



µGard®2

## Sensor unit MC2 for toxic gases and oxygen 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
- 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>)
- Duct mounting kit (accessory)



Exchangeable sensor unit



Option Housing "A"





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# Sensor unit MC2 for toxic gases and oxygen 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	50 mA, max. (1.7 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 ± 20 %
Storage temperature	5 °C to 30 °C (41 °F to 86 °F)
Storage time	6 months

### Physical

Housing type 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
<b>Directives</b>	EMC directives 2014/30/EU CE Compliance with: EN 61010-1:2010 ANSI/UL 61010-1 CAN/CSA-C22.2 No. 61010-1 EN 50104 (for O <sub>2</sub> )
<b>Warranty</b>	1 year on material



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# Sensor unit MC2 for toxic gases and oxygen with AO

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

Ordering No.	Measuring range	Accuracy	Resolution	Repeatability	t90 Time	Zero-point variation	Drift		Temperature range	Humidity (non-condensing)	Life time <sup>1</sup>	Relative gas density	Mounting height	Calibration interval <sup>1</sup>
							Zero	Gain						
MC2-	ppm	± ppm	ppm	≤± % sig.	≤ sec.	±ppm	< % signal/month		°C	% r. F.	> months	Air = 1	(m)	Month
E1125-A	0-100	10	2	10	90	10	1	1	-30 / +50	15-90	24	0.59	Ceiling	12
E1125-B	0-300	30	4	10	120	50	1	2	-30 / +50	15-90	24	0.59	Ceiling	12
E1125-C	0-500	30	4	10	120	50	1	2	-30 / +50	15-90	24	0.59	Ceiling	12
E1125-D	0-1000	30	4	10	120	50	1	2	-30 / +50	15-90	24	0.59	Ceiling	12
E1193-B	0-5	0.1	0.1	2	90	0.2	1	2	-20 / +50	15-90	24	2.4	Floor	6
E1193-C	0-10	0.1	0.1	2	90	0.2	1	2	-20 / +50	15-90	24	2.4	Floor	6
E1193-D	0-20	0.1	0.1	2	90	0.2	1	2	-20 / +50	15-90	24	2.4	Floor	6
E1181-A	0-1	0.05	0.03	4	120	0.1	1	1	-20 / +40	15-90	24	3.09	Floor	6
E1182-A	0-10	0.1	0.15	10	90	0,2	1	1	-20 / +40	15-90	18	0.72	Ceiling	6
E1183-C	0-100	0.2	0.1	2	20	1	1	2	-10 / +45	15-90	24	0.93	Ceiling	6
E1186-D	0-20	0.5	0.2	2	60	1	2	2	-20 / +50	15-90	24	1.25	Floor	6
E1189-C	0-200	1.0	0.3	1	60	4	1	3	-20 / +50	15-90	24	0.97	1.5-1.8	12
E1198-A	0-1	0.05	0.02	2	80	0.1	1	4	-10 / +40	15-90	18	1.31	Floor	6
E1185-B	0-10	0.5	0.01	2	50	0.2	1	2	-10 / +45	15-90	36	1.09	Floor	6
E1110-B	0-100	3	0.5	5	50	4	0.4	0.4	-15 / +50	10-95	72	0.97	1.5-1.8	12
E1110-C	0-150	3	0.5	5	50	4	0.4	0.4	-15 / +50	10-95	72	0.97	1.5-1.8	12
E1110-E	0-250	3	0.5	5	50	4	0.4	0.4	-15 / +50	10-95	72	0.97	1.5-1.8	12
E1110-F	0-300	3	0.5	5	50	4	0.4	0.4	-15 / +50	10-95	72	0.97	1.5-1.8	12
E1110-H	0-500	3	0.5	5	50	4	0.4	0.4	-15 / +50	10-95	72	0.97	1.5-1.8	12
E1190-A	0-5	0.1	0.05	5	60	0.15	1	2	-10 / +45	15-90	24	1.66	Floor	12
E1187-A	0-5	0.05	0.03	2	25	0.06	1	2	-10 / +45	15-90	24	1.18	Floor	12
E1196-B	0-20	0.2	0.2	2	20	0.1	1	2	-10 / +45	15-90	24	2.26	Floor	12
E1197-A	0-50	0.2	0.1	2	60	0.1	1	2	-10 / +50	15-90	24	1.19	Floor	12
E1188-A	0-50	0.2	0.1	2	60	1	2	2	-10 / +45	15-90	24	1.16	Floor	12
E1130-A	0-10	0.5	0.1	2	25	0.2	1	2	-20 / +50	15-90	24	1.59	1.5-1.8	12
E1130-B	0-20	0.5	0.1	2	25	0.2	1	2	-20 / +50	15-90	24	1.59	1.5-1.8	12
E1130-C	0-30	0.5	0.1	2	25	0.2	1	2	-20 / +50	15-90	24	1.59	1.5-1.8	12
E1130-D	0-500	20	2	2	25	0,2	1	2	-20 / +50	15-90	24	1.59	1.5-1.8	12
E1129-A	0-10	0.15	0.1	2	45	0.5	1	2	-10 / +50	15-90	36	1.04	1.5-1.8	12
E1129-B	0-20	0.15	0.1	2	45	0.5	1	2	-10 / +50	15-90	36	1.04	1.5-1.8	12
E1129-C	0-100	0.15	0.1	2	45	0.5	1	2	-10 / +50	15-90	36	1.04	1.5-1.8	12
E1129-D	0-1000	20	2	2	45	24	1	2	-10 / +50	15-90	36	1.04	1.5-1.8	12
	Vol %													
E1195-A	0-25	0.5	0.05	--	15	--	--	0.3	-10/50	5-95	24 / 36		1.5-1.8	24
E1195-B	0-21	0.5	0.05	--	15	--	--	0.3	-10/50	5-95	24 / 36		1.5-1.8	24

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



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# Sensor unit MC2 for toxic gases and oxygen with AO

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

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	Hydrogen, H <sub>2</sub>
MC2-		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
E1125-A		10/0	100/0	100/0	200/0	5000/0	10/<10	10/<20	20/<2	20/0	1000/-10
E1125-B		10/0	100/0	100/0	200/0	5000/0	10/<12	10/<30	20/0	20/0	1000/-150
E1125-C		10/0	100/0	100/0	200/0	5000/0	10/<12	10/<30	20/0	20/0	1000/-150
E1125-D		10/0	100/0	100/0	200/0	5000/0	10/<12	10/<30	20/0	20/0	1000/-150
E1193-X <sup>2</sup>					300/0		5/0		20/20	35/0	300/0
E1181-A	1000/0	1/0.3			100/0	500/0		20/0	10 /4	100/0	3000/0
E1182-A											
E1183-C				100/0	100 /2		20/38	15/25	5/-12	35/0	100 /2
E1186-D		20/0			1000/0		100/0	20/31	20/-6	25/0	0
E1189-C					< 60%						
E1198-A	1000/0	1/1.4			100/0	5000/0	20/-0.2	1/-2	10/8		1000/0
E1185-B					10-18%						1-3%
E1110-X <sup>2</sup>		2/0	2000/5			5000/0	50/0.5	25/0	50/-1	50/8	100/20
E1190-A		5/45/4	100/0		300/0		5/0		20/10	35/0	300/0
E1187-A					100/0		100/25	34/8	100/-30	100/0	100/0
E1196-B			100/0		100/1			10/0	100/-125	100/0	100/1
E1197-A					100/2		100/20		5/1	35/2	100/20
E1188-A					200/0		5/1	5/8			200/0
E1130-X <sup>2</sup>		1/1	100/0	500/0	400/0	5000/0	30/-0.6	20/-25		50/0	1000/0
E1129-A		10/15			400/0	5Vol%/0	20/3	20/30	50/5		400/0
E1129-B		10/15			400/0	5Vol%/0	20/3	20/30	50/5		400/0
E1129-C		10/15			400/0	5Vol%/0	20/3	20/30	50/5		400/0
E1129-D					300/0		5/0	15/<5	20/<5		300/0
E1195-X <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.



