



~~MIRO~~



MULTICOMPONENT GAS ANALYZER

## MGA Overview

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High-precision all-in-one gas analyzers to combat climate change and air pollution

Innovation with Integrity

## Highlights

- Measures 10 gases simultaneously selectable from: **CH<sub>4</sub>, CO, CO<sub>2</sub>, SO<sub>2</sub>, NH<sub>3</sub>, N<sub>2</sub>O, NO, NO<sub>2</sub>, H<sub>2</sub>O, O<sub>3</sub>, OCS, HCHO and HONO**
- Direct measurement of all compounds (incl. NO<sub>2</sub>)
- High precision for ambient air quality and greenhouse gas monitoring at low concentrations
- High time resolution (1 Hz or 10 Hz)
- Suitable for laboratory applications, field deployable and mobile measurements (aircraft, vehicle, marine, ground-based stations)

The MIRO MGA<sup>10</sup>-GP has revolutionized and simplified the monitoring of greenhouse gases and air pollutants by enabling simultaneous online measurements of 10 gases at high measurement rates, while offering excellent stability and precision. Different gas combination options are below:

	Gas Species	MGA <sup>10</sup> - GP				MGA <sup>5</sup> - GHG	MGA <sup>3</sup> - GHG		
		C1	C2	C3	C4		C1	C2	C3
GHG	H <sub>2</sub> O	✓	✓	✓	✓	✓	✓	✓	✓
	CO	✓	✓	✓	✓	✓	-	✓	-
	CO <sub>2</sub>	✓	✓	✓	✓	✓	-	-	✓
	N <sub>2</sub> O	✓	✓	✓	-	✓	✓	✓	-
	CH <sub>4</sub>	✓	✓	-	✓	✓	✓	-	-
Pollutants	NH <sub>3</sub>	✓	✓	✓	✓	-	-	-	-
	NO	✓	✓	✓	✓	-	-	-	-
	NO <sub>2</sub>	✓	✓	✓	✓	-	-	-	-
	O <sub>3</sub>	✓	✓	✓	✓	-	-	-	-
	OCS	-	✓	✓	✓	-	-	-	✓
	SO <sub>2</sub>	✓	-	-	✓	-	-	-	-
	HONO	-	-	✓	-	-	-	-	-

MIRO's MGA<sup>10</sup>-GP analyzers directly measure concentrations of all compounds using mid-infrared laser absorption spectroscopy with **Quantum Cascade Lasers**. This allows for highly specific and accurate gas detection along with maximum measurement sensitivity.

Our analyzers are typically free of measurement interferences from other gas species. The intuitive touch display enables fast and easy control. The analyzer is suitable for various applications from air monitoring to **eddy covariance flux** measurements.

MIRO's products are made in Switzerland and undergo strict quality control before shipping.

## Applications

MGA is a general purpose multicomponent gas analyzer suitable for a wide range of applications.

### Atmospheric Science



- Direct & precise
- Continuous measurements of most of the regulated/observed atmospheric gases
- Almost no maintenance required

### Biosphere



- Field deployable
- Low gas flows possible
- No interference from other gases

# Accessories & Options

## • 10 Hz Sampling Rate

An increased flow and sampling rate enables fast measurements as required for eddy covariance.



## • MIRO Mobile Kit

Shock-proofed rack including a battery to run the system up to 10 h without external power supply. Ideal for airborne, zeppelin-, ship- or car-based mobile measurements.

System Parameters	Specification
Dimensions	94 w x 66 h x 70 d
Rack Weight	29 kg
Total System Weight	109 kg
Battery Capacity	3 kWh
Max. Vertical Acceleration	5 G



## Eddy Covariance



- Field deployable
- High time resolution (10 Hz)

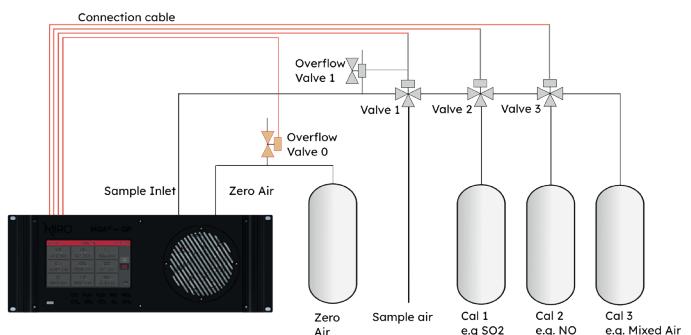
## • MIRO Field Enclosure

Protects the instrument with rugged casing and provides a temperature controlled environment for stable measurements.



