



μGard®2

# Sensor unit MC2 for toxic gases with analog output

**Exchangeable sensor unit including digital value processing, temperature compensation and self control for the continuous monitoring of the ambient air.**

The sensor unit MC2 houses a module with μController, analog output and power supply in addition to the electrochemical sensor element including amplifier. The μController calculates a linear 4 – 20 mA (or 2 – 10 V) signal out of the measurement signal and also stores all relevant measured values and data of the sensor element. Calibration is done either by simply replacing the sensor unit or by using the comfortable, integrated calibration routine directly at the system.

## APPLICATION

The μGard®2 Sensor MC2 is used for the detection of toxic gases or for oxygen monitoring wherever a typical 4 – 20 mA (or 2 – 10 V) signal is required.

## FEATURES

- Digital measurement value processing incl. temperature compensation
- Internal function control with integrated hardware watchdog
- Data / measured values in μC of the sensor unit, therefore simple exchange uncalibrated <> calibrated
- High accuracy, selectivity and reliability
- Low zero point drift
- Long sensor life time
- Hardware & software according to SIL2 compliant development process
- Easy maintenance and calibration by exchange of the sensor unit or by comfortable on-site calibration
- 4 – 20 mA (or 2 – 10 V) analog output with selectable signal output for special mode, fault etc.
- Reverse polarity protected, overload and short-circuit proof
- Housing for integration of the sensor unit
- IP 65 version
- Display (option)
- Display with two open-collector outputs for horn (resettable) and warning lamp (option)
- Conformity to
  - EN 50271
  - EN 61010-1
  - ANSI/UL 61010 1
  - CAN/CSA-C22.2 No. 61010-1
  - EN 50104 (for O<sub>2</sub>)
  - EN 45544
  - EN 50545
  - EN 378
- Duct mounting kit (accessory)



Exchangeable sensor unit in plastic housing without cable



Option housing "A" with sensor unit in plastic housing

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## Sensor unit MC2 for toxic gases with AO

### SPECIFICATIONS

#### Electrical

Power supply	16 – 29 V DC, reverse-polarity protect.; 18 - 27 V AC (only for output signal 2-10 V)
Power consumption	23 mA, max. (0.6 VA for 24 V)
Analog output signal	Proportional, overload and short-circuit proof, load ≤ 500 Ohm for current signal, ≥ 50 kOhm for voltage signal 4 - 20 mA or 2 - 10 V = measuring range 3.2 < 4 mA or 1.6 - 2 V = underrange > 20- 21.2 mA or 10 - 10.6 V = overrange 2 mA or 1 V = fault > 21.8 mA or 10.9 V = fault High

#### Sensor performance

Gas type	See Order Information
Sensor element	Electrochemical
Pressure range	Atmospheric ± 10 %
Storage temperature	5 °C to 65 °C (41 °F to 147 °F)
Storage time	6 months

#### Physical

Housing A for integration of the sensor unit	Polycarbonate UL 94 V2
Enclosure colour	RAL 7032 (light grey)
Dimensions (W x H x D)	94 x 130 x 57 mm (3.7 x 5.1 x 2.2 in.)
Weight	Ca. 0.2 kg
Packaging volume	Ca. 4.5 l
Protection class	IP 65
Mounting	Wall mounting
Pre-embossed entries for cable / sensor unit	6 x M20/M25
Enclosure M25	Polycarbonate UL 94 V2
Enclosure colour	RAL 7032 (light grey)
Dimensions	(D x H) 24 x 22 mm (0.94 x 0.87 in.)
Weight	Ca. 30 g (0.066 lb)
Protection class	IP 65
Mounting	Screw mounting / M25
Wire connection	Screw-type terminal min. 0.25 mm <sup>2</sup> , max. 1.3 mm <sup>2</sup> , 3-pin

#### Directives

EMC directives 2014/30/EU  
CE  
Compliance with:  
EN 50271  
EN 61010-1:2010  
ANSI/UL 61010-1  
CAN/CSA-C22.2 No. 61010-1  
EN 50104 (for O<sub>2</sub>)  
EN 45544  
EN 50545  
EN 378

#### Warranty

1 year on sensor (not if poisoned or overloaded),  
2 years on device

#### Options

<b>LCD display</b>	
LCD	Two lines, 16 characters each, monochrome
<b>Open-collector (transistor) output (2)</b>	For horn (resettable) and warning lamp
Switching capacity	24 V DC / 50 mA (+ switching)