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# Sensor unit MC2 for toxic gases and oxygen with AO

## ORDER INFORMATION

MC2- X E11XX-X

	Gas type	Sensor type	Measuring range
E1125-A	Ammonia, NH <sub>3</sub>	Electrochemical	0 – 100 ppm
E1125-B	Ammonia, NH <sub>3</sub>	Electrochemical	0 – 300 ppm
E1125-C	Ammonia, NH <sub>3</sub>	Electrochemical	0 – 500 ppm
E1125-D	Ammonia, NH <sub>3</sub>	Electrochemical	0 – 1000 ppm
E1193-B*	Chlorine, Cl <sub>2</sub>	Electrochemical	0 – 5 ppm
E1193-C*	Chlorine, Cl <sub>2</sub>	Electrochemical	0 – 10 ppm
E1193-D*	Chlorine, Cl <sub>2</sub>	Electrochemical	0 – 20 ppm
E1181-A*	Chlorine dioxide, ClO <sub>2</sub>	Electrochemical	0 – 1 ppm
E1182-A	Hydrogen fluoride, HF	Electrochemical	0 – 10 ppm
E1183-C*	Hydrogen cyanide, HCN	Electrochemical	0 – 100 ppm
E1186-D	Hydrogen chloride, HCl	Electrochemical	0 – 20 ppm
E1189-C*	Ethylene, C <sub>2</sub> H <sub>4</sub>	Electrochemical	0 – 200 ppm
E1198-A*	Fluorine, F <sub>2</sub>	Electrochemical	0 – 1 ppm
E1185-B	Formaldehyde, CH <sub>2</sub> O	Electrochemical	0 – 10 ppm
E1110-B	Carbon monoxide, CO	Electrochemical	0 – 100 ppm
E1110-C	Carbon monoxide, CO	Electrochemical	0 – 150 ppm
E1110-E	Carbon monoxide, CO	Electrochemical	0 – 250 ppm
E1110-F	Carbon monoxide, CO	Electrochemical	0 – 300 ppm
E1110-H	Carbon monoxide, CO	Electrochemical	0 – 500 ppm
E1190-A*	Ozone, O <sub>3</sub>	Electrochemical	0 – 5 ppm
E1187-A*	Phosphine, PH <sub>3</sub>	Electrochemical	0 – 5 ppm
E1196-B*	Sulphur dioxide, SO <sub>2</sub>	Electrochemical	0 – 20 ppm
E1197-A*	Hydrogen sulphide, H <sub>2</sub> S	Electrochemical	0 – 50 ppm
E1188-A*	Silane, SiH <sub>4</sub>	Electrochemical	0 – 50 ppm
E1130-A	Nitrogen dioxide, NO <sub>2</sub>	Electrochemical	0 – 10 ppm
E1130-B	Nitrogen dioxide, NO <sub>2</sub>	Electrochemical	0 – 20 ppm
E1130-C	Nitrogen dioxide, NO <sub>2</sub>	Electrochemical	0 – 30 ppm
E1130-D	Nitrogen dioxide, NO <sub>2</sub>	Electrochemical	0 – 500 ppm
E1129-A*	Nitrogen monoxide, NO	Electrochemical	0 – 10 ppm
E1129-B*	Nitrogen monoxide, NO	Electrochemical	0 – 20 ppm
E1129-C	Nitrogen monoxide, NO	Electrochemical	0 – 100 ppm
E1129-D*	Nitrogen monoxide, NO	Electrochemical	0 – 1000 ppm
E1195-A-2	Oxygen, O <sub>2</sub> , 2 years	Electrochemical	0 – 25 Vol. %
E1195-A-3	Oxygen, O <sub>2</sub> , 3 years	Electrochemical	0 – 25 Vol. %
E1195-A-5	Oxygen, O <sub>2</sub> , 5 years	Electrochemical	0 – 25 Vol. %
E1195-B-2	Oxygen, O <sub>2</sub> , 2 years	Electrochemical	0 – 21 Vol. %
E1195-B-3	Oxygen, O <sub>2</sub> , 3 years	Electrochemical	0 – 21 Vol. %

### HOUSING FOR INTEGRATION OF THE SENSOR UNIT

- 0** Without housing
- A** Plastic housing type A, 90 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
- F** Plastic housing type F, round, (d x H) 87 x 45.5 mm

\* only on request



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## Sensor unit MC2 for toxic gases and oxygen with AO

**EXAMPLE**

CO sensor unit, measuring range 300 ppm, with plastic housing type A

**Ordering number: MC2-A-E1110-F****ACCESSORY**

Duct mounting kit

**Order number: C2-Z2****WIRING CONFIGURATION**