



# Operation Manual

## MICRO IV

(G221 / G222 / G223)

Single Gas Detector



# Content

	Page
<b>Introduction</b>	<b>3</b>
<b>For your Safety</b>	<b>3</b>
<b>Application and Use</b>	<b>3</b>
<b>General Description</b>	<b>3</b>
<b>Detection Principle</b>	<b>3</b>
<b>Design</b>	<b>4</b>
<b>Operational Notes</b>	<b>4</b>
<b>Detection Mode</b>	<b>4</b>
Turning ON	4
Display Illumination	4
Peak and Minimum Values, Short-term and Long-term Averages	5
Turning OFF	5
Alarm	5
Alarm Signals	5
Special Notes for Oxygen Monitoring	6
Battery	6
Check of Battery Capacity	6
Time and Date	7
<b>Service Mode</b>	<b>7</b>
Activation	7
Confidence Bleep	7
Zeroing – Adjust Zeropoint	8
Calibration – Sensitivity Calibration	9
Sensor Replacement	10
Adjustment by means of Configuration Program	11
<b>Datalogger</b>	<b>11</b>
<b>Annex</b>	<b>11</b>
<b>Cleaning</b>	<b>11</b>
<b>Service and Repair</b>	<b>11</b>
<b>Maintenance and Inspection</b>	<b>11</b>
<b>Accessories</b>	<b>12</b>
<b>Spare Parts</b>	<b>12</b>
<b>Types of Sensors and Detection Range</b>	<b>13</b>
<b>Sensor Specification</b>	<b>14</b>
<b>Alarm Thresholds-Standard Settings and Test Gas Chart</b>	<b>17</b>
<b>Technical Data</b>	<b>18</b>
<b>EC-Type Examination Approval</b>	<b>19</b>

## Introduction

### For your Safety

According to § 3 of the law about technical working media, this manual points out the proper use of the product and serves to prevent dangers. This manual must be carefully read by all individuals who have or will have the responsibility for using and servicing this product. As any piece of complex equipment, the GfG MICRO III will do the job designed to do, only, if it is used and serviced in accordance with the manufacturer's instructions. If the product is not used and serviced in accordance with the instructions in this manual the warranty will be voided. Adjustments in the service mode must be done by experts only.

**Before operating the detector, use the operational beep to check the battery status, the alarm signal activation and the readiness for operation.**

The above does not alter statements regarding GfG's warranties and conditions of sale and delivery.

### Application and Use

The MICRO IV is meant for personal safety under atmospheric conditions. It is a pocket-size detector for your personal protection from gas hazards. The detector is operating continuously in diffusion mode and gives a visual and audible alarm, if dangerous gas concentrations build up.

The Micro IV is approved for the use in explosion endangered areas and is subject to an EC-Type Examination Certificate issued by DMT Deutsche Montan Technologie GmbH, according to regulation 94/9/EG (ATEX100a):

Certificate: DMT 99 ATEX E 044

Labelling: Ⓢ II 2G EEx ib IIC T4 resp. T3  $-20^{\circ}\text{C} \leq T_a \leq +45^{\circ}\text{C}$  resp.  $+55^{\circ}\text{C}$ .

### General Description

The MICRO IV is a very small and handy single gas detector. Depending on the sensor it can be used for monitoring toxic gases, hydrogen or oxygen. The MICRO IV stores long-term and short-term average values (TWA, STEL). The event logger records, when alarm was triggered, which kind of alarm was activated (A1, A2, A3, STEL, TWA), and which gas concentration was measured. An infrared interface allows to transfer data to a PC or to a docking station.

### Detection Principle

For measuring toxic gases and oxygen the Micro IV uses electrochemical (EC) sensors.

#### Electrochemical sensor (EC)

The electrochemical cells contain an electrolyte, a working electrode (anode), a counter electrode (cathode) and, depending on the sensor type, a reference electrode. The cell is adapted to the gas to be monitored by specific electrodes and a suitable electrolyte. The electrochemical reaction generates an electrical signal, which is proportional to the gas concentration. GfG sensor cells are using the capillary diffusion barrier technology, which, in combination with an additional temperature compensation, avoids effects caused by changing atmospheric pressure and temperature.

## Design



## Operational Notes

### Detection Mode

The detection mode provides various functions, which must be known by the user for proper operation of the gas monitor MICRO IV.

### Turning ON

Turn the MICRO III on before you enter a possibly confined area. Only this makes sure that accidents caused by gas hazards are prevented. For turning on just insert the battery or, when the battery is already fit, shortly push key .

At first stage the MICRO III checks, if a valid sensor is fit, and if not, a LED flashes. The display reads **SENS.ERR**. This fault report is indicated until a valid sensor is plugged in.

Then the MICRO IV does a complete self-check. Both LEDs light up shortly, and the buzzer sounds for approx. 1 second. Additionally a test of display segments (switch on of all segments) and the battery capacity is displayed (see Check of Battery Capacity). The necessary warm-up time of the sensor is indicated by a countdown in the display (only for the initial activation).

Once the self-check is completed, the MICRO IV turns to detection mode. The LCD display indicates the gas and the concentration, e.g.:

Display	0.0 PPM	alternating	0.0 CO
---------	---------	-------------	--------

Depending on the parameter setting, either a visual or an audible confidence beep in regular intervals is activated during the detection mode. This signal proves that the detector is ready for operation. This signal can be turned on or off (see *Confidence Bleep*).

### Display Illumination

The display illumination will be turned on for approx. 5 seconds by pressing any button shortly.

## Peak and Minimum Values, Short-term and Long-term Averages

The MICRO IV provides a memory for peak and averages values. Push  to read the minimum value measured by the oxygen sensor resp. the peak value measured by the TOX sensor. For the TOX models you can push  again to indicate STEL and TWA values. For OX sensors the display reads the minimum value first. Pushing  again indicates the peak value. If you do not hit any key, the detector turns to the standard display mode after 5 seconds without changes.

While the peak or average values are indicated, you can delete the displayed value by pushing **QUIT**.

The stored value is also deleted by turning the detector off or by removing the battery.

## Turning OFF

The current consumption of the MICRO IV is very low. A single AA battery is sufficient for continuous operation of 6 months, depending on alarm and display conditions.

<b>Turn OFF</b>	Press button  approx. 5 seconds
-----------------	--

## Alarm

Should the gas concentration exceed a pre-set threshold, a visual and audible alarm is triggered immediately.

The MICRO IV provides several alarm thresholds:

Detectors for:	Description	Alarms Thresholds
<b>Toxic Gases</b>	AL 1	Alarm 1, exceeding ↑
	AL 2	Alarm 2, exceeding ↑
	AL 3	Alarm 3, exceeding ↑
<b>Oxygen</b>	AL 1	Alarm 1, falling below ↓
	AL 2	Alarm 2, falling below ↓
	AL 3	Alarm 3, exceeding ↑

The Thresholds AL1, AL2, and AL3 stand for instantaneous concentration alarms.

The alarms for TLV and STEL can be activated with the configuration program.

