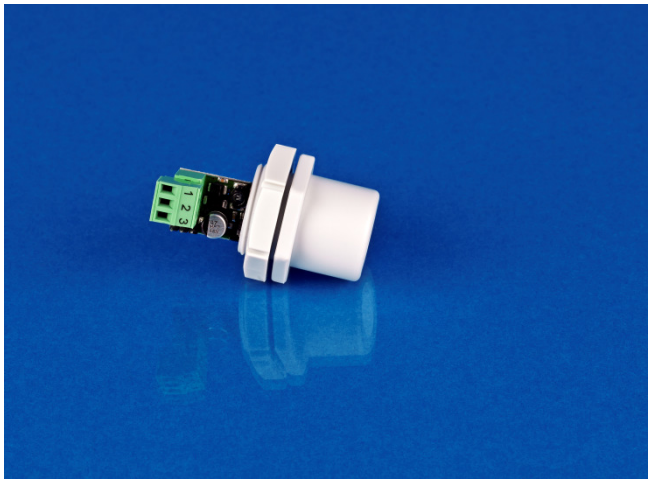


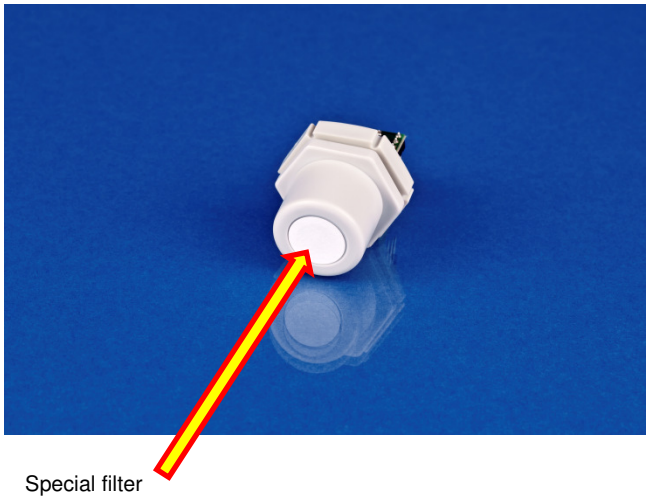
Carbon Monoxide (CO) gas detector GCO for wall mounting



Carbon Monoxide (CO) gas sensor with PCB.

Normal life time is 6 years for CO gas sensor.

The Carbon Monoxide (CO) gas sensor with PCB can easily be exchanged after 6 years.



Special filter
for IP65 protection of Carbon Monoxide (CO) gas sensor

Features

- **Output 4-20 mA or 2-10 Vdc**
- **Power supply 24 Vdc**
- **Ranges 0-100 ppm or 0-300 ppm**
- **IP65 enclosure with quick locking screws**
- **Digital measurement value processing incl. temperature compensation**
- **Internal function control with integrated hardware watchdog**
- **Data / measured values in micro controller of sensor unit, therefore simple exchange uncalibrated <> calibrated**
- **High accuracy, selectivity and reliability**
- **Low zero point drift**
- **Hardware & software according to SIL2 compliant development process**
- **Easy maintenance and calibration by exchange of the sensor unit or by comfortable on-site calibration**
- **Duct mounting set available for sensing Carbon Monoxide (CO) gas in ventilation ducts.**

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Ordering

Type no.	Description
GCO 100	Carbon Monoxide (CO) gas detector for wall mounting 4-20 mA or 2-10 Vdc, 24 Vdc, **0-100 ppm**
GCO 300	Carbon Monoxide (CO) gas detector for wall mounting 4-20 mA or 2-10 Vdc, 24 Vdc, **0-300 ppm**

Design features

Exchangeable Carbon Monoxide (CO) gas sensor unit GCO including digital value processing, temperature compensation and self control for the continuous monitoring of the ambient air.

The Carbon Monoxide (CO) gas sensor unit GCO houses a module with a micro controller, analog output and power supply in addition to the electrochemical sensor element including amplifier.

