



Features

- Internal function monitoring with integrated hardware watchdog
- Hardware and software according to SIL2 compliant development process
- Easy maintenance / calibration by replacing the sensor cartridge or via comfortable on-site calibration
- Serial RS 485 interface with protocol for CGD06, or Modbus protocol as an option
- LCD display (option)
- Status LED for alarm, fault, operation and service (option)
- Warning buzzer (option)
- Reset button (option)
- Operating voltage 230Vac with wide range input 90 to 240Vac (option)
- UPS (option)

Technical Data

Sensor Board

Power supply	24Vdc reverse-polarity protected
Power consumption (24 Vdc)	Max. 60 mA (1.5 VA)
Sensor MC2	Max. 85 mA (2.1 VA)
horn / warning light	Max. 40 mA (1.0 VA)
Alarm relays (3)	250 Vac, 5 A, potential-free, contacts (SPDT)
Transistor output (2)	24 Vdc/ 0.1 A (switching to plus)
Digital input (2)	Potential-free
Analog input (2)	4 – 20 mA overload and short-circuit proof, input resistance 200 Ω
Analog output signal (1)	Proportional, overload and short-circuit proof, load ≤ 500 Ω 4-20 mA or 2-10V = meas. range 3.0 <4 mA = underrange >20- 21.2 mA = overrange 2.0 mA = fault
Output for local bus	5 Vdc, 250 mA max. Overload, short-circuit and reverse-polarity protected
Temperature range	-25 °C to +50 °C (-13 °F to +122 °F)
Humidity range	15 - 95 % r.H not-condensing
Storage temperature	+5 °C to +30 °C (+41 °F to +86 °F)
Storage time	6 months
GCD bus	1-wire / 19200 Baud
Field bus	RS 485 / 19200 Baud
Tool bus	2-wire / 19200 Baud
Housing	Polycarbonate
Combustion	UL 94 V2
Housing colour	RAL 7032 (light grey)
Dimension housing (W x H x D)	130 x 130 x 75 mm (5.12 x 5.12 x 2.95 in.)
Weight	ca. 0.6 kg (1.32 lb.)
Protection class	IP 65
Installation	Wall mounting
Cable entry	Standard 6 x M20/25

Application

This detector is used as a stand-alone unit with its relay outputs or alternatively with its analog output signal or ModBus.

It is also used as a two-wire connection and contact anywhere in the building network.

The SNO2 is designed for detection and warning of nitrogen gases in many commercial and industrial applications.

Design Features

Gas measuring, monitoring and warning detector based on state-of-the-art micro-technology for continuous monitoring of the ambient air to detect Nitrogen Dioxide.

The detector monitors the measured values and activates the alarm relays if the set alarm thresholds for pre-alarm and main alert are exceeded.

In addition, the values are provided for direct connection to the BMS via an RS-485 interface and also as 4-20 mA output.

The SIL 2 compliant self-monitoring function in the SNO2 and in the connected sensor activates the fault message in case of an internal error as well as in case of a fault in the local bus communication and/or at the 4-20 mA input / output current signals.

Other options such as LCD display, three-color status LED, buzzer, digital input for acknowledgment or test function, various communication protocols ensure proper adaptation to the wide range of applications in gas detection technology.

For convenient commissioning the SNO2 can be pre-configured and parametrised with factory-set defaults.

Ordering Codes on next page



Nitrogen Dioxide Stand-Alone Detector - Analog, ModBus

SNO2

Jun. 16

Wire connection:

- **Local bus (SC2)** 3-pin connector
- **Digital input, analog output** Screw-type terminal min. 0.25 mm², max. 1.3 mm²
- **Power supply, relays** Screw-type terminal min. 0.25 mm², max. 2.5 mm²

Mounting height 0.4m above floor

Pre-programmed alarm output
Standard = 0-10 ppm
Alarm 1 = 2 ppm
Alarm 2 = 5 ppm
Alarm 3 = 10 ppm
Other levels on request

Directives
EMC directives 2014/30/EU
Low voltage directive 2014/35/EU
CE
Conformity to:
EN 50271 / IEC 61508
60079-29-1
EN 61010-1:2010
ANSI/UL 61010-1
CAN/CSA-C22.2 No. 61010-1
1 year on material

Technical Data Sensor

Electrical

Power supply 5 Vdc from sensor board, reverse polarity protected

Power consumption: 50 mA, max. (1.0 VA)

Serial interface local bus 1-wire / 19200 Baud

Sensor element Electrochemical

Measuring range 0 – 10, 0 - 30, 0 - 500 ppm

Accuracy ± 0.5 ppm, 20 ppm 0 - 500

Resolution 0.1 ppm, 2 ppm 0 - 500

Repeatability < ± 2 % sig.

Response time t₉₀ ≤25 sec.

Zero point variation ± 0.2 ppm

Zero Drift < 1 % signal / month

Zero Gain < 2 % signal / month

Pressure range Atmospheric ± 20 %

Sensor life time 2 years / normal ambient conditions

Calibration interval¹ 12 months

Storage temperature range + 5 to + 30 °C (41 to 86 °F)

Warranty 1 year on material (without sensor element)

¹ Manufacturer-recommended calibration interval for normal environmental conditions.