## Alarm Signals

The alarms are distinguished by means of different flash and sound frequencies of the visual and audible alarm signals:

Alarm	Audible and Visual Alarm	Alarm Signal	Priority
AL 1	Slow sound and flash frequency	2 x  2 x  ...	low
AL 2	Medium sound and flash frequency	4 x  4 x  ...	medium
AL 3	Fast sound and flash frequency	8 x  8 x  ...	high

The LCD display indicates the gas and the alarm threshold, e.g.

Display	<b>27.5 AL2</b>	alternating	<b>27.5 H2S</b>
---------	-----------------	-------------	-----------------

## Special Notes for Oxygen Monitoring

Sour gases like CO<sub>2</sub> and SO<sub>2</sub> are easily absorbed by the electrolyte of the oxygen sensor. This results in an increased oxygen signal of e.g. approximately 0.3 % of the measurement value per 1 Vol.-% CO<sub>2</sub>. The oxygen sensor, therefore, cannot be recommended for continuous measurement in concentrations above 25 Vol.-% CO<sub>2</sub>. If the carrier gas is a gas with a molecular weight, which is different from that for nitrogen, the display values may also be incorrect. There are no cross sensitivities of the oxygen sensor for toxic gas concentrations within the TLV range.

## Battery

The MICRO IV is powered by one 1.5 V AA Mignon alkaline cell. This battery allows a continuous operation of up to 6 months. The operational time may be reduced by frequent alarms, by display indication (versions with display) or by activated confidence bleep. This battery has to be purchased from GfG as the manufacturer. Internal controls ensure the use of batteries prescribed by the EC-Type Examination Certificate. The correct battery type is: **Duracell PROCELL MN 1500 LR6 AA**

### Battery alarm

The MICRO IV monitors the battery voltage permanently and gives a warning, if it falls below the minimum voltage, which is equivalent to approx. 5% of the battery capacity. A battery alarm is indicated by an audible warning.

Audible Battery Alarm	Alarm Signal
Fast sound frequency (2 strokes)	2 x  6 seconds. pause 2 x  . . .

The LCD display indicates the battery capacity „XX bAT“, e.g.

Display	5 bAT
---------	-------

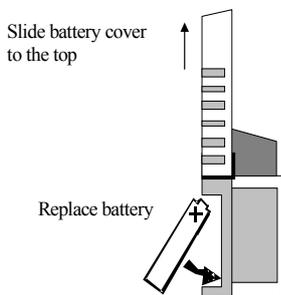
The remaining capacity after the first battery alarm allows detection for at least another 15 minutes. For safe operation the battery is to be replaced as soon as possible.

Should the battery voltage become so low that proper functioning is no longer possible, the detector turns off automatically. The display reads **OFF**. This reading is shown until the battery is replaced or until the battery is discharged completely.

### Battery Replacement (only in safe area, resp. outside of Ex-areas)

#### Note

The Duracell PROCELL MN 1500 LR 6 AA battery must be inserted or replaced in safe areas only. Take care of the correct polarity when fitting the battery (fit the plus pole first). Once the battery is fit, the MICRO IV effects a self-check, testing the visual and audible alarms.



For battery replacement slide the battery cover to the top. Then take the old battery out and replace it by a new one.

#### Note:

- Use only the approved battery type for operation in hazardous areas!
- Watch out for the correct polarity of the new battery!
- Fit battery with + pole first!

## Check of Battery Capacity

The remaining battery capacity is shown after pressing key  shortly.

The capacity is also shown in the LCD display: e.g. **90 bAT** = 90% battery capacity

Display	90 bAT
---------	--------

In addition to this the detector effects a self-check as after turning on.

## Time and Date

By pressing key  for approx. 3 seconds the display shows the time. The date is shown by pressing again shortly while the time is displayed. The indication is done in the typical format for your country. Time and date of the Micro IV are programmed automatically with the docking station DS220 or by using a configuration adapter. Replacing the battery resets time and date to 01.01.1980 0:00.

## Service Mode

In the service mode you can check the confidence beep and the calibration (sensor adjustment). Adjustment procedures are done by means of the keypad.

## Activation

<b>Activation of Service Menu</b>	Press first button <b>QUIT</b> and keep pressed. Then press button <input type="checkbox"/> and press both buttons approx. 3 seconds.
-----------------------------------	--

Display

SERVICE

Once you activated the service menu, you can select the individual menu points one after the other by shortly pressing button . These menu points are:

Key	Display	Information
QUIT		
<input type="checkbox"/>		Press both keys for approx. 3 seconds
	SERVICE	Activation of service mode.
<input type="checkbox"/>		
	BEEP	
<input type="checkbox"/>		
	AUTO ZPT	
<input type="checkbox"/>		
	AUTO CAL	
<input type="checkbox"/>		
	EXIT	Quit Service mode by pressing QUIT
<input type="checkbox"/>		Back to the first option



The relevant menu point is shown in the display. The menu points can be selected with the key **QUIT**. The service menu is deactivated by selection of menu point EXIT or automatically after 15 seconds if you do not hit any key.

## Confidence Bleep

In the standard setting the alternating display of gas and unit indicates that the detector is operated in detection mode. An additional audible or visual confidence bleep can be activated, reminding the user in regular intervals that the detector is working. The confidence bleep interval is 1 minute. The confidence bleep can also be turned off again.

Key	Display	Information
QUIT		
▼		Press both buttons approx. 3 seconds
	SERVICE	Activation of service mode
▼		
	BEEP	
QUIT		Selection of confidence bleep
	BEEP OFF	No confidence bleep Selection with key QUIT
▼		
	BEEP OPT	Visual confidence bleep LED Selection with key QUIT
▼		
	BEEP ACH	Audible confidence bleep loud Selection with key QUIT
	BEEP ACL	Audible confidence bleep Selection with key QUIT
▼		Back to the first option

## Zeroing – Adjust Zeropoint

The adjustment of the zeropoint sets the MICRO IV to its nominal zeropoint value. 0 For toxic gases (e.g. CO, H<sub>2</sub>S) clean ambient air can be used for the adjustment of the zeropoint. The nominal value for toxic gases is 0 ppm. To adjust the zeropoint for oxygen, 100.0 %Vol. nitrogen is required .

During the adjustment of the zeropoint the instantaneous value and the type of gas is displayed alternating with **ZPT**. If an error occurs during the adjustment, the display shows **ERROR**. Possible malfunctions are faulty sensors or gas concentrations beyond the valid tolerance. In this case please call GfG service. To reset these errors press key **QUIT** . The MICRO IV switches back to detection mode after successful adjustment.

Key	Display	Information
QUIT		
▼		Press both keys approx. 3 seconds
	SERVICE	Activation of service mode.
▼		
	BEEP	
▼		
	AUTO ZPT	
QUIT		Selection of zeropoint adjustment.
	0 ZPT	Display of nominal value.
	e.g.: 1 CO or 1 H2S	Display of instantaneous value. Alternating reading until sensor is adjusted or an error is indicated.
		If there is no error, detection is started again.
	ZPT ERR	Indication of sensor error.
QUIT		Confirmation of error. Starting detection.



## Calibration – Sensitivity Calibration

The test gas adjustment sets the MICRO IV to a gas specific nominal value. For toxic gas sensors make sure that the fresh air adjustment is effected before calibration. For sensitivity calibration the correct test gas is needed.

