

Technical Datasheet



µGard[®]2

MC2 Sensor

with Electrochemical Sensor Element
for Toxic Gases
with Analog Output

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Specifications subject to change without notice.

Up-to-date data sheets and user manuals can be found in the download area of www.msr-24.com.

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■ All Products
■ Made
■ in Germany

DESCRIPTION

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 μ Controller, analog output and power supply in addition to the electrochemical sensor element including amplifier. The μ Controller calculates a linear 4–0 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 μ Gard[®]2 Sensor MC2 is used for the detection of toxic gases or for oxygen monitoring when 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 μ C of the sensor unit, therefore simple exchange uncalibrated <> calibrated
- High accuracy, selectivity and reliability
- Low zero-point drift
- Long sensor lifetime
- Hardware & software according to SIL 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
- IP65 version
- Housing for integration of the sensor unit (option)
- Display (option)
- Display with 2 open-collector outputs for horn (resettable) and warning lamp (option)
- Conformity to:
 - EN 378
 - EN 45544-1, -3
 - EN 50104 (for O₂)
 - EN 50271
 - EN 50545
 - EN 61010-1
 - ANSI/UL 61010 1
 - CAN/CSA-C22.2 No. 61010-1
- Duct mounting kit (accessory)

SPECIFICATIONS

ELECTRICAL	
Power supply	18–29 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 $\leq 500 \Omega$ for current signal, $\geq 50 \text{ k}\Omega$ for voltage signal 4–20 mA or 2–10 V = measuring range 3–4 mA or 1.5–2 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 ELEMENT	
Gas type	See Ordering Information
Sensor element	Electrochemical
Pressure range	90–110 kPa
Storage temperature range ¹	0 °C to 20 °C (32°F to 68 °F) or 5 °C to 20 °C (41°F to 68 °F) for NH ₃ , CO, NO ₂ , O ₂
Storage time ²	Ca. 6 months
Poisoning	Electrochemical sensors are susceptible to poisoning by organic solvents and silicone vapours.
PHYSICAL	
Enclosure P (M25)	Polycarbonate UL 94 V2
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	IP65 (only if mounted in housing type A, D)
Mounting	Screw mounting / M25
Wire connection	Screw-type terminal min. 0.25 mm ² , max. 1.3 mm ² , 3-pin, 24–16 AWG
REGULATIONS	
Directives (only in connection with the MSR Sensor-Boards)	EMC directives 2014/30/EU, CE Compliance with: EN 378 EN 45544-1, -3 EN 50104 (for O ₂) EN 50271 EN 50545 EN 61010-1:2010 ANSI/UL 61010-1 CAN/CSA-C22.2 No. 61010-1
Warranty	1 year on sensor (not if poisoned or overloaded), 2 years on device
OPTIONS	
ENCLOSURE A	
Enclosure A for integration of sensor	Polycarbonate UL 94 V2
Enclosure colour	RAL 7032 (light grey)
Dimensions	(B x H x T) 94 x 130 x 57 mm (3.7 x 5.1 x 2.2 in.)
Weight / package volume	Ca. 0,2 kg (0.4 lb) / ca. 4,5 l
Protection class	IP65
Mounting	Wall mounting
Pre-embossing for cable entry / sensor	6 x M20/M25
LCD-DISPLAY	
LCD	2 lines, 16 characters each, monochrome
OPEN-COLLECTOR	
Transistor output (2)	For horn (resettable) and warning lamp
Switching capacity	24 V DC / 50 mA (+ switching)

¹ A higher storage temperature can have a negative effect on sensitivity and service life.

² If stocked for a longer period, we recommend checking the zero point and recalibrating if necessary.

