

Gas Detection.



## Technical Datasheet



**PolyGard®2**

### **MC2 Sensor**

with Catalytic Sensor Element  
for Combustible 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](http://www.msr-24.com).

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■ All Products  
■ Made  
■ in Germany

## DESCRIPTION

**Catalytic sensor including digital value processing and integrated self-diagnosis, for the continuous monitoring of the ambient air to detect combustible gases.**

The intelligent MC2 Sensor for detection of combustible gases includes a catalytic sensor element (Pellistor) and electronics with a measuring amplifier and a  $\mu$ Controller as well as a module with a terminal for the analog output and the external power supply. The  $\mu$ Processor converts the sensor's measuring signal into a linear 4–20 mA signal (or 2–10 V). All relevant data and measured values of the sensor are stored fail-safe in the internal memory of the  $\mu$ Processor.

The maintenance of the device can be done either by simply exchanging the sensor or by using the integrated, comfortable calibration routine directly at the system.

## APPLICATION

The PolyGard®2 MC2 Sensor is used to detect combustible gases in non-exlosive areas when an analog 4–20 mA (or 2–10 V) signal is required.



Garage



Tunnel



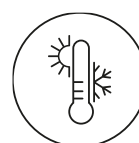
Food



Beverage  
dispensing



Laboratory



Climate



Hydrogen



Battery



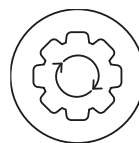
Biogas



Agriculture



Waste



Process



Gas storage

## FEATURES

- Internal function control with integrated watchdog
- Easy maintenance and calibration by exchange of the sensor or by comfortable on-site calibration
- High accuracy and reliability
- Sensor with long life expectancy
- Hardware and software according to SIL compliant development process
- 4–20 mA (or 2–10 V) analog output with selectable signal output for Special Mode (fault, maintenance, service etc.)
- Reverse polarity protected, overload and short-circuit proof
- IP65 protection (when installed)

## SPECIFICATIONS

| ELECTRICAL                             |                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply                           | 18–29 V DC, reverse-polarity protected;<br>18–27 V AC (only for output signal 2–10 V)                                                                                                                                                                                                                                   |
| Power consumption                      | 75 mA, max. (1.8 VA for 24 V)                                                                                                                                                                                                                                                                                           |
| Analog output signal                   | Proportional, overload and short-circuit proof,<br>load $\leq 500 \Omega$ for current signal, $\geq 50 \text{ k}\Omega$ for voltage signal<br>4–20 mA or 2–10 V = measuring range<br>3–4 mA or 1.5–2 V = underrange<br>> 20–21.2 mA or 10–10.6 V = overrange<br>2 mA or 1 V = fault<br>> 21.8 mA or 10.9 V = fault High |
| SENSOR ELEMENT                         |                                                                                                                                                                                                                                                                                                                         |
| Gas type and measuring range           | See Ordering Information                                                                                                                                                                                                                                                                                                |
| Measuring principle                    | Catalytic (Pellistor, catalytic bead principle)                                                                                                                                                                                                                                                                         |
| Temperature range                      | -30 °C to +60 °C (-22 °F to 140 °F)                                                                                                                                                                                                                                                                                     |
| Humidity range                         | 0–95 % RH non-condensing                                                                                                                                                                                                                                                                                                |
| Pressure range                         | 90–110 kPa                                                                                                                                                                                                                                                                                                              |
| Sensor lifetime <sup>1</sup> in air    | > 5 years                                                                                                                                                                                                                                                                                                               |
| Poisoning                              | Pellistors can be poisoned by silicone-containing substances or other catalyst poisons up to complete loss of sensitivity.                                                                                                                                                                                              |
| RECOMMENDED STORAGE CONDITIONS         |                                                                                                                                                                                                                                                                                                                         |
| Storage temperature range <sup>2</sup> | 0 °C to +20 °C (32 °F to 68 °F)                                                                                                                                                                                                                                                                                         |
| Storage time <sup>3</sup>              | Ca. 6 months                                                                                                                                                                                                                                                                                                            |
| Humidity range                         | 0–95 % RH non-condensing                                                                                                                                                                                                                                                                                                |
| Pressure range                         | 90–110 kPa                                                                                                                                                                                                                                                                                                              |
| PHYSICAL                               |                                                                                                                                                                                                                                                                                                                         |
| Housing type P                         | Polycarbonate; UL 94 V2                                                                                                                                                                                                                                                                                                 |
| Housing colour                         | Similar to RAL 7035 (light grey)                                                                                                                                                                                                                                                                                        |
| Dimensions (Ø x H)                     | 24 x 22 mm (0.94 x 0.87 in.)                                                                                                                                                                                                                                                                                            |
| Weight                                 | Ca. 30 g (0.066 lb)                                                                                                                                                                                                                                                                                                     |
| Protection class                       | IP65                                                                                                                                                                                                                                                                                                                    |
| Mounting                               | Screw mounting, external thread M25 x 1.5 mm                                                                                                                                                                                                                                                                            |
| Wire connection                        | Screw-type terminal, 0.25 –1.3 mm <sup>2</sup> , 3-pin                                                                                                                                                                                                                                                                  |
| REGULATIONS                            |                                                                                                                                                                                                                                                                                                                         |
| Directives                             | EMC directives 2014/30/EU<br>CE<br>UKCA<br><br>Compliance with:<br>EN 50271<br>EN 50545:2017;<br>EN 61010-1:2010,<br>ANSI/UL 61010-1,<br>CAN/CSA-C22.2 No. 61010-1                                                                                                                                                      |
| Warranty                               | 1 year on sensors (not if poisoned or overloaded)                                                                                                                                                                                                                                                                       |

<sup>1</sup> Expected service life for normal ambient conditions.