## • Valve Sequencer Option

Adjustable automatic valve sequencer controlling up to 3 external 3 way valves. Ideal for advanced calibration settings.



## Mobile Measurements



- Compact & robust
- Shock-proofed
- Lower power consumption
- All-in-one lab

## General Technical Specifications

Parameters	1 Hz	10 Hz
Ambient Temperature		15 - 30°C
Ambient Humidity		< 90% RH, non-condensing
Sample Pressure		700 - 1050 mbar
Sample Flow Rate	0.5 to 1.5 slpm	15 slpm
Sample Inlet Fittings	6 mm - Swagelok	12 mm - Swagelok
Dimensions		48 w x 18 h x 70 d (cm)
Accessories required		Chiller unit, Vacuum pump
Weight	20 kg (Analyzer), 11 kg (Chiller unit), 9 kg (Vacuum pump)	20 kg (Analyzer), 11 kg (Chiller unit), 24 kg (Vacuum pump)
Power	100–240 VAC / 50–60 Hz; <100 W Analyzer, <230 W (Pump and Chiller unit)	100–240 VAC / 50–60 Hz; <100 W Analyzer, <450 W (Pump and Chiller unit)
Installation		19" Rack mountable or benchtop
Digital Ports		RS232 (for data output), USB, Ethernet
Connectivity	The instrument provides remote access and control of its main functionalities. It contains a PC which is running the instrument software. If a network access is provided, the instrument's full functionality can be accessed via a remote control software.	
Electrical and Laser Safety	CE-Mark (EN IEC 61326-1: 2021, EN IEC 61000-3-2: 2019, EN 61000-3-3:2013/ A2 :2021, EN 61010-1:2010/ A1:2019/AC:2019, EN 60825-1:2014/ AII:2021/AC:2022, EN IEC 63000:2018)	
Service Interval	The instrument is suitable for operation without on-site interventions for a period of at least three weeks.	

## Specifications

Species	MGA <sup>10</sup> - GP	MGA <sup>5</sup> - GHG	MGA <sup>3</sup> - GHG	Max. Drift* (24 hours)	Specification Range	Measurement Range (ppm)
	Precision @ 1s / <200 s	Precision @ 1s / <200 s	Precision @ 1s / <200 s			
CH <sub>4</sub> (ppb)	1 (0.2)	1 (0.2)	0.3 (0.1)	5	1'000 - 3'000	0 - 200
CO (ppb)	0.4 (0.1)	0.4 (0.1)	0.1 (0.05)	1	0 - 1'000	0 - 20
CO <sub>2</sub> ** (ppm)	0.5 (0.05)**	0.5 (0.05)	0.5 (0.05)	1	300 - 500	0 - 8'000
SO <sub>2</sub> (ppb)	2 (0.2)	-	-	5	0 - 300	0 - 150
NH <sub>3</sub> (ppb)	0.1 (0.02)	-	-	1	0 - 50	0 - 15
N <sub>2</sub> O (ppb)	0.5 (0.05)	0.2 (0.07)	0.03 (0.01)**	2	300 - 400	0 - 20
NO (ppb)	0.8 (0.1)	-	-	2	0 - 400	0 - 100
NO <sub>2</sub> (ppb)	0.4 (0.04)	-	-	1	0 - 200	0 - 40
H <sub>2</sub> O (ppm)	20 (2)	30 (5)	10 (5)**	120	0 - 30'000	0 - 100'000
O <sub>3</sub> (ppb)	1 (0.2)	-	-	10	0 - 300	0 - 300
OCS (ppb)	0.05 (0.01)	-	-	2	0 - 100	0 - 2
HONO (ppb)	2 (0.4)	-	-	10	0 - 300	0 - 5

\* Maximum pk-to-pk difference of 1-hour averaged data over 24 hours. Drift for reactive species (SO<sub>2</sub>, NO, NO<sub>2</sub>, O<sub>3</sub>) can be greatly improved by activating MIRO's automatic zero-air correction using scrubbed, clean air or nitrogen. \*\* Depending on the configuration these values might slightly differ.

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