



GenTwo V2.4

## Multigas Analyzer GenTwo V2.4

M&C premium series GenTwo® features an innovative modular navigation and sensor concept

### Special Features

- **Modular design for up to 6 different sensors**
- **Resistive 7" color touch display**
- **Multi-sensor enabled**
  - Paramagnetic oxygen sensor (PMA2)
  - ZrO<sub>2</sub> oxygen sensor (in-situ)
  - Electrochemical oxygen sensor
  - Electrochemical H<sub>2</sub>S sensor
  - Thermal conductivity detector (TCD)
  - NDIR/NDUV/UVRAS photometers
- **Measured value storage over one year directly in the analyzer**
- **Pressure compensation 0.8 to 1.2 bar abs.**
- **Analog signal outputs 0-20/4-20 mA**
- **Modbus and AK protocol TCP/IP**
- **Ethernet/USB**
- **User-programmable limit values**
- **Remote operation via VNC viewer**
- **Three different housings:**
  - 19" rack housing short
  - 19" rack housing long
  - Wall-mount housing

### Application

The Multigas Analyzer of the GenTwo® series is suitable for continuous measurements of gases in gas mixtures.

Areas of application are in particular combustion control, process optimization in a wide variety of industries, inertization monitoring, environmental protection or laboratory measurements, each in non-explosive environments.

### Description

The Multigas Analyzer is characterized by its modular design and innovative navigation concept. This enables fast intuitive understanding and adaptation of the analyzer to a wide variety of applications. Display and functions can be set according to the operator's requirements, for example language, measuring ranges, physical units, application-related designations.

The basic design of the analyzer is mounted in a 19" rack or wall-mount housing and is connected using FKM (Viton®) tubing. As an option, the internal gas paths can be ordered in PTFE or stainless steel. All device variants have a wide-range power supply, a resistive 7" color touch display and can be equipped with up to 6 measuring channels/sensors incl. the corresponding sensor and I/O electronics. Pressure transducers are used for process pressure compensation and flow monitoring. Depending on the sensor type, temperature monitoring is available.

For NDIR benches, humidity compensation can be built in if necessary.

Each measured value is available as mA signal. The Multigas Analyzer offers status and alarm outputs as well as two freely programmable limit values per measuring channel. All measured values are provided via the Modbus and AK communication protocol on the Ethernet port. A special feature is the integrated data logger function for time-resolved display and long-term recording of measurement, warning and alarm messages. The Multigas Analyzer offers the user convenient calibration functions for zero point and full scale calibration.

### Sensors

#### – Paramagnetic oxygen sensor PMA2

The M&C oxygen transmitter uses the paramagnetic properties of oxygen. The compact design of the transmitter and the small measuring cell offers short response times and a long service life.

The dumbbell principle implemented here represents a physical, wear-free and proven measuring method. It is suitable for low-drift, long-term stable measurements in the range from 0 to 100 vol% or for purity measurements with suppressed zero point.

#### – ZrO<sub>2</sub> oxygen sensor

This sensor type uses the diffusion properties of oxygen ions on a high-temperature doped ceramic solid electrolyte. An electrical potential known as the Nernst voltage is established between a Pt working electrode and a reference electrode. This allows a robust in-situ oxygen measurement from 0 to 21 vol%. Mounted in M&C gas sample probes, it can be used for fast control tasks in combustion processes.

#### – Electrochemical oxygen sensor

This compact, fast-response, long-life sensor measures the oxygen content in a gas mixture, typically up to 25 vol% over an electrochemically generated voltage. The electrochemical oxygen sensor is CO<sub>2</sub>-resistant.

#### – Electrochemical H<sub>2</sub>S sensor

This compact sensor is available for different hydrogen sulfide concentrations from 10 to 10 000 ppm.

#### – Thermal conductivity detector (TCD)

This type of sensor uses the thermal properties of gases. In the design implemented here, the thermal conductivity of hydrogen in a binary gas mixture is used to determine the H<sub>2</sub> concentration.

**- NDIR/NDUV/UVRAS photometers**

With this technique, the concentration of multiatomic gases, i.e. molecules with permanent or induced electrical dipole moment, can be determined.