<sup>2</sup> A deviating storage temperature can have a negative effect on sensitivity and service life.

<sup>3</sup> If stocked for a longer period, we recommend checking the zero point and recalibrating if necessary.

| OPTIONS                                |                                         |
|----------------------------------------|-----------------------------------------|
| HOUSING TYPE A                         |                                         |
| Material                               | Polycarbonate                           |
| Flammability classification            | UL 94 V2                                |
| Housing colour                         | Similar to RAL 7035 (light grey)        |
| Dimensions (B x H x D)                 | 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                             |
| DISPLAY                                |                                         |
| LC Display                             | 2 lines, 16 characters each, monochrome |
| Temperature range                      | -20 °C to +60 °C (-4 °F to 140 °F)      |
| OPEN-COLLECTOR                         |                                         |
| Transistor output (2)                  | For horn (resettable) and warning lamp  |
| Switching capacity                     | 24 V DC / 50 mA (+ switching)           |

| Gas type                                      | Ordering No. | Measuring range | Accuracy                           | Display resolution | Repeatability                      | t <sub>90</sub> time | Reaction time | Zero-point variation                 | Drift in air                       | Relative gas density <sup>1</sup> | Calibration interval <sup>2</sup> |
|-----------------------------------------------|--------------|-----------------|------------------------------------|--------------------|------------------------------------|----------------------|---------------|--------------------------------------|------------------------------------|-----------------------------------|-----------------------------------|
|                                               | MC2-X-       | % LEL / ppm     | ± % sig.                           | % LEL / ppm        | < ± % sig.                         | ≤ sec.               | ≤ sec.        | ± % LEL                              | < % / month                        | Air = 1                           | Months                            |
| CH <sub>4</sub>                               | P3400-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | 15                   | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 0.56                              | 12                                |
| LPG                                           | P3402-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | n.d.                              | 6                                 |
| NH <sub>3</sub>                               | P3408-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | 20                   | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 0.60                              | 6                                 |
| NH <sub>3</sub>                               | P3408-B      | 0–20 % LEL      | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | 10                   | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 0.60                              | 6                                 |
| C <sub>2</sub> H <sub>4</sub>                 | P3410-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 0.97                              | 6                                 |
| C <sub>6</sub> H <sub>12</sub>                | P3415-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 2.90                              | 6                                 |
| C <sub>2</sub> H <sub>6</sub>                 | P3420-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 1.05                              | 6                                 |
| C <sub>2</sub> H <sub>5</sub> OH              | P3425-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 1.59                              | 6                                 |
| C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>  | P3427-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 3.04                              | 6                                 |
| C <sub>6</sub> H <sub>6</sub>                 | P3430-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 2.70                              | 6                                 |
| C <sub>6</sub> H <sub>14</sub>                | P3435-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 2.97                              | 6                                 |
| H <sub>2</sub>                                | P3440-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 1 (CH <sub>4</sub> )               | 10                   | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 0.07                              | 12                                |
| C <sub>6</sub> H <sub>12</sub> O <sub>2</sub> | P3448-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 4.01                              | 6                                 |
| CH <sub>3</sub> OH                            | P3450-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 1.10                              | 6                                 |
| C <sub>4</sub> H <sub>8</sub> O               | P3458-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 2.48                              | 6                                 |
| C <sub>4</sub> H <sub>10</sub>                | P3460-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 2.08                              | 6                                 |
| C <sub>4</sub> H <sub>10</sub> O              | P3468-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 2.55                              | 6                                 |
| C <sub>8</sub> H <sub>18</sub>                | P3470-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 3.94                              | 6                                 |
| C <sub>5</sub> H <sub>10</sub>                | P3472-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 2.42                              | 6                                 |
| C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>  | P3473-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 2.56                              | 6                                 |
| C <sub>5</sub> H <sub>12</sub>                | P3475-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 2.49                              | 6                                 |
| C <sub>3</sub> H <sub>8</sub>                 | P3480-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | 20                   | 5             | 0.5 (CH <sub>4</sub> )               | 2 (C <sub>3</sub> H <sub>8</sub> ) | 1.55                              | 12                                |
| C <sub>3</sub> H <sub>8</sub>                 | P3480-B      | 0–30 % LEL      | 2 (C <sub>3</sub> H <sub>8</sub> ) | 0.01               | 2 (C <sub>3</sub> H <sub>8</sub> ) | 15                   | 5             | 0.5 (C <sub>3</sub> H <sub>8</sub> ) | 2 (C <sub>3</sub> H <sub>8</sub> ) | 1.55                              | 12                                |
| C <sub>3</sub> H <sub>8</sub>                 | P3480-C      | 0–5000 ppm      | 2 (C <sub>3</sub> H <sub>8</sub> ) | 1 (ppm)            | 2 (C <sub>3</sub> H <sub>8</sub> ) | 15                   | 5             | 0.5 (C <sub>3</sub> H <sub>8</sub> ) | 2 (C <sub>3</sub> H <sub>8</sub> ) | 1.55                              | 12                                |
| C <sub>3</sub> H <sub>6</sub>                 | P3481-B      | 0–30 % LEL      | 2 (C <sub>3</sub> H <sub>6</sub> ) | 0.01               | 5 (C <sub>3</sub> H <sub>6</sub> ) | 15                   | 5             | 1.0 (C <sub>3</sub> H <sub>6</sub> ) | 2 (C <sub>3</sub> H <sub>6</sub> ) | 1.48                              | 12                                |
| C <sub>3</sub> H <sub>8</sub> O               | P3482-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 2.07                              | 6                                 |
| C <sub>3</sub> H <sub>6</sub> O               | P3485-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 2.00                              | 6                                 |
| C <sub>7</sub> H <sub>8</sub>                 | P3490-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 3.18                              | 6                                 |
| C <sub>7</sub> H <sub>16</sub>                | P3491-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 3.46                              | 6                                 |
| C <sub>4</sub> H <sub>6</sub>                 | P3494-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 1.92                              | 6                                 |
| C <sub>9</sub> H <sub>20</sub>                | P3495-A      | 0–100 % LEL     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | 4.43                              | 6                                 |
| Petrol Vapours                                | P3496-A      | 0–100 % UEG     | 1 (CH <sub>4</sub> )               | 0.1                | 2 (CH <sub>4</sub> )               | n.d.                 | 5             | 0.5 (CH <sub>4</sub> )               | 2 (CH <sub>4</sub> )               | n.d.                              | 6                                 |