The micro controller calculates a linear 4-20 mA or 2-10 Vdc 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

For detection of Carbon Monoxide (CO) within a wide range of commercial applications such as vehicle exhaust in parking structures (e.g. underground garages) engine repair shops, tunnels, loading bays, engine test benches, shelters, go-kart race courses etc.

Due to the standard analogue signal the Carbon Monoxide (CO) detector is compatible with any electronic analogue control, DDC/PLC control or automation system.

Duct Mounting

Duct mounting set for sensing Carbon Monoxide (CO) gas in ventilation ducts**.**

The duct mounting set DMS 300G includes:

- 300 mm long duct probe with neoprane gasket on the duct flange for good sealing into the duct.
- 2 x 1 meter silicone hose
- Plug-connector to the Carbon Monoxide (CO) gas sensor head.



Duct Mounting Set DMS 300G



Duct Mounting Set DMS 300G assemblied with Carbon Monoxide (CO) Gas Detector GCO

Technical Data

Gas type	Carbon Monoxide (CO)
Detector element	Electrochemical
Power supply	16 -29 Vdc, reverse-polarity protect
Power consumption	50 mA, max. (1.7VA for 24V)
Analog output signal	Proportional, overload and short-circuit proof, load ≤ 500 Ohm for current signal, ≥ 10kΩ for voltage signal 4-20 mA or 2-10V = measuring range 3.2 <4 mA or 1.6-2V = under range >20-21.6 mA or 10-10.8V = over range 2.5 mA or 1.25V = fault >21.8 mA or 10.9V = fault high
Detector coverage	400 m2 garage application, as rule of thumb
Measuring range	See ordering codes
Accuracy	±3 ppm
Resolution	0.5 ppm
Repeatability	< ± % sig. 5
t90 Time (time allowed for sensor to detect 90% of existing gas conc.)	≤ 50 sec.
Zero-point variation	±4 ppm
Drift (zero)	<0.4 % signal/month
Drift (Gain)	<0.4 % signal/month
Temperature range	-15°C to +50°C
Humidity range, non-condensing	10 to 95% r.H.
Sensor life time	6 years
Relative gas density	0.97 (Air = 1)
Mounting height	1.5 - 1.8 m above floor
Storage temperature	5°C to 30°C
Calibration interval*	12 months
Pressure range	Atmospheric ± 20 %
Storage time	6 months

Cont. Technical Data

Enclosure colour	White
Dimensions (W x H x D)	110 x 85 x 60 mm, excl. sensor unit and cable gland
Weight	Ca. 0.2 kg
Protection class	IP 65 incl. gas sensor unit
Pre-embossed entries for cable / sensor unit	PG 13.5
Conformity to	EN 50271 EN 601010-1 ANSI/UL 61010-1 CAN/CSA-C22.2 No.61010-1

* Manufacturer recommended calibration interval for normal environmental conditions.

Wiring



24 Vdc supply
0 Vdc
4-20 mA output

For output 2-10 Vdc connect the supplied 500 ohm resistors between terminal 2 and 3

Cross Sensitivity

(The sensor reacts differently to the following gases)

Gas	Concentration ppm	Reaction ppm
Chlorine, Cl_2	2	0
Ethanol, C_2H_5OH	2000	5
Carbon dioxide, CO_2	5000	0
Sulphur dioxide, SO_2	50	0.5
Hydrogen sulphide, H_2S	25	0
Nitrogen dioxide NO_2	50	-1
Nitrogene monoxide NO	50	8
Hydrogen, H_2	100	20

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.

General information

When and where is comprehensive monitoring needed to cover a large area?

You may fear that leaks could occur over the whole area.

One example could be a solvent storage depot. In similar places you have to assume that an area of 20-40 m2 per detector could be affected depending on to what extent the vapours can spread (shelving, obstacles, etc.).

In a garage, the sensors are distributed rather evenly.

It is estimated that no dangerously high concentrations would form in a garage between two detectors at the specified alarm thresholds with one detector covering 400 m2.

Concern about combustible gases has to be based on similar considerations with 80-120 m2 per detector.

In a brewery, it is assumed that on a floor to be supervised the CO2 will spread relatively evenly and close to the floor level.

In a storage depot one detector per 100 m2 would probably be sufficient.

It is important at on-site visits to detect the deeper located areas where CO2 could accumulate.

If there are several such places, each of these areas has to be monitored with (at least) one detector independent of the other detectors. In addition you would have to consider obstacles disturbing uniform spread of vapours.

For a comprehensive monitoring of toxic gases it is important to consider the rate of propagation for this gas.

Chlorine for instance, diffuses only very slowly. One detector can monitor a maximum of 10 m2.

Ammonia is lighter than air and propagates easily.

But if there is moisture somewhere between the leak and the detector,
a great deal of ammonia will be bound there and the detector will only detect a small amount of gas .

If there are ice deposits in cold stores, the ammonia will also be bound there and a detector will detect nothing.

In this respect there is no general statement for a comprehensive monitoring,
but in most applications this is not necessary.

Gas monitoring and ventilation control in parking areas

Gas monitoring in parking areas meets two main needs:

- To give a warning when the amount of harmful gases reaches an unhealthy level.
- To ensure that the ventilation control is done in the best and most profitable way, ie for fresh air needs.

Hazardous gases

Petrol and diesel exhaust fumes emit harmful levels of nitrogen dioxides (NO_2), hydrocarbons (CH) and carbon monoxides (CO).

As a rule only carbon monoxides and nitrogen dioxides are monitored in parking areas since it is often (wrongly) believed that other gases do not reach harmful levels.

Carbon monoxide is a highly dangerous toxic gas (see table at the top of page 5).

Nitrogen dioxide is a carcinogen.

When considering monoxide from gas monitoring perspective it is appropriate to have two alarm levels, where one level, occurs at about 20 ppm, and the other at about 35 ppm.

A gas alert sign or similar can warn of unhealthy carbon monoxide levels at the lower alert level. At the higher alert level, ie critical alarm level,
it may be appropriate to allow the system to activate a warning siren.

A detector density of at least 1 detector/400 m^2 is would be appropriate.

In case there are diesel vehicles in the parking area, it is important to take other harmful gases into consideration, such as nitrogen oxides and hydrocarbons.

In cases described above, specific monoxide detectors cannot cover the detection needs. Detectors that can detect these gases are required, eg, the NO_2 gas detector GNO2.

Application areas

- Car repair shops
- Trucks/Indoor
- Parking areas
- Tunnels
- Mines
- Ice Hockey Rinks
- Bus/Lorry Terminals
- Generator rooms
- Garages

Ventilation control

The minimum requirement to be set in ventilation control is to make certain that the gas monitoring facility affects the ventilation in such a way that if harmful gas concentrations occur, the fresh air intakes must increase in order to reduce gas concentrations to reach harmless levels.

A well-regulated demand controlled ventilation in a parking area not only improves the air quality but it also minimizes the energy consumption by avoiding unnecessary ventilation.

Optimal ventilation with regard to gas concentrations can usually be achieved by regular ventilation.

In a modern gas monitoring facility there are functions both for alarms (two levels) and controls for air evacuation.

The control options in the gas monitoring facility can be adapted to the control modes of most ventilation facilities.

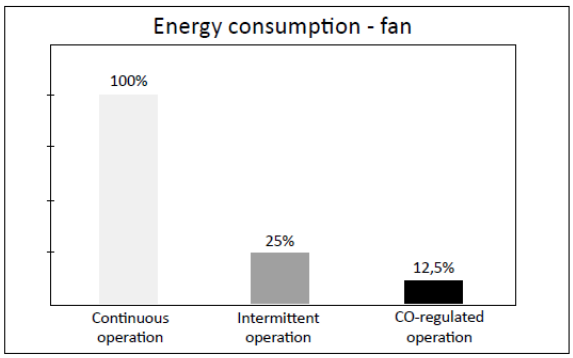
The gas monitoring facility allows for incrementally controlled ventilation.

