

Stationary monitoring of toxic gases and vapours



Protection from toxic gases

Toxic gases are often used as production or work media, or occur as a by-product of certain processes. Many of such gases can be difficult to store or ship. Most toxic gases are imperceptible to human senses, but even the lowest concentrations can cause immediate poisoning or health hazards in the long term. The values fixed as TLV (Threshold Limit Value) and TRK (Technical Guideline Concentration, Germany) give an indication for the peak concentrations people may be exposed to at their workplaces. Not only legal regulations and inspections, but also your own responsibility for employee safety

and production efficiency require continuous monitoring of the ambient air for toxic gases. GfG's fixed gas warning systems allow an early recognition of gas hazards to ensure that countermeasures are taken in time. A fixed gas monitoring system consists of one or more transmitters connected by cable to any controller of the GMA 40, 80, 100 or 300 series.

Transmitter

The transmitter is the key component of a gas monitoring system. It is installed wherever toxic gases might be present and cause health hazards. Even very low gas concentrations are converted into an

electrical signal that is proportional to the actual gas concentration. The signals are then transmitted to a central controller.

Four detection principles are used to monitor toxic gases, depending on different measurement requirements:

- Charge Carrier Injection (CI)
- Chemosorption (CS)
- Electrochemical (EC)
- Infrared (IR)

All GfG transmitters offer integrated electronic circuits for voltage stabilization, signal transmission and temperature compensation. This results in stable measurement signals, even in case of considerable temperature changes.

The transmitters are produced by GfG and are subject to a 100% quality control. Installation is easy; since the transmitters are calibrated before shipment, the service engineer does a quick readjustment when putting them into operation.



EC 25

Transmitter with electrochemical sensor for measurement of toxic gases and vapours and oxygen (see gas list)

- LC display
- Sensors with long-term stability
- Highly selective
- Easy handling
- 0,2..1mA or 4..20mA output signal
- Service lid for:
 - Measurement of output signal
 - Service switch for output signal suppression allows for maintenance without alarm activation
 - Simple one-man calibration on-site
- Plug-in sensor cell in stainless steel sleeve, replaceable without opening the case

The transmitter EC 25 can be used as a single device or in connection with any GfG-Controller.



EC 24

Transmitter with electrochemical sensor for measurement of toxic gases and vapours and oxygen (see gas list).

- For use in hazardous areas (zone 1+2)
- Sensors with long-term stability
- Highly selective
- Easy handling
- 0,2 .. 1 mA or 4 .. 20 mA output signal
- Service lid for:
 - Measurement of output signal
 - Simple one-man calibration on-site
- Solid aluminium casing, IP 54 (optionally IP 68 for up to 10 m water column)
- Plug-in sensor cell in stainless steel sleeve, replaceable without opening the casing

The most important benefits of the EC 24 are its easy handling, long operating life and the quick-response.



CS 24 EX

Transmitter with chemosorption sensor for measurement of toxic gases and vapours (see gas list).

- For use in hazardous areas (zone 1+2)
- Even under large temperature variations stable measuring values will be provided
- Fast response time
- Easy installation
- Almost maintenance-free
- High sensitivity
- Easy handling
- Long-life sensors
- 0,2 .. 1 mA or 4 .. 20 mA output signal
- Service lid for:
 - Measurement of output signal
 - Service switch for output signal suppression allows for maintenance without alarm activation
 - Simple one-man calibration on-site
- Solid aluminium casing, IP 54 (optionally IP 68 for up to 10 m water column)
- Plug-in sensor cell in stainless steel sleeve, replaceable without opening the casing

CI 21

Transmitter with special charge carrier injection sensor for measuring of ammonia. A new, progressive detection principle allows a very selective measurement of ammonia over a



wide range from a few ppm up to 1 Vol.-%. Considerably reduced sensitivity for hydrogen and solvents and its ability to be operated at temperatures down to -35 °C make this transmitter an almost universal solution for ammonia monitoring applications.

- Thermostatic sensor provides stable measurement values even during dramatic temperature changes
- Measurement in dry air and at 99% humidity
- No false alarms for hydrogen, natural gas, carbon monoxide, oil vapours, solvents
- Wide dynamic detection range, starting from a few ppm, up to Vol. %

CS 21

Transmitter with chemosorption sensor for monitoring of toxic gases and vapours.

- Fast response time and high sensitivity
- Wide detection range
- Affordable
- Long-life sensors
- Minimum cost of ownership

IR 24

Transmitter with infrared sensor for the accurate detection of carbon dioxide (CO₂). Using the precision of light provides high reliability and reproducibility. The infrared principle is unambiguous as a fingerprint in criminology. This



means that no other gas interferes with the measurement.

- Almost maintenance-free
- Easy handling
- Long-life sensors
- Low cost of ownership
- Wide detection range
- Reliable measuring results

Accessories

For regular function tests as well as for very difficult measuring tasks GfG offers an extensive range of accessories.



Sampling system

The sampling system supplies gases to the transmitter from inaccessible areas. There are special filters available to protect the transmitter from dust, condensate and corrosive compounds. The EX-proof model of the sampling system can also be used for explosive gas mixtures and in explosion endangered areas.



Measurement cable

The connection between transmitter and controller is effected by means of a shielded three-core cable.

Calibration adapter - flow adapter

During periodic sensitivity checks, the transmitters are exposed to certain test gases. The calibration adapter, which is screwed on the transmitter, allows for a reliable and steady gas supply.

Weather protection

Transmitters that are mounted outdoors, can be further protected from dirt, temperature extremes or rain, by using a protective casing.



Gas list – Toxic gases

Gas list for EC 25 and EC 24

Gas	Chemical formula	Gas density (air=1)	TLV (TRK*)		Minimum range ppm	Maximum range ppm	Resolution ppm	Alarm threshold ppm	
			ppm	mg/m ³				1	2
Ammonia	NH ₃	0.59	50	14	0.. 50	0.. 200	1	50	75
Chlorine	Cl ₂	2.45	0.5	1.5	0.. 5	0.. 20	0.1	0.5	1
Hydrogen chloride	HCl	1.26	5	7	0.. 10	0.. 50	1	5	10
Hydrogen cyanide	HCN	0.93	10	11	0.. 20	0.. 50	1	10	15
Ethylene oxide	C ₂ H ₄ O	1.52	(1*)	(2*)	0.. 20	0.. 100	1	5	10
Carbon monoxide	CO	0.97	30	33	0.. 100	0.. 4000	1(10)	30	60
Ozone	O ₃	1.66	0.1	0.2	0.. 2	0.. 5	0.1	0.5	1
Sulphur dioxide	SO ₂	2.21	2	5	0.. 10	0.. 2000	1(10)	2	4
Hydrogen sulphide	H ₂ S	1.19	10	14	0.. 30	0.. 1000	1	10	15
Nitrogen dioxide	NO ₂	1.59	5	9	0.. 10	0.. 1000	1	5	7.5
Nitrogen monoxide	NO	1.04	20	30	0.. 100	0.. 5000	1(10)	10	20

Gas list for CS 24 Ex, CS 21 and CI 21**

Gas	Chemical formula	Gas density (air=1)	TLV (TRK*)		Minimum range ppm	Maximum range ppm	Alarm threshold ppm	
			ppm	mg/m ³			1	2
Acetone	C ₃ H ₆ O	2.00	500	1200	(0)20.. 500	(0)50.. 10000	500	1000
Ammonia	NH ₃	0.59	20	14	(0)20.. 300	(0)30.. 10000	50(500)	200(800)
Butyl acetate	C ₆ H ₁₂ O ₂	4.01	200	950	(0)20.. 1000	(0)50.. 10000	200	400
Dimethyl Ether	C ₂ H ₆ O	1.63	1000	1910	(0)20.. 1000	(0)50.. 5000	1000	1500
Ethanol	C ₂ H ₆ O	1.59	1000	1900	(0)20.. 500	(0)50.. 10000	250	1000
Ethyl acetate	C ₄ H ₈ O ₂	3.04	400	1400	(0)20.. 1000	(0)50.. 10000	400	600
Frigen R 22	CHClF ₂	2.98	500	1800	(0)20.. 500	(0)50.. 5000	500	800
n-Butane	C ₄ H ₁₀	2.05	1000	2350	(0)30.. 1000	(0)50.. 10000	1000	2000
n-Hexane	C ₆ H ₁₄	2.79	50	180	(0)20.. 1000	(0)50.. 10000	500	1000
n-Pentane	C ₅ H ₁₂	2.49	1000	2950	(0)20.. 1000	(0)50.. 10000	1000	2000
Propane	C ₃ H ₈	1.56	1000	1800	(0)20.. 1000	(0)50.. 10000	1000	2000
Solkane/Frigen 134a	CH ₂ F-CF ₃	3.45	1000		(0)20.. 500	(0)50.. 5000	100	400
Toluene	C ₇ H ₈	3.18	50	380	(0)20.. 1000	(0)50.. 10000	500	1000

Gas list for IR 24

Gas	Chemical formula	Gas density (air=1)	TLV (TRK*)		Minimum range ppm	Maximum range % Vol.	Resolution ppm	Alarm threshold ppm	
			ppm	mg/m ³				1	2
Carbon dioxide	CO ₂	1.52	5000	9000	0..10000	0.5..25..70	1 (100)	300 (5000)	500 (10000)

Excerpt taken from GfG gas list. Transmitters for other gases and ranges are available. Please ask for special catalogues.

* TLV (Threshold Limit Value) TRK (Technical Guideline Concentration, Germany)
** CI 21 for ammonia only

Transmitter Technical Data

General

Gas: Toxic gases (see gas list)
Range: ppm range (see gas list)
Gas supply: Diffusion or flow adapter
Cable gland: PG9
Casing protection: IP 54 / IP 68 (option)
Cable length to controller: < 300 m (3x0.75 mm² cable)
> 300m (3x1.5 mm² cable) shielded cable (LIYCY)

EC 25

Detection principle: Electrochemical
Response time: t₉₀ < 10 seconds (depending on gas)
Output signal: 0.2 .. 1 mA or 4 .. 20 mA
Supply voltage: 12 .. 24 V
Ambient temperature: -20 to +40 °C
Expected lifetime: 2-4 years (depending on gas)
Dimensions: 120 x 122 x 95 mm (WxHxD)
Weight: 1500 g

EC 24

Detection principle: Electrochemical
Response time: t₉₀ < 10 seconds (depending on gas)
Output signal: 0.2 .. 1 mA or 4 .. 20 mA
Supply voltage: 18 .. 24 V
Ambient temperature: -20 to +50 °C
Expected lifetime: 2-4 years (depending on gas)
Dimensions: 80 x 185 x 60 mm (WxHxD)
Weight: 980 g

CS 24

Detection principle: Chemosorption
Response time: t₉₀ < 8 seconds (depending on gas)
Output signal: 0.2 .. 1 mA or 4 .. 20 mA
Supply voltage: 18 .. 24 V (max. 26 V), 300 mA
Ambient temperature: -30 to +55 °C, -20 to +40 °C tested
Expected lifetime: > 5 years
Dimensions: 80 x 185 x 60 mm (WxHxD)
Weight: 1000 g
Ex-approval: Ex II 2G CE 0158
Ignition Protection Classification: EEx dem (ib) IIC T6
EC-Type Examination Certificate: BVS 03 ATEX G 009 X (with measuring function; see page 1)
Function Test: PFG-Nr.: 41300597
EMC Test: EN 55011, EN 55022 resp. EN 50081-1, EN 50081-2 as well as EN 50270 type 1 and type 2

CI 21

Detection principle: Charge carrier injection
Gas: Ammonia, NH₃
Response time: t₉₀ < 8 seconds
Detection range: 0 .. 200 / 0 .. 1000 / 0 .. 1 Vol.-%
Humidity: 0.1 .. 99 % r.h.
Ambient temperature: -30 to +55 °C
Output signal: 0.2 .. 1 mA or 4 .. 20 mA
Supply voltage: 10 .. 28 V
Expected lifetime: > 2 years
Dimensions: 100 x 100 x 57 mm (WxHxD)
Weight: 370 g

CS 21

Detection principle: Chemosorption
Response time: t₉₀ < 8 seconds (depending on gas)
Output signal: 0.2 .. 1 mA or 4 .. 20 mA
Supply voltage: 10 .. 32V
Ambient temperature: -30 .. +55 °C
Expected lifetime: > 5 years
Dimensions: 100 x 100 x 57 mm (WxHxD)
Weight: 370 g

IR 24

Detection principle: Infrared
Response time: t₉₀ < 25 seconds
Output signal: 0.2 .. 1 mA or 4 .. 20 mA
Supply voltage: 18 .. 26 V, 100 mA
Ambient temperature: -20 to +40 °C
Expected lifetime: 5 years
Dimensions: 10 x 145 x 80 mm (WxHxD)
Weight: 780 g
Humidity: 0 .. 99%

Accessories: Protective housing, Sampling system, Calibration adapter

Transmitter for toxic gases and vapours



Safe and reliable measurement
One-man calibration on-site
Long-life sensors
Low cost of ownership

Worldwide Supplier of Safety Solutions

We reserve the right of modification



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