<sup>1</sup> The recommended mounting height depends on the relative gas density of the type of gas to be monitored. Depending on the relative gas density (d), the following recommendation therefore applies:

d ≤ 0.85: Mounting 0.3–0.5 m below the ceiling

0.85 < d < 1.15: Mounting at 1.2–1.8 m height

d ≥ 1.15: Mounting 0.3–0.5 m above the floor

<sup>2</sup> Manufacturer-recommended calibration interval for normal environmental conditions.

All specifications were collected under optimal test conditions.

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

The T 021 (DGUV-I-213-056) and T 023 (DGUV-I-213-057) as well as T 055 leaflets must be observed.



## EXAMPLE

CH<sub>4</sub> sensor, measuring range 0–100 % LEL, with plastic housing type A without display  
(order number: MC2-A-P3400-A-0-P)

## ACCESSORY

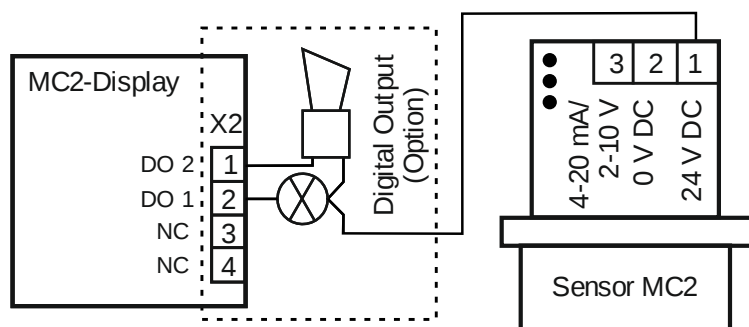
Sensor protection cap (order number: C2-Z1)

Duct mounting kit (order number: C2-Z2)

Calibration adapter (order number: C2-Z4, C2-Z4-A, C2-Z4-B, C2-Z4-C)

Splash protection SplashGuard (order number: C2-Z5)

## WIRING CONFIGURATION



### Note:

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

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

## FURTHER MEASURING PRINCIPLES



### Infrared:

Methane (CH<sub>4</sub>), propane (C<sub>3</sub>H<sub>8</sub>)

→ See data sheet DB\_MC2\_IR\_Premium and data sheet DB\_MC2\_IR



### MPS™:

Methane (CH<sub>4</sub>), propane (C<sub>3</sub>H<sub>8</sub>), hydrogen (H<sub>2</sub>)

→ See data sheet DB\_MC2\_MPS



### Semiconductor:

Ammonia (NH<sub>3</sub>), ethylene (C<sub>2</sub>H<sub>4</sub>)

→ See data sheet DB\_MC2\_HL



### Electrochemical:

Ammonia (NH<sub>3</sub>), ethylene (C<sub>2</sub>H<sub>4</sub>), hydrogen (H<sub>2</sub>)

→ See data sheet DB\_MC2\_Tox



Further information in the catalog: