



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 O₂)
 - EN 45544
 - EN 50545
 - EN 378
- Duct mounting kit (accessory)



Exchangeable sensor unit in plastic housing without cable



Exchangeable sensor unit in plastic housing with cable 5 m



Option housing "A" with sensor unit in plastic housing





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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 ² , max. 1.3 mm ² , 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 ₂) |
| | EN 45544 |
| | EN 50545 |
| | EN 378 |

Warranty

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

Options

| | |
|---|---|
| LCD display | |
| LCD | Two lines, 16 characters each, monochrome |
| Open-collector (transistor) output (2) | 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-range condensing) | Life time ¹ in air | Relative gas density ² | Calibration interval ¹ |
|-------------------|--------------------|-----------------|----------|--------------------|---------------|----------|----------------------|------------------|------|-------------------|---------------------------------|-------------------------------|-----------------------------------|-----------------------------------|
| | | | | | | | | Zero | Gain | | | | | |
| | MC2- | ppm | ± % sig. | ppm | <± % sig. | ≤ sec. | ±ppm | < % signal/month | | °C | % r. F. | > months | Air = 1 | Month |
| NH ₃ | E1125-AX | 0-100 | 5 | 0.1 | 10 | 40 | 10 | 1 | 1 | -30 / +50 | 15-90 | 24 | 0.59 | 12 |
| NH ₃ | E1125-BX | 0-300 | 2 | 0.1 | 10 | 40 | 50 | 1 | 2 | -30 / +50 | 15-90 | 24 | 0.59 | 12 |
| NH ₃ | E1125-CX | 0-500 | 3 | 0.1 | 10 | 40 | 50 | 1 | 2 | -30 / +50 | 15-90 | 24 | 0.59 | 12 |
| NH ₃ | E1125-DX | 0-1000 | 3 | 1 | 10 | 40 | 50 | 1 | 2 | -30 / +50 | 15-90 | 24 | 0.59 | 12 |
| NH ₃ | E1125-EX | 0-5000 | 2 | 1 | 10 | 40 | 100 | 1 | 2 | -30 / +50 | 15-90 | 24 | 0.59 | 12 |
| Cl ₂ | E1193-BX | 0-5 | n.d. | 0.001 | 2 | 40 | 0.2 | 1 | 2 | -20 / +50 | 15-90 | 24 | 2.4 | 6 |
| Cl ₂ | E1193-CX | 0-10 | n.d. | 0.01 | 2 | 40 | 0.2 | 1 | 2 | -20 / +50 | 15-90 | 24 | 2.4 | 6 |
| Cl ₂ | 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 ₂ 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 ₃ | E1190-AX | 0-5 | n.d. | 0.001 | 5 | 30 | 0.15 | 1 | 2 | -10 / +50 | 15-90 | 24 | 1.66 | 12 |
| O ₃ | E1190-BX | 0-10 | n.d. | 0.01 | 5 | 30 | 0.15 | 1 | 2 | -10 / +50 | 15-90 | 24 | 1.66 | 12 |
| SO ₂ | E1196-BX | 0-20 | 2 | 0.01 | 2 | 30 | 0.1 | 1 | 2 | -10 / +50 | 15-90 | 24 | 2.26 | 12 |
| H ₂ S | E1197-AX | 0-50 | 3 | 0.01 | 2 | 30 | 0.1 | 1 | 2 | -10 / +50 | 15-90 | 24 | 1.19 | 12 |
| H ₂ S | E1197-BX | 0-100 | 2 | 0.1 | 2 | 40 | 0.1 | 1 | 2 | -10 / +50 | 15-90 | 24 | 1.19 | 12 |
| H ₂ S | E1197-CX | 0-200 | 2 | 0.1 | 2 | 40 | 0.1 | 1 | 2 | -10 / +50 | 15-90 | 24 | 1.19 | 12 |
| H ₂ S | E1197-DX | 0-500 | n.d. | 0.1 | 2 | 40 | 0.1 | 1 | 2 | -10 / +50 | 15-90 | 24 | 1.19 | 12 |
| NO ₂ | E1130-AX | 0-10 | 5 | 0.01 | 2 | 25 | 0.2 | 1 | 2 | -20 / +65 | 15-90 | 24 | 1.59 | 12 |
| NO ₂ | E1130-BX | 0-20 | 5 | 0.01 | 2 | 25 | 0.2 | 1 | 2 | -20 / +65 | 15-90 | 24 | 1.59 | 12 |
| NO ₂ | E1130-CX | 0-30 | 5 | 0.01 | 2 | 25 | 0.2 | 1 | 2 | -20 / +65 | 15-90 | 24 | 1.59 | 12 |
| NO ₂ | E1130-EX | 0-100 | 5 | 0.1 | 2 | 25 | 0,2 | 1 | 2 | -20 / +65 | 15-90 | 24 | 1.59 | 12 |
| O ₂ | 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 |

¹ Manufacturer-recommended calibration interval for normal environmental conditions

² 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 for NO₂ sensors: 0.5 to 1.8 m above floor!



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CROSS SENSITIVITY¹ – SENSOR UNIT (MC2) / SENSOR ELEMENT

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

Illustration: Gas concentration of cross gas / reaction of sensor

¹ 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.

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.





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)

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 ₃ | Electrochemical | 0 – 100 ppm |
| E1125-BX | Ammonia, NH ₃ | Electrochemical | 0 – 300 ppm |
| E1125-CX | Ammonia, NH ₃ | Electrochemical | 0 – 500 ppm |
| E1125-DX | Ammonia, NH ₃ | Electrochemical | 0 – 1000 ppm |
| E1125-EX | Ammonia, NH ₃ | Electrochemical | 0 – 5000 ppm |
| E1193-BX | Chlorine, Cl ₂ | Electrochemical | 0 – 5 ppm |
| E1193-CX | Chlorine, Cl ₂ | Electrochemical | 0 – 10 ppm |
| E1193-DX | Chlorine, Cl ₂ | 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 ₂ H ₄ | Electrochemical | 0 – 200 ppm |
| E1185-BX | Formaldehyde, CH ₂ 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 ₃ | Electrochemical | 0 – 5 ppm |
| E1190-BX | Ozone, O ₃ | Electrochemical | 0 – 10 ppm |
| E1187-AX* | Phosphine, PH ₃ | Electrochemical | 0 – 5 ppm |
| E1196-BX | Sulphur dioxide, SO ₂ | Electrochemical | 0 – 20 ppm |
| E1197-AX | Hydrogen sulphide, H ₂ S | Electrochemical | 0 – 50 ppm |
| E1197-BX | Hydrogen sulphide, H ₂ S | Electrochemical | 0 – 100 ppm |
| E1197-CX | Hydrogen sulphide, H ₂ S | Electrochemical | 0 – 200 ppm |
| E1197-DX | Hydrogen sulphide, H ₂ S | Electrochemical | 0 – 500 ppm |
| E1188-AX* | Silane, SiH ₄ | Electrochemical | 0 – 50 ppm |
| E1130-AX | Nitrogen dioxide, NO ₂ | Electrochemical | 0 – 10 ppm |
| E1130-BX | Nitrogen dioxide, NO ₂ | Electrochemical | 0 – 20 ppm |
| E1130-CX | Nitrogen dioxide, NO ₂ | Electrochemical | 0 – 30 ppm |
| E1130-EX | Nitrogen dioxide, NO ₂ | Electrochemical | 0 – 100 ppm |
| E1195-A2 | Oxygen, O ₂ , 2 years | Electrochemical | 0 – 25 Vol. % |
| E1195-A3 | Oxygen, O ₂ , 3 years | Electrochemical | 0 – 25 Vol. % |
| E1195-A5 | Oxygen, O ₂ , 5 years | Electrochemical | 0 – 25 Vol. % |
| E1195-A7 | Oxygen, O ₂ , 7 years | Electrochemical | 0 – 25 Vol. % |

- 0 Without housing
- A Plastic housing type A, 94 x 130 x 57 mm
- S Stainless steel housing type S, 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





μGard®2

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

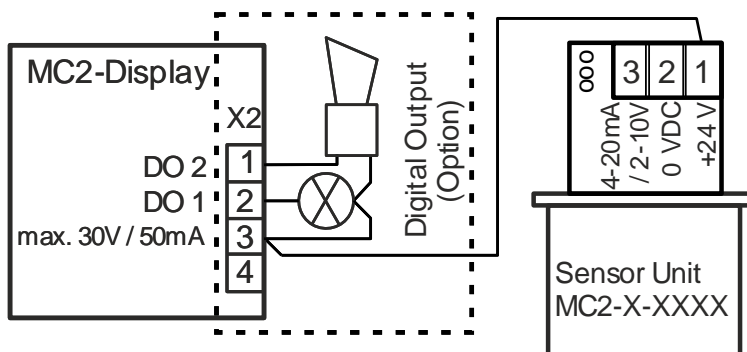
Order number: MC2-A-E1110-FX-0-P-00

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.

