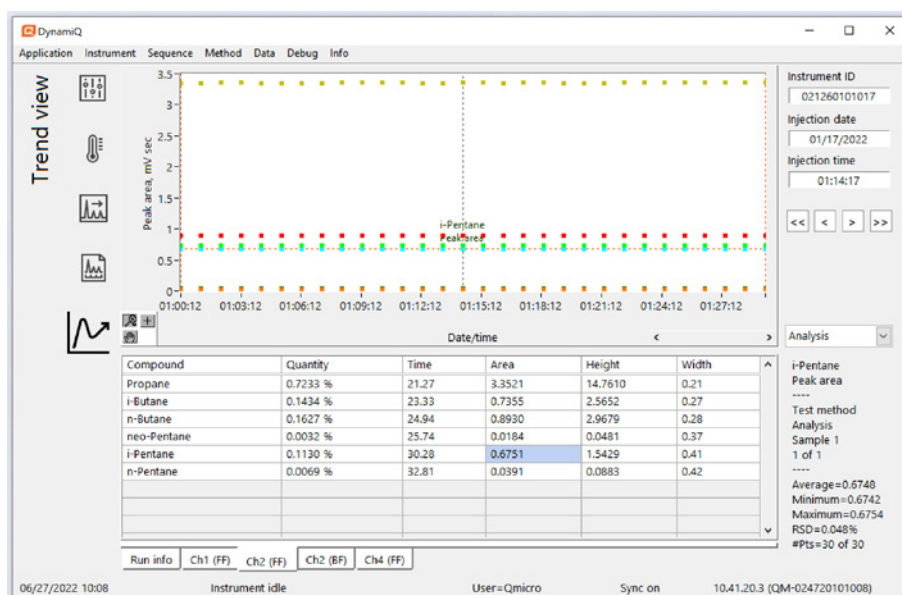
- View and change instrument and method settings;
- Perform calibration or validation runs;
- Perform multi-level calibration with polynomial fitting;
- Store factory method and calibration;
- Enable a locked state to prevent tampering;
- Enable automatic run mode;
- Analyze collected data in detail;
- Show trend plots of measurement data and calculated results.

### Trends

The software is able to show a trend plot for the results of a series of analyses for a selected parameter, e.g., quantity, retention time, area, gross calorific value, unnormalized sum or a status parameter of the instrument at run start.

### Historical data

All method parameters, analysis results, calibration results, calculated values and alarms can be stored with date and time stamp for about a year, with a memory storage of up to 128 GB inside the DynamiQ-X BG2300. This facilitates problem-solving, may help to comply with legislation and enables observation of long-term trends.



DynamiQ software trend view screen example

# Accessories

## Easy-connect cable (2 m)

All DynamiQ-X easy-connect analyzers contain a receptacle for powering and communication. Optionally, a 2-meter cable with connector and wiring scheme is provided to enable practical outward connections.

## Junction box with easy-connect cable

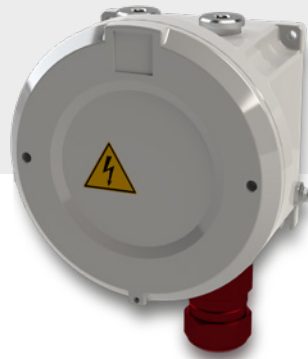
An optional junction box enables users to use their own cables (e.g., separate power cable and communication cable) for connecting to the DynamiQ-X easy-connect analyzers. It is an Ex electrical junction box to be placed near the DynamiQ-X in the same zone. The box has a pre-assembled cable with a connector for the DynamiQ-X easy-connect receptacle. Inside the box are terminals for wiring and the box has several (customizable) cable glands.



## Junction box for DynamiQ-X universal

All DynamiQ-X universal analyzers seamlessly connect to the universal Ex junction box, which includes a cable gland for the Ex cable gland assembly of the DynamiQ-X universal analyzer. Inside you will find several threaded holes for customizable cable glands.

The round, metal Ex electrical junction box is classified as Class I, Div 1 and Groups B, C and D T6.



The plastic square-shaped Ex electrical junction box is classified as Class I, Div 2 and Groups A, B, C and D T6.



### Protective case

To ensure safe transportation, a robust customized protective case is offered.



### Mounting wall plate

Normally, the DynamiQ-X analyzers are wall-mounted with all gas and electrical connections directed downwards. The DynamiQ-X analyzers are supplied with a backplate, which enables them to be mounted to the wall or setup. In addition, an optional mounting wall plate is available, which enables quick mounting and removal of the DynamiQ-X BG2300.



### Vent plug set

An optional vent plug set with the correct screw thread facilitates connections between a vent line and the instrument.

### Fastener set

A complete spare set of screws for the instrument housing is provided, along with fastener-set instructions.

### DynamiQ display

The DynamiQ display is designed for placement in the same explosive hazardous zones as the DynamiQ-X easy-connect analyzers, providing users with immediate access to the GC.



# Technical specifications

## DynamiQ-X BG2300

Specifications	Values
Calorific value repeatability	± 0.025 % (24.3 to 52.0 MJ/m <sup>3</sup> )
Components repeatability	0.05% RSD (for concentrations >0.1%)
Calorific value calculation	ISO 6976, GPA 2172, ASTM D3588
Compressibility calculation	AGA8
Cycle time	45 s
Operating temperature	-20 to 55°C / -4 to 131°F
Storage temperature	-25 to 70°C / -13 to 158°F
Moisture (non-condensing)	5 to 95%
Dust/water protection	IP65 (only valid with receptacle cap/mating connections)
Power supply	20 VDC to 28 VDC
Power consumption	20 W nominal, 75 W max
Dimensions	289 × 258 × 122 mm / 11.4 × 10.2 × 4.8"
Weight	< 15 kg / 33lb. (without mounting brackets)
Gas ports	1/16" VICI
Carrier gas	Helium and argon
Carrier gas input pressure	450 ± 5% kPa
Carrier gas consumption	2 – 5 ml/min per GC unit
Sampling	Pressurized (10 to 100 kPa) or atmospheric (integrated pump)
Sample conditions	Dry and particle-free
Sample streams	4
Detectors	Micro TCD
Detection limit	<500 ppb
Communication protocols and ports	MODBUS over serial or ethernet
	1× RS-232
	2× RS-485
	2× Ethernet
	1× Digital input
Memory storage	1× Digital output
	128 GB
Certifications	 0344  II 2G Ex db IIB+H <sub>2</sub> T4 Gb
	 CLASS: 1, DIVISION: 1, GROUPS: B, C, D, T4*
	EMC 2014/30/EU
	FCC Part 15 Class B

\* Universal options only

## Contact

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