Gas type	Ordering No.	Measuring range ¹	Accuracy		Repeatability	t ₉₀ time	Zero point variation	Drift in air		Temperature range	Humidity range (non-condensing)	Life time ² in air	Relative gas density ³	Calibration interval ⁴
			± %	ppm				Zero	Gain					
	MC2-	ppm	± % sig.	ppm	<± % sig.	≤ sec.	±ppm	< % signal/month		°C	% r. F.	> months	Air = 1	Month
CO	E1110-C	0-150	2	0.1	5	10	4	0.4	0.4	-20 / +50	10-95	72	0.97	12
CO	E1110-E	0-250	2	0.1	5	10	4	0.4	0.4	-20 / +50	10-95	72	0.97	12
CO	E1110-F	0-300	2	0.1	5	10	4	0.4	0.4	-20 / +50	10-95	72	0.97	12
CO	E1110-H	0-500	2	0.1	5	10	4	0.4	0.4	-20 / +50	10-95	72	0.97	12
NH ₃	E1125-A	0-100	5	0.1	10	75	5	1	1	-30 / +50	15-90	24	0.60	12
NH ₃	E1125-B	0-300	3	0.1	10	75	5	1	2	-30 / +50	15-90	24	0.60	12
NH ₃	E1125-C	0-500	3	0.1	10	75	5	1	2	-30 / +50	15-90	24	0.60	12
NH ₃	E1125-D	0-1000	3	1	10	75	10	1	2	-30 / +50	15-90	24	0.60	12
NH ₃	E1125-E	0-5000	2	1	10	40	100	1	2	-30 / +50	15-90	24	0.60	12
NO ₂	E1130-A	0-10	5	0.01	2	25	0.2	1	2	-30 / +50	15-90	24	2.80	12
NO ₂	E1130-B	0-20	5	0.01	2	25	0.2	1	2	-30 / +50	15-90	24	2.80	12
NO ₂	E1130-C	0-30	5	0.01	2	25	0.2	1	2	-30 / +50	15-90	24	2.80	12
NO ₂	E1130-E	0-100	5	0.1	2	25	2	1	2	-30 / +50	15-90	24	2.80	12
HCN	E1183-B	0-50	5	0.01	5	30	2	1	2	-20 / +50	15-90	24	0.93	6
HCN	E1183-C	0-100	5	0.1	5	30	2	1	2	-20 / +50	15-90	24	0.93	6
CH ₂ O	E1185-B	0-10	n.d.	0.01	5	60	0.2	1	2	-30 / +50	15-90	36	1.04	6
HCl	E1186-D	0-20	5	0.01	5	60	0.5	1	2	-20 / +50	15-90	24	1.27	6
C ₂ H ₄	E1189-C	0-200	n.d.	0.1	5	120	5	2	5	-30 / +50	15-90	24	0.97	6
O ₃	E1190-A	0-5	n.d.	0.001	5	60	0.1	1	2	-30 / +50	15-90	24	1.66	6
O ₃	E1190-B	0-10	n.d.	0.01	5	60	0.2	1	2	-30 / +50	15-90	24	1.66	6
Cl ₂	E1193-C	0-10	n.d.	0.01	5	40	0.2	1	2	-30 / +50	15-90	24	2.48	6
Cl ₂	E1193-D	0-20	n.d.	0.01	5	40	0.2	1	2	-30 / +50	15-90	24	2.48	6
SO ₂	E1196-B	0-20	3	0.01	5	30	0.2	1	2	-20 / +50	15-90	24	2.73	6
H ₂ S	E1197-A	0-50	3	0.01	5	30	1	1	2	-10 / +50	15-90	24	1.19	12
H ₂ S	E1197-B	0-100	3	0.1	5	40	1	1	2	-10 / +50	15-90	24	1.19	12
H ₂ S	E1197-C	0-200	3	0.1	5	40	2	1	2	-10 / +50	15-90	24	1.19	12
H ₂ S	E1197-D	0-500	3	0.1	5	40	5	1	2	-10 / +50	15-90	24	1.19	12
H ₂ S	E1197-E	0-1500	3	1	5	60	15	n.d.	n.d.	-10 / +50	15-90	24	1.19	12
ETO	E1199-A	0-10	n.d.	0.01	5	150	1	1	2	+10 / +30	15-90	24	1.56	12
		% vol												
O ₂	E1195-A2/3	0-25	2	0.01	n.d.	15	n.d.	n.d.	0.4/0.6	-40 / +50	5-95	24/36	1.11	6/6
O ₂	E1195-A5/7	0-25	2	0.01	n.d.	15	n.d.	n.d.	0.4	-40 / +50	15-90	60/84	1.11	12/12

¹ Exceeding the measuring range limit will include a risk of damaging the sensor element.

² Expected service life for normal ambient conditions

³ 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 NO₂: Mounting height: 0.5–1.8 m above floor.

⁴ Manufacturer-recommended calibration interval for normal environmental conditions

CROSS SENSITIVITY¹

Gas concentration of cross gas / reaction of sensor

Gas type	Ordering No.	Chlorine, Cl ₂	Ethanol, C ₂ H ₆ O	Ethylene, C ₂ H ₄	Carbon monoxide, CO	Carbon dioxide, CO ₂	Sulphur dioxide, SO ₂	Hydrogen sulphide, H ₂ S	Nitrogen dioxide NO ₂	Nitrogen monoxide, NO	Hydrogen, H ₂
CO	MC2-E1110-X ²	ppm 2/0	ppm 2000/5	ppm	ppm	ppm 5000/0	ppm 50/0,5	ppm 25/0	ppm 50/-1	ppm 50/8	ppm 100/20
NH ₃	E1125-A	10/0	100/0	100/0	200/0	5000/0	10/<10	10/<20	20/<2	20/0	1000/-10
NH ₃	E1125-B	10/0	100/0	100/0	200/0	5000/0	10/<12	10/<30	20/0	20/0	1000/-150
NH ₃	E1125-C	10/0	100/0	100/0	200/0	5000/0	10/<12	10/<30	20/0	20/0	1000/-150
NH ₃	E1125-D	10/0	100/0	100/0	200/0	5000/0	10/<12	10/<30	20/0	20/0	1000/-150
NH ₃	E1125-E	10/0	100/0	100/0	200/0	5000/0	10/<12	10/<30	20/0	20/0	1000/-150
NO ₂	E1130-X ²	1/1	100/0	500/0	400/0	5000/0	30/-0.6	20/-25		50/0	1000/0
HCN	E1183-X ²			100/0	100/2		20/38	15/25	5/-12	35/0	100/2
CH ₂ O	E1185-B				10-18 %						1-3 %
HCl	E1186-D	20/0		100/0	1000/0		100/0	20/31	20/-6	25/0	/0
C ₂ H ₄	E1189-C				< 60 %						
O ₃	E1190-X ²	5/45/4	100/0		300/0		5/0		20/10	35/0	300/0
Cl ₂	E1193-X ²				300/0		5/0		20/20	35/0	300/0
O ₂	E1195-XX ²					5 % vol					
SO ₂	E1196-B		100/0		100/1			10/0	100/-125	100/0	100/1
H ₂ S	E1197-X ²				100/2		100/20		5/1	35/2	100/20
ETO	E1199-A		30/21		100/45						

¹ The table does not 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.

² 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.

ORDERING INFORMATION

MC2-	X-	E11XX-X(X)-	X-	P	
				P	Sensor housing plastic Sensor housing
				0	Without display
				1	With display for indication of meas. values (only housing A or N)
				2	With display for values & operation, 2x open-collector for horn & warning lamp (only housing A / N) Display
					Gas type Measuring range
		E1110-C			Carbon monoxide, CO 0–150 ppm
		E1110-E			Carbon monoxide, CO 0–250 ppm
		E1110-F			Carbon monoxide, CO 0–300 ppm
		E1110-H			Carbon monoxide, CO 0–500 ppm
		E1125-A*			Ammonia, NH ₃ 0–100 ppm
		E1125-B*			Ammonia, NH ₃ 0–300 ppm
		E1125-C*			Ammonia, NH ₃ 0–500 ppm
		E1125-D*			Ammonia, NH ₃ 0–1 000 ppm
		E1125-E*			Ammonia, NH ₃ 0–5 000 ppm
		E1130-A			Nitrogen dioxide, NO ₂ 0–10 ppm
		E1130-B			Nitrogen dioxide, NO ₂ 0–20 ppm
		E1130-C			Nitrogen dioxide, NO ₂ 0–30 ppm
		E1130-E			Nitrogen dioxide, NO ₂ 0–100 ppm
		E1183-B			Hydrogen cyanide, HCN 0–50 ppm
		E1183-C			Hydrogen cyanide, HCN 0–100 ppm
		E1185-B			Formaldehyde, CH ₂ O 0–10 ppm
		E1186-D			Hydrogen chloride, HCl 0–20 ppm
		E1187-A*			Phosphine, PH ₃ 0–5 ppm
		E1188-A*			Silane, SiH ₄ 0–50 ppm
		E1189-C			Ethylene, C ₂ H ₄ 0–200 ppm
		E1190-A			Ozone, O ₃ 0–5 ppm
		E1190-B			Ozone, O ₃ 0–10 ppm
		E1193-C			Chlorine, Cl ₂ 0–10 ppm
		E1193-D			Chlorine, Cl ₂ 0–20 ppm
		E1195-A2			Oxygen, O ₂ , 2 years 0–25 % vol
		E1195-A3			Oxygen, O ₂ , 3 years 0–25 % vol
		E1195-A5			Oxygen, O ₂ , 5 years 0–25 % vol
		E1195-A7			Oxygen, O ₂ , 7 years 0–25 % vol
		E1196-B			Sulphur dioxide, SO ₂ 0–20 ppm
		E1197-A			Hydrogen sulphide, H ₂ S 0–50 ppm
		E1197-B			Hydrogen sulphide, H ₂ S 0–100 ppm
		E1197-C			Hydrogen sulphide, H ₂ S 0–200 ppm
		E1197-D			Hydrogen sulphide, H ₂ S 0–500 ppm
		E1197-E			Hydrogen sulphide, H ₂ S 0–1500 ppm
		E1199-A			Ethylene oxide, C ₂ H ₄ O 0–10 ppm
					Gas type/ Measuring range
		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
					Housing for the integration of the sensor

* On request only

EXAMPLE

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

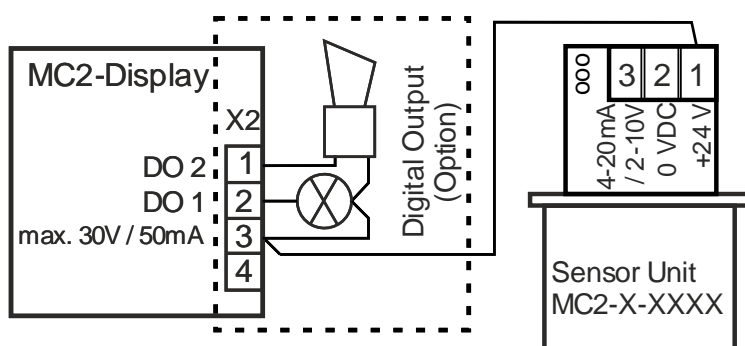
Ordering number: MC2-A-E1110-F-0-P

ACCESSORY

Duct mounting kit

Ordering number: C2-Z2

WIRING CONFIGURATION



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.