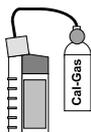
### Test gases are:

**For toxic gases, e.g. carbon monoxide (CO), hydrogen sulfide (H<sub>2</sub>S) etc.**

**For Oxygen clean ambient air can be used.**

For the correct test gas please refer to the test report of your detector.

### Calibration procedure:



Put the calibration adapter over the diffusion inlet of the MICRO IV. For avoiding mistakes in calibration due to gas absorption make sure that the MICRO III is exposed to a constant test gas flow for approx. 3 minutes. The flow rate should be 0.5...0.6 l/min.

Before starting the display reads the calibration gas concentration, which can be changed by means of keys ▼ and ▲. Push key QUIT to start calibration.

Key	Display	Information
QUIT		
▼		Press both keys approx. 3 seconds
	SERVICE	Activation of service mode.
▼		
	BEEP	
▼		
	AUTO ZPT	
▼		
	AUTO CAL	
QUIT		Selection of sensitivity calibration.
	CAL 200	Display of programmable nominal value.
▼, ▲		Reduction or increase of nominal value.
QUIT		Starting of sensitivity calibration with nominal value.
	200 CAL	Display of nominal value
	e.g: 199 CO or 50 H2S	Display of instantaneous value. Alternating reading until sensor is adjusted (calibrated) or an error is indicated.
		If there is no error detection is started again.
	CAL ERR	Indication of sensor error.
QUIT		Confirmation of error. Starting detection.



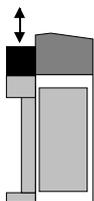
The display readings during and after the test gas calibration are the same as for the fresh air adjustment. Once the sensitivity calibration is completed successfully, the MICRO IV returns to detection mode automatically.

**Attention:**

Adjustment of zeropoint or sensitivity calibration can be simplified and automated considerably by means of the Dockingstation DS220.

## Sensor Replacement

The sensors may only be replaced in safe areas.



Before an expert replaces the sensor, the battery must be removed as described previously. Slide the battery cover off the casing completely. Now pull the sensor out and replace it by a new one. Re-assembling is done in reverse order.

## Adjustment by means of Configuration Program

The optional configuration program allows to connect the MICRO IV to a PC by means of an adapter and to change the settings below:

- Alarm thresholds (exceeding, falling below, latching)
- Alarm activation and deactivation
- Blocking of zeropoint adjustment and sensitivity calibration
- Storage capacity of event logger from 0 up to 1024 events
- Interval of data logger from 30 up to 300 seconds
- Readout of event logger and storing data on computer
- Readout of data logger and storing data on computer
- Calibration gas concentration
- Time interval of confidence beep (6 to 90 seconds)
- Different signal adjustments, e.g.: keypad response or confidence beep (off, low, high)

## Datalogger

The MICRO IV provides an event and a data logger. The event logger stores 128 events together with the measured gas concentration. When event 129 occurs, the first (oldest) event will be overwritten. The data logger is able to store 8685 measuring points, this complies to a runtime of 6 days at an interval of 60 seconds. The data logger is also designed as a loop memory. The stored data with date and time can be downloaded over a PC with the relevant software installed.

## Annex

### Cleaning

Give the MICRO IV a short sight check after use. Use a damp cloth to remove stains or soiling from the casing. Never use solvents or cleaning agents!

### Service and Repair

Service stands for maintenance, inspection and repair of gas warning equipment. The function test must be done at least once a year and checks:

- the charge status of the battery
- the reading at zero gas and standard test gas and, if necessary, the relevant adjustment
- the activation of gas alarms, e.g. with alarm test gas
- the response time

This test has to be done by an expert, and a written confirmation must be filed. In case the Micro IV needs to be repaired, this has to be done according to the manufacturer's instructions and using only genuine spare parts.

### Maintenance and Inspection

Maintenance and inspection describe those measures, which retain the nominal status of the MICRO IV. They include a regular check and adjustment of sensitivity and zeropoint. In addition to this, the working order of the detector is to be checked as well.

Before safety related measurements are effected, you should do a check which includes:

- the charge status of the battery
- the display with zero gas and with test gas
- the activation of gas alarms

## Accessories

Description	Part No.
Dockingstation 6-fold	1319201
Rubber-cover	1318214
Leather case	1318206
Calibration incl. Magnet	1318202
Configuration software with adapter cable for PC (on request)	
Sampling pump	1318215

## Spare Parts

	Description	Part No.
1.	Battery DURACELL PROCELL MN1500 LR6 AA	1318201
2.	Battery cover	1318315
3.	Oxygen sensor 0 .. 25 Vol.% O <sub>2</sub> (1-year sensor) MK342-5	1318230
4.	Oxygen sensor 0 .. 25 Vol.% O <sub>2</sub> (2-year sensor) MK3783-5	1319126
5.	Carbon monoxide sensor 0 .. 300 ppm CO (reduced H <sub>2</sub> -sensitivity ) MK369-5	1318232
6.	Carbon monoxide sensor 0 .. 300 ppm CO (no warning for H <sub>2</sub> S) MK344-5	1318233
7.	Carbon monoxide sensor 0 .. 300 ppm CO (no warning for H <sub>2</sub> S) MK343-5	1318234
8.	Carbon monoxide sensor 0 .. 500 ppm CO (reduced H <sub>2</sub> -sensitivity) MK369-6	1318251
9.	Carbon monoxide sensor 0 ..1000 ppm CO (no warning for H <sub>2</sub> S) MK344-6	1318235
10.	Carbon monoxide sensor 0 .. 2000ppm CO (no warning for H <sub>2</sub> S) MK389-6	1318252
11.	Hydrogen sulfide sensor 0 .. 100 ppm H <sub>2</sub> S MK345-5	1318236
12.	Hydrogen sulfide sensor 0 .. 500 ppm H <sub>2</sub> S MK345-6	1318253
13.	Sulfur dioxide sensor 0 ... 10 ppm SO <sub>2</sub> MK346-5	1318237
14.	Nitrogen dioxide sensor 0 ... 30 ppm NO <sub>2</sub> MK348-5	1318238
15.	Ammonia sensor 0 .. 200 ppm NH <sub>3</sub> (3-year-sensor) MK393-5	1318254
16.	Ammonia sensor 0 ..1000 ppm NH <sub>3</sub> (3-year-sensor) MK399-5	1318261
17.	Ethylene oxide sensor 0 ... 20 ppm C <sub>2</sub> H <sub>4</sub> O (ETO) MK379-5	1318241
18.	Phosphine sensor 0 ... 10 ppm PH <sub>3</sub> MK353-5	1318242
19.	Silane sensor 0 ... 20 ppm SiH <sub>4</sub> (SIL) MK404-5	1319123
20.	Nitrogen monoxide sensor 0 .. 100 ppm NO MK347-5	1318244
21.	Chlorine sensor 0 ... 10 ppm Cl <sub>2</sub> MK390-5	1318246
22.	Phosgene sensor 0 ... 2 ppm COCl <sub>2</sub> (PGN) MK349-5	1318248
23.	Chlorine dioxide sensor 0 ... 2 ppm ClO <sub>2</sub> (CLO) MK391-5	1318247
24.	Hydrogen chloride sensor 0 ... 30 ppm HCl MK392-5	1318249
25.	Hydrogen sensor 0 .. 2000ppm H <sub>2</sub> MK396-5	1318250
26.	Hydrogen sensor 0 ... 1 Vol.% H <sub>2</sub> MK402-5	1318258
27.	Hydrogen sensor 0 ... 4 Vol.% H <sub>2</sub> MK403-5	1318259
28.	Hydrogen cyanide sensor 0 ... 50 ppm HCN MK409-5	1318255
29.	Ozone sensor 0 ... 1 ppm O <sub>3</sub> MK411-5	1318257
31.	THT Sensor 0-... 100 mg/m <sup>3</sup> THT MK405-5	1318256
32.	Diethylether 0-... 200 ppm DEE MK379-6	1318260
33.	0...10 ppm MK412-5	1319126