Example:

At low load, ventilation is running at 1/2-power. If the gas concentration exceeds 20 ppm
(level 1), the sensors react and ventilation is controlled is switched over to the 1/1 power.

Staff Alarm - e.g. warning by sirens in the parking area - is given when the concentration exceeds 35 ppm (level 2).

Step less control via frequency converter controller or via DDC/PLC gives the best energy savings.



By monitoring CO levels and only running the fans when necessary the CO detector becomes a significant energy saver.

Normally parking area ventilation need only be operational in 2 out of 24 hours, which naturally saves a great deal of energy.

Poisoning Hazard

There are several gas that when released in the air uncontrolled can poison and kill people. Common poisonous gases in industry are e.g. ammonia, carbon monoxide and hydrogen sulphide (all the examples listed are also flammable).

Experts within occupational health and medicine estimate the gas concentrations for harmful gases when the adverse impacts are minor.

In Sweden, these so called hygienic levels are set and updated by the Swedish Work Environment Authority.

A distinction is made between the maximum exposure limit, i.e. the maximum value for a 15-minute average exposure, and the exposure limit value, i.e. the maximum value for an 8-hour average exposure.

When monitoring gas it is advisable to let the hygienic exposure limit values provide indications for the choice of alarm levels.

This does not mean however that you necessarily need to adhere to the above described levels.

Alarm levels should be chosen according to
how dangerous the gas is and the particular installation conditions.

How carbon monoxide affects people			
Vol-%	ppm	Contact duration	Symptom med möjliga följder
0.02	200	2-3 h	Light headache
0.04	400	1-2 h	Severe headache (forehead)
0.08	800	45 min 2 h	Malfunctions in the body Unconsciousness
0.16	1600	20 min 2 h	Malfunctions in the body Death
0.32	3200	5-10 min 30 min	Malfunctions in the body Death
0.64	6400	1-2 min 10-15 min	Malfunctions in the body Death
1.28	12800	1-3 min	Death

Emission values for different engine types, as well as hygienic exposure limits of the gases									
GAS	Impurities (g/kg fuel) caused by petrol and diesel engines			ppm content petrol exhausts	ppm content diesel exhausts	Hygienic limits			
						ppm 8 h	mg/m³ 8 h	ppm 15 min	mg/m³ 15 min
NO_2	25	10,5	42	100-200	2000	25	30	-	-
CO	155	12	13	20000-60000	1000	35	39	50	55
CH	15	6	4	200-1500	500	25-1000			

By using gas detectors with an analog output, 4-20 mA, which sends the signal to a computerized control, regulation and monitoring system, the ventilation control is done in a more refined manner.

Depending on the capacity of the computerized system, the ventilation can be controlled continuously instead of stepwise. One can have a throttle control, optional time delays, breakdown of the ventilation into zones, etc.

The impact of various gases and vapours on people and hygienic exposure limits. Gas concentration in ppm (parts per million).					
Gas	Lethal dose 5-10 min duration	Severe poisoning	Tempo-rary trouble	Max exp. lim.	Av. exp. lim.
Ammonia (NH_3)	5.000	2.500	250	50	25
Carbon monoxide (CO)	7.000	2.000	1.000	100	35
Petrol	20.000	7.500	3.000	-	200*
Acetylene	500.000	250.000	100.000	-	-
* Refers to mg/m³					

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Installation Guide lines

for Carbon Monoxide (CO) gas detectors and Nitrogen Dioxide (NO2) gas detectors in underground garages, parking houses and tunnels.

On this link:

http://www.ventilationcontrolproducts.net/guide-lines-co-and-no2-gas-detectors

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