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## SPECIFICATIONS – SENSOR UNIT (MC2) / SENSOR ELEMENT

Gas type	Ordering No.	Measuring range	Accuracy	Display resolution	Repeatability	t90 Time	Zero-point variation	Drift in air		Temperature range	Humidity (non-condensing)	Life time <sup>1</sup> in air	Relative gas density <sup>2</sup>	Calibration interval <sup>1</sup>
								Zero	Gain					
	MC2-	ppm	± % sig.	ppm	<± % sig.	≤ sec.	±ppm	< % signal/month		°C	% r. F.	> months	Air = 1	Month
NH <sub>3</sub>	E1125-AX	0-100	5	0.1	10	40	10	1	1	-30 / +50	15-90	24	0.59	12
NH <sub>3</sub>	E1125-BX	0-300	2	0.1	10	40	50	1	2	-30 / +50	15-90	24	0.59	12
NH <sub>3</sub>	E1125-CX	0-500	3	0.1	10	40	50	1	2	-30 / +50	15-90	24	0.59	12
NH <sub>3</sub>	E1125-DX	0-1000	3	1	10	40	50	1	2	-30 / +50	15-90	24	0.59	12
NH <sub>3</sub>	E1125-EX	0-5000	2	1	10	40	100	1	2	-30 / +50	15-90	24	0.59	12
Cl <sub>2</sub>	E1193-BX	0-5	n.d.	0.001	2	40	0.2	1	2	-20 / +50	15-90	24	2.4	6
Cl <sub>2</sub>	E1193-CX	0-10	n.d.	0.01	2	40	0.2	1	2	-20 / +50	15-90	24	2.4	6
Cl <sub>2</sub>	E1193-DX	0-20	n.d.	0.01	2	40	0.2	1	2	-20 / +50	15-90	24	2.4	6
HCN	E1183-BX	0-50	5	0.01	2	30	n.d.	n.d.	n.d.	-20 / +50	15-90	24	0.93	6
HCN	E1183-CX	0-100	5	0.1	2	30	n.d.	n.d.	n.d.	-20 / +50	15-90	24	0.93	6
CH <sub>2</sub> O	E1185-BX	0-10	0.5	0.001	2	60	0.2	1	2	-10 / +50	15-90	36	1.09	6
CO	E1110-BX	0-100	3	0.1	5	10	4	0.4	0.4	-20 / +65	10-95	72	0.97	12
CO	E1110-CX	0-150	2	0.1	5	10	4	0.4	0.4	-20 / +65	10-95	72	0.97	12
CO	E1110-EX	0-250	2	0.1	5	10	4	0.4	0.4	-20 / +65	10-95	72	0.97	12
CO	E1110-FX	0-300	2	0.1	5	10	4	0.4	0.4	-20 / +65	10-95	72	0.97	12
CO	E1110-HX	0-500	2	0.1	5	10	4	0.4	0.4	-20 / +65	10-95	72	0.97	12
O <sub>3</sub>	E1190-AX	0-5	n.d.	0.001	5	30	0.15	1	2	-10 / +50	15-90	24	1.66	12
O <sub>3</sub>	E1190-BX	0-10	n.d.	0.01	5	30	0.15	1	2	-10 / +50	15-90	24	1.66	12
SO <sub>2</sub>	E1196-BX	0-20	2	0.01	2	30	0.1	1	2	-10 / +50	15-90	24	2.26	12
H <sub>2</sub> S	E1197-AX	0-50	3	0.01	2	30	0.1	1	2	-10 / +50	15-90	24	1.19	12
H <sub>2</sub> S	E1197-BX	0-100	2	0.1	2	40	0.1	1	2	-10 / +50	15-90	24	1.19	12
H <sub>2</sub> S	E1197-CX	0-200	2	0.1	2	40	0.1	1	2	-10 / +50	15-90	24	1.19	12
H <sub>2</sub> S	E1197-DX	0-500	n.d.	0.1	2	40	0.1	1	2	-10 / +50	15-90	24	1.19	12
NO <sub>2</sub>	E1130-AX	0-10	5	0.01	2	25	0.2	1	2	-20 / +65	15-90	24	1.59	12
NO <sub>2</sub>	E1130-BX	0-20	5	0.01	2	25	0.2	1	2	-20 / +65	15-90	24	1.59	12
NO <sub>2</sub>	E1130-CX	0-30	5	0.01	2	25	0.2	1	2	-20 / +65	15-90	24	1.59	12
NO <sub>2</sub>	E1130-EX	0-100	5	0.1	2	25	0,2	1	2	-20 / +65	15-90	24	1.59	12
O <sub>2</sub>	E1195-A 2/3/5/7	0-25	2	0.01	--	15	--	--	0.3	-25 / +50	5-95	24 / 36 60 / 84		6 / 6 / 12 / 12

<sup>1</sup> Manufacturer-recommended calibration interval for normal environmental conditions

<sup>2</sup> The sensor must be installed at the correct height depending on the relative gas density (d):

d < 0.95: Mount on the ceiling

0.95 < d < 1.05: Mount at a height of 1.5 – 1.8 m above floor

d > 1.05: Mount at a height of 0.3 m above floor

Exception NO<sub>2</sub>: Mounting height for NO<sub>2</sub> sensors: 0.5 to 1.8 m above floor!

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## CROSS SENSITIVITY<sup>1</sup> – SENSOR UNIT (MC2) / SENSOR ELEMENT

Gas type	Ordering No.	Alcohols	Chlorine, Cl <sub>2</sub>	Ethanol, C <sub>2</sub> H <sub>6</sub> O	Ethylene, C <sub>2</sub> H <sub>4</sub>	Carbon monoxide, CO	Carbon dioxide, CO <sub>2</sub>	Sulphur dioxide, SO <sub>2</sub>	Hydrogen sulphide, H <sub>2</sub> S	Nitrogen dioxide NO <sub>2</sub>	Nitrogen monoxide, NO
	MC2-	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
NH <sub>3</sub>	E1125-AX	10/0	100/0	100/0	200/0	5000/0	10/<10	10/<20	20/<2	20/0	1000/-10
NH <sub>3</sub>	E1125-BX	10/0	100/0	100/0	200/0	5000/0	10/<12	10/<30	20/0	20/0	1000/-150
NH <sub>3</sub>	E1125-CX	10/0	100/0	100/0	200/0	5000/0	10/<12	10/<30	20/0	20/0	1000/-150
NH <sub>3</sub>	E1125-DX	10/0	100/0	100/0	200/0	5000/0	10/<12	10/<30	20/0	20/0	1000/-150
NH <sub>3</sub>	E1125-EX	10/0	100/0	100/0	200/0	5000/0	10/<12	10/<30	20/0	20/0	1000/-150
Cl <sub>2</sub>	E1193-XX <sup>2</sup>				300/0		5/0		20/20	35/0	300/0
HCN	E1183-XX <sup>2</sup>			100/0	100/2		20/38	15/25	5/-12	35/0	100/2
CH <sub>2</sub> O	E1185-BX				10-18%						1-3%
CO	E1110-XX <sup>2</sup>	2/0	2000/5			5000/0	50/0,5	25/0	50/-1	50/8	100/20
O <sub>3</sub>	E1190-XX <sup>2</sup>	5/45/4	100/0		300/0		5/0		20/10	35/0	300/0
SO <sub>2</sub>	E1196-BX		100/0		100/1			10/0	100/-125	100/0	100/1
H <sub>2</sub> S	E1197-XX <sup>2</sup>				100/2		100/20		5/1	35/2	100/20
NO <sub>2</sub>	E1130-XX <sup>2</sup>	1/1	100/0	500/0	400/0	5000/0	30/-0,6	20/-25		50/0	1000/0
O <sub>2</sub>	E1195-XX <sup>2</sup>					5Vol%/					

Illustration: Gas concentration of cross gas / reaction of sensor

<sup>1</sup> The table doesn't claim to be complete. Other gases, too, can have an influence on the sensitivity. The mentioned cross sensitivity data are only reference values valid for new sensors.

<sup>2</sup> Cross sensitivity data valid for all measuring ranges of the sensor.

All specifications were collected under optimal test conditions.

We confirm compliance with the minimum requirements of the applicable standard.

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ORDER INFORMATION

MC2- X E11XX-XX - X- X- XX

00 Without connection cable (standard)

XX\* With connection cable: 01, 02, 03, 04, 05 ... 15 max. (length in m) – only on request!