Spare parts and accessories should be stored at an ambient temperature of 0 to 30°C. The storage time should not exceed 5 years. For batteries and sensors shorter storage times of 6 months are valid. When storing oxygen sensors, please note that the expected lifetime is reduced.

## Types of Sensors and Detection Range

Sensor type (ID)	Detection range	Gas	Resolution	T-Band *
MK342-5	0 .. 25 Vol.%	O <sub>2</sub> Oxygen	0.1 Vol.%	±0.3 Vol.%
MK343-5	0 .. 300 ppm	CO Carbon monoxide	1 ppm	±3 ppm
MK344-5	0 .. 300 ppm	CO Carbon monoxide	1 ppm	±3 ppm
MK344-6	0 .. 1000 ppm	CO Carbon monoxide	1 ppm	±5 ppm
MK345-5	0 .. 100 ppm	H <sub>2</sub> S Hydrogen sulphide	1 ppm	±1 ppm
MK345-6	0 .. 500 ppm	H <sub>2</sub> S Hydrogen sulphide	1 ppm	±3 ppm
MK346-5	0 .. 10 ppm	SO <sub>2</sub> Sulphur dioxide	0.1 ppm	±0.3 ppm
MK347-5	0 .. 100 ppm	NO Nitrogen monoxide	1 ppm	±3 ppm
MK348-5	0 .. 30 ppm	NO <sub>2</sub> Nitrogen dioxide	0.2 ppm	±0.6 ppm
MK349-5	0 .. 2 ppm	COCl <sub>2</sub> Phosgene (PGN)	0.01 ppm	±0.02 ppm
MK353-5	0 .. 10 ppm	PH <sub>3</sub> Phosphine	0.05 ppm	±0.05 ppm
MK369-5	0 .. 300 ppm	CO Carbon monoxide	1 ppm	±3 ppm
MK369-6	0 .. 500 ppm	CO Carbon monoxide	1 ppm	±4 ppm
MK383-5	0 .. 25 Vol.%	O <sub>2</sub> Oxygen	0.1 Vol.%	±0.3 Vol.%
MK404-5	0 .. 20 ppm	SiH <sub>4</sub> Silane (SIL)	0.05 ppm	±0.10 ppm
MK379-5	0 .. 20 ppm	C <sub>2</sub> H <sub>4</sub> O Ethylene oxide (ETO)	0.1 ppm	±0.3 ppm
MK389-6	0 .. 2000 ppm	CO Carbon monoxide	1 ppm	±4 ppm
MK390-5	0 .. 10 ppm	Cl <sub>2</sub> Chlorine	0.1 ppm	±0.1 ppm
MK391-5	0 .. 2 ppm	ClO <sub>2</sub> Chlorine dioxide (CLO)	0.01 ppm	±0.03 ppm
MK392-5	0 .. 30 ppm	HCl Hydrogen chloride	0.2 ppm	±0.4 ppm
MK393-5	0 .. 200 ppm	NH <sub>3</sub> Ammonia	1 ppm	±3 ppm
MK396-5	0 .. 2000 ppm	H <sub>2</sub> Hydrogen	2 ppm	±10 ppm
MK399-5	0 .. 1000 ppm	NH <sub>3</sub> Ammonia	5 ppm	±10 ppm
MK402-5	0 .. 1 Vol.%	H <sub>2</sub> Hydrogen	0.01 Vol.%	±0.02 Vol.%
MK403-5	0 .. 4 Vol.%	H <sub>2</sub> Hydrogen	0.01 Vol.%	±0.05 Vol.%
MK405-5	0 .. 100 mg/m <sup>3</sup>	C <sub>4</sub> H <sub>8</sub> S Tetrahydrothiophen (THT)	0.5 mg/m <sup>3</sup>	±1.0 mg/m <sup>3</sup>
MK409-5	0 .. 50 ppm	HCN Hydrogen cyanide	0.5 ppm	±1.5 ppm
MK411-5	0 .. 1 ppm	O <sub>3</sub> Ozone	0.01 ppm	±0.02 ppm
MK412-5	0 .. 10 ppm	HF Hydrogen fluoride		