Ordering Codes

Supply Voltage 12 - 24Vdc

SNO2 010C CGD bus 0-10 ppm 16-29Vdc

SNO2 010M ModBus 0-10 ppm 16-29Vdc

XNO2 010 Sensor 0-10 ppm for exchange (2-years)
Head

SNO2 030M ModBus 0-30 ppm 16-29Vdc

SNO2 030C CGD-bus 0-30 ppm 16-29Vdc

XNO2 030 Sensor 0-30 ppm for exchange (2 years)
Head (Repl.)

SNO2 500M ModBus 0-500 ppm 16-29Vdc

SNO2 500C CGD-bus 0-500 ppm 16-29Vdc

XNO2 500 Sensor 0-500 ppm for exchange (2 years)
Head (Repl.)

SPS 12 Power Supply 12Vdc

USV 90240 Battery Power Supply 90 - 240V/24V 0.8Ah

SPS 230 Power Supply 90 - 240Vac/15VA

SRELNO2 3 relay outputs for different alarm levels,
standard 2/5/10 ppm (0-10 ppm version)

SSTOP Reset button with external input, incorporated
in detector

SBUZ LED Buzzer with built-in LED indication in three
colours, incorporated in detector

SDUCT Duct Kit

DR 24/30 Power supply 24Vdc

CSTAIN Option, stainless housing

REG Pressure regulator, flow adjustment to 0.5 l/min

GAS Calibration Gas 17 liters

GKIT Calibration Kit

SP 600 Impact protection

Alarm Units

AAW 24 Warning Horn 24Vdc 98dB

AAW 230 Warning Horn 230Vac 98dB

OA 24 Flashlight 24Vdc, red

OAW 24 Combined Warning Horn/Flashlight, 24Vdc 98dB

OAW 230 Combined Warning Horn/Flashlight, 230Vac
98dB

OAW 24T Combined Warning Horn/Flashlight with reset
button, 24Vdc 98dB

Warning Plate

Gas Alarm Flashing gas alarm plate "GASALARM" 24Vac/dc

SP 600 Impact protection



LCD display	Options
LCD	Two lines, 16 characters each, background highlighted in two colours
Operation	Menu driven via six push-buttons
Power consumption	5V, 60 mA, 0.3 VA
Status LED	
Colour / mode	Red / yellow / green (alarm – fault – operation - service)
Protection class	IP 65
Warning buzzer	
Acoustic pressure	> 90 dB (A)
Frequency	2300 Hz
Protection class	IP 65
Power supply 230Vac	
Wide range input	90 -240Vac - 50/60 Hz
Output rating type 5	5 VA
Output rating type 7	15 VA
UPS	
Power unit with wide range input	90 -240Vac - 50/60 Hz
Output rating	15 VA
Rechargeable battery	12V, 0.8 Ah
Operating time	> 60 min
Power supply 12Vdc	
	12Vdc reverse-polarity protected
"Power consumption (12 Vdc)	"Max. 120 mA (1.5 VA)
- sensor MC2	Max. 170 mA (2.1 VA)
- horn / warning light"	Max. 80 mA (1.0 VA)"

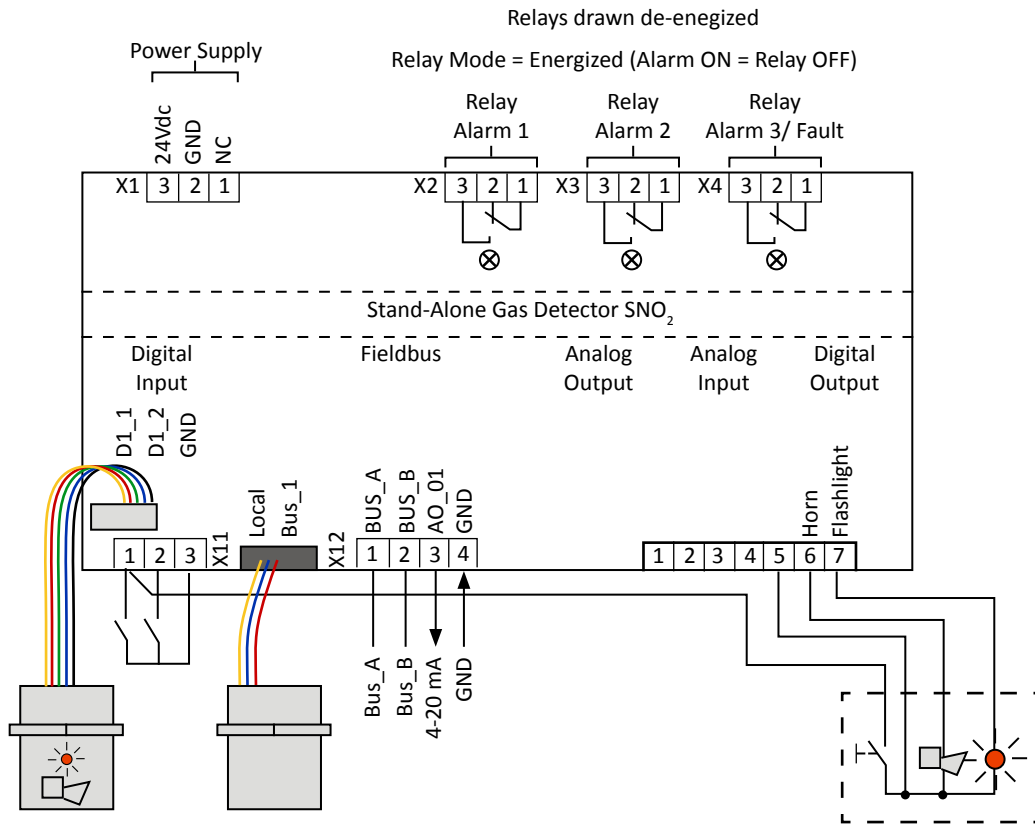
SHORT DESCRIPTION OF THE FUNCTION: DIGITAL OUTPUTS WITH THREE RELAYS

Action	Reaction Relay 1 (Alarm1)	Reaction Relay 2 (Alarm2)	Reaction Warning light (Alarm 2)	Reaction Horn (Alarm 2)	"Reaction Relay 3 (Alarm2 + fault)"	Reaction LED
Gas signal < alarm threshold 1	OFF	OFF	OFF	OFF	ON	GREEN
Gas signal > alarm threshold 1	ON	OFF	OFF	OFF	OFF	RED
Gas signal > alarm threshold 2	ON	ON	ON	ON	ON	RED
Gas signal < alarm threshold 2, but button Horn OFF activated	OFF		ON	OFF after delay ON		RED
Gas signal < (alarm threshold 2 - hysteresis) but >= alarm threshold 1	ON	OFF	OFF	OFF	OFF	RED
No alarm, no fault	OFF	OFF	OFF	OFF	ON	GREEN
No fault, but maintenance due	OFF	OFF	OFF	OFF	ON	GREEN flashing
Internal error	OFF	OFF	ON	OFF	OFF	YELLOW

Note 1: Status OFF = Relay is configured "Alarm ON = Relay" or the SNO₂ is free from voltage.

Note 2: Alarm thresholds can have the same value, therefore the relays and/or the horn and flashlight can be triggered together.

Electrical Connection



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 (NO₂), 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.

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

Nitrogen dioxide is a carcinogen.

When considering nitrogen dioxide from gas monitoring perspective it is appropriate to have two alarm levels, where one level, occurs at about 2 ppm, and the other at about 5 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 m² 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 nitrogen dioxide detectors cannot cover the detection needs. Detectors that can detect these gases are required, eg, the SNO₂ gas detector.

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.

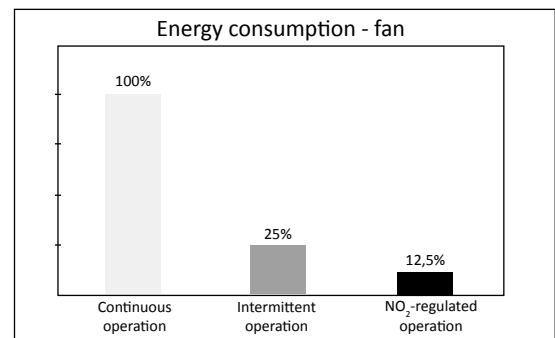
The gas monitoring facility allows for incrementally controlled ventilation.

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 25 ppm (level 2).

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



By monitoring NO₂ 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/m ³ 8 h	ppm 15 min	mg/m ³ 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	Temporary 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	-	-

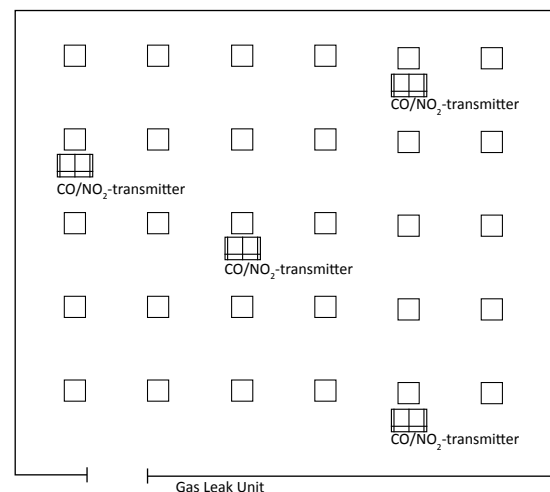
* Refers to mg/m³

Installation exemple

Installation in parking area with mechanical ventilation at 40 x 40 m (1600m²).

The CO-detectors are placed at 140-180 cm above the floor, evenly distributed over the area, with consideration taken for walls and section dividers.

As a rule of thumb there should be one detector per 400m², the exact number depending on the shape of the area.



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