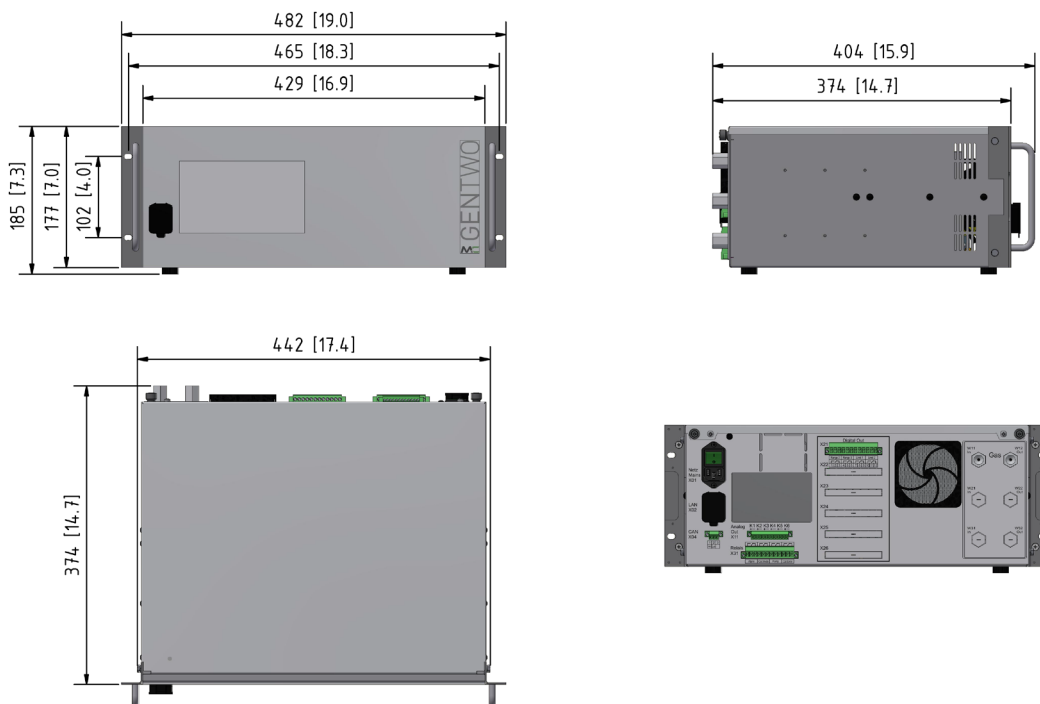
For the measurement of nitrogen monoxide (NO), the UV resonance absorption method is used. In contrast to the LED-based UV measuring benches, the UVRAS uses an electrode-free UV discharge lamp (EDL). The measuring cells are available in various lengths for different measuring ranges.

The measuring benches realized here are robust and do not require any moving parts. Up to three gases can be measured using one bench. In addition, the three basic measuring principles can be combined on one bench.

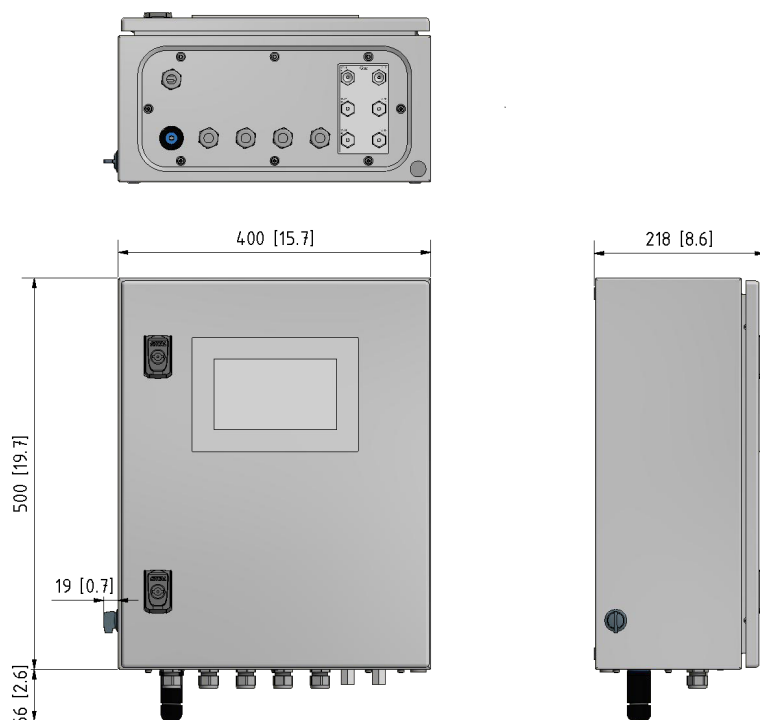
A temperature compensation at zero and end point is standard. If required, additional water vapor compensation can be added using a capacitive humidity sensor for NDIR measurements.

For increased stability of the measurement, the measurement benches can be installed in a thermobox heated to a temperature between 45 and 50 °C [113 and 122 °F]. An optional AutoZero- module for automatic cyclic zero adjustment is available.

**Dimensions 19"-rack housing (long housing)**



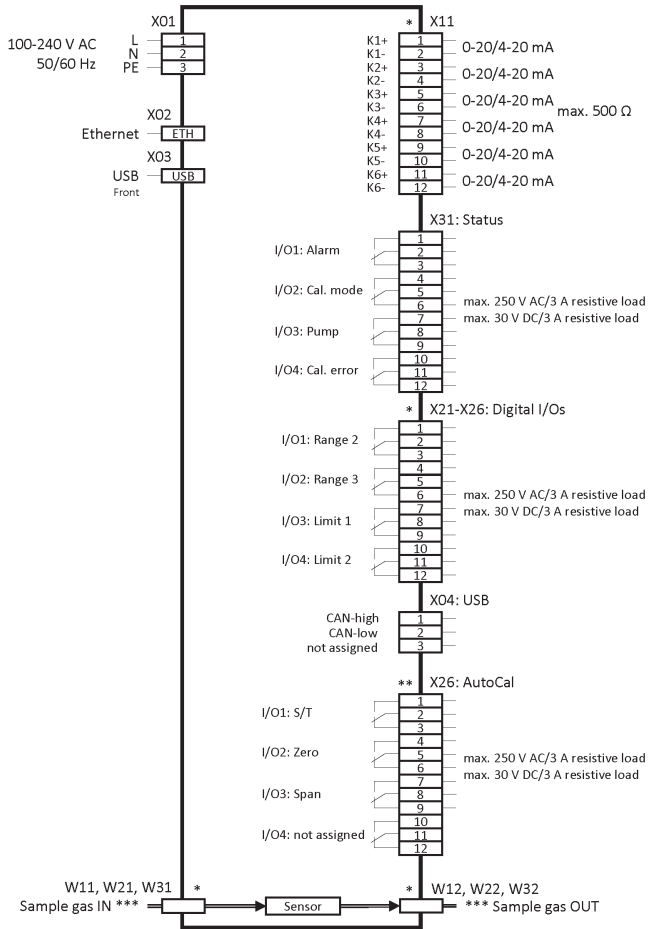
**Dimensions wall-mount housing**



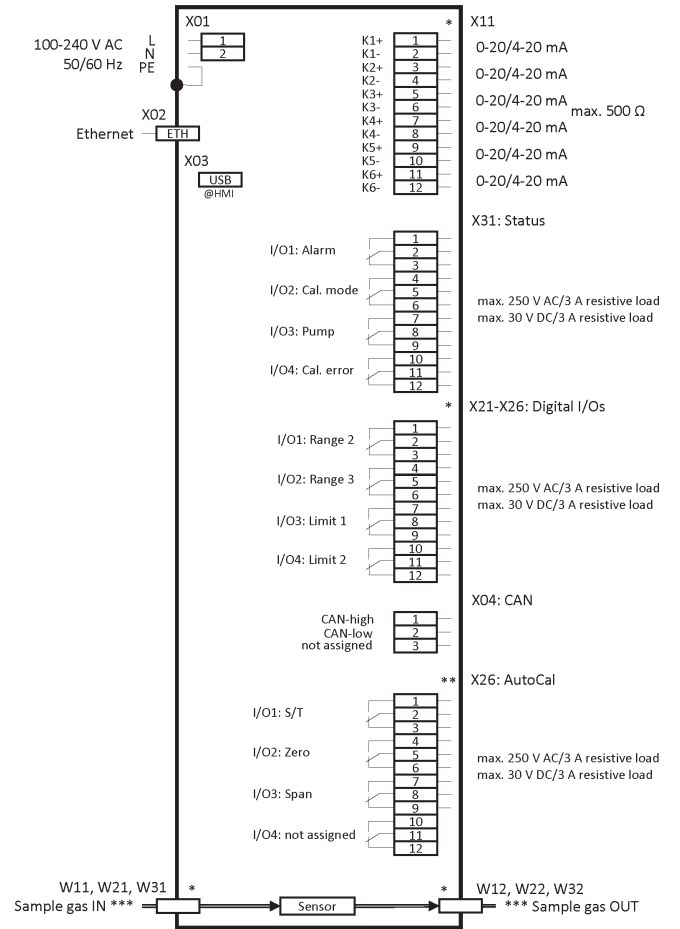
Dimensions in mm [Inches]

# Interfaces diagrams

## 19"-rack housing



## Wall-mount housing



\* Number of these interfaces depending on the application

\*\* Only equipped with the AutoCal function

\*\*\* G 1/4" female, if internal tubing is made of Viton®/PTFE; 1/8" NPT female, if internal tubing is made of stainless steel

## Technical specifications in general

Multigas Analyzers of the GenTwo® Series	GenTwo V2.4
Basic device w/o sensors, short housing: Part No.	08A2240
Basic device w/o sensors, long housing: Part No.	08A2230
Basic device w/o sensors, wall-mount housing: Part No.	08A2220
Warm-up period	Approx. 30 min. depending on sensor configuration
Response time for 90 %	Depending on sensor used and on configuration
Sample gas flow rate	25 to max. 120 NI/h, depending on sensor used
Sample gas inlet pressure	800 to 1200 mbar abs. pressure-compensated
Sample gas outlet pressure	Recommendation: discharge freely into atmosphere (requires higher pressure at the analyzer inlet compared to the outlet)
Sample gas temperature and characteristics	0 to +50 °C [+32 to +122 °F]; dry, oil- and dust-free gas, avoid temperature dropping below dew point
Ambient temperature	0 to +50 °C [+32 to +122 °F] depending on sensor configuration, avoid temperature dropping below dew point
Storage temperature	-20 to +60 °C [-4 to +140 °F], avoid condensation
Display	7" capacitive color touchscreen
Measuring ranges in general	4 measuring ranges, two of them adjustable, suppressed zero point possible
Output signals	Analogue: 0-20/4-20 mA, max. 500 Ohm; digital: Modbus/TCP, AK Protokoll TCP/IP
Status relay outputs	4 x relay output (1 x status, 1 x Cal. mode, 1 x pump, 1 x Cal. error) contacts: 250 V AC/3 A or 30 V DC/3 A at resistive load, change-over contact, potential-free
Digital relay outputs	4 x per measuring signal DO (2 x limit values, 2 x measuring range feedback) contacts: 250 V AC/3 A or 30 V DC/3 A at resistive load, change-over contact, potential-free
Interfaces	Ethernet/USB
Communication protocol	Modbus TCP/IP and AK protocol TCP/IP
Mains connection	100 to 240 V AC, -15/+10 %, 50 to 60 Hz power supply
Power consumption	Max. 150 VA

## Technical specifications in general (continued)

Multigas Analyzers of the GenTwo® Series	GenTwo V2.4
Wetted materials	Platinum, epoxy resin, glass, FKM (Viton®), stainless steel 316Ti, PVDF, PPS, depending on tubing material
Sample gas connection	Screw-on bulkhead fitting with 1/4" internal thread, PVDF (standard)
Case protection	IP20: 19" rack housing, IP54: wall-mount housing, EN 60529
Electrical standard	EN 61010
Housing color	RAL 9003, signal white
Maximum installation altitude	2000 m [≈ 6561.7 ft]
Long housing: dimensions (W x H x D)	482 x 185 x 404 [≈ 19" x 7.3" x 15.9"], length of gas connection fittings is additional
Short housing: dimensions (W x H x D)	482 x 185 x 265 mm [≈ 19" x 7.3" x 10.4"], length of gas connection fittings is additional
Wall-mount housing: dimensions (W x H x D)	400 x 500 mm plus approx. 66 mm gas connection fitting x 218 mm [≈ 15.7" x 19.7" plus approx. 2.4" gas connection fitting x 8.6"]
Long housing: weight	Approx.13 kg [≈ 29 lbs] (depending on sensor configuration)
Short housing: weight	Approx.11 kg [≈ 24 lbs] (depending on sensor configuration)
Wall-mount housing: weight	Approx.18 kg [≈ 39.7 lbs] (depending on sensor configuration)

Options	
08A2650	Front filter FPF+
08A2660	Flow meter FM40
98A2550	For 19" housing: telescopic slides in EU version
98A2500	For 19" housing: telescopic slides in US version

Please note: NI/h and NI/min refer to the German standard DIN 1343 and are based on these standard conditions: 0 °C [32 °F], 1013 mbar.  
 Viton® is a registered trademark of DuPont Performance Elastomere

## Technical specifications sensors

### Paramagnetic oxygen sensor PMA2

Multigas Analyzer GenTwo® Series	PMA2
Part No. Add-on PMA2, for connection with Viton®	08A2730
Part No. Add-on PMA2, for connection with PTFE	08A2740
Part No. Add-on PMA2, for connection with stainless steel	08A2750
Gas measured	O <sub>2</sub>
Measuring ranges (min./max. range)	0-1/0-100 vol%
Limit of detection (LOD)*	Up to 0.02 vol%
Response time for 90 % FSD**	< 3 s at 60 NI/h
Noise	≤ 0.2 % of full scale value or better
Linearity error	< ±0.1 vol%
Reproducibility deviation*	< ±0.01 vol%
Accuracy after calibration*	±1 % of full scale value or 0.02 vol% O <sub>2</sub> , depending on which value is greater
Zero drift	< 0.06 vol% in 72 hours
Sample gas flow rate	25-60 NI/h
Transmitter temperature	Factory setting +55 °C [131 °F]
Wetted materials	Glass, platinum, FKM (Viton®), stainless steel 316Ti, epoxy resin, PP, ceramic, nickel

\* At constant ambient conditions in the compensated temperature and pressure range (±0.015 %/mbar). Additionally the limit of detection (LOD) is depending on sample gas and the selected measuring range.

\*\* Depends on sample gas input pressure, density and flow rate at the analyzer input.

## Technical specifications sensors

### Electrochemical oxygen sensor

Multigas Analyzer GenTwo® Series	Electrochemical oxygen sensor
Part No. Add-on O <sub>2</sub> electrochem. sensor	08A3060
Gas measured	O <sub>2</sub>
Measuring ranges (min./max. range)	0-1/0-25 vol%
Limit of detection (LOD)*	0.1 vol%
Response time for 90 % FSD**	< 10 s, depending on the number and type of sensors used
Linearity error	0-2 vol% O <sub>2</sub> : ±0.1 vol%; 2.1-25 vol% O <sub>2</sub> : 0.5 % of measured value
Reproducibility deviation*	±1 vol% at 100 vol% O <sub>2</sub> applied for 5 min
Accuracy after calibration*	±1 % of full scale value, not better than 0.1 vol%
Drift	< 1 % per month, averaged over 12 months
Sample gas flow rate	25-60 NI/h
O <sub>2</sub> sensor temperature	Not heated
Wetted parts	ABS, PVC, PPS, PVDF, PTFE, stainless steel
Shelf time	< 6 months recommended
Cross-sensitivities	< 20 ppm at 100 vol% CO, CO <sub>2</sub> , C <sub>3</sub> H <sub>8</sub> , < 400 ppm at 100 vol% H <sub>2</sub> (complete list on request)

### ZrO<sub>2</sub> oxygen sensor

Multigas Analyzer GenTwo® Series	Zirkonium dioxide oxygen sensor
Part No. Add-on ZrO <sub>2</sub> Sensor	08A2430
Gas measured	O <sub>2</sub>
Measuring ranges (min./max. range)	0-1/0-18 vol% (up to 21 vol% with reduced accuracy)
Limit of detection (LOD)*	0.1 vol%
Response time for 90 % FSD**	Depending on the installation type of the sensor
Noise	0.2 % of full scale value
Linearity error	< ±0.5 vol% of full scale value
Accuracy after calibration*	10 % of measured value, not better than ±0.5 vol%
Zero drift	< 1 % of full scale value per month
Sample gas temperature at the sensor, outside the analyzer	Up to +320 °C [608 °F], process gas
Ambient temperature	5 to 50 °C [41 to 122 °F]
O <sub>2</sub> Sensor temperature	Factory setting > 600 °C [1112 °F]
Wetted parts	Stainless steel, platinum, ZrO <sub>2</sub>
Cross-sensitivities	CO, H <sub>2</sub> , unburned hydrocarbons

### Electrochemical H<sub>2</sub>S sensor

Multigas Analyzer GenTwo® Series	Electrochemical H <sub>2</sub> S sensor
Part No. Add-on H <sub>2</sub> S electrochemical sensor (1-50 ppm)	08A3100
Part No. Add-on H <sub>2</sub> S electrochemical sensor (50-1000 ppm)	08A3110
Part No. Add-on H <sub>2</sub> S electrochemical sensor (500-10000 ppm)	08A3120
Gas measured	H <sub>2</sub> S
Measuring ranges (min./max. range)	1-50/500-10,000 ppm
Response time for 90 % FSD**	< 25-90 s, depending on the number and type of sensors used
Reproducibility deviation*	< 2 % of measured value, applied for 5 min alternating test gas and dry air
Accuracy after calibration*	±1 % of full scale value, not better than 0.1 vol%
Sample gas flow rate	25-60 NI/h
Sensor temperature	Not heated
Wetted parts	PP, PPS, PVDF, PTFE, stainless steel
Shelf time	< 3 months recommended
Cross-sensitivities	Depending on sensor type, complete list on request

\* At constant ambient conditions in the compensated temperature and pressure range (±0.015 %/mbar). Additionally the limit of detection (LOD) is depending on sample gas and the selected measuring range.

\*\* Depends on sample gas input pressure, density and flow rate at the analyzer input.

## Technical specifications sensors

### Thermal conductivity detector (TCD)

Multigas Analyzer GenTwo® Series	Thermal conductivity detector (TCD)
Part No. Add-on H <sub>2</sub> TCD sensor, for PTFE connection	08A2850
Part No. Add-on H <sub>2</sub> TCD sensor, for stainl. steel connection	08A2860
Gas measured	H <sub>2</sub>
Measuring ranges (min./max. range)	0-1/0-100 vol%
Limit of detection (LOD)*	0.1 vol%
Response time for 90 % FSD**	< 1 s at 60 NI/h
Noise	< 1 % of full scale value
Linearity error	< 1 % of full scale value
Reproducibility deviation*	< 1 % of full scale value
Accuracy after calibration*	< 1 % of full scale value, not better than 0.1 vol%
Zero drift	< 2 % of full scale value per week
Sample gas flow rate	25 - 60 NI/h
Sensor temperature	63 °C
Wetted parts	SS 316Ti, silicon oxinitrite (ceramic), gold, covar, epoxy
Cross-sensitivities	Sensor is suitable for binary gas mixtures, complete list on request

### Available measuring ranges: oxygen sensors, electrochemical H<sub>2</sub>S sensor and TCD

Measuring ranges	O <sub>2</sub> PMA2	O <sub>2</sub> Zirconia	O <sub>2</sub> electrochemical	H <sub>2</sub> S electrochemical	H <sub>2</sub> TCD
0-100 vol%	x	-	-	-	x
0-50 vol%	x	-	-	-	x
0-30 vol%	x	-	-	-	x
0-25 vol%	x	-	x	-	x
0-20 vol%	x	x	x	-	x
0-10 vol%	x	x	x	-	x
0-5 vol%	x	x	x	-	x
0-1 vol%	x	x	x	x	x
0-50 ppm	-	-	-	x	-

x: Available gas and measuring range, -: Measuring range not available  
Other gases on request

### NDIR/NDUV/UVRAS photometers

Technical Data	NDIR	NDUV	UVRAS
Limit of detection (LOD) in % of full scale value (3 σ)*	< 0.1-1	< 0.1-0.5	< 0.1-0.5
Response time for 90 % FSD**	< 10 s		
Linearity error	< ±1 % of full scale value		
Reproducibility deviation*	±0.5 % of full scale value		
Long time stability (zero drift)***	< ±2 % of full scale value per week	< ±1 % of full scale value per 24 hours	< ±2 % of full scale value per 24 hours
Long time stability (measuring range drift)	< ±2 % of full scale value per month	< ±1 % of full scale value per month	
Temperature influence: zero point****	< 1 % of full scale value per 10 Kelvin		
Temperature influence: measuring range****	< 2 % of full scale value per 10 Kelvin		
Pressure influence	< 1.5 % per 10 hPa of the measured value (with pressure compensation < 0.15 % per 10 hPa of the measured value)		
Wetted parts	Depending on the selected version: FKM (Viton®), stainless steel 1.4571, aluminium with/without protective coating, PVDF, PPS		
Cross-sensitivities	Internal compensation for multiple measuring benches, application-dependent, complete list on request		

### Options

Pressure sensor for process pressure compensation

Capacitive H<sub>2</sub>O sensor for internal water vapor compensation, measuring range 0-1 vol%, for selected NDIR measuring benches

\* At constant ambient conditions in the compensated temperature and pressure range (±0.015 %/mbar). Additionally the limit of detection (LOD) is depending on sample gas and the selected measuring range.

\*\* Depends on sample gas input pressure, density and flow rate at the analyzer input.

\*\*\* The long-term zero drift can be reduced by using an AutoZero module.

\*\*\*\* The temperature dependence can be reduced by using a heated box (THB 50 °C).

## Technical specifications sensors

### Available gases and standard measuring ranges: NDIR photometers

Measuring ranges	CO <sub>2</sub>	CO	CH <sub>4</sub>	C <sub>n</sub> H <sub>m</sub>	N <sub>2</sub> O	SF <sub>6</sub>	CF <sub>4</sub>	NO	H <sub>2</sub> O
0-100 vol%	x	x	x	x	x	x	x	-	-
0-50 vol%	x	x	x	x	x	x	x	-	-
0-30 vol%	-	*	*	*	*	*	*	-	-
0-20 vol%	x	-	-	-	*	*	*	-	x
0-10 vol%	x	x	x	x	*	*	*	-	x
0-5 vol%	x	x	x	x	*	*	*	-	x
0-1 vol%	x	x	x	x	-	-	*	x	x
0-5000 ppm	x	x	x	x	-	x	*	x	x
0-2000 ppm	x	x	x	x	x	x	*	x	-
0-1000 ppm	x	x	x	x	x	x	*	x	-
0-500 ppm	x	x	x	-	x	-	-	-	-
0-300 ppm	-	-	-	-	x	-	-	-	-
0-100 ppm	x	-	-	-	x	x	-	-	-
0-50 ppm	x	-	-	-	-	x	-	-	-
0-10 ppm	-	-	-	-	-	-	-	-	-

### Available gases and standard measuring ranges: NDUV photometers

Measuring ranges	H <sub>2</sub> S	SO <sub>2</sub>	NO <sub>2</sub>	Cl <sub>2</sub>	O <sub>3</sub>
0-100 vol%	-	-	-	-	-
0-50 vol%	-	-	-	-	-
0-30 vol%	-	-	-	x	-
0-20 vol%	-	-	-	-	-
0-10 vol%	*	x	-	x	-
0-5 vol%	*	x	-	x	-
0-1 vol%	*	*	-	*	-
0-5000 ppm	x	x	x	*	-
0-2000 ppm	x	x	x	*	x
0-1000 ppm	x	x	x	*	x
0-500 ppm	x	x	x	x	x
0-300 ppm	-	x	x	-	-
0-100 ppm	x	x	x	-	x
0-50 ppm	-	x	x	-	x
0-10 ppm	-	-	-	-	x
0-1 ppm	-	-	-	-	x

### Available gases and standard measuring ranges: UVRAS photometers

Measuring ranges	NO
0-100 vol%	-
0-50 vol%	-
0-30 vol%	-
0-20 vol%	-
0-10 vol%	-
0-5 vol%	-
0-1 vol%	-
0-5000 ppm	x
0-2000 ppm	x
0-1000 ppm	x
0-500 ppm	x
0-300 ppm	x
0-100 ppm	x
0-50 ppm	-
0-10 ppm	-

x: Available gas and standard measuring range, \*: customized range, available on request, -: Measuring range not available  
Other gases on request

\* NDIR: non-dispersive infrared photometer, NDUV: non-dispersive ultraviolet photometer, UVRAS: ultraviolet resonance absorption spectrometer

The cross-sensitivities of the sensors depend on the individual gas composition. For a general list of cross-sensitivities, please refer to the Multigas Analyzer operating manual. Viton® is a trademark of DuPont Performance Elastomers.