P Sensor housing plastic

S Sensor housing stainless steel

0 Without display

1 With display for indication of measurement values (only in housing A or N)

2 With display for values & operation, 2x open-collector for horn & warning lamp (only housing A / N)

	Gas type	Sensor type	Measuring range
E1125-AX	Ammonia, NH <sub>3</sub>	Electrochemical	0 – 100 ppm
E1125-BX	Ammonia, NH <sub>3</sub>	Electrochemical	0 – 300 ppm
E1125-CX	Ammonia, NH <sub>3</sub>	Electrochemical	0 – 500 ppm
E1125-DX	Ammonia, NH <sub>3</sub>	Electrochemical	0 – 1000 ppm
E1125-EX	Ammonia, NH <sub>3</sub>	Electrochemical	0 – 5000 ppm
E1193-BX	Chlorine, Cl <sub>2</sub>	Electrochemical	0 – 5 ppm
E1193-CX	Chlorine, Cl <sub>2</sub>	Electrochemical	0 – 10 ppm
E1193-DX	Chlorine, Cl <sub>2</sub>	Electrochemical	0 – 20 ppm
E1183-BX	Hydrogen cyanide, HCN	Electrochemical	0 – 50 ppm
E1183-CX	Hydrogen cyanide, HCN	Electrochemical	0 – 100 ppm
E1189-CX*	Ethylene, C <sub>2</sub> H <sub>4</sub>	Electrochemical	0 – 200 ppm
E1185-BX	Formaldehyde, CH <sub>2</sub> O	Electrochemical	0 – 10 ppm
E1110-BX	Carbon monoxide, CO	Electrochemical	0 – 100 ppm
E1110-CX	Carbon monoxide, CO	Electrochemical	0 – 150 ppm
E1110-EX	Carbon monoxide, CO	Electrochemical	0 – 250 ppm
E1110-FX	Carbon monoxide, CO	Electrochemical	0 – 300 ppm
E1110-HX	Carbon monoxide, CO	Electrochemical	0 – 500 ppm
E1190-AX	Ozone, O <sub>3</sub>	Electrochemical	0 – 5 ppm
E1190-BX	Ozone, O <sub>3</sub>	Electrochemical	0 – 10 ppm
E1187-AX*	Phosphine, PH <sub>3</sub>	Electrochemical	0 – 5 ppm
E1196-BX	Sulphur dioxide, SO <sub>2</sub>	Electrochemical	0 – 20 ppm
E1197-AX	Hydrogen sulphide, H <sub>2</sub> S	Electrochemical	0 – 50 ppm
E1197-BX	Hydrogen sulphide, H <sub>2</sub> S	Electrochemical	0 – 100 ppm
E1197-CX	Hydrogen sulphide, H <sub>2</sub> S	Electrochemical	0 – 200 ppm
E1197-DX	Hydrogen sulphide, H <sub>2</sub> S	Electrochemical	0 – 500 ppm
E1188-AX*	Silane, SiH <sub>4</sub>	Electrochemical	0 – 50 ppm
E1130-AX	Nitrogen dioxide, NO <sub>2</sub>	Electrochemical	0 – 10 ppm
E1130-BX	Nitrogen dioxide, NO <sub>2</sub>	Electrochemical	0 – 20 ppm
E1130-CX	Nitrogen dioxide, NO <sub>2</sub>	Electrochemical	0 – 30 ppm
E1130-EX	Nitrogen dioxide, NO <sub>2</sub>	Electrochemical	0 – 100 ppm
E1195-A2	Oxygen, O <sub>2</sub> , 2 years	Electrochemical	0 – 25 Vol. %
E1195-A3	Oxygen, O <sub>2</sub> , 3 years	Electrochemical	0 – 25 Vol. %
E1195-A5	Oxygen, O <sub>2</sub> , 5 years	Electrochemical	0 – 25 Vol. %
E1195-A7	Oxygen, O <sub>2</sub> , 7 years	Electrochemical	0 – 25 Vol. %

0 Without housing

A Plastic housing type A, 94 x 130 x 57 mm

5 Stainless steel housing type 5, 113 x 135 x 45 mm

D Plastic housing type D, 94 x 65 x 57 mm

N Plastic housing type N, 80 x 82 x 55 mm

\* only on request

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## Sensor unit MC2 for toxic gases with AO

### EXAMPLE

CO sensor unit, measuring range 300 ppm, with plastic housing type A, without display, sensor unit in plastic housing without connection cable

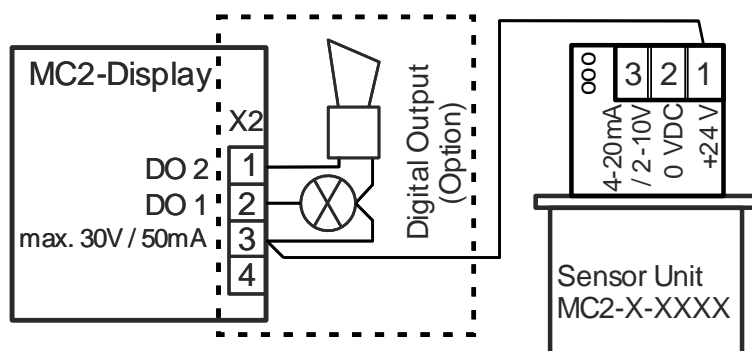
**Order number: MC2-A-E1110-FX-0-P-00**

### ACCESSORY

Duct mounting kit

**Order number: C2-Z2**

### WIRING CONFIGURATION (including options)



### Note:

The installation of the sensor unit MC2 directly on the MSC2, MGC2 or MSB2 housing isn't-possible, only external connection with separate housing!

For 4- 20 mA output signal you have to remove the resistor between pin 2 and pin 3.

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