

Operating instructions

DynamiQ-X micro-GC analyzer



Disclaimer

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QMICRO-346718359-29
V 5.23

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ABBREVIATIONS

Abbreviation	Description
A	Actuation gas inlet
AC	Alternating current
Ar	Argon
Av	Actuation vent
C1	Carrier gas inlet one
C2	Carrier inlet two
CAS	Chemical Abstract Service
CH ₄	Methane
Cv1	Carrier vent one
Cv2	Carrier vent two
DC	Direct current
e.g.,	For example,
EMC	Electromagnetic compatibility
ESD	Electrostatic discharge
Ex	Explosion proof
FAQ	Frequently asked questions
FCC	Federal Communications Commission
FSI	Fast Serial Interface
GC	Gas chromatograph
H ₂	Hydrogen
He	Helium
i.e.,	that is
IP	Ingress protection rating
LAN	Local area network
LED	Light-emitting diode
MEMS	Micro-electromechanical systems
N/A	Not Applicable/ Not Available
N ₂	Nitrogen
OEM	Original equipment manufacturer

Abbreviation	Description
PC	Personal computer
PE	Protective earth
SDSs	Safety Data Sheets
SELV	Separated extra-low voltage
S/N	Serial number
Sv	Sample vent
TCP	Transmission control protocol
VDC	Volts of direct current
WEEE	Waste Electrical and Electronic Equipment
W/O	Work order

1 Introduction

Welcome to the DynamiQ-X operating instructions manual. A comprehensive guide for utilizing the DynamiQ-X micro-gas chromatograph (GC) analyzer effectively and efficiently. This manual is carefully designed to provide the necessary tools on how to operate the DynamiQ-X together with clear installation and commissioning instructions. This document contains all information needed by a trained technician to install, commission, and operate the DynamiQ-X micro-GC.

The "DynamiQ" analyzer refers to the entire DynamiQ family of micro-GC analyzers, including NG2210, NG2220, rebranded and original equipment manufacturer (OEM) versions. DynamiQ-X analyzers refer to both the DynamiQ-X analyzer and OEM-X versions. This document is specific for operating instructions regarding the DynamiQ-X analyzers. The DynamiQ micro-GC analyzers are controlled by the dedicated DynamiQ software, specifically DynamiQ Explorer and DynamiQ Process¹.

Organized into the following sections: Introduction, Safety information, Unpacking and inspection, DynamiQ-X micro-GC analyzer, Hardware and installation, DynamiQ-X startup and commissioning, Troubleshooting, service and maintenance, Technical specifications, Resources and references, Appendices and, Index; this manual is a roadmap to seamless DynamiQ-X micro-GC analyzer functionality.

This document contains numerous figures that illustrate, e.g., procedures within the GC. These figures can contain different symbols which are explained below in Table 1.

Table 1. Meaning of symbols used in figures.

Symbol	Meaning
▷	Open valve
◀	Closed valve
○○○	GC Column

Adhering to the guidance within this manual allows procedures within your operations to flow smoothly, by aiding with solving and overcoming challenges that may arise and enhancing technicians'/users overall grasp of the DynamiQ-X micro-GC analyzers functionalities.

Should any challenges arise or if further assistance is required after reading this manual, rest assured that the dedicated Qmicro support team is readily available to offer guidance and address any questions. For prompt communication, we kindly request you to utilize this email address: support@qmicro.com.

Let this manual be your trusted companion when you operate and or encounter challenges with the DynamiQ-X micro-GC analyzer, ensuring success every step of the way.

¹ To find out more about the DynamiQ Explorer software functionality, please refer to the *DynamiQ software manual*.

To find out more about the DynamiQ Process software functionality, please refer to the *DynamiQ Process software manual*.

2 Safety information

This manual contains information and warnings which must be followed to ensure safe operation and to keep the device in a safe condition. Installation, maintenance, and repairs should only be performed by qualified personnel. The installation instructions mentioned in this manual are intended for information only. The installation instructions must conform to any national, local, or company codes applicable to the location. Qmicro does not assume responsibility if the precautions outlined in this manual are not adhered to.

Symbols in this manual are used to indicate essential information. The absence of graphical symbols does not exempt the user from following all the necessary instructions, guidelines, or regulations associated with the product.

The following symbols and typographical conventions can be used throughout this manual:

DynamiQ symbols and typographical



This alerts you to an action or sequence that, if improperly performed, could result in damage to the instrument or possible physical harm to the user.



This indicates an electric shock hazard.



This indicates danger from high temperature surfaces or substances.



This indicates an explosion hazard.



This indicates advice from Qmicro.



This indicates the need for proper disposal in accordance with the Waste Electrical and Electronic Equipment (WEEE) directive.

Italic

Italics are used to emphasize a point and identify titles of documents that are referred to in the text.

Cross references

In online documents, the blue text indicates hyperlinks that once clicked-on redirects to the referred material.

Bold text

This indicates the beginning of a chapter or procedure. Bold text is also used to emphasize a point.

General precautions for DynamiQ-X



The DynamiQ-X instrument must be used in accordance with the instructions given in this guide. Improper use can adversely affect instrument protection. Analytical operation requires the use of gases having different hazard specifications. Before using gases, please read the hazard indications and information reported in the Safety Sheet supplied by the manufacturer referring to the relevant Chemical Abstract Service (CAS) number and/or Safety Data Sheets (SDSs).



When using the DynamiQ-X instrument, the user should always adhere to the safety, environmental and law regulations/codes that apply in the country of use.



Power off by disconnecting the DynamiQ-X, also shut off all gases before exchanging the cartridge. Take proper electrostatic discharge (ESD) precautions to prevent electrostatic discharge and prevent touching electronic components. Make sure there are no harmful gases present in the instrument before removing the cartridge as it may be released to the environment.



In case of damage or presumable defects, do not commission the DynamiQ-X and contact Qmicro.



Do not diagnose or repair the GC in humid, dusty, dirty or unsafe conditions to prevent damage to the GC.



It is prohibited to remove any of the host unit enclosure parts. Access to the host unit is not allowed. The warranty is no longer valid after unauthorized access.



Do not reuse cartridge or lid screws that exhibit any signs of damage, contamination, or rust; to maintain the integrity of the assembly and prioritize safety.



It is crucial to adhere strictly to the guidelines provided in the manual and utilize exclusively the designated equipment. Failure to do so can have severe consequences, potentially resulting in personal injury, irreparable damage to the instrument or additional hazard



The DynamiQ-X may only be opened after 30 minutes waiting time after de-energizing as described on the type label. When the enclosure is opened prematurely, there is a burn risk due to hot components and shock risk due to residual electrical charges in the electronics. In case of a hazardous environment, there is a risk of explosion.



Do not use soap solutions or liquid leak testing devices, as it will damage the GC.



Carrier gases used in the instrument should be dry and particle free.



It is prohibited to remove any of the gas ports. In case of a damaged gas port, do not use the DynamiQ-X and contact Qmicro. Make sure that the gas port vents are not blocked at any time.



It is strongly recommended not to remove the weather-protection plug of the gas port vents as weather protection can then no longer be guaranteed and warranty is no longer valid.

General precautions for DynamiQ-X



Do not use excessive force/torque for making a gas connection to a gas port. In case a gas port can be freely rotated, do not commission the DynamiQ-X and contact Qmicro.



The applied sample gas pressures should not exceed 200kPa, as the sample valves can handle a maximum of 200kPa.



The carrier gas supply pressures should be $450 \pm 5\%$ kPa.



Make sure that the gas port vents are not blocked at any time or experience any flow resistance to avoid internal valve damage. In addition, do not connect/combine gas port vents to avoid pneumatic crosstalk effects.



Only use the screws and washers supplied by Qmicro for DynamiQ-X.



Avoid liquids entering inside the instrument.



In the event that materials are spilled in the instrument, immediately shut down the instrument and call a Qmicro customer support engineer for proper instructions.



Do not access/replace the lithium battery within the DynamiQ-X instruments.



The DynamiQ-X can be used with carrier gases He, Ar, N₂, H₂ and air, but do not use other gases as it might harm the instrument.

Note that DynamiQ-X does not include any safety measures when using Hydrogen as the carrier gas. Therefore, safety precautions must be taken. For more information please, contact Qmicro.



This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.



Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3 Unpacking and inspection

The DynamiQ-X micro-GC is shipped in a carton box or an optional robust case together with gas port vent plugs and an accessories kit consisting of Valco fitting ferrules and nuts, and a 1/4" combination spanner. Optionally, a junction box is also supplied. See the *Shipment packing list* in the package.

Carefully remove all items from the case or box. The DynamiQ-X should be checked for damage after every shipment. Inspection points are dents, scratches, loose parts, bent parts, etc. If there is any damage or defects, contact Qmicro.

Inspection precautions²



In case of damage or presumable defects, do not commission the DynamiQ-X and contact Qmicro.

3.1 Labelling

The DynamiQ-X has three labels namely: the logo label, the type label which indicates the conditions under which the DynamiQ-X is approved for use and the user label which gives information on the electrical, ground and gas connections.

Note that the receptacle also has a label attached which is supplied by the receptacle manufacturer. This label contains the article number, the work order (W/O) and serial number (S/N) of the cable.

Labeling precautions²



It is prohibited to remove the labels from the DynamiQ-X.

² These precautions are in addition to the general precautions for the DynamiQ-X micro-GC analyzer. Therefore, the general precautions for the DynamiQ-X micro-GC analyzer should also be considered.

4 DynamiQ-X micro-GC analyzer

4.1 Gas chromatography

The DynamiQ instruments are based on gas chromatography which is a chemical analysis method for determining gas composition of gas mixtures. The GC uses a flow-through narrow tube known as the column, through which different chemical constituents of a sample pass in a gas stream (carrier gas, mobile phase) at different rates. The rate depends on the various chemical and physical column properties and their interaction with a specific column filling, called the stationary phase. The function of the stationary phase in the column is to separate different components, causing each one to exit the column at a different time (retention time). Other parameters that can be used to alter the order or time of retention are the carrier gas pressure, column length, column diameter and column temperature. As the chemicals exit at the end of the column, they are detected electronically and identified with a data system.

GC hardware in general consists of 3 building blocks: injector, column oven and detector which are schematically represented in Figure 1.

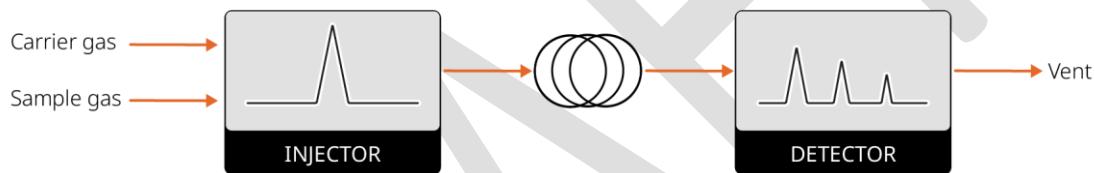


Figure 1. Schematic representation of gas components separation in a GC.

4.2 DynamiQ instruments

The DynamiQ micro-GC analyzer is an instrument that analyses the concentrations of constituents in a gas mixture. It can accommodate multiple GC units, each performing in parallel a different GC analysis under individually optimized conditions.

The DynamiQ micro-GC analyzer is equipped with several micro-electromechanical systems (MEMS) chip components, which are connected by a patented chip to chip connection technology. This enables not only a compact instrument but also very short analysis times of typically less than a minute.

The instrument is designed for continuous monitoring and works therefore stand-alone using the integrated processor with firmware, without the need of a separate controller giving commands. In addition, dedicated DynamiQ PC software can be used to analyze the collected data in further detail and to change operation settings.

The DynamiQ micro-GC analyzer can contain up to 4 GC units, each simultaneously performing their own analysis. Every GC unit contains an injector chip with micro channels, micro valves, columns and micro detectors, and is specifically designed to analyze a range of components. The GC units are defined by their column type and parameters such as temperature, pressure and injection time. A schematic representation of a GC unit is given in Figure 2.

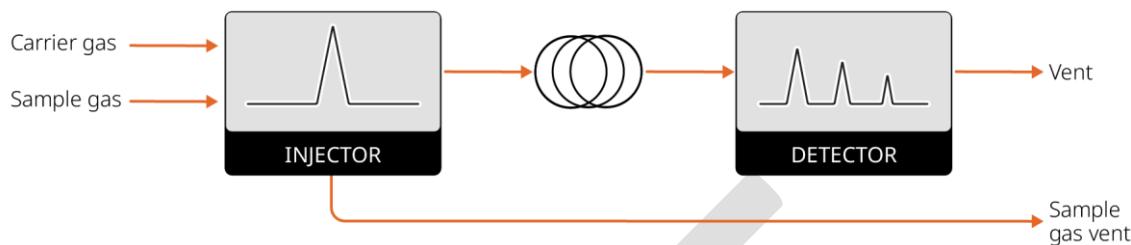


Figure 2. Schematic representation of a GC unit consisting of injector, column and detector.

In Figure 3 a block diagram is shown of the typical layout of the DynamiQ analyzer. Carrier gas, calibration gas and multiple sample lines (streams) can be connected to the inlet of the stream selector, see § 4.2.1). After the stream selector, the selected sample gas together with the carrier gas is led in parallel through all GC units. In the injector, a small amount of sample gas is injected in the carrier gas flow and guided via the column to the detector and vent, see § 4.2.2.

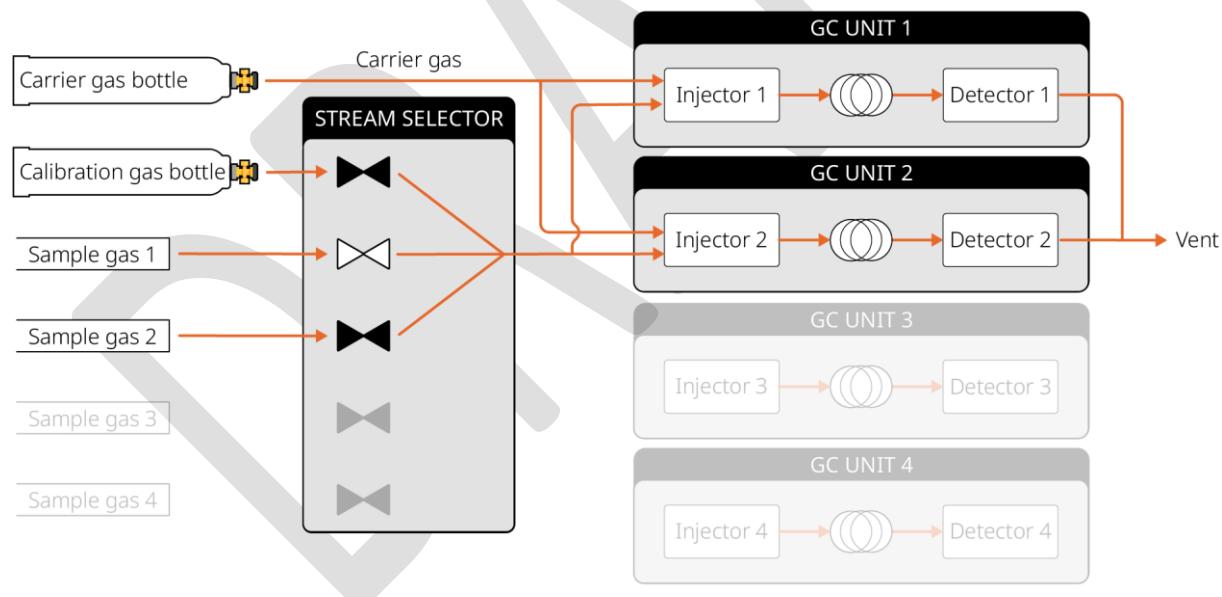


Figure 3. Block diagram of a typical layout of the DynamiQ analyzer.

All DynamiQ instruments are equipped with an exchangeable cartridge that contains the analytical parts of all the GC units.

4.2.1 Stream selector

The DynamiQ micro-GC analyzer is equipped with an internal multi stream selector which allows to connect multiple sample gases and/or calibration gases. The number of streams within the DynamiQ micro-GC analyzer is specific to GC type. In Figure 4 a schematic representation of a 3-stream selector with 2 sample gases and 1 permanent calibration gas is given. This integrated stream selector switches between the different inlets, so only 1 stream is let into the analyzer at a time. Stream switch occurs during the analysis (inrun), e.g., when switching from stream 1 to stream 2, the first analysis of stream 2 will be made with the stream 1. Note that in the case of applying a permanent calibration bottle to one of the inlets, for a 3-stream selector only 2 sample gas stream inlets are possible. The stream selector is a double block and bleed design so there are virtually no history or cross contamination effects between the different gas streams.

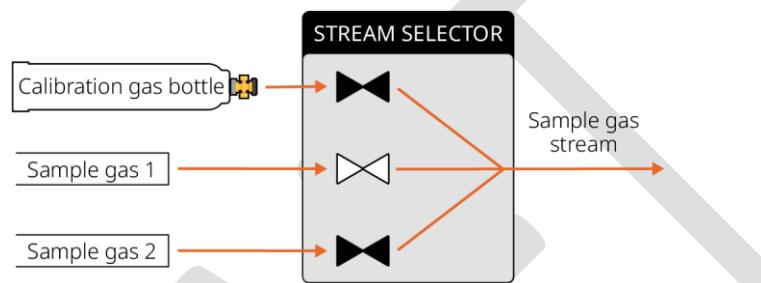


Figure 4. Schematic representation of a 3-stream selector.

4.2.2 Injection

In principle both the sample gas and the carrier gas flow continuously into the GC and through the chips of all GC units. Inside these chips is a small chamber called the sample loop, through which the sample gas is continuously flowing. At injection, this sample loop is closed off, pressurized by carrier gas pressure, followed by a release towards the columns, see Figure 5. The advantage of this principle is that sample gas is injected at controlled carrier gas pressure and consequently there is no measurement error by pressure variation. The amount of sample that is injected depends on the injection time, a parameter that can be set in the DynamiQ software. Please refer to the *DynamiQ Software Manual / DynamiQ Process Software Manual* for more information on how to set parameters in the software.

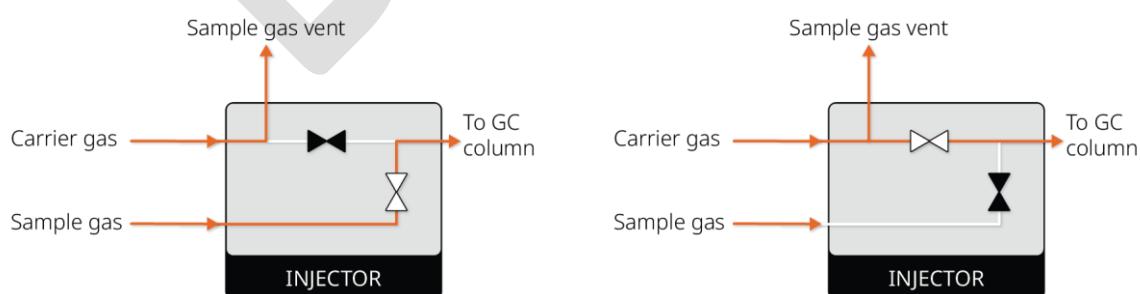


Figure 5. Schematic representation of the micro injector. Left: no injection, right: during injection.

4.2.3 Detector

The used in-house fabricated detector chip is a thermal conductivity detector (TCD) which is a universal detector for gas chromatography. This detector senses changes in the thermal conductivity of the column effluent and compares it to a reference flow of carrier gas. The major advantages of the TCD are its simplicity, its large dynamic range, its general response to both organic and inorganic species and its non-destructive character.

4.2.4 Back-flush-to-detector

DynamiQ micro-GC analyzer is equipped with a back-flush-to-detector configuration, a pre-column is added before the analytical column. After a defined time after injection, the flow in the pre-column is reversed and backflushed to a second detector (TCD BF). Simultaneously, the peaks that already left the pre-column are led via the analytical column to the first detector (TCD FF). The purpose of this configuration is two-fold:

1. The analytical column lifetime is increased because polluting/reactive components are prevented to enter the column.
2. By using a second detector, both foreflush and backflush chromatograms run in parallel, which thus reduces the total analysis time which is explained in detail below.

At the start of an analysis, the carrier gas directs the sample in the so called foreflush (FF) state to the pre-column and analytical column, as depicted in the Figure 6. The injected sample is separated in the pre-column and the separated components can enter the analytical column.

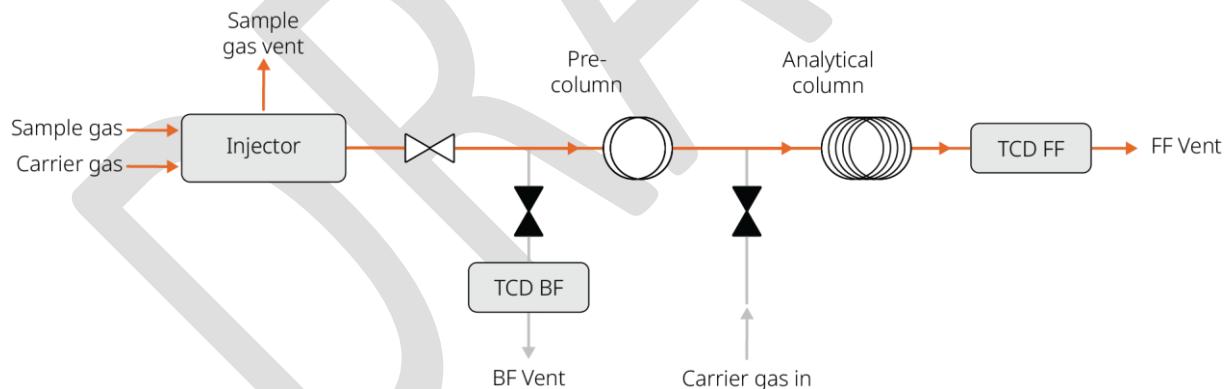


Figure 6. Foreflush to detector.

After a certain time, the flow is switched to the backflush (BF) state. The 'carrier gas'-valve in between the columns is opened and the gas flows backwards in the pre-column and simultaneously keeps on flowing forward in the analytical column. The backward flow of the pre-column is led to the backflush TCD and to the backflush vent, see Figure 7. In this way, unwanted components that move slowly through the pre-column are prevented from entering the analytical column; so, in principle the pre-column backflush works as a filter. Note that separated sample components in the pre-column will group again during backflush and consequently result in a single so-called backflush peak at the backflush detector.

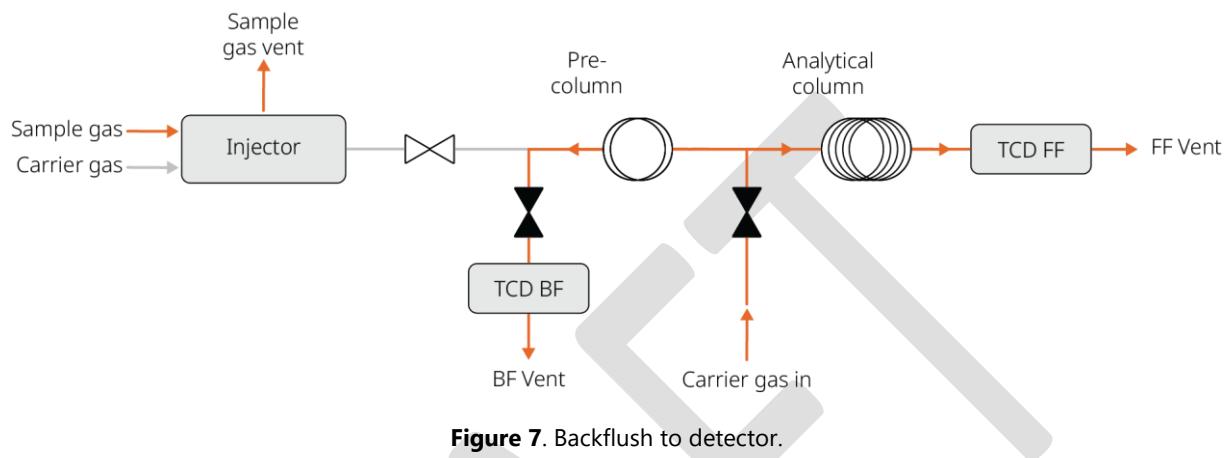


Figure 7. Backflush to detector.

4.2.5 Fastloop

To enhance the transport of fresh sample gas toward the analyzer, the fastloop option can be enabled. The fastloop increases the incoming sample flow by connecting a parallel gas channel which reduces the overall sample flow resistance, see figure below. Note that the sample flow through the injector chip remains the same in both 'fastloop on' and 'fastloop off' situation. The fastloop can be switched on or off via the software. In Figure 8, a schematic representation of a fastloop line is given. Please refer to the *DynamiQ Software Manual / DynamiQ Process Software Manual* for more information on how to enable/disable the fastloop option.

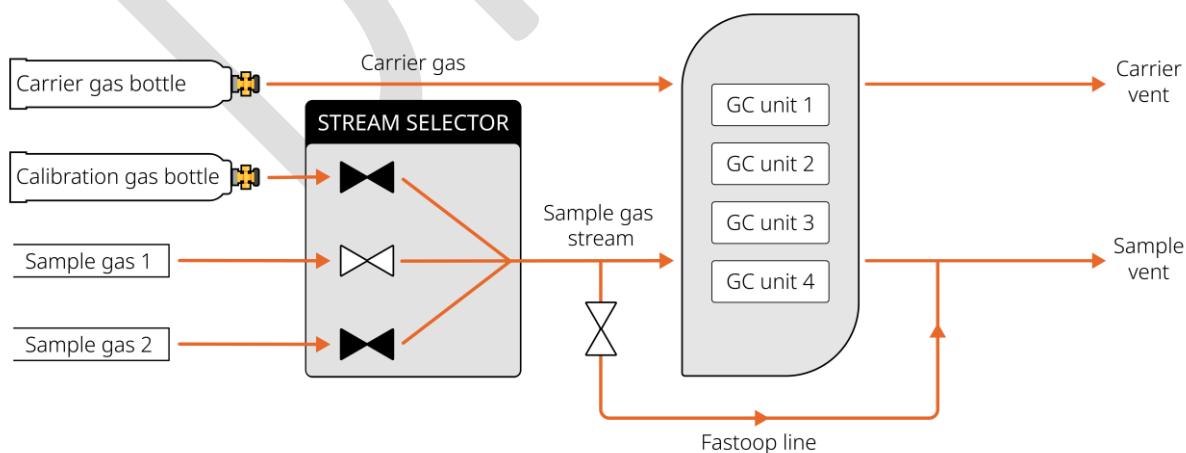


Figure 8. Schematic representation of the fastloop.

4.2.6 Sample pump

Optionally, the DynamiQ micro-GC analyzer can be equipped with an integrated sample pump. The sample pump is located between the GC units and sample vent, see Figure 9. It creates a continuous sample flow by sucking sample gas into the instrument. This is used when no pressurized sample is available. The sample pump can be combined with a stream selector and fastloop line. Please refer to the *Quick Guide-DynamiQ integrated sample pump* for more information about the optional integrated sample pump provided by Qmicro.

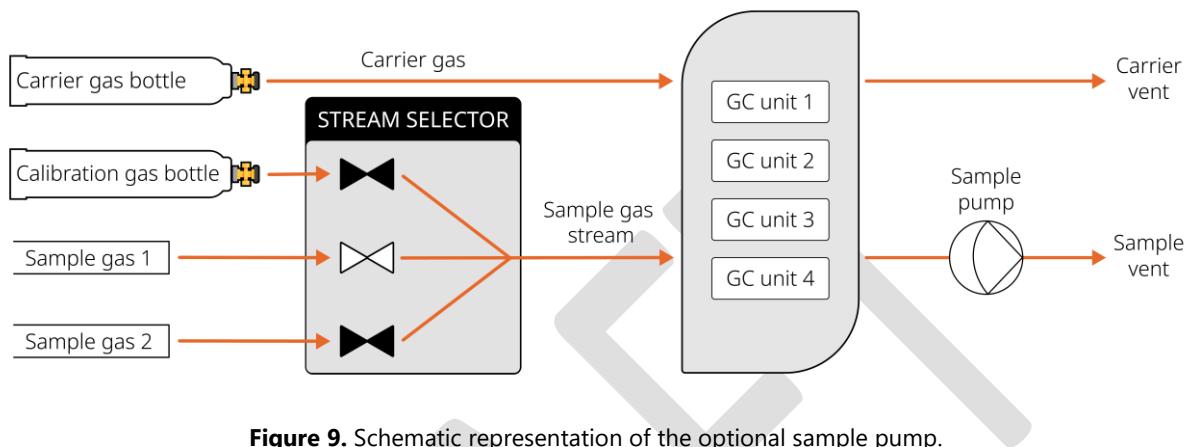


Figure 9. Schematic representation of the optional sample pump.

4.2.7 Data acquisition

The detector data is processed by an integrated processor. The autonomous running instrument generates data according to a user defined format. This can be MODBUS, ASCII or customer specific over LAN, RS232 or RS485. Besides, result reports can be generated. Please refer to the *Quick Guide - DynamiQ Modbus connection* for more information about Modbus connection with DynamiQ instruments.

5 Hardware and installation

The DynamiQ-X is a small microchip-based gas analyzer in an explosion safe enclosure for fast analysis of gaseous samples based on gas chromatography. The naming conventions of DynamiQ-X are given in Figure 10. The DynamiQ-X enclosure consists of two main parts: the host and the cartridge within an enclosure, see Figure 11 for an exploded view of the DynamiQ-X. The cartridge contains all core GC hardware (injector, column, detector and heaters). The host facilitates fluidic and electronic connections and contains the pneumatic and electronic control functionality. The parts are discussed in more detail in the subsequent sections. Normally, the DynamiQ-X instrument is wall mounted with all gas and electrical connections directed downwards. The standard orientation of the DynamiQ-X is given in Figure 12. Before starting the installation, read this chapter together with the Instrument configuration appendix carefully.

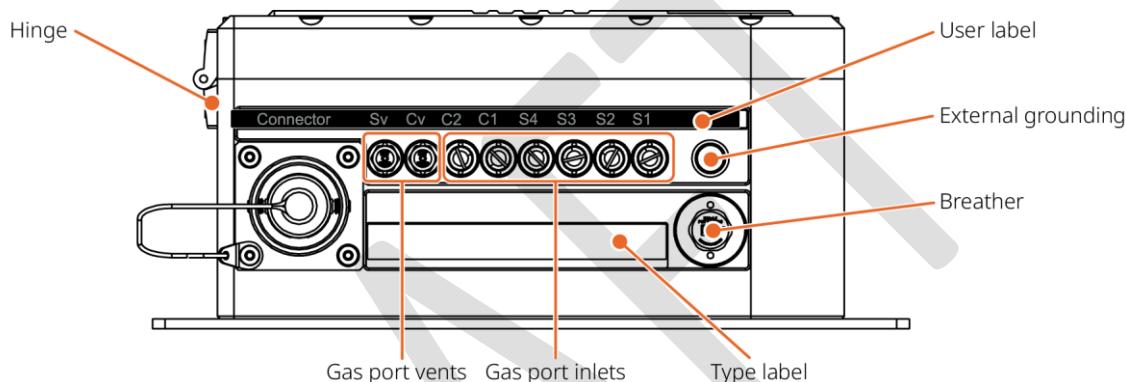


Figure 10. DynamiQ-X naming conventions.

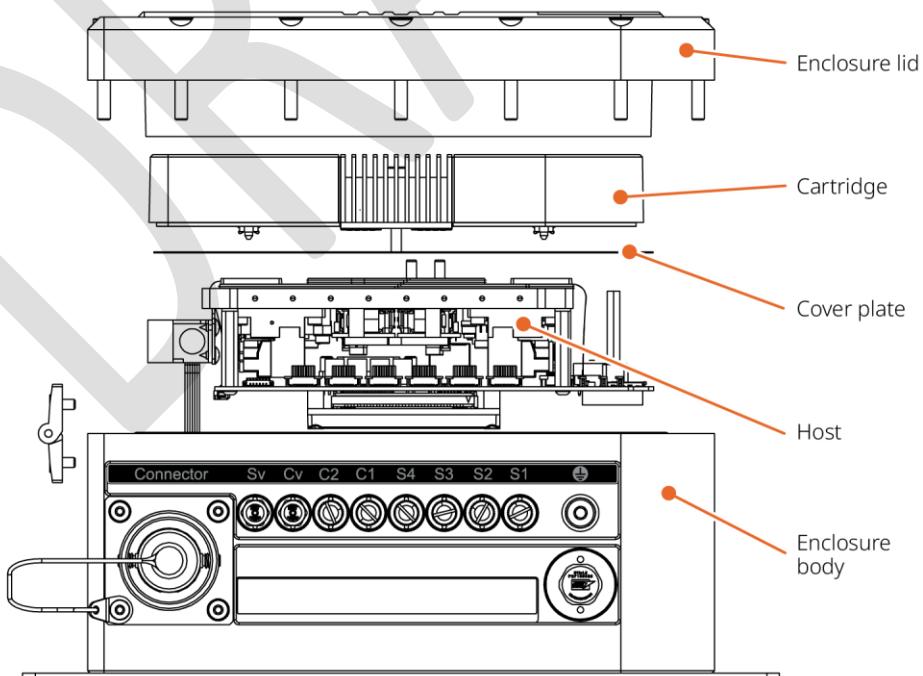


Figure 11. Exploded view of the DynamiQ-X

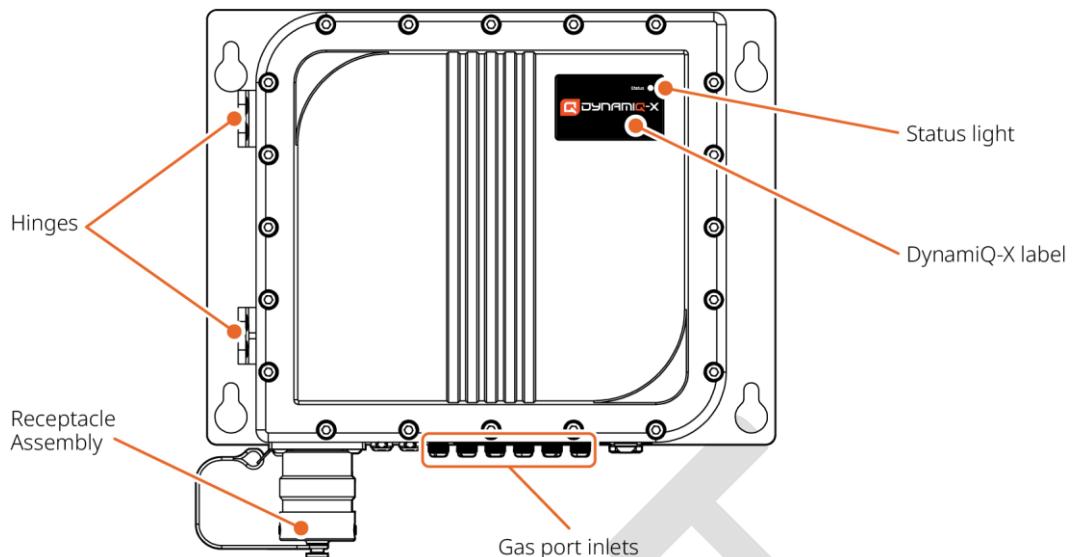


Figure 12. DynamiQ-X standard orientation.

5.1 Enclosure

The DynamiQ-X enclosure consists of a marine grade aluminum body and lid. The aluminum surface is hard anodized and coated with high-grade paint to improve corrosion resistance and make it suitable for marine/offshore application. The explosion-proof enclosure is machined with high accuracy to guarantee safe operation; it can withstand an internal explosion without transmission of the explosion to the outside. The enclosure body and lid are mounted together via fasteners and two hinges to facilitate convenient opening when the DynamiQ-X is wall mounted. The body contains a sealing gasket which prevents the penetration of fluids when the lid is properly installed.

5.2 Host

The host consists of electronics with processing power, pneumatic components and a gas distribution manifold. Via dedicated firmware it takes care of controlling the microchips, column heaters, sample injectors and read-out of the thermal conductivity detector (TCD) signals. Furthermore, it controls valves for directing the incoming gases to the cartridge and provides the electrical connections to the cartridge and to the receptacle (i.e. power supply and communication). A schematic representation of the host interface is given in Figure 13. Note that the electrical and gas connections and the gas ports should always be kept clean.

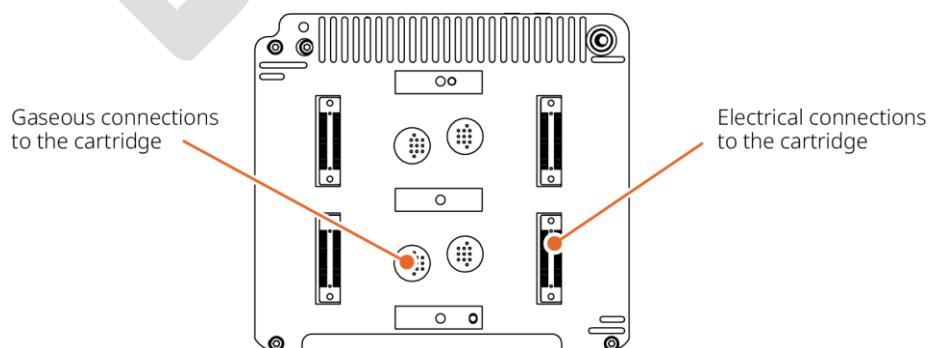


Figure 13. Schematic representation of the host interface.

5.3 Cover plate

The cover plate is mounted on top of the host unit, see Figure 14. It prevents accidental access to the host when the DynamiQ-X is opened, and the cartridge is removed. It protects the host from getting damaged by e.g. ESD, bumping, etc.

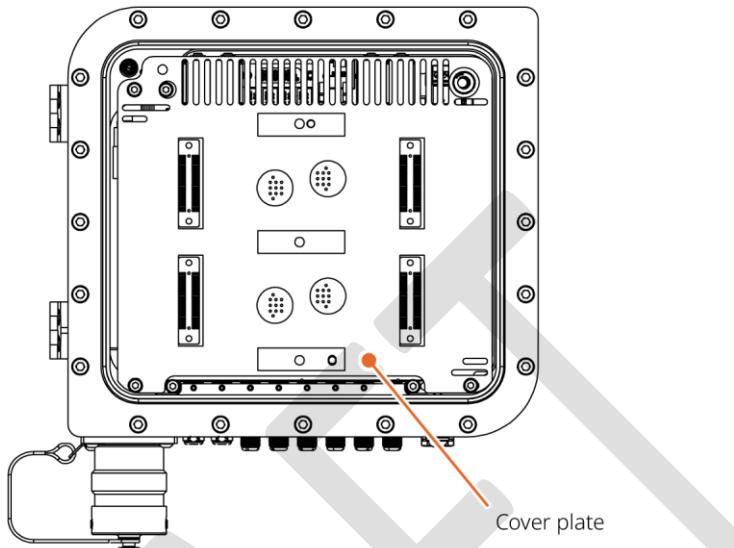


Figure 14. DynamiQ-X cover plate.

Cover plate precautions²



It is prohibited to remove the cover plate. Access to the host unit is not allowed. The warranty is no longer valid after unauthorized access.



The cover plate displays a sticker with the following text: 'WARNING - DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT'. The cover plate features this caution sticker because the instrument contains a battery. Please note that exchanging the battery is strictly prohibited, as the instrument requires the battery to maintain the operation of the internal clock.

² These precautions are in addition to the general precautions for the DynamiQ-X micro-GC analyzer. Therefore, the general precautions for the DynamiQ-X micro-GC analyzer should also be considered.

5.4 Cartridge

The cartridge is an exchangeable part which can be replaced by the end user. Please refer to § 7.2 for cartridge re-attachment / replacement instructions. The cartridge contains four separate areas for four GC units. The cartridge contains an electrical and a gas connection per unit. A schematic representation of the cartridge is displayed below in Figure 15. The number of installed GC units in the cartridge depends on the application. The cartridge can only be placed in one way. Note that the electrical and gas connections should always be kept clean.

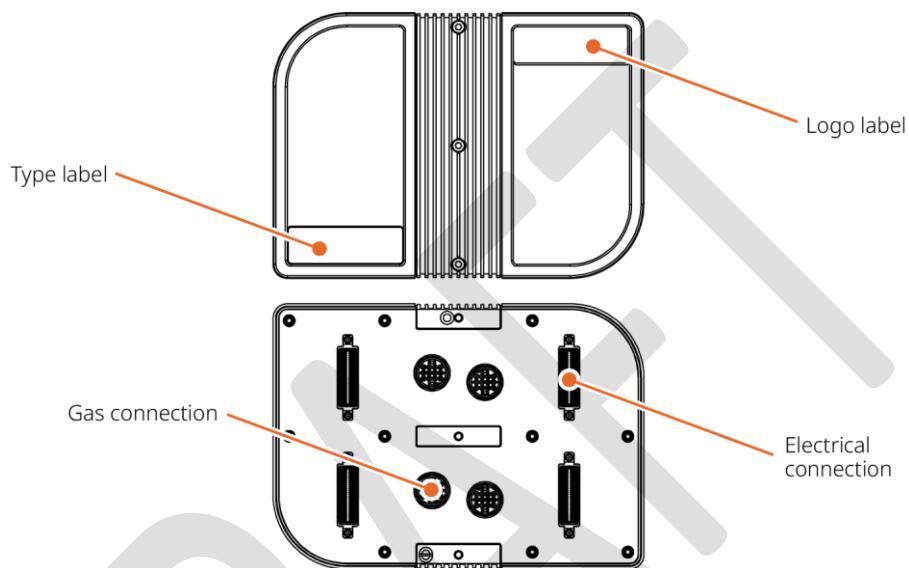


Figure 15. Top and bottom view of a cartridge that contains four analytical units.

5.5 Back plate and optional mounting wall plate

The DynamiQ-X is supplied with a backplate and an optional mounting wall plate, see Figure 16. The standard supplied back plate makes it possible to mount the DynamiQ-X to a wall or setup, see Figure 17 for the technical drawings of the back plate. Additionally, the optional mounting wall plate enables quick mounting and removal of the DynamiQ-X, see Figure 18 for the optional mounting wall plate technical drawing.

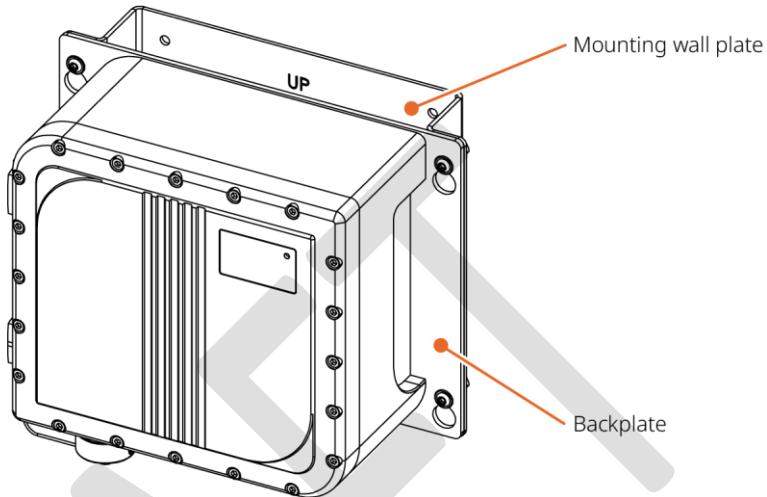


Figure 16. Backplate and optional mounting wall plate.

Backplate and optional mounting wall plate advice²



For optimal operation of the DynamiQ-X, it is advised to always use the mounting wall plate.

² These precautions are in addition to the general precautions for the DynamiQ-X micro-GC analyzer. Therefore, the general precautions for the DynamiQ-X micro-GC analyzer should also be considered.

5.5.1 Mounting

The DynamiQ-X is preferably mounted vertically via the supplied backplate to a wall/setup (or via the optional mounting wall plate). Please refer to § 5.5 for more information about the mounting wall plate. The mounting hole pattern (technical drawing) on the wall for the backplate and the optional mounting wall plate can be derived from Figure 17 and Figure 18.

Mounting precautions²



Make sure that the wall/setup can support the weight of the DynamiQ-X. There must be at least 50 mm distance between instrument backside and wall, and at least 250 mm spacing of free air in front of the DynamiQ-X for convection.

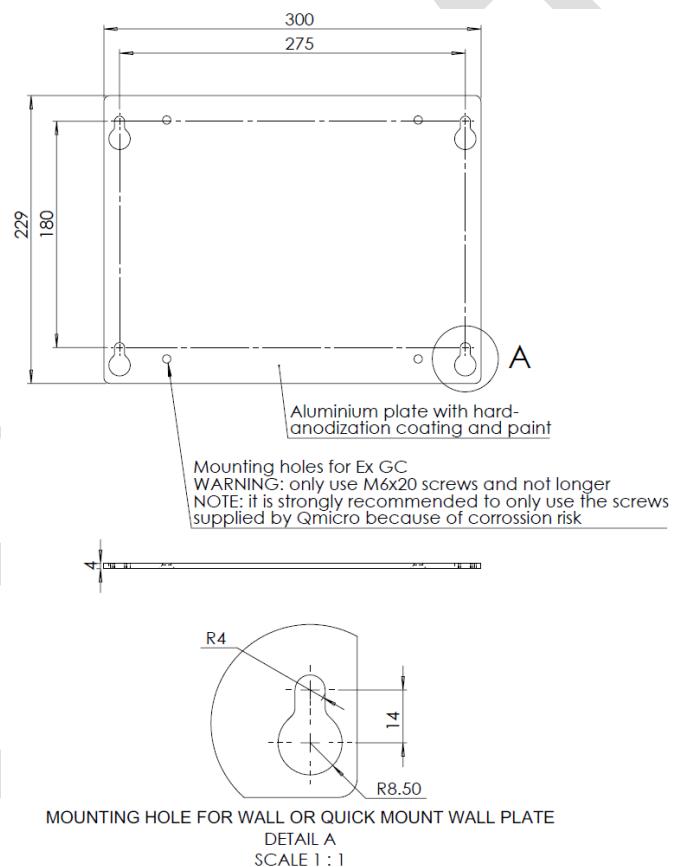


Figure 17. Backplate technical drawing.

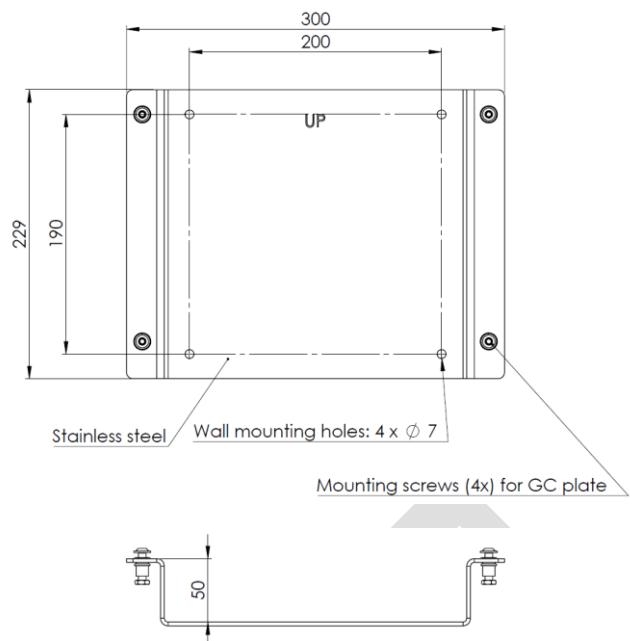


Figure 18. Optional mounting wall plate technical drawing.

5.6 Data connections

The DynamiQ-X contains two types of data connections: LAN and I/O. Both are within the receptacle see Figure 19. The exact configured communication interface and protocol is described in the *Instrument configuration appendix*.

The following protocols listed in Table 2 are available. For further information about implementing Modbus protocol, please refer to the *Quick Guide-DynamiQ Modbus connection*.

Table 2. Supported protocols.

Name	Description	Compatible bus	Default
Modbus serial (RTU)	Modbus over serial line (binary)	RS-232, RS-485	Yes
Modbus serial (ASCII)	Modbus over serial line (ASCII)	RS-232, RS-485	Upon request
Modbus TCP	Modbus over LAN	LAN	Yes
VICI stream selector	Control external rotary valve VICI stream selector	RS-232	Upon request
Smalltalk	Qmicro protocol for DynamiQ application	LAN	Yes
Custom projects	Custom protocols	LAN, RS-232, RS-485	Upon request
Custom sensors	Custom external sensor protocols	LAN, RS-232, RS-485	Upon request
Simple	Qmicro protocol for simple functionality	LAN, RS-232, RS-485	Upon request

5.7 Electrical connections

The DynamiQ-X must be powered by nominal 24 VDC (max 75 Watt). The DynamiQ-X easy-connect instrument has an Ex connector and it is IECEx and ATEX certified, see § 5.7.1. The DynamiQ-X universal instrument has a fixed Ex cable, and it is IECEx, ATEX and cQPSUs certified, see § 5.7.2.

5.7.1 DynamiQ-X easy-connect instrument

The receptacle assembly, which consists of a receptacle and the environmental blanking cap, functions as the power connector and also as the communication receptacle, see Figure 19. The receptacle is an Amphenol Amphe-EX explosion-proof threaded connector. This connector is ATEX and IECEx-approved to be used in Zone 1, made from machined aluminum components and plated in hard-anodic coating designed to withstand the most extreme environments.

The receptacle has a M32x1.5 thread which also functions as the Ex flame path of the DynamiQ-X instrument enclosure and a double-lead acme thread. The environmental blanking cap only contains a double-lead acme thread which allows for self-cleaning mating action that does not clog under adverse conditions like e.g., ice, snow, mud or sand.

The receptacle pin layout is shown in Figure 19. The functional description of the receptacle pins/wires is described in the Instrument configuration appendix, see Table 3 for the electrical connector pins and cable color. END A of the optionally provided cable should be plugged in the instrument, END B can be connected to a power source with nominal 24 VDC (max 75 Watt), see Figure 20. The Label on the cable contains the article number, the work order (W/O) and serial number (S/N).

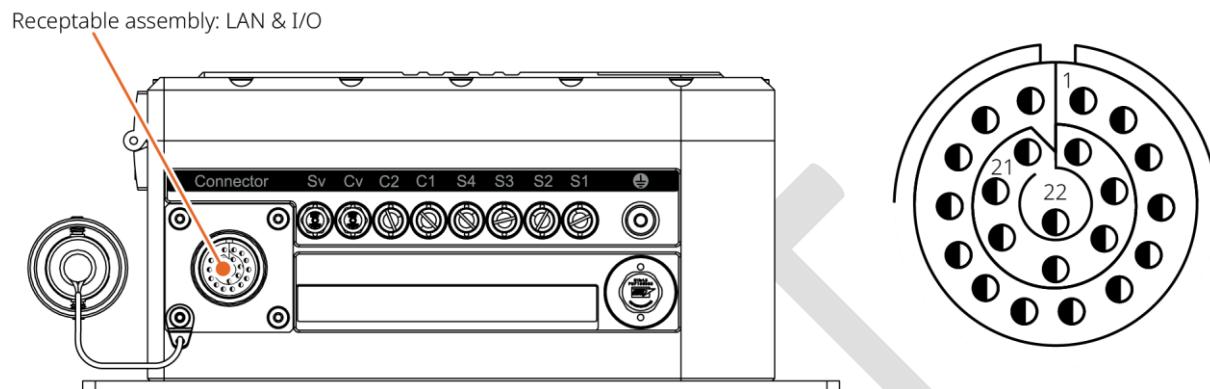


Figure 19. DynamiQ-X easy-connect receptacle assembly together with receptacle plug pin layout.

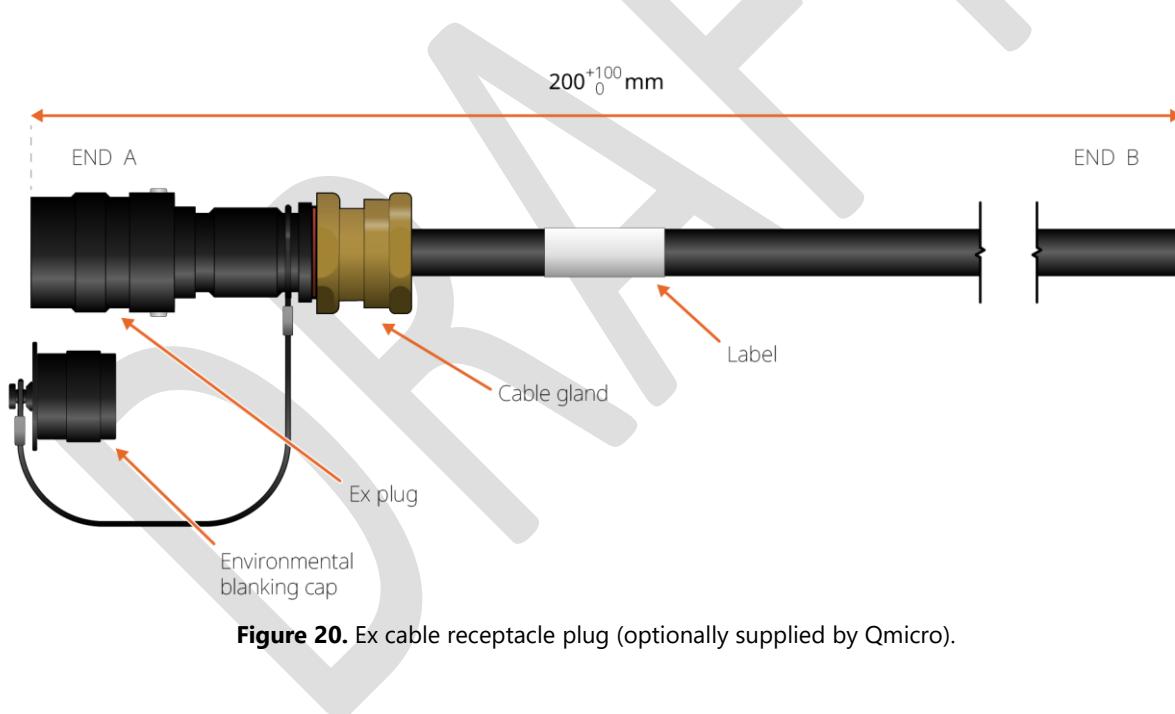


Figure 20. Ex cable receptacle plug (optionally supplied by Qmicro).

Table 3. DynamiQ-X easy-connect – Electrical connector pins and cable color.

Electrical connections		
Pin	Function	Cable color
1	Shield*	Shield
2	RS485 (2) A	white/pink - 10A
3	RS485 (2) B / RS232 (2) TX	pink/brown - 10B
4	DO (NO)	white/grey - 9A
5	DO (COM)	grey/brown - 9B
6	Ethernet TD+	white/yellow - 8A
7	Ethernet TD-	yellow/brown - 8B
8	Ethernet RD+	white/green - 7A
9	Ethernet RD-	brown/green - 7B
10	DI (COM)	grey - 3A
11	RS232 RX (2)	pink - 3B
12	DI (24 VDC Max)	green - 2A
13	Reset	yellow - 2B
14	RS485 (1) A	white - 1A
15	+24V DC**	black - 5A
16	+24V DC**	violet - 5B
17	GND***	grey/pink - 6A
18	GND***	red/blue - 6B
19	RS232 (1) TX (analyzer)	blue - 4A
20	RS232 (1) RX (analyzer)	red - 4B
21	RS485 (1) B	brown - 1B
22	Not connected	dummy

* Shielding must be connected, recommended to the PE rail in the junction box.

**Pin 15 & 16 must be connected and used together.

***Pin 17 & 18 must be connected and used together.

5.7.2 DynamiQ-X universal instrument

The DynamiQ-X universal instrument has a fixed Ex cable, and it is IECEx and ATEX certified, II 2G Ex db IIB+H2 T4 Gb and approved to be used in Zone 1, additionally it is, Class I, Division 1, Groups B, C and D, T4.

The Ex cable gland has a M32 threaded connection which mounts directly in the DynamiQ-X enclosure (which has a M32 threaded hole). The M32 threaded connection functions as the Ex flame path of the DynamiQ-X instrument. For environmental protection a M32 sealing ring is used. Additionally, the shielding is connected internally for Electromagnetic compatibility (EMC).

The Ex cable together with a cross-sectional view of the cable can be seen in Figure 21. The functional description of the wires inside the cable is described in the Instrument configuration appendix. See Table 4 for the electrical connector ferrule and cable color. End A is fixed to the DynamiQ-X instrument and *End B* should be connected to the user's setup and powered with nominal 24 VDC (max 75 Watt), see Figure 22.

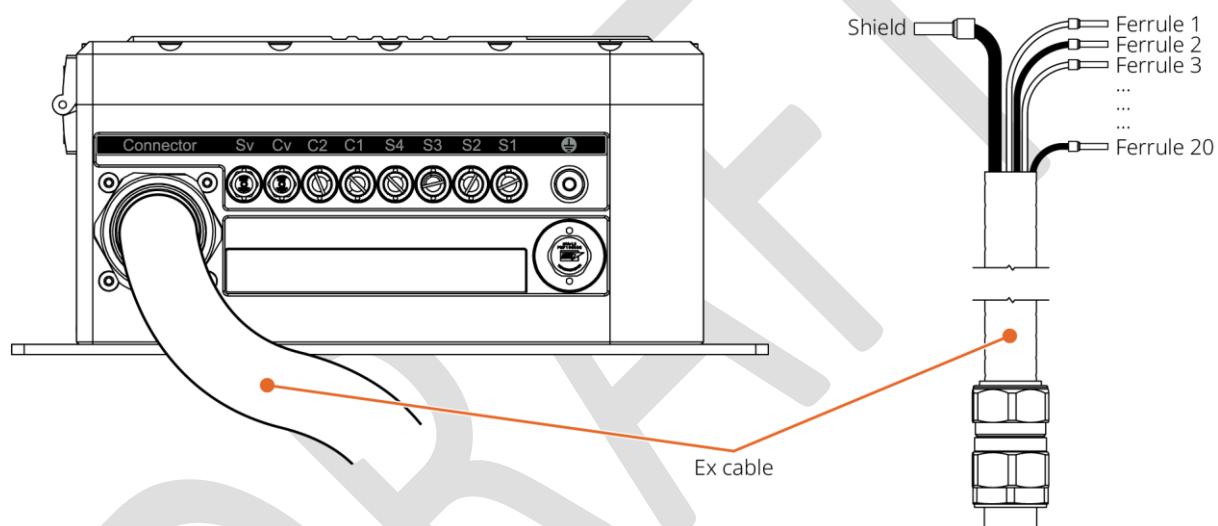


Figure 21. DynamiQ-X universal with fixed Ex cable & cross-sectional view of the Ex cable.

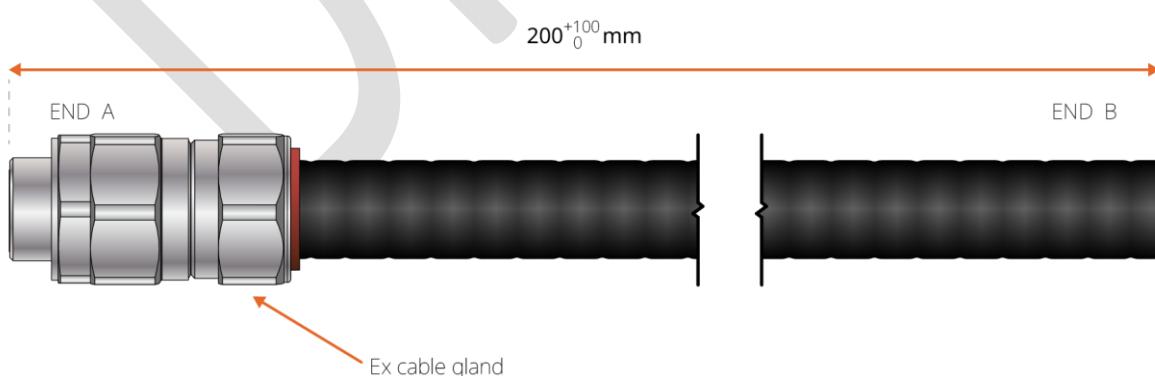


Figure 22. Ex cable gland assembly with cable.

Table 4. DynamiQ-X universal – Electrical connections and cable color.

Electrical connections		
Ferrule	Value	Cable color
	Shield*	Shield
1	RS485 (2) A	White - 1
2	RS485 (2) B/ RS232 (2) Tx	Black - 1
3	DO (NO)	White - 2
4	DO (COM)	Black - 2
5	Ethernet TD+	White - 7
6	Ethernet TD-	Black - 7
7	Ethernet RD+	White - 8
8	Ethernet RD-	Black - 8
9	DI (COM)	White - 3
10	RS232 (2) Rx	White - 4
11	DI (24 VDC Max)	Black - 3
12	Reset	Black - 4
13	RS485 (1) A	White - 5
14	+24V DC**	White - 9
15	+24V DC**	Black - 9
16	GND***	White - 10
17	GND***	Black - 10
18	RS232 (1) Tx (analyzer)	White - 6
19	RS232 (1) Rx (analyzer)	Black - 6
20	RS485 (1) B	Black - 5

* Shielding must be connected, recommended to the PE rail in the junction box.

**Ferrule 14 & 15 must be connected and used together.

***Ferrule 16 & 17 must be connected and used together.

5.7.3 Grounding

The DynamiQ-X instrument must be grounded before installation and commissioning for safety reasons. Grounding is achieved by connecting the grounding screw to a central grounding point, see Figure 23. The grounding screw is at the right side of the gas connections and indicated with the \perp symbol. The screw is M6, and an associated lug should be used in between the two washers, see Figure 23. The minimum permissible cable cross-section is 4 mm².

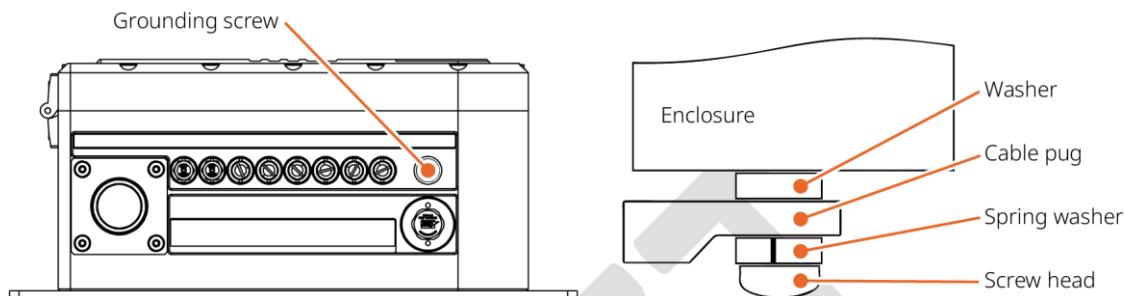


Figure 23. Grounding the DynamiQ-X.

The internal grounding is realized via the contact between the internal grounding spring and the internal grounding screw. The internal grounding spring and the internal grounding screw are located between the enclosure body and the lid of the DynamiQ-X instrument, see Figure 24.

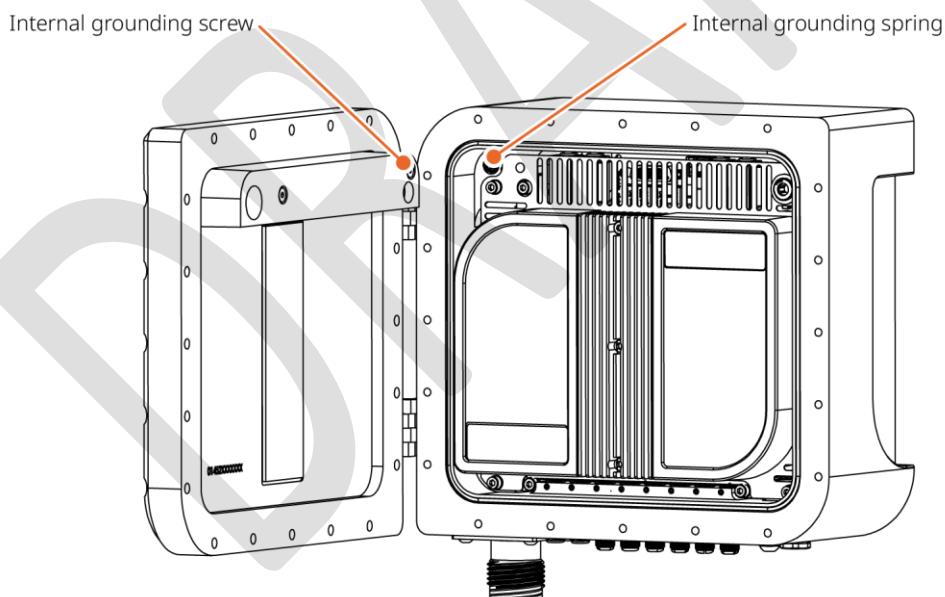


Figure 24. Internal grounding between enclosure body and lid.

Grounding precautions²



Only use the grounding screw and washers supplied by Qmicro otherwise proper electrical contact cannot be guaranteed (over time).



It is prohibited to remove the internal grounding spring or screw. Always make sure there is no blockade between the grounding spring and the screw. In case of damaged grounding spring and/or screw, do not use the DynamiQ-X and contact Qmicro.

Do not apply electrical power to the device until all interconnections and external signal connections have been verified and proper earthing has been made.

5.7.4 Instructions to commission the electrical connections

1. Ensure proper grounding by connecting the grounding screw to a central grounding point, see Figure 23.
2. Inspect the cable for any signs of damage or defects.
3. Take off the receptacle cap and the plug cap and screw the plug cable in the receptacle which allows for electrical (I/O) and LAN connection.

Electrical connection precautions²



The DynamiQ-X should first be grounded before any other connections are made.



It is prohibited to disassemble the receptacle assembly of the DynamiQ-X. In case of a (suspected) damaged receptacle assembly contact Qmicro.



Before applying power, make sure the DynamiQ-X is grounded. Use the DynamiQ-X instrument only with the correct mating connector optionally supplied via Qmicro or acquired via other channels. Always conform to the connector specific conditions of use.



The plugs and receptacles are not to be energized when fitted with the environmental blanking caps.



The Ingress protection rating (IP) of the receptacle is only guaranteed when the mating connector or cap is used.



The DynamiQ-X should be powered by a 24 VDC power supply with a maximal 75W power rating, and it should be compliant with the separated extra-low voltage (SELV) standard.



Failure to check the power supply label may result in injury or death to personnel or cause damage to the equipment. Applying 110 to 220 VAC to the DC power terminals will severely damage the device. See power supply label prior to connection.



Do not use a higher or lower voltage power supply as proper operation of the instrument is no longer guaranteed or can harm the instrument's electronics.

Electrical connection precautions²



To prevent twisting, all electrical connections, i.e. power/communication cable and bonding wire, shall be secured close to the connection.



Do not separate when energized.



This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

The DynamiQ-X instrument has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This DynamiQ-X generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.



If the DynamiQ-X instrument causes harmful interference to radio or television reception, which can be determined by turning the instrument off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

² These precautions are in addition to the general precautions for the DynamiQ-X micro-GC analyzer. Therefore, the general precautions for the DynamiQ-X micro-GC analyzer should also be considered.

5.7.5 Optional junction box

The DynamiQ-X can be connected with an optional Ex-e electrical junction box that enables users to use their own cables (e.g., separate power cable and ethernet cable), see Table 5 for the Ex-e electrical junction box schematic. Technical drawings and connections of the optional Ex-e electrical are presented in Figure 25.

The Ex-e electrical junction box has a communication cable attached with a connector for the DynamiQ-X receptacle. Inside the Ex-e electrical junction box there are several customizable cable glands. The Ex-e electrical junction box can be placed in the same explosive hazardous zones as the DynamiQ-X micro-GC. Custom connections are described in the *Instrument configuration appendix*. Please contact Qmicro for more information.

The Ex-e electrical junction box is optionally provided by Qmicro and can also be used to make the connection between the optionally provided explosion-proof DynamiQ display and the DynamiQ-X micro-GC possible. Please refer to the *DynamiQ Display operating instructions manual* for more information about the DynamiQ display.

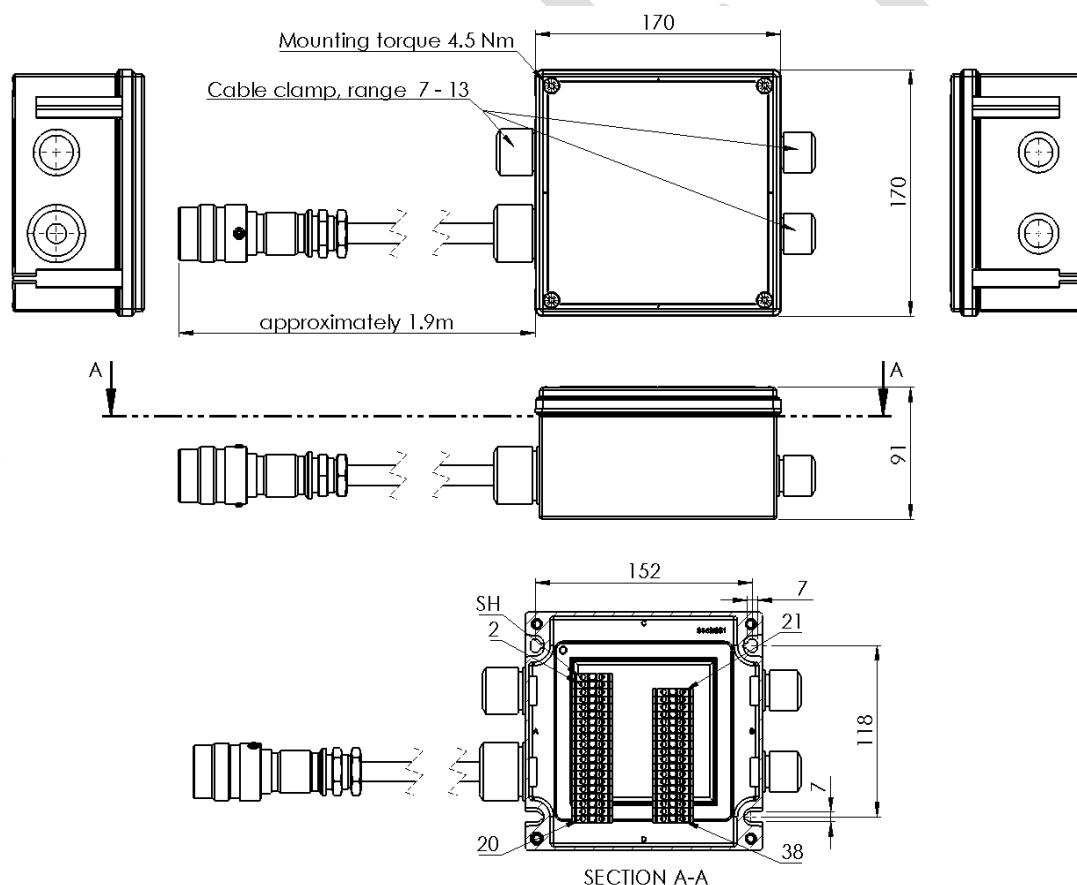


Figure 25. Optional Ex-e electrical junction box, technical drawings and connections.

Table 5. Optional Ex-e electrical Junction box connection schematic.

Terminal	Function
SH	Shield
2, 3	+24 VDC
4, 5, 10, 13	GND
6	Ethernet TD+
7	Ethernet TD-
8	Ethernet RD+
9	Ethernet RD-
11	RS232 (1) TX
12	RS232 (1) RX
14	RS485 (1) B
15	RS485 (1) A
21	RS485 (2) A
22	RS485 (2) B / RS232 (2) Tx
23	DO (NO)
24	DO (COM)
25	DI (COM)
26	RS232 Rx (2)
27	DI (24 VDC Max)
28	Reset

Note that the availability of certain functions may vary based on the users' specific configuration.

5.8 Gas connections and flow

The DynamiQ-X micro-GC contains a stainless-steel manifold in which, depending on the application, the type, amount and mapping of gas connections and vents are implemented. The function and type of gas port is indicated on the user label above the ports, see Figure 26. Please refer to the *Instrument configuration appendix* of the GC which is available on the Qmicro Partner SharePoint site, where the exact number of gas inlet and vent ports are indicated together with their specifications.

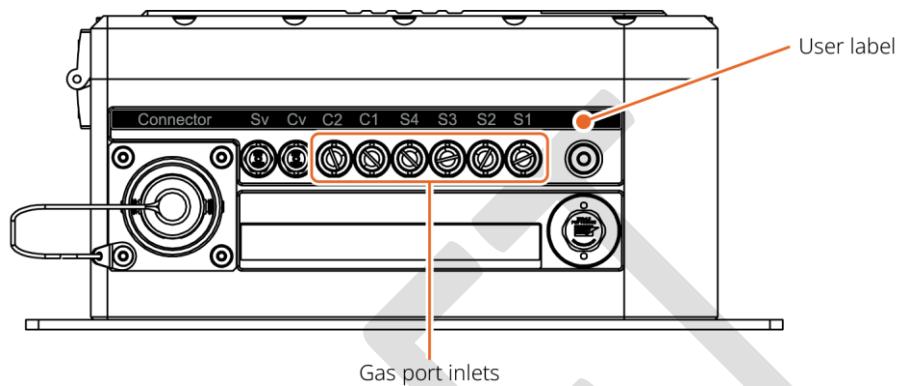


Figure 26. Gas connections (example) and Valco fitting.

Carrier gas 1 (C1 gas inlet) is always connected to GC units 1, 2 and 3, while carrier gas 2 (C2 gas inlet) is always connected to GC unit 4. Both inlets (C1 and C2) must be connected to carrier gas all the time. In case of a single carrier gas application the same carrier gas source can be connected to C1 and C2 gas inlets by using a carrier gas inlet splitter $1/16''$.

Figure 27 gives an example of a DynamiQ-X instrument that consists of 4 GC units to visualize the gas connection and flow within the DynamiQ analyzers. The stream selector allows the user to select the desired stream for executing measurements. After the stream selector, the selected sample gas together with the carrier gas is led simultaneously through all GC units. In the injector, a small amount of sample gas is injected in the carrier gas flow and guided via the column to the detector and vent. The fastloop is an extra line in the sample path that reduces resistance.

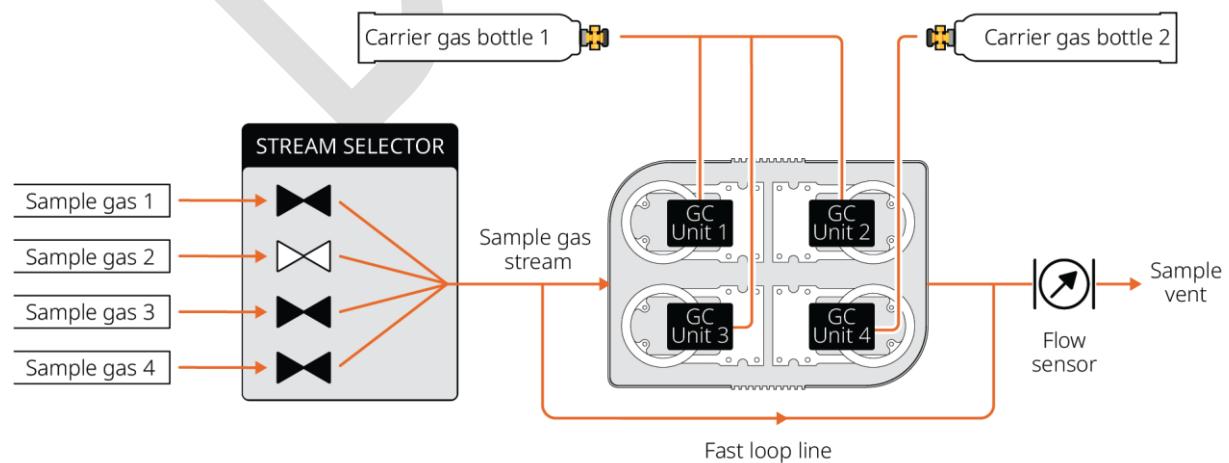


Figure 27. Schematic representation of gas connections and flow in DynamiQ analyzers.

5.8.1 Gas ports

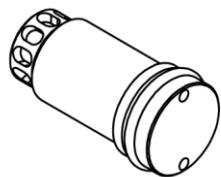
DynamiQ-X instruments have 3 types of gas ports namely gas port inlets, gas port vents and blind plug, see Figure 28. Gas port inlets are for connecting the sample, carrier and actuation gases, whereas gas port vents are for venting the outgoing gases. The blind plug is used for shutting off an unused port in the enclosure. Please note that the blind plug is not a gas connection.



Gas port inlet



Gas port vent



Gas port blind

Figure 28. Gas ports.

The gas port inlet contains an internal flame arrestor and flow restrictor, while the gas port vent only contains an internal flame arrestor. The gas ports are secured from the inside to prevent unauthorized removal. The gas ports configuration can be derived from the user label on the enclosure. For more information, see the *Instrument configuration appendix*.

Gas connections precaution²



It is important to vent outgoing gases as hazardous substances can endanger the health and safety of the user. Venting outgoing gases must conform with local, national and/or international regulations that are applicable to the GC installation location.

The type of connection to the gas port inlets is customizable. However, it is standard Valco fitting (VICI AG international) for $1/16$ " tubing [1]. Note that the tubing, nuts, and ferrules should all be stainless steel. The default gas vent ports for the DynamiQ-X have a female M6 x 0.75 thread and dedicated connectors. The gas port vent can be recognized by the black plastic plug which allows venting of the gases into free space, while providing weather protection. Optionally, the gas port vent(s) e.g., sample gas can be made suitable for connection to a tube for further processing/ transportation of the vented gas, for more information consult Qmicro.

Gas connections advice



During shipping, dust plugs are mounted into the gas port inlets/outlets which must be removed before use. It is recommended to store the dust plugs for future transport.

² These precautions are in addition to the general precautions for the DynamiQ-X micro-GC analyzer. Therefore, the general precautions for the DynamiQ-X micro-GC analyzer should also be considered.

5.8.2 Connecting gas lines

1. Remove the dust plugs from the GC and store them safely for future use when storing or transporting the GC.
2. Flush all stainless-steel tubing with the applicable gas(es) before connecting gas lines to the GC.
3. Assemble the stainless-steel gas tubing fittings by following steps given in § 5.8.4.
4. Connect a carrier gas supply to the carrier/actuation inlet and connect the sample gas to the sample inlet, see *Instrument configuration appendix*. To connect the inlet gas lines, use the $1\frac{1}{16}$ " Valco fittings that are delivered with the DynamiQ-X: nuts ZN1 and ferrules ZF1 from VICI AG International.
5. Set the carrier/actuation pressure to $450 \pm 5\%$ kPa with the pressure controller on the carrier gas supply.
6. To connect tubing to the vent outlets, optional connectors that are available. Please consult Qmicro for more information.
7. Check the connections made for leakage with an electronic leak testing device.

Gas connections precaution² and advice



Do not use soap solutions or liquid leak testing devices, as it will damage the GC.



Use only dual stage regulators for carrier gas bottles.



Use stainless-steel gas tubing and stainless-steel fittings only.



Do not block the sample and carrier vents.



Ensure that stainless steel gas tubes are connected to the correct DynamiQ micro-GC gas inlets and gas bottles by referring to the same *Instrument configuration appendix*.

² These precautions are in addition to the general precautions for the DynamiQ-X micro-GC analyzer. Therefore, the general precautions for the DynamiQ-X micro-GC analyzer should also be considered.

5.8.3 The DynamiQ-X gas supplies requirements

1. An externally regulated and conditioned carrier/actuation gas supply: helium, argon, nitrogen, hydrogen or air. Supplied gas should be pure (e.g. 99.999%), dry and free of particles. Carrier pressure should be $450 \pm 5\%$ kPa for optimal functionality of the GC. Supply pressure for carrier gas is also used for actuation pressure.
2. One or more sample gas supplies. The supplied gases should be dry (non-condensing between 0-50 °C) and free of particles. When the optional internal sample pump of the DynamiQ-X is not used, the sample gas should be supplied with a pressure between 10 and 200 kPa (hardware limit). Please note that the pressure upper limit is application specific.

Gas connections advice



Sample pressure that is too high can result in split chromatogram peaks. Therefore, it is advised to maintain a sample pressure that is 10-15% lower than the lowest carrier pressure in the analysis method.

3. Typically, the gas for actuation and carrier is the same gas. But optionally, a separate actuation gas supply is available (different than the carrier gas).

The supplied actuation gas should be dry and free of particles. In the *Instrument configuration appendix*, it is described if this option is installed, together with the required actuation supply pressure. In some configurations/applications more than one carrier gas is applied.

Gas connections precautions²



Before using gases, carefully read the hazard indications and information reported in the Safety Sheet supplied by the manufacturer referring to the Chemical Abstract Service (CAS) number and/or Safety Data Sheets (SDSs). It is the user's responsibility to see that all local safety regulations for the use of gases are obeyed.



Carrier gases used in the instrument should be dry and particle free



Make sure that the gas port vents are not blocked at any time or experience any flow resistance to avoid internal valve damage. In addition, do not connect/combine gas port vents to avoid pneumatic crosstalk effects.



Do not use excessive force/torque for making a gas connection to a gas port. In case a gas port can be freely rotated, do not commission the DynamiQ-X and contact Qmicro.



The applied gas pressures should not exceed 200 kPa, as the sample valves can handle a maximum of 200 kPa.



The carrier gas pressures should be $450 \pm 5\%$ kPa.



Vent ports should be free (not blocked) at all times to avoid internal valve damage. Do not connect/combine vents to avoid pneumatic crosstalk effects

Gas connections precautions²



The DynamiQ-X can be used with carrier gases He, Ar, N₂, H₂ and air, but do not use other gases as it might harm the instrument.

Note that the DynamiQ-X does not include any safety measures when using Hydrogen as the carrier gas. Therefore, safety precautions must be taken. For more information please, contact Qmicro.



It is important to vent outgoing gases as hazardous substances can endanger the health and safety of the user. Venting outgoing gases must conform with local, national and/or international regulations that are applicable to the GC installation location.



For connecting the gases, use $\frac{1}{16}$ " metal tubing and only use dual stage pressure regulators with metal seals.



Flush all the tubing and regulators before use and flush gas lines to remove air or other unwanted gases.

5.8.4 Stainless-steel gas tubing fitting assembly

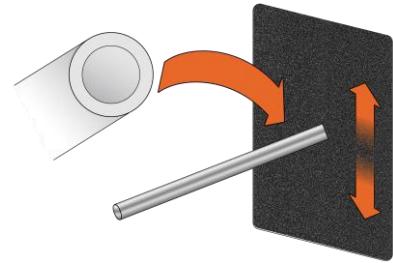
Vici Valco fittings are used for all $\frac{1}{16}$ " tubing and couplings at Qmicro. The connection between the tubing and body of fitting is made with ferrules that have a cone shape. The VICI Valco fittings for chromatography typically employ a compression fitting, in which a ferrule is compressed onto the tube as a nut is tightened. These fittings provide excellent stability and reliability in high pressure applications for GC [1]. Please gather the necessary equipment listed in Table 6 and proceed with the following instructions.

Table 6. Equipment for stainless steel gas tubing assembly.

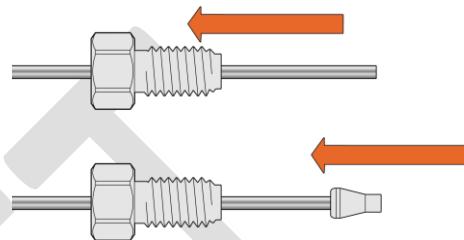
Equipment for stainless steel gas tubing assembly	
Equipment	Brand/ type
$\frac{1}{16}$ " stainless steel tubing	Generic Vici (recommended)
File	Generic
Stainless steel tubing cutter	Generic
GC accessories kit	
• Vici stainless steel male nut $\frac{1}{16}$ " SS303	Vici
• Vici stainless steel ferrule $\frac{1}{16}$ " SS303	Vici
• Combination spanner $\frac{1}{4}$ "	Generic

² These precautions are in addition to the general precautions for the DynamiQ-X micro-GC analyzer. Therefore, the general precautions for the DynamiQ-X micro-GC analyzer should also be considered.

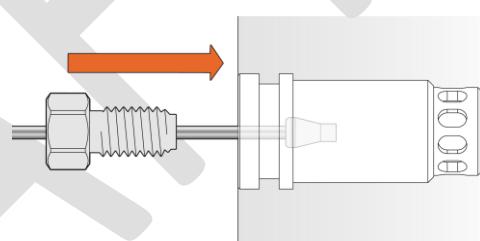
1. Measure the desired length of stainless-steel tubing to fit between the gas inlets and gas bottles and cut with a $1\frac{1}{16}$ " (1.6 mm) tubing cutter.



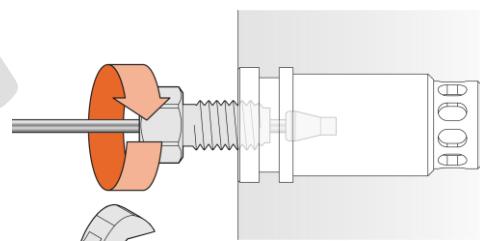
2. Ensure that the edges of the stainless-steel tube are flat with a visible hole. Use sandpaper if needed to flatten the edges of the cut stainless steel tube.



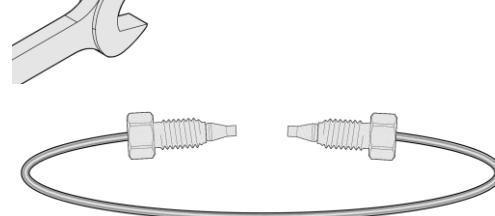
3. Place the male nut over the stainless-steel tube.



4. Place the ferrule over the stainless-steel tube



6. Apply pressure with the $\frac{1}{4}$ " combination spanner.



7. Repeat steps 1 to 5 on the other side of the stainless-steel tube. New stainless-steel gas tube is complete.

5.9 Breather

The breather minimizes moisture build up inside the DynamiQ-X due to the ventilation, see Figure 29. In addition, it prevents that the pressure inside the DynamiQ-X is higher than the external atmospheric pressure in agreement with explosion safety regulations. The breather is secured from the inside to prevent unauthorized removal.

The breather contains a plug with a gas permeable membrane which allows venting of the gases while providing weather protection. Furthermore, it contains an internal flame arrestor.

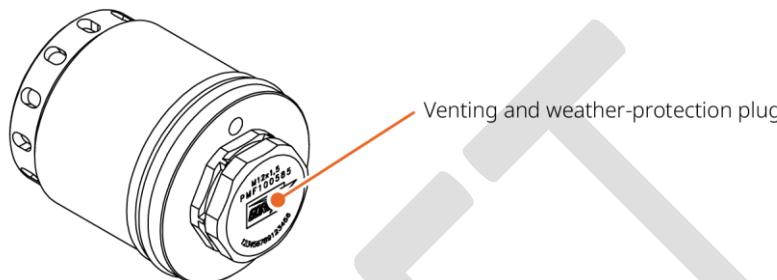


Figure 29. Breather.

Breather precautions²



It is prohibited to remove the breather. In case of a damaged breather, contact Qmicro. Make sure that the breather is not blocked at any time.



It is prohibited to remove the plug of the breather as weather protection can then no longer be guaranteed and warranty is no longer valid.

² These precautions are in addition to the general precautions for the DynamiQ-X micro-GC analyzer. Therefore, the general precautions for the DynamiQ-X micro-GC analyzer should also be considered.

5.10 Specific conditions of use

The DynamiQ-X has a flame path between the enclosure body and the instrument lid, see Figure 30. However, beside this flame path the instrument contains five additional flame paths namely:

1. Depending on the DynamiQ-X instrument configuration either a threaded flame path between Ex receptacle and Ex housing body or a threaded flame path between Ex cable gland and Ex housing body.
2. Flanged flame path between Ex housing body and Ex housing cover
3. Threaded flame path between Ex Breather and Ex housing body
4. Threaded flame path between Ex gas ports and Ex housing body
5. Cylindrical flame path between Ex indicator light glass and Ex housing cover

Each of the above-mentioned flame paths are described in detail below.

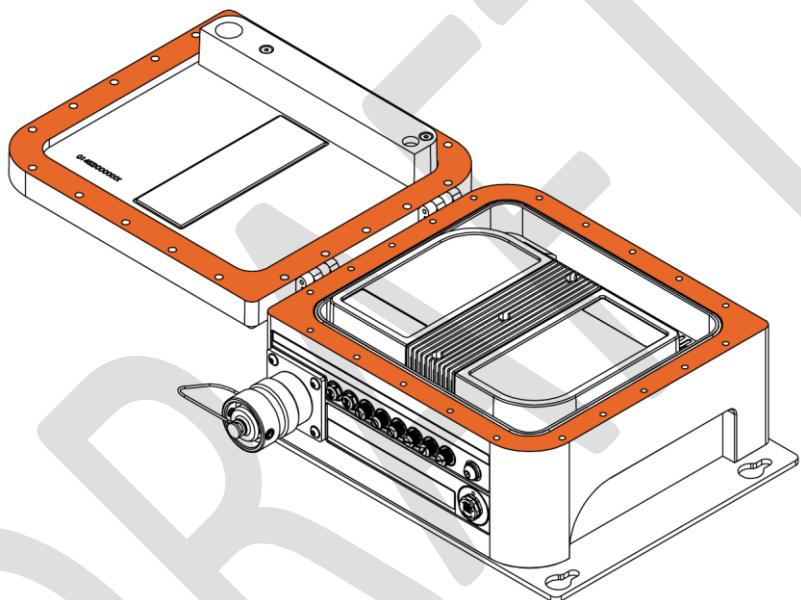


Figure 30. Flame path between the DynamiQ-X enclosure body and lid.

Threaded flame path between Ex receptacle and Ex housing body

This flame path has a thread size of M32x1.5 and a fit class 6g/6H. The receptacle is supplied with an environmental seal (Buna O-ring) and locked in place with 4 screws mounted in the flange of the receptacle. Once the receptacle is correctly mounted there are a minimum of 11.5 threads engaged, see Figure 31.

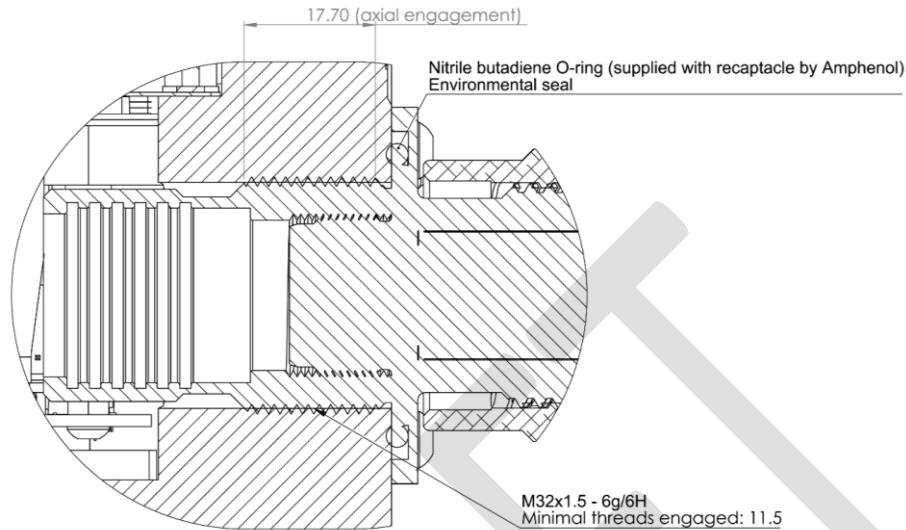


Figure 31. Flame path receptacle.

Threaded flame path between Ex cable gland and Ex housing body

The cable gland has a threaded flame path with the enclosure body. The cable gland assembly has a thread of M32 x 1.5 mm. The sealing ring is in between the cable gland and the enclosure body, so the thickness of the sealing ring is not taken into account. There are a minimum of 8.8 threads engaged, see Figure 32.

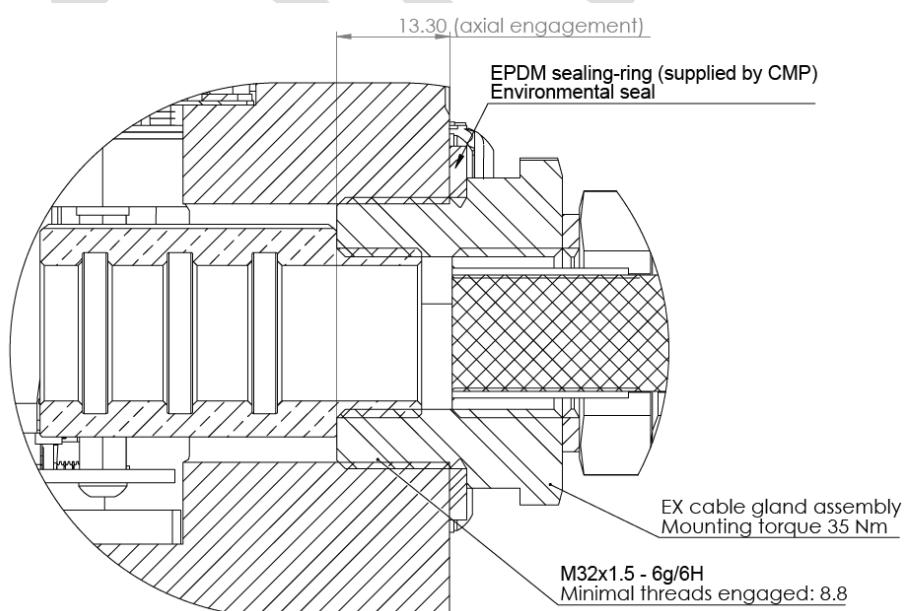


Figure 32. Flamepath between Ex cable gland and Ex housing body.

Flanged flame path between Ex housing body and Ex housing cover

This flame path has a maximum gap of 0.025 mm and minimum length of 17.50 mm. The EX housing body is provided with an environmental seal (FKM O-ring) and closed with 20 M5x35 hexagon socket head screws torqued to 9 Nm each, see Figure 33. Flange surfaces of both the cover and the body cover should be free of scratches, dents and debris.

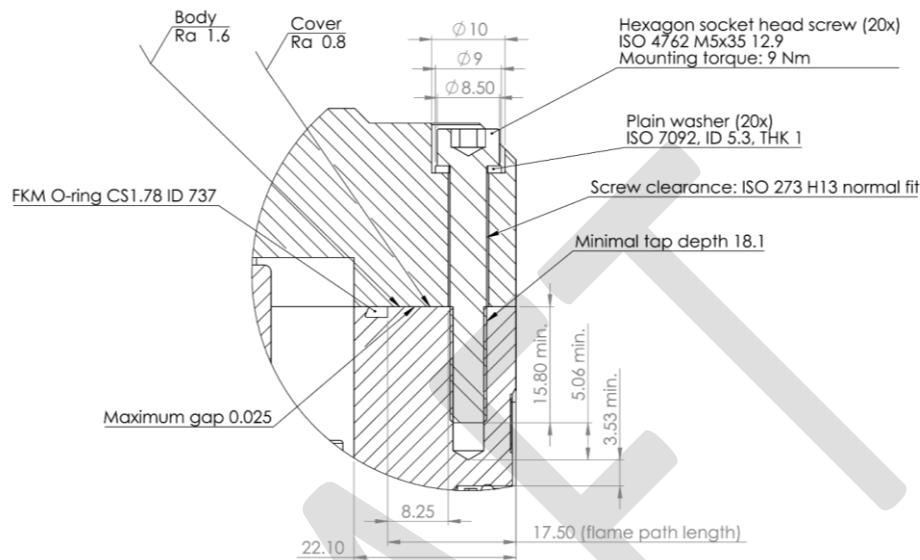


Figure 33. Flame path between enclosure body and cover.

Threaded flame path between Ex breather and Ex housing body

This flame path has a thread size of M27x1.5 and a fit class 6g/6H. The breather is provided with an environmental seal (FKM O-ring) and locked in place with 1 set screw. Once the breather is correctly mounted there are a minimum of 10.4 threads engaged, see Figure 34.

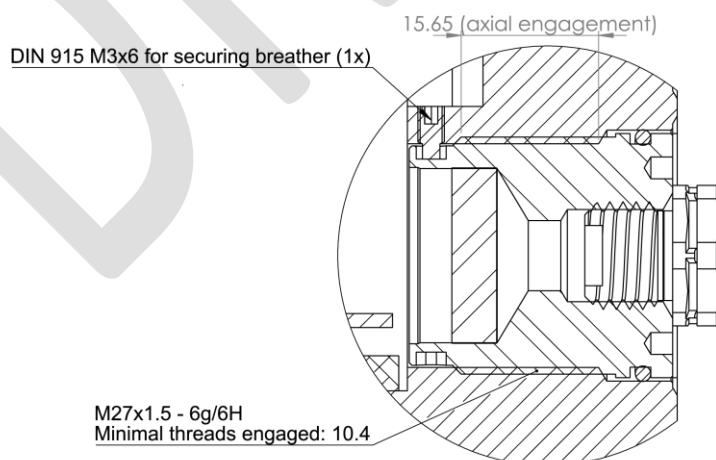


Figure 34. Flame path breather.

Threaded flame path between Ex gas ports and Ex housing body

This flame path has a thread size of M12x1.25 and a fit class 6g/6H. There are a maximum of 8 ports, both inlets and vents. The gas ports are provided with an environmental seal (FKM O-ring) and locked in place with 1 set screw. Once the gas ports are correctly mounted there are a minimum of 11.1 threads engaged, see Figure 35.

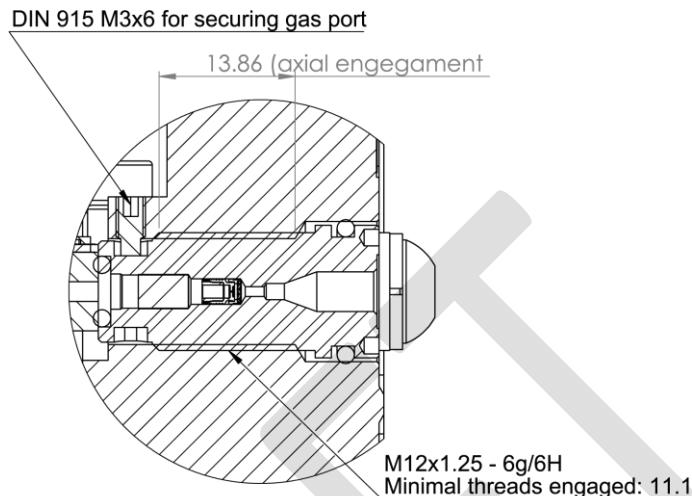


Figure 35. Flame path of all gas port types.

Cylindrical flame path between Ex indicator light glass and Ex housing cover

This flame path has a maximum gap of 0.08 mm and minimum length of 19.90 mm. The indicator light glass is provided with an environmental seal (FKM O-ring) and locked in place with 1 circlip. The indicator light glass should be free of cracks and chips and compliant with the tolerances given in Figure 36. The hole in the cover should be free of scratches, dents and debris.

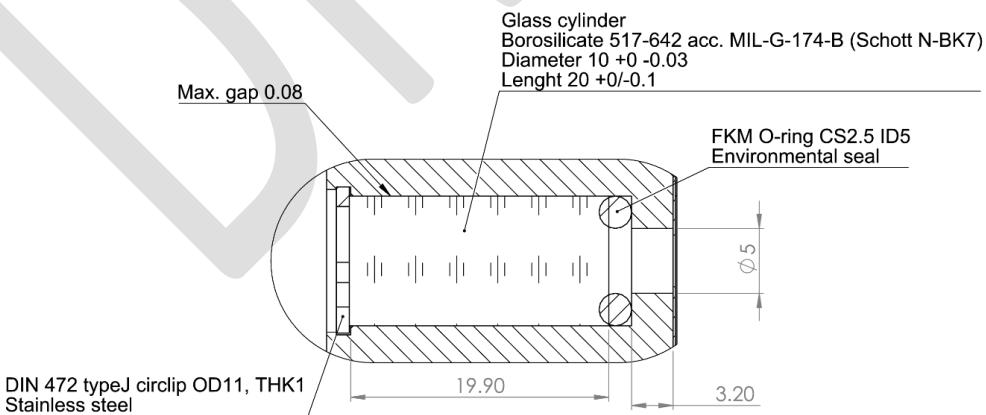


Figure 36. Flame path indicator light glass.

6 DynamiQ-X start up and commissioning

This paragraph gives step-by-step instructions on how to start-up and commission the GC. The DynamiQ-X micro-GC gas analyzers have an industrial power mode. With industrial mode the GC is directly turned on when connected to a power source. When powering up, the status LED light indicator should light up. The status LED light indicator is located at the front of the DynamiQ-X see Figure 37.

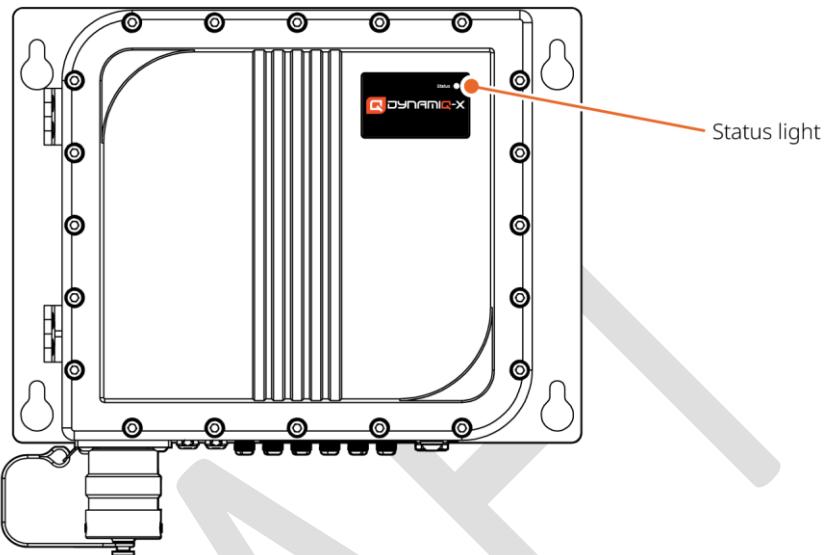


Figure 37. LED indicator on the DynamiQ-X.

6.1 Instructions to start up the DynamiQ-X micro-GC

1. Before powering up the GC ensure proper grounding and gas line connections as described in Chapter 5.
2. Power the DynamiQ-X instrument with the specified voltage as described in Chapter 8 (Technical specifications).
 - a. The DynamiQ-X easy-connect is powered by removing the environmental blanking cap of the receptacle assembly and plug cap from the cable. Plug END A of the cable to in the DynamiQ-X instrument, see Figure 20.
 - b. The DynamiQ-X universal is powered by connecting End B to the user's setup see Figure 22. Make the necessary power, IO and communication connections at the other end of the cable (END B), see Figure 20 and Figure 21 and please refer to the *Instrument configuration appendix*, or the optional Ex-e electrical junction box.
3. The instrument will start up automatically when powered.
 - a. In case the LED light indicator does not light up, the GC is unable to receive power. Contact Qmicro support team.
 - b. The LED status light blinks white and blue continuously when the instrument is switched on and is solid red when the instrument is only powered (in standby mode). Normally the instrument will start-up in idle mode. However, if the instrument is shut down during an analysis, e.g., due to a power outage, it will resume the programmed analysis sequence once it is powered back on.
 - c. If any other LED light pattern shows, please identify the GC status with Table 7.
 - d. Further operation is done via DynamiQ Explorer or DynamiQ Process software. Login is possible when the instrument starts stabilizing. Please refer to the *DynamiQ Software Manual / DynamiQ Process Software Manual* for detailed information on how to start analyzing with the DynamiQ instrument.
4. Check the actuation pressure, this should be $450 \pm 5\%$ kPa.
5. Read the *Instrument configuration appendix* to check if the analytical units should be conditioned before use.
6. The DynamiQ-X should be in idle mode for at least 2 hours, connected with carrier gas, to reach thermal equilibrium for optimal accuracy (stabilize).
7. Adjust the sample inlet pressure to get a (stable) value < 200 kPa such that enough refreshing sample is realized for the application. For an optimal accuracy, the sample pressure should be set within $\pm 10\%$ of the sample pressure at calibration, and the sample pressure cannot be higher than the lowest carrier pressure in the method.
8. The DynamiQ-X is now ready for (continuous) analysis. For detailed information how to start analyzing, please refer to the *DynamiQ Software Manual* for instructions regarding the DynamiQ Explorer software or the *DynamiQ Process Software Manual* for instructions regarding the DynamiQ Process software.

Table 7. LED status light scheme indicators for DynamiQ-X.

LED status light	Status ³
Off	Off
Solid red	Standby and powered
Solid yellow	Processor booting
Blinking yellow/red	Processor error
Solid white	Normal, processor in run mode
Solid blue	Mode: analysis running
Blinking blue/white	Mode: idle
Slow blinking (0.5 Hz)	
Blinking blue/white	Mode: stabilizing
Moderate blinking (1 Hz)	
Blinking blue/white	Mode: sequence error
Fast blinking (2.5 Hz)	
Solid yellow ⁴	System error: <ul style="list-style-type: none"> Power supply voltage critical Sample flow out of range Actuation pressure out of range
Blinking red/blue	Status error:
Fast blinking (2.5 Hz)	<ul style="list-style-type: none"> Hardware error (configuration corruption) Low memory High equipment temperature

Note that the status LED light indicator blinks blue and white when the device is connected to a power source and is thus in Idle mode. However, if the device is shut off via the DynamiQ Explorer software, the LED status light will turn red. A red LED light indicates that the device is connected to a power source but is not in use since it got turned off via the software.

Status LED light indicator precautions²



It is prohibited to remove the glass cylinder of the status LED light indicator from the lid. Otherwise, explosion safety and weather protection can no longer be guaranteed, and warranty is no longer valid.

² These precautions are in addition to the general precautions for the DynamiQ-X micro-GC analyzer. Therefore, the general precautions for the DynamiQ-X micro-GC analyzer should also be considered.

³ Older DynamiQ-X instruments have a red/blue LED status light. The LED light turns blue when the device is connected to a power source. However, if the devices are shut off via the DynamiQ software, the LED light will turn red. A red LED light indicates that the device is connected to a power source but is not in use since it got turned off via the software.

⁴ Depending on the GC mainboard type, the LED status light can also be blinking yellow/white (fast blinking (2.5 Hz)).

7 Troubleshooting, service and maintenance

For troubleshooting and support see the corresponding manuals and quick guides which are available on the Qmicro Partner SharePoint site.

For support contact Qmicro at support@qmicro.com.

For field support contact your supplier.

Troubleshooting, service and maintenance²



Except for the hinges, repair of the DynamiQ-X is prohibited. Flameproof joints are not intended to be repaired. In case of defects or damage, always contact Qmicro.

DynamiQ-X cartridge exchange precautions² and advice



Before opening the DynamiQ-X, be sure that the hinges are intact.



Power off and disconnect the DynamiQ-X, also shut off all gases before exchanging the cartridge. Take proper ESD precautions to prevent electrostatic discharge and prevent touching electronic components. Make sure there are no harmful gases present in the instrument before removing the cartridge as it may be released to the environment.



Always be sure that the sealing O-ring between enclosure body and lid is positioned in the dedicated groove before closing the lid.



Use only replacement parts supplied by Qmicro and follow the specified installation instructions.



Be careful with the sealing O-ring while replacing the cartridge. The IP rating is no longer guaranteed when the instrument is used with a damaged O-ring, and the warranty is no longer valid.



Never use the DynamiQ-X when one of the contact faces is damaged/not clean. In case of damage, contact Qmicro.



Do not reuse cartridge and lid screws that exhibit any signs of damage, contamination, or rust; to maintain the integrity of the assembly and prioritize safety.

The DynamiQ-X can be used with carrier gases He, Ar, N₂, H₂ and air, but do not use other gases as it might harm the instrument.

Note that the DynamiQ-X does not include any safety measures when using Hydrogen as the carrier gas. Therefore, safety precautions must be taken. For more information please, contact Qmicro.



For fixing the cartridge to the host, it is advised to use screws provided by Qmicro. Never use stainless steel screws to prevent cold welding.

² These precautions are in addition to the general precautions for the DynamiQ-X micro-GC analyzer. Therefore, the general precautions for the DynamiQ-X micro-GC analyzer should also be considered.

7.1 Unmounting

Follow the instructions below to unmount the DynamiQ-X.

1. Switch the DynamiQ-X off via the DynamiQ software. Please refer to the *DynamiQ Software Manual / DynamiQ Process Software Manual* for more information regarding shutting off the GC.
2. Shut off the gas supplies.
3. Disconnect the DynamiQ-X from the power supply and ensure all I/O and communication lines are unpowered and wait at least 60 minutes.
4. Disconnect the connector from the receptacle and place the protective cap on the receptacle. Also, place the protective cap on the connector.
5. Disconnect the gas connections and screw the dust caps into the gas port inlets.
6. Disconnect the grounding wire.
7. Unmount the DynamiQ-X from the wall.

7.2 Cartridge re-attachment / replacement

The DynamiQ-X micro-GC analyzers consist of an exchangeable cartridge on a host, see Chapter 5. To exchange the cartridge, please gather the necessary equipment listed Table 8 and follow instructions given below.

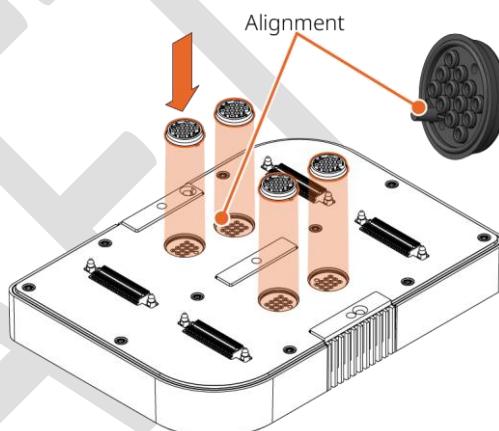
Table 8. Equipment for cartridge re-attachment and replacement.

Equipment	Brand/type
Inbus key	Generic – 3 mm inbus
Torque screwdriver	Generic – 3 mm inbus
Inbus key	Generic – 4 mm inbus

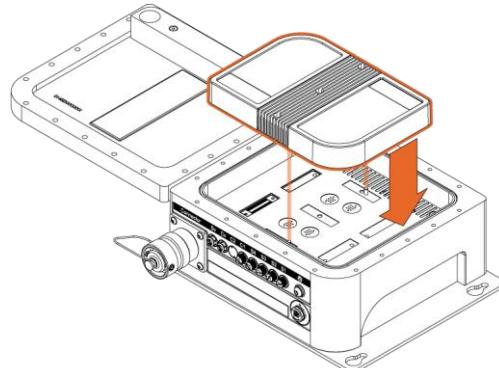
1. Shut down the GC using the DynamiQ software and make sure that **no power** is supplied to the GC and shut off all gas supplies.
2. De-energize the DynamiQ-X and wait 30 minutes without opening.
3. Make sure the device is still connected to ground and wear a properly connected ESD bracelet.
4. Make sure the hinges are intact
5. Unscrew the lid screws on the DynamiQ-X instrument with a 4 mm inbus key to open the DynamiQ-X lid and take the cartridge out.
6. Unscrew the three middle screws on the cartridge with a 3 mm inbus key that attaches the cartridge with the GC and take the cartridge out.
7. Before placing the cartridge back on the DynamiQ-X instrument host inspect and or change the gaskets if needed.

Bad cartridge connection may be solved by exchanging the gaskets on a cartridge.

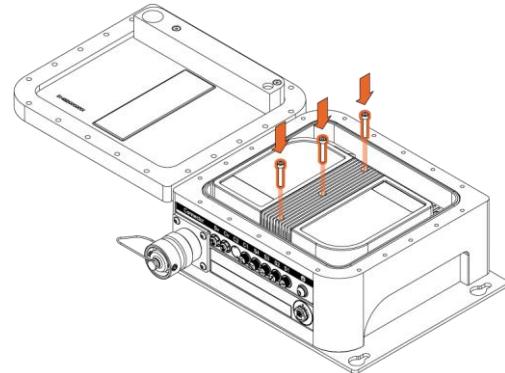
- To inspect the gasket, make sure that the gasket is securely in place on the analytical unit and does not move.
- To exchange the gasket, use tweezers to carefully detach the gasket from the analytical unit. Once the gasket is removed place another gasket aligning the gasket pin with the hole in the analytical unit. Apply slight pressure on the gasket and pinch the sides of the gasket into the analytical unit with tweezers. The gasket should be stuck to the analytical unit.



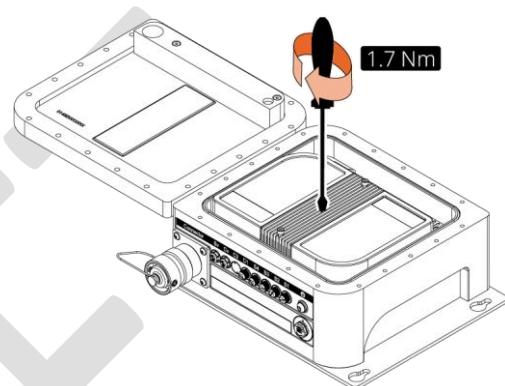
8. Place the cartridge back on the host with the two pins. Visually check that the cartridge correctly slid over the pins and is still parallel to the GC. Note that the cartridge can only be installed in one way, dowel pins prevent incorrect installation. Note that when wall-mounted, the cartridge labels (i.e., logo and text) are upside down, see also the illustration presented on step 16.



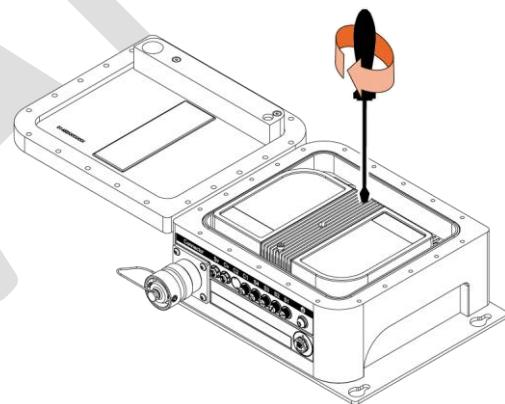
9. Place the three screws in the cartridge holes. Visually check that the cartridge correctly slides over the pins and is still parallel to the manifold.



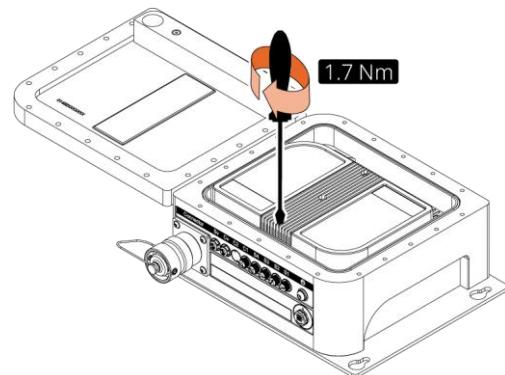
10. First tighten the center screw with mounting torque 1.7 Nm.
Use torque screwdriver.



11. Tighten the top screw until a slight resistance is felt. Do **not** apply mounting torque.

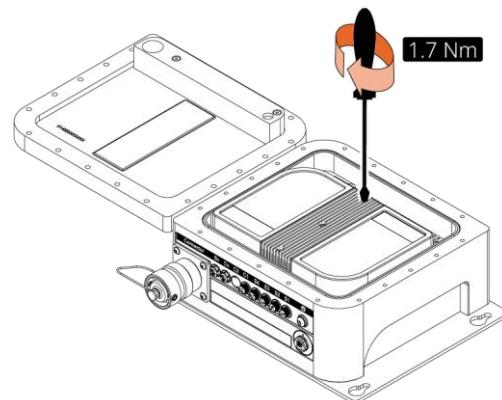


12. Tighten the bottom screw with mounting torque 1.7 Nm.
Use torque screwdriver.



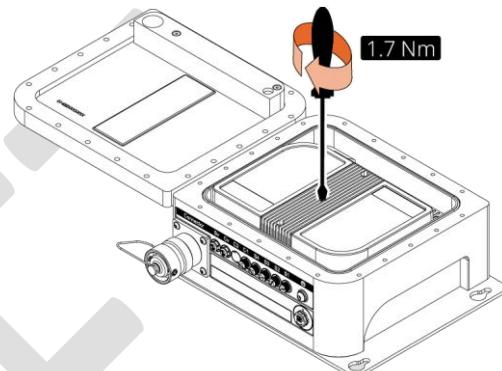
13. Tighten the top screw with mounting torque 1.7 Nm again.

- Use torque screwdriver.



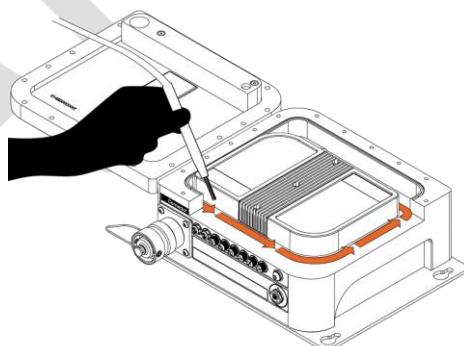
14. Tighten the middle screw again with mounting torque 1.7 Nm.

- Use torque screwdriver.

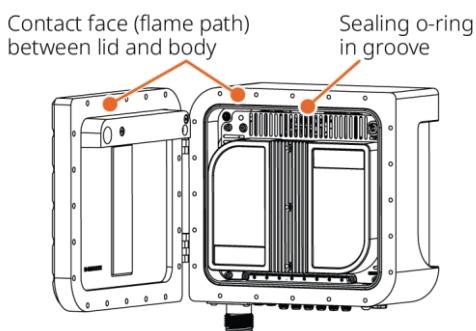


15. It is strongly recommended to perform a leak test using an electronic leak testing device around the cartridge. Note that this step can only be executed in a non-hazardous zone. When the lid is open, explosion protection and the IP rating specified in Chapter 8 is no longer valid.

- Supply the instrument with carrier gas.
- Perform leak test with electronic leak testing device.



16. Make sure that the contact face (flame path) between lid and body are clean and undamaged, and that the sealing O-ring is intact and positioned in the dedicated groove.



17. Make sure the lid screws are fit for reuse, i.e. no damage, pollution, rust, etc. Otherwise, use new screws which can be obtained from Qmicro.

18. Close the lid and tighten all lid screws. Tighten the screws with torque as specified on the Ex GC-drawing in the configuration appendix.

19. Supply the instrument with the carrier gas after mounting the cartridge back on.

Cartridge re-attachment / replacement precautions² and advice

When the DynamiQ-X micro-GC lid is open, explosion protection and the IP rating specified in Chapter 8 is no longer valid



Cartridge leak tests should be performed in a non-hazardous zone.



Avoid liquids entering inside the instrument.



Perform leak test with electronic leak testing device.

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² These precautions are in addition to the general precautions for the DynamiQ-X micro-GC analyzer. Therefore, the general precautions for the DynamiQ-X micro-GC analyzer should also be considered.

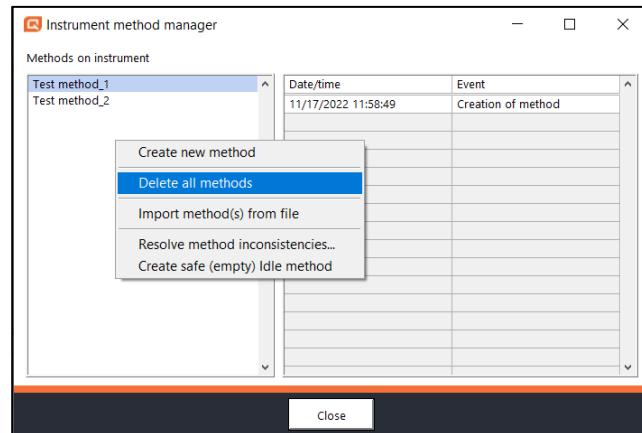
7.2.1 Commissioning the GC after the cartridge replacement

The GC can be commissioned after cartridge replacement for cartridges with or without an application method. See § 7.2.1.1 for instructions with application method and § 7.2.1.2 for instructions without.

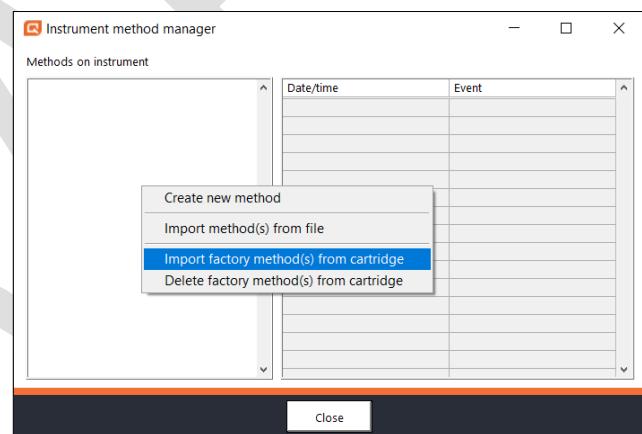
7.2.1.1 Cartridge with an application method

1. Turn on the DynamiQ micro-GC gas analyzer.
2. Log in to the DynamiQ software. Please refer to the *DynamiQ Software Manual* for more information.

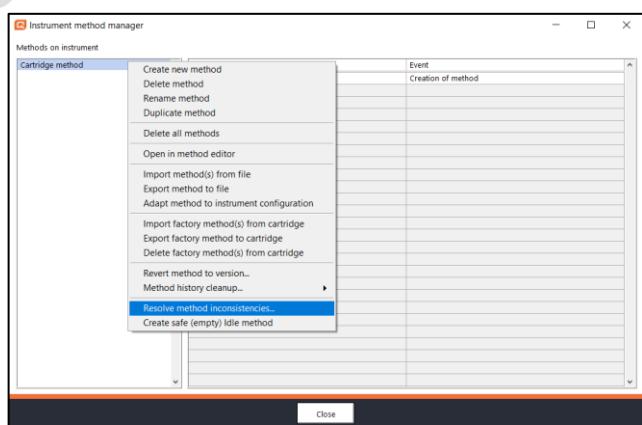
3. Go to *Instrument method manager* (Ctrl+F9). Delete all existing methods by right-clicking on a method and then click *Delete all methods*.



4. Go to *Instrument method manager* (Ctrl+F9) and import factory methods from cartridge by right-clicking on *Methods on instrument* table.



5. Go to *Instrument method manager* (Ctrl+F9) and resolve method inconsistencies by right-clicking *Methods on instrument* table.



6. Note that timing of integration events and/or identification windows may need to be adjusted. Please refer to the *DynamiQ Software Manual* for information about the integration and/or identification windows.

7.2.1.2 Cartridge without an application method

1. Switch on the DynamiQ micro-GC gas analyzer.
2. Log in to the DynamiQ software. Please refer to the *DynamiQ Software Manual* for more information.
3. Let the GC stabilize in Idle state for at least 2 hours.
4. Connect the calibration or validation sample to the selected stream and open the bottle.
5. Run the analysis method with selected stream until stabilization.
6. Check the results of all GC units, when the chromatograms are stabilized.
7. When the peaks are not identified as their correct gas components, the carrier pressure and/or the column temperature should be adjusted.
 - a. Adjust the carrier pressure accordingly to set the first peak of the chromatogram at its correct place. When the peak is on the right side of its identification window, increase the carrier pressure and when the peak is on the left side of its window decrease the carrier pressure. Do this until the first peak is identified as its correct gas component.
 - b. Then, adjust the column temperature to get the last peak in the chromatogram to its correct place. When the peak is on the right side of its identification window, increase the column temperature and when the peak is at the left side of its window decrease the column temperature.
 - c. Lastly, adjust the carrier pressure a last time to get the first peak in its correct place as described under step 7a).
8. Adjust the backflush timing when it is necessary. Please refer to *Quick guide- Backflush* for more information.
9. Run the analysis method with the new settings and check the results of all GC units. When the concentrations in the analysis results are not the same as expected from the bottle, adjust the injection time to get the correct concentrations. When the concentrations in the results are lower than expected from the bottle the injection time should be increased and when the concentrations are higher the injection time should be decreased.
10. Note that timing of integration events and/or identification windows may need to be adjusted.

Please refer to the *DynamiQ Software Manual* or the *DynamiQ Process Software Manual* for more information.

7.3 Hinges replacement

When one or both hinges are damaged or not functioning properly, the hinges should be replaced. It is allowed to replace the hinges in case of wear-out. When the lid is properly mounted to the enclosure body, the hinges can be replaced via the countersunk screws. Although the hinges do not contribute to the explosion safety, it is strongly recommended not to remove the hinges permanently.

Hinges replacement advice



Only use hinges and corresponding screws supplied by Qmicro. It is strongly recommended to replace both the hinges and screws together.

7.4 Transportation

It is strongly recommended to transport the DynamiQ-X in the carton box/robust case with protective foam as how the DynamiQ-X was delivered. To transport the DynamiQ-X instrument first follow the instructions for unmounting the instrument given in § 7.1. Thereafter, place the DynamiQ-X in the dedicated protective case/box for transportation.

Transportation advice



During shipping, dust plugs are mounted into the gas port inlets/outlets which must be removed before use. It is recommended to store the dust plugs for future transport.

It is strongly recommended to transport the DynamiQ-X in the carton box/robust case with protective foam as how the DynamiQ-X was delivered.

7.5 Cleaning

The DynamiQ-X can be cleaned with a damp cloth wetted by water, while unpowered.

Cleaning advice



Use of cleaning agents is not recommended nor is the use of a water projection nozzle.

7.6 Disposal

Follow local, national and/or international regulations to dispose of the DynamiQ-X.

Disposal precaution



The DynamiQ-X should be disposed of in accordance with the Waste Electrical and Electronic Equipment (WEEE) directive.

7.7 Overheating

If the DynamiQ-X gets too hot, it automatically shuts down via an internal thermal fuse. This is necessary to prevent the surface temperature from exceeding the T class. The thermal fuse is reset when the surface temperature decreases below 60 °C. The DynamiQ-X can then be commissioned again.

Overheating advice



If overheating occurs repeatedly while the environmental temperature is below 55 °C and the correct mounting bracket is used with the prescribed minimal distance from wall/ceiling, there may be a defect, and it is recommended to contact Qmicro.

8 Technical specifications

Environmental	
Ambient operating temperature	-20 °C to 55 °C / -4 °F to 131 °F
Ambient storage temperature	-25 °C to 70 °C / -13 °F to 158 °F
Ambient transportation temperature	-25 °C to 70 °C / -13 °F to 158 °F
Ambient relative humidity	5% to 95% non-condensing
Dust/water protection	IP65 (only valid with receptacle cap/mating connector and gas port mating connections)
Electrical	
Power supply	20 VDC to 28 VDC
Maximum power consumption	75 W
Communication	
Protocol	MODBUS over serial or Ethernet
Ports	1x RS232 (serial) 2x RS485 (serial) 2x TCP/LAN (Ethernet) 1x Digital Input 1x Digital Output
Memory storage	128 GB SD card integrated in the host
Dimensions and weight	
Dimensions	289 x 258 x 122 mm / 11.4 x 10.2 x 4.8" (without mating connector, without mounting brackets)
Weight	<15 kg / 33 lb. (without mounting brackets)
Minimal distance from wall/ceiling	50 mm / 2"
Columns	
Type	Variety of silica (WCOT/PLOT) columns
Number/type of GC units	1 to 4 columns/temperature-ramping possible (isothermal recommended)
Column temperature range	70 °C to 150 °C continuously, 180 °C intermittent
Column temperature stability	± 0.1 °C

Carrier gas

Carrier gas	He, Ar, N ₂ , H ₂ (see Chapter 2 for safety precautions regarding H ₂)
Gas purity	≥ 99.999%tr
Required filtration	5 µm filter size
Carrier gas consumption	2-5 ml/min per GC channel (application dependent)
Carrier gas input pressure	450 ± 5% kPa
Gas ports	1/16" VICI. Please refer to the <i>Instrument configuration appendix</i> .

Injector and sample gas

Sample inlets	Maximum 4. Please refer to the <i>Instrument configuration appendix</i> .
Sampling	Pressurized sample or sample pumping
Gas ports	1/16" VICI. Please refer to the <i>Instrument configuration appendix</i> .
Sample conditions	Non-condensing gas of 0°C to 50 °C
Sample pressure	10 kPa to 200 kPa (application dependent)
Injector type	Foreflush and backflush-to-detector
Heated injector	Up to 120 °C
Injection volume	0.1-17 µL uncompressed, time based

Detectors

Detector type	On chip dual channel foreflush and backflush TCD.
Internal flow path TCD	15 nl
Chemical protection	Inert coated sensors
Thermal/electrical protection	Intrinsically safe against heater burnout.

Performance

Detection range	500 ppb to 100% (application dependent)
Detection limit (for pentane in natural gas)	< 500 ppb
Repeatability (for concentrations > 0.1%)	0.05% RSD
Cycle time	Typical 15 s to 60 s (application dependent)

Safety

 0344  II 2G Ex db IIB+H₂ T4 Gb

 CLASS: 1, DIVISION: 1, GROUPS: B, C, D, T4

ATEX certificate: DEKRA 16ATEX0111

IECEx certificate: IECEx DEK 16.006

FCC ID: 2BL2G-GC446171

Certifications

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9 Resources and references

[1] "VALCO FITTINGS," 21 8 2023. [Online]. Available: <https://www.vici.com/vfit/vfit.php>.

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10 Appendices

10.1 Declaration of conformity

EU Declaration of Conformity

We,

Qmicro B.V.
Neptunusstraat 21
7521WC, Enschede
The Netherlands

hereby declare in our sole responsibility, that the following product:

Type Qmicro Ex gas chromatograph
DynamIQ-X and its private labeled or OEM equivalents

is in accordance with the Directives:

2014/34/EU, Equipment and Protective Systems in Potentially Explosive Atmospheres,

2014/30/EU, EMC Directive.

The equipment has been designed and manufactured to the relevant parts of the following harmonized standards:

EN 60079-1:2014,

EN 55011 (2009) + A1 (2010), EN-IEC 61000-4-2 (2009), EN-IEC 61000-4-3 (2006) + A1 (2008) + A2 (2010),
EN-IEC 61000-4-4 (2012), EN-IEC 61000-4-5 (2014), EN-IEC 61000-4-6 (2014), EN-IEC 61000-4-8 (2010).

Other Standards used:

EN 60079-0:2012+A11:2013

(A review against EN IEC 60079-0:2018, which is harmonised, shows no significant changes relevant to this equipment so EN 60079-0:2012+A11:2013 continues to represent "State of the Art".)

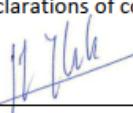
The ATEX marking of the equipment is:

CE 0344 Ex II 2G Ex db IIB+H₂ T4 Gb

T_{ambient} = -20°C...+55°C.

The equipment is certified under EU-Type Examination Certificate **DEKRA 16ATEX0111** by DEKRA Certification B.V. #0344, The Netherlands.

We hereby certify that, to the best of our knowledge, compliance with RoHS (Reg. 2011/65/EU and the delegated directive 2015/863/EU) has been verified through internal controls, receipt of supplier declarations of compliance and/or analytical tests.



Mark Kok
Managing Director
Enschede, August 22, 2023

MICRO

10.2 Applicable standards

The DynamiQ-X complies with the following standards:

Test description	Standard
Explosive atmospheres - Part 0: Equipment – General requirements	IEC 60079-0
Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"	EN 60079-1
Conducted emission, test with a LISN	EN 55011 + A1
Radiated emission up to 1 GHz (SAC)	EN 55011 + A1
ESD	EN-IEC 61000-4-2
Radiated Immunity	EN-IEC 61000-4-3 + A1 + A2
EFT	EN-IEC 61000-4-4
Surge	EN-IEC 61000-4-5
Conducted Immunity	EN-IEC 61000-4-6
Power frequency magnetic field	EN-IEC 61000-4-8

The DynamiQ-X micro-GC gas analyzer is marked with the  symbol.

10.3 ATEX and IECEx Certificates

CERTIFICATE

EU-Type Examination

Date of certification: 3 September 2020

DEKRA Certification B.V.

R. Schuller
Certification Manager

Page 1/2



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DEKRA Certification B.V. Meander 1051, 6825 MJ Arnhem P.O. Box 5185, 6802 ED Arnhem The Netherlands
T +31 88 96 83000 F +31 88 96 83100 www.dekra-product-safety.com Registered Arnhem 09085396

**(13) SCHEDULE**

(14) to EU-Type Examination Certificate DEKRA 16ATEX0111 Issue No. 1

(15) Description

The gas chromatograph is a chemical analysis instrument for determining gas composition of a complex gas sample. The gas chromatograph consists of a single Ex d enclosure and is provided with a separately certified Amphenol receptacle and optionally with a remote junction box, for connection of the power supply and communication cable.

Ambient temperature range -20 °C to +55 °C.

Degree of protection: IP65 in accordance with EN 60529 and EN 60079-0.

Electrical data

Power supply: 20 to 28 Vdc

Power consumption: max. 75 W

Installation instructions

The instructions provided with the product shall be followed in detail to assure safe operation.

(16) Report Number

No. NL/DEK/ExTR/16.0087/01.

(17) Specific conditions of use

None.

(18) Essential Health and Safety Requirements

Covered by the standards listed at item (9).

(19) Test documentation

As listed in Report No. NL/DEK/ExTR/16.0087/01.

(20) Certificate history

Issue 0 - 219648000 initial certificate

Issue 1 - 224819100 manufacturer address change



IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx DEK 16.0065	Page 1 of 4	Certificate history Issue 0 (2017-03-23)
Status:	Current	Issue No: 1	
Date of Issue:	2020-09-03		
Applicant:	Qmicro B.V. Neptunusstraat 21 Enschede 7521 WC Netherlands		
Equipment:	Gas Chromatograph		
Optional accessory:			
Type of Protection:	Ex db		
Marking:	Ex db IIB+H2 T4 Gb		

Approved for issue on behalf of the IECEx
Certification Body:

R. Schuller

Position:

Certification Manager

Signature:
(for printed version)

Date:

2020-09-03

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.



Certificate issued by:

DEKRA Certification B.V.
Meander 1051
6825 MJ Arnhem
Netherlands





IECEx Certificate of Conformity

Certificate No.: **IECEx DEK 16.0065**

Page 2 of 4

Date of issue: **2020-09-03**

Issue No: 1

Manufacturer: **Qmicro B.V.**
Neptunusstraat 21
Enschede 7521 WC
Netherlands

Additional
manufacturing
locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2011 Explosive atmospheres - Part 0: General requirements
Edition:6.0

IEC 60079-1:2014-06 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
Edition:7.0

This Certificate does not indicate compliance with safety and performance requirements
other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

[NL/DEK/ExTR16.0087/01](#)

Quality Assessment Report:

[NL/DEK/QAR17.0003/02](#)



IECEx Certificate of Conformity

Certificate No.: **IECEx DEK 16.0065**

Page 3 of 4

Date of issue: **2020-09-03**

Issue No: **1**

EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The gas chromatograph is a chemical analysis instrument for determining gas composition of a complex gas sample. The gas chromatograph consists of a single Ex d enclosure and is provided with a separately certified Amphenol receptacle and optionally with a remote junction box, for connection of the power supply and communication cable.

Ambient temperature range: -20 °C to +55 °C
Power supply: 20 to 28 Vdc
Power consumption: max 75 W

Degree of protection: IP65 in accordance with IEC 60529 and IEC 60079-0

SPECIFIC CONDITIONS OF USE: NO



IECEx Certificate of Conformity

Certificate No.: **IECEx DEK 16.0065**

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Date of issue: **2020-09-03**

Issue No: 1

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

Manufacturer address change

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