\* T-Band = Tolerance band

# Sensor Specification

<b>MK342-5 / MK 383-5 Electrochemical Sensor for Oxygen O<sub>2</sub></b>			
Response time		t <sub>20</sub> : <10 sec	T <sub>90</sub> : <20 sec
Pressure	800...1200 hPa:	max. ±0,2Vol.% or ±2,5% of detection range (regarding 1000 hPa)	
Humidity	0%...99% r.h.:	max. ±0,2Vol.% or ±2,5% of detection range (regarding 50% r.F.)	
Temperature	-20...+50°C:	max. ±0,5Vol.% or ±2,5% of display (regarding 20°C)	
Expected lifetime:		MK342-5: 1 year in air / MK383-5: 2 years in air	
<b>MK343-5 Electrochemical Sensor for Carbon monoxide CO (DualTox)</b>			
Response time		t <sub>20</sub> : <10 sec	T <sub>90</sub> : <40 sec
Pressure	800...1200 hPa:	max. ±3ppm or ±7% of display (regarding 1000 hPa)	
Humidity	15%...90% r.h.:	max. ±3ppm or ±7% of display (regarding 50% r.F.)	
Temperature	-10...+40°C:	max. ±3ppm or ±7% of display (regarding 20°C)	
Temperature	-20...+50°C:	max. ±3ppm or ±15% of display (regarding 20°C)	
Cross sensitivities:		H <sub>2</sub> S: ≈250% , H <sub>2</sub> : <40% , NO <sub>2</sub> : ≈-60% , SO <sub>2</sub> : ≈50% , NO: ≈30% , Cl <sub>2</sub> : 0..-100% (*1)	
Expected lifetime:		3 years	
<b>MK344-5 /-6 Electrochemical Sensor for Carbon monoxide CO</b>			
Response time		t <sub>20</sub> : <10 sec	t <sub>90</sub> : <40 sec
Pressure	800...1200 hPa:	max. ±3ppm or ±7% of display (regarding 1000 hPa)	
Humidity	15%...90% r.h.:	max. ±3ppm or ±7% of display (regarding 50% r.F.)	
Temperature	-10...+40°C:	max. ±3ppm or ±7% of display (regarding 20°C)	
Temperature	-20...+50°C:	max. ±3ppm or ±15% of display (regarding 20°C)	
Cross sensitivities:		H <sub>2</sub> S: ≈7% , H <sub>2</sub> : <40% , C <sub>2</sub> H <sub>4</sub> : <85% , NO: <9% , NO <sub>2</sub> : 0...-20% , SO <sub>2</sub> : 0% , Cl <sub>2</sub> : 0% , C <sub>2</sub> H <sub>6</sub> O: 0% (*1)	
Expected lifetime:		3 years	
<b>MK345-5 /-6 Electrochemical Sensor for Hydrogen Sulphide H<sub>2</sub>S</b>			
Response time		t <sub>20</sub> : <10 sec	t <sub>90</sub> : <40 sec
Pressure	800...1200 hPa:	max. ±3ppm or ±10% of display (regarding 1000 hPa)	
Humidity	15%...90% r.h.:	max. ±3ppm or ±10% of display (regarding 50% r.F.)	
Temperature	-10...+40°C:	max. ±3ppm or ±10% of display (regarding 20°C)	
Temperature	-20...+50°C:	max. ±3ppm or ±15% of display (regarding 20°C)	
Cross sensitivities:		SO <sub>2</sub> : ≈20% , NO <sub>2</sub> : ≈-20% , NO: <2% , CO: <0,5% , H <sub>2</sub> : <0,1% (*1)	
Expected lifetime:		3 years	
<b>MK346-5 Electrochemical Sensor for Sulphur dioxide SO<sub>2</sub></b>			
Response time		t <sub>90</sub> : <30 sec	
Pressure	800...1200 hPa:	max. ±0,2ppm or ±5% of display (regarding 1000 hPa)	
Humidity	15%...90% r.h.:	max. ±0,2ppm or ±5% of display (regarding 50% r.F.)	
Temperature	-20...+50°C:	max. ±0,2ppm or ±5% of display (regarding 20°C)	
Cross sensitivities:		NO <sub>2</sub> : ≈-100% , CO: <1% , H <sub>2</sub> S: 0% , NO: 0% (*1)	
Expected lifetime:		3 years	
<b>MK347-5 Electrochemical Sensor for Nitrogen monoxide NO</b>			
Response time		t <sub>90</sub> : <30 sec	
Pressure	800...1200 hPa:	max. ±1ppm or ±7% of display (regarding 1000 hPa)	
Humidity	15%...90% r.h.:	max. ±1ppm or ±7% of display (regarding 50% r.F.)	
Temperature	-20...+50°C:	max. ±2ppm or ±7% of display (regarding 20°C)	
Cross sensitivities:		NO <sub>2</sub> : <30% , H <sub>2</sub> S: ≈10% , CO: 0% , SO <sub>2</sub> : 0% (*1)	
Expected lifetime:		2..3 years	
Warm-up time:		3 minutes bup to 1 day – depending on time the detector has been turned off	
<b>MK348-5 Electrochemical Sensor for Nitrogen dioxide NO<sub>2</sub></b>			
Response time		t <sub>90</sub> : <30 sec	
Pressure	800...1200 hPa:	max. ±0,3ppm or ±5% of display (regarding 1000 hPa)	
Humidity	15%...90% r.h.:	max. ±0,3ppm or ±5% of display (regarding 50% r.F.)	
Temperature	-20...+50°C:	max. ±0,3ppm or ±5% of display (regarding 20°C)	
Cross sensitivities:		Cl <sub>2</sub> : ≈100% , H <sub>2</sub> S: ≈8% , CO: 0% , SO <sub>2</sub> : 0% , NO: 0% (*1)	
Expected lifetime:		3 years	
<b>MK412-5 Electrochemical sensor for hydrogen fluoride HF</b>			
Response time		t <sub>50</sub> : <40 s	t <sub>90</sub> : <90 s
Pressure	800...1200 hPa:	Max. ±0,2ppm or ±10% of display (related to 1000 hPa)	
Humidity	10%...80% r.h.:	max. ±0,2ppm or ±10% of display (related to 50% r.h.)	
Temperature	-20...+40°C:	max. ±0,2ppm or ±10% of display (related to 20°C)	
Cross sensitivities:		Cl <sub>2</sub> ≈40% , NO <sub>2</sub> >1% , CO=CO <sub>2</sub> =H <sub>2</sub> S=H <sub>2</sub> =0% (*1)	
Expected lifetime:		1..2 Years	
Dead band:		0,3 ppm	
Resolution:		0,1 ppm	

(\*1): Displayed value with reference to the supplied gas concentration, which lies in the range of the TLV value

<b>MK349-5 Electrochemical Sensor for Phosgene COCl<sub>2</sub></b>		
Response time		t <sub>90</sub> : <150 sec
Pressure	800...1200 hPa:	max. ±0,02ppm or ±10% of display (regarding 1000 hPa)
Humidity	10%...95% r.h.:	max. ±0,02ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+40°C:	max. ±0,02ppm or ±10% of display (regarding 20°C)
Cross sensitivities:		C <sub>2</sub> H <sub>6</sub> O=CO <sub>2</sub> =CO=Cl <sub>2</sub> =H <sub>2</sub> =HF=PH <sub>3</sub> =SO <sub>2</sub> : 0% HCN=H <sub>2</sub> S: 0% (aber Vergiftung bei längerer Gaseinwirkung) (*1)
Expected lifetime:		1..1,5 years
<b>MK353-5 Electrochemical Sensor for Phosphine PH<sub>3</sub></b>		
Response time		t <sub>90</sub> : <90 sec
Pressure	800...1200 hPa:	max. ±0,05ppm or ±10% of display (regarding 1000 hPa)
Humidity	15%...90% r.h.:	max. ±0,05ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±0,05ppm or ±10% of display (regarding 20°C)
Cross sensitivities:		H <sub>2</sub> : ≈3% , SO <sub>2</sub> : ≈20% , SiH <sub>4</sub> : ≈90% , GeH <sub>4</sub> : ≈85% , B <sub>2</sub> H <sub>6</sub> : ≈35% , AsH <sub>3</sub> : 0% , C <sub>2</sub> H <sub>4</sub> : <2% , CO: <0,1% (*1)
Expected lifetime:		2..3 years
<b>MK369-5 /-6 Electrochemical Sensor for Carbon monoxide CO</b>		
Response time		t <sub>20</sub> : <10 sec T <sub>90</sub> : <30 sec
Pressure	800...1200 hPa:	max. ±3ppm or ±10% of display (regarding 1000 hPa)
Humidity	15%...90% r.h.:	max. ±3ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±3ppm or ±15% of display (regarding 20°C)
Cross sensitivities::		H <sub>2</sub> : <10% , NO: <9% , H <sub>2</sub> S: 0% , SO <sub>2</sub> : 0% (*1)
Expected lifetime:		2..3 years
<b>MK404-5 Electrochemical Sensor for Silane SiH<sub>4</sub></b>		
Response time		t <sub>90</sub> : <70 sec
Pressure	800...1200 hPa:	max. ±0,1ppm or ±10% of display (regarding 1000 hPa)
Humidity	15%...90% r.h.:	max. ±0,1ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±0,1ppm or ±10% of display (regarding 20°C)
Cross sensitivities:		PH <sub>3</sub> : ≈110% , GeH <sub>4</sub> : ≈95% , AsH <sub>3</sub> : ≈90% , B <sub>2</sub> H <sub>6</sub> : ≈40% , SO <sub>2</sub> : ≈20% , C <sub>2</sub> H <sub>4</sub> : ≈2% , CO: <1% , H <sub>2</sub> : <0,05% (*1)
Expected lifetime:		2..3 years
<b>MK379-5 Electrochemical Sensor for Ethylene oxide C<sub>2</sub>H<sub>4</sub>O</b>		
Response time		t <sub>90</sub> : <120 sec
Pressure	800...1200 hPa:	max. ±1ppm or ±15% of display (regarding 1000 hPa)
Humidity	15%...90% r.h.:	max. ±2ppm or ±15% of display (regarding 50% r.F.)
Temperature	0...+30°C:	max. ±1ppm or ±15% of display (regarding 20°C)
	-20...+50°C:	max. ±2ppm or ±20% of display (regarding 20°C)
Cross sensitivities:		CO: ≈40% , CH <sub>4</sub> O: ≈150% , C <sub>2</sub> H <sub>2</sub> : ≈125% , CH <sub>2</sub> O: ≈120% , CH <sub>4</sub> S: ≈100% , C <sub>2</sub> H <sub>4</sub> : ≈80% , C <sub>2</sub> H <sub>6</sub> O: ≈55% , C <sub>4</sub> H <sub>10</sub> O: ≈40% , C <sub>7</sub> H <sub>8</sub> : ≈20% , MEK: ≈10% u.a. (*1)
Expected lifetime:		2..3 years
Warm-up time:		4 minutes up to 7 days – depending on time the detector has been turned off
<b>MK389-6 Electrochemical Sensor for Carbon monoxide CO</b>		
Response time		t <sub>20</sub> : <10 sec T <sub>90</sub> : <30 sec
Pressure	800...1200 hPa:	max. ±3ppm or ±7% of display (regarding 1000 hPa)
Humidity	15%...90% r.h.:	max. ±3ppm or ±7% of display (regarding 50% r.F.)
Temperature	-10...+40°C:	max. ±3ppm or ±7% of display (regarding 20°C)
Temperature	-20...+50°C:	max. ±3ppm or ±15% of display (regarding 20°C)
Cross sensitivities:		H <sub>2</sub> : ≈25% , NO: ≈25% , H <sub>2</sub> S=NO <sub>2</sub> =SO <sub>2</sub> =CO <sub>2</sub> = Cl <sub>2</sub> =NH <sub>3</sub> : 0% (*1)
Expected lifetime:		3..4 years
<b>MK390-5 Electrochemical Sensor for Chlorine Cl<sub>2</sub></b>		
Response time		t <sub>90</sub> : <30 sec
Pressure	800...1200 hPa:	max. ±0,2ppm or ±10% of display (regarding 1000 hPa)
Humidity	10%...95% r.h.:	max. ±0,2ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±0,2ppm or ±10% of display (regarding 20°C)
Cross sensitivities:		F <sub>2</sub> : ≈44% , ClO <sub>2</sub> : ≈20% , NO <sub>2</sub> : ≈12% , H <sub>2</sub> S: ≈ -3% , HCl: <2% , CO: 0% , SO <sub>2</sub> : 0% (*1)
Expected lifetime:		2..3 years
<b>MK391-5 Electrochemical Sensor for Chlorine dioxide ClO<sub>2</sub></b>		
Response time		t <sub>90</sub> : <120 sec
Pressure	800...1200 hPa:	max. ±0,05ppm or ±10% of display (regarding 1000 hPa)
Humidity	10%...95% r.h.:	max. ±0,05ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±0,05ppm or ±10% of display (regarding 20°C)
Cross sensitivities:		Cl <sub>2</sub> : ≈90% , H <sub>2</sub> S: ≈ -0,2% , H <sub>2</sub> =CO <sub>2</sub> =CO=GeH <sub>4</sub> =B <sub>2</sub> H <sub>6</sub> : 0% , available but not defined: NO <sub>2</sub> , O <sub>3</sub> and F <sub>2</sub> (*1)
Expected lifetime:		1..2 years

(\*1): Displayed value with reference to the supplied gas concentration, which lies in the range of the TLV value

<b>MK392-5 Electrochemical Sensor for Hydrogen chloride HCl</b>			
Response time		$t_{90}$ : <90 sec	
Pressure	800...1200 hPa:	max. $\pm 1$ ppm or $\pm 10\%$ of display	(regarding 1000 hPa)
Humidity	10%...95% r.h.:	max. $\pm 1$ ppm or $\pm 10\%$ of display	(regarding 50% r.F.)
Temperature	-20...+50°C:	max. $\pm 1$ ppm or $\pm 10\%$ of display	(regarding 20°C)
Cross sensitivities:		PH <sub>3</sub> : 300% , H <sub>2</sub> S: 28% , Cl <sub>2</sub> : 20% , HCN: 7% , CO: 1% , C <sub>2</sub> H <sub>6</sub> O=CO <sub>2</sub> =H <sub>2</sub> =HF=N <sub>2</sub> : 0% (*1)	
Expected lifetime:		2..3 years	
<b>MK393-5 Electrochemical Sensor for Ammonia NH<sub>3</sub></b>			
Response time		$t_{90}$ : <60 sec	
Pressure	800...1200 hPa:	max. $\pm 1$ ppm or $\pm 10\%$ of display	(regarding 1000 hPa)
Humidity	10%...95% r.h.:	max. $\pm 1$ ppm or $\pm 10\%$ of display	(regarding 50% r.F.)
Temperature	-20...+50°C:	max. $\pm 1$ ppm or $\pm 15\%$ of display	(regarding 20°C)
Cross sensitivities:		CO: 0% , CO <sub>2</sub> : 0% , H <sub>2</sub> : 0% , C <sub>2</sub> H <sub>6</sub> O: 0% , Cl <sub>2</sub> : 0% , HCN: 0% , N <sub>2</sub> : 0% , H <sub>2</sub> S: 0% (in minute range) (*1)	
Expected lifetime:		2..3 years	
<b>MK396-5 Electrochemical Sensor for Hydrogen H<sub>2</sub> (*2)</b>			
Response time		$t_{90}$ : <90 sec	
Pressure	800...1200 hPa:	max. $\pm 5$ ppm or $\pm 10\%$ of display	(regarding 1000 hPa)
Humidity	15%...90% r.h.:	max. $\pm 5$ ppm or $\pm 10\%$ of display	(regarding 50% r.F.)
Temperature	-20...+50°C:	max. $\pm 10$ ppm or $\pm 20\%$ of display	(regarding 20°C)
Cross sensitivities:		CO: <20% , H <sub>2</sub> S: <20% , NO: $\approx 30\%$ , HCN: $\approx 30\%$ , SO <sub>2</sub> : 0% , NO <sub>2</sub> : 0% , Cl <sub>2</sub> : 0% , HCl: 0% , C <sub>2</sub> H <sub>4</sub> : $\approx 80\%$ (*1)	
Expected lifetime:		2..3 years	
<b>MK399-5 Electrochemical Sensor for Ammonia NH<sub>3</sub></b>			
Response time		$t_{90}$ : <90 sec	
Pressure	800...1200 hPa:	max. $\pm 5$ ppm or $\pm 10\%$ of display	(regarding 1000 hPa)
Humidity	10%...95% r.h.:	max. $\pm 5$ ppm or $\pm 10\%$ of display	(regarding 50% r.F.)
Temperature	-20...+50°C:	max. $\pm 10$ ppm or $\pm 20\%$ of display	(regarding 20°C)
Cross sensitivities:		CO=CO <sub>2</sub> =H <sub>2</sub> = C <sub>2</sub> H <sub>6</sub> O=Cl <sub>2</sub> =HCN=N <sub>2</sub> : 0% H <sub>2</sub> S: 0% (in minute range) (*1)	
Expected lifetime:		2..3 years	
<b>MK402-5 Electrochemical Sensor for Hydrogen H<sub>2</sub> (*2)</b>			
Response time		$t_{90}$ : <90 sec	
Pressure	800...1200 hPa:	max. $\pm 0,01$ Vol.% or $\pm 10\%$ of display	(regarding 1000 hPa)
Humidity	10%...90% r.h.:	max. $\pm 0,01$ Vol.% or $\pm 10\%$ of display	(regarding 50% r.F.)
Temperature	-20...+50°C:	max. $\pm 0,02$ Vol.% or $\pm 20\%$ of display	(regarding 20°C)
Cross sensitivities:		CO: <15% , Cl <sub>2</sub> : $\approx 800\%$ (*1)	
Expected lifetime:		2..3 years	
<b>MK403-5 Electrochemical Sensor for Hydrogen H<sub>2</sub> (*2)</b>			
Response time		$t_{90}$ : <90 sec	
Pressure	800...1200 hPa:	max. $\pm 0,01$ Vol.% or $\pm 10\%$ of display	(regarding 1000 hPa)
Humidity	10%...90% r.h.:	max. $\pm 0,01$ Vol.% or $\pm 10\%$ of display	(regarding 50% r.F.)
Temperature	-20...+50°C:	max. $\pm 0,02$ Vol.% or $\pm 25\%$ of display	(regarding 20°C)
Cross sensitivities:		CO: <15% (*1)	
Expected lifetime:		2..3 years	
<b>MK405-5 Electrochemical Sensor for Tetrahydrothiophen (THT) C<sub>4</sub>H<sub>8</sub>S</b>			
Response time		$t_{90}$ : <30 sec	
Pressure	800...1200 hPa:	max. $\pm 1$ mg/m <sup>3</sup> or $\pm 10\%$ of display	(regarding 1000 hPa)
Humidity	10%...95% r.h.:	max. $\pm 1$ mg/m <sup>3</sup> or $\pm 10\%$ of display	(regarding 50% r.F.)
Temperature	-10...+45°C:	max. $\pm 2$ mg/m <sup>3</sup> or $\pm 15\%$ of display	(regarding 20°C)
Cross sensitivities:		CO <sub>2</sub> : 0% 4mg/m <sup>3</sup> at 1000ppmCO 150mg/m <sup>3</sup> at 1Vol.% H <sub>2</sub> 2mg/m <sup>3</sup> at 2ppmSO <sub>2</sub> 216mg/m <sup>3</sup> at 1300ppm CH <sub>4</sub> O -3mg/m <sup>3</sup> at 10ppm NO <sub>2</sub>	
Expected lifetime:		2 years	
Warm-up time:		4 minutes up to 3 days - depending on time the detector has been turned off	
<b>MK409-5 Electrochemical Sensor for Hydrogen cyanide HCN</b>			
Response time		$t_{90}$ : <60 sec	
Pressure	800...1200 hPa:	max. $\pm 0,5$ ppm or $\pm 10\%$ of display	(regarding 1000 hPa)
Humidity	10%...95% r.h.:	max. $\pm 0,5$ ppm or $\pm 10\%$ of display	(regarding 50% r.F.)
Temperature	-20...+50°C:	max. $\pm 0,5$ ppm or $\pm 15\%$ of display	(regarding 20°C)
Cross sensitivities:		NO <sub>2</sub> : -120% , Cl <sub>2</sub> : $\approx -20\%$ , CO: 0% , CO <sub>2</sub> : 0% , H <sub>2</sub> : 0% , HF: 0% , NO: 0% , PH <sub>3</sub> : 0% (*1)	
Expected lifetime:		2 years	
<b>MK411-5 Electrochemical Sensor for Ozone O<sub>3</sub></b>			
Response time		$t_{90}$ : <60 sec	
Pressure	800...1200 hPa:	max. $\pm 0,03$ ppm or $\pm 10\%$ of display	(regarding 1000 hPa)
Humidity	10%...95% r.h.:	max. $\pm 0,03$ ppm or $\pm 10\%$ of display	(regarding 50% r.F.)
Temperature	-10...+45°C:	max. $\pm 0,03$ ppm or $\pm 15\%$ of display	(regarding 20°C)
Cross sensitivities:		Cl <sub>2</sub> : 70..210% , ClO <sub>2</sub> : 60..180% , NO <sub>2</sub> : 60..80% , F <sub>2</sub> : $\approx 70\%$ , PH <sub>3</sub> : 10% , H <sub>2</sub> : $\approx 0\%$ , HCN: -0,3% , CO=CO <sub>2</sub> =HF: 0% (*1)	
Expected lifetime:		2 years	

(\*1): Displayed value with reference to the supplied gas concentration, which lies in the range of the TLV value

(\*2): Not approved for monitoring of the lower explosion limit for applications of the primary explosion protection.

## Alarm Thresholds-Standard Settings and Test Gas Chart

### Instantaneous alarms following TRGS 900 (Version 2000)

Detection range		Alarm 1	Alarm 2	Alarm 3	Cal.-Gas
25 Vol.% O <sub>2</sub>	Oxygen	19,0 ↓	17,0 ↓	23,0 ↑	20,9
1,00/4,00 Vol.% H <sub>2</sub>	Hydrogen (*2)	0,20 (*2)	0,40 (*2)	0,60 (*2)	1,00
2000 ppm H <sub>2</sub>	Hydrogen (*2)	1000 (*2)	1500 (*2)	2000 (*2)	1000
1000/2000 ppm CO	Carbon monoxide	30	60	300	400
300/500 ppm CO	Carbon monoxide	30	60	300	200
500 ppm H <sub>2</sub> S	Hydrogen sulphide	10	20	100	100
100 ppm H <sub>2</sub> S	Hydrogen sulphide	10	20	100	50
200 ppm NH <sub>3</sub>	Ammonia	50	100	200	100
100 ppm NO	Nitrogen monoxide	25	50	100	100
10,0 ppm SO <sub>2</sub>	Sulphur dioxide	2,0	4,0	10,0	10,0
50,0 ppm HCN	Hydrogen cyanide	10,0	20,0	50,0	50,0
30,0 ppm HCl	Hydrogen chloride	5,0	10,0	30,0	10,0
20,0 ppm C <sub>2</sub> H <sub>4</sub> O	Ethylene oxide (ETO)	2,0 (*3)	4,0	20,0	20,0
20,00 ppm SiH <sub>4</sub>	Silane (SIL)	5,00	10,00	20,00	5,00
10,00 ppm PH <sub>3</sub>	Phosphine	0,30 (*3)	0,40 (*3)	10,00	5,00
1,00 ppm COCl <sub>2</sub>	Phosgene (PGN)	0,10 (*3)	0,20 (*3)	1,00	1,00
100,0 mg/m <sup>3</sup> C <sub>4</sub> H <sub>8</sub> S	Tetrahydrothiophen (THT)	25,0	50,0	100,0	37,0
30,0 ppm NO <sub>2</sub>	Nitrogen dioxide	5,0	10,0	30,0	20,0
10,0 ppm Cl <sub>2</sub>	Chlorine	0,5	1,0	10,0	5,0
1,00 ppm O <sub>3</sub>	Ozone	0,10	0,20	1,00	0,70
2,00 ppm ClO <sub>2</sub>	Chlorine dioxide	0,10	0,20	1,00	1,00

zu (\*2): Not approved for monitoring of the lower explosion limit for applications of the primary explosion protection.  
zu (\*3): A reliable TLV (threshold limit value) monitoring is not possible with the sensor technology currently available.

## Technical Data

<b>Detector type:</b>	MICRO IV
<b>Detection principle:</b>	electrochemical sensor (EC)
<b>Detection ranges:</b>	see section „Type of Sensors and Detection Ranges“
<b>Response time <math>t_{90}</math>:</b>	see section „Sensor Specification“
<b>Expected sensor life:</b>	see section „Sensor Specification“
<b>Climatic effects:</b>	see section „Sensor Specification“
<b>Display:</b>	LCD Display with backlight illumination
<b>Alarm:</b>	Visual and audible warning 3 instantaneous concentration alarms see section „Basic Adjustment of Alarm Thresholds“
<b>Gas supply:</b>	Diffusion
<b>Zeropoint/Calibration:</b>	With calibration adapter at a flow rate of 0.5...0.6 l/min
<b>Climate conditions:</b>	for operation: -20...+55(45)°C / 5...95% r.h. / 800...1200hPa see section „Sensor specification“ for storage: -25...+55°C / 10...95% r.F. / 700...1300hPa (recomm. 0...+30°C)
<b>Power supply:</b>	1 AA Mignon 1,5V Type: DURACELL PROCELL MN1500 LR6 AA Operational time: 6 months, maybe reduced depending on alarm frequency
<b>Casing</b>	Casing material: Polycarbonate, metalised Dimensions: 47 x 88 x 25 mm (WxHxD) weight: min 61 g -Model without display, without keypad, with CO sensor max 85.6 g -Model with display, with keypad, with O <sub>2</sub> sensor Protection: IP54
<b>Approval:</b>	Electromagnetic Compatibility: As per EN50270 Type 2 and EN50081-1 resp. EN55022 K1.B Labelling and ignition protection: Only when used with DURACELL PROCELL MN1500 LR6 AA ⊕ II 2G EEx ib IIC T4 resp. T3 -20°C ≤ T <sub>a</sub> ≤ +45°C resp. +55°C When using the pump (see accessories) the detector unit is subject to the temperature classification for the MICRO IV. EC type approval: DMT 99 ATEX E 044 Production supervision: CE 0158 (by notified body - EXAM)

### Worldwide Supplier of Gas Detection Solutions



GfG Gesellschaft für Gerätebau mbH  
D-44390 Dortmund  
Phone: +49-(0)231-56400 0 Fax: +49-(0)231-516313  
E-Mail: info@gfg.biz  
Internet: www.gasdetection.biz

180-000.53\_OM\_MICRO\_IV.doc Edition 25. September 2009  
Firmware Version 2.14 We reserve the right of modification

# EC-Type Examination Approval




**Translation**

**EC-Type Examination Certificate**

(1) **- Directive 94/9/EC -**  
**Equipment and protective systems intended for use**  
**in potentially explosive atmospheres**

(2) **DMT 99 ATEX E 044**

(3) **Equipment: Gas measuring device type MICRO III**

(4) **Manufacturer: Gesellschaft für Gerätebau mbH**

(5) **Address: 44143 Dortmund, Germany**

(6) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.

(7) The certification body of Deutsche Montan Technologie GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive. The examination and test results are recorded in the test and assessment report BVS PP 99.2050 EG.

(8) The Essential Health and Safety Requirements are assured by compliance with:  
 EN 50014:1992 (VDE 0170/0171 part 1/3.94) General requirements  
 EN 50020:1994 (VDE 0170/0171 part 7/4.96) Intrinsic safety 'i'

(9) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(10) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(11) The marking of the equipment shall include the following:


**II 2G EEx ib IIC T6 resp. T5**  
**-20 °C ≤ Ta ≤ +40 °C resp. +50 °C**

**Deutsche Montan Technologie GmbH**  
 Essen, dated 01.10.1999

Signed: Dr. Jockers Signed: Dr. Dill

Certification body
Special services unit

Page 1 of 2 to DMT 99 ATEX E 044  
 This certificate may only be reproduced in its entirety and without change.  
 DEKRA EXAM GmbH Dimendahlstrasse 9 44809 Bochum Germany Phone +49 234 3696-103 Fax +49 234 3696-110 E-mail zs-exam@dekra.com  
 (until 31.05.2003: Deutsche Montan Technologie GmbH Am Technologiepark 1 45307 Essen Germany)



Appendix to

**EC-Type Examination Certificate**

**DMT 99 ATEX E 044**

(13)

(14) **15.1 Gas measuring device type MICRO III**

**15.2 Description**

The gas measuring device type MICRO III is a portable instrument with a battery supplied in a separate chamber. It serves the purpose of detecting oxygen or toxic gases (electrochemical cell) in ambient air under atmospheric conditions. The measuring is done by means of diffusion; the values measured are shown on a built-in LC-display (optionally). If the preset limits are reached, a visual alarm, an audible alarm and, optionally, a vibrating alarm are produced. The gas measuring device does not provide an electrostatic hazard.

**15.3 Parameters**

None

(16) **Test and assessment report**  
 Nr. BVS PP 99.2050 EG  
 16 Pages

(17) **Special conditions for safe use**

None

---

We confirm the correctness of the translation from the German original.  
 In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 11.07.2007  
 BVS-Rip/Ar E 0841/07

**DEKRA EXAM GmbH**

  
 Certification body

  
 Special services unit

Page 2 of 2 to DMT 99 ATEX E 044  
 This certificate may only be reproduced in its entirety and without change.  
 DEKRA EXAM GmbH Dimendahlstrasse 9 44809 Bochum Germany Phone +49 234 3696-103 Fax +49 234 3696-110 E-mail zs-exam@dekra.com  
 (until 31.05.2003: Deutsche Montan Technologie GmbH Am Technologiepark 1 45307 Essen Germany)




**Translation**

**1st Supplement**

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

**to the EC-Type Examination Certificate**

**DMT 99 ATEX E 044**

**Equipment: Gas measuring device type MICRO III**

**Manufacturer: Gesellschaft für Gerätebau mbH**

**Address: 44143 Dortmund, Germany**

**Description**

The gas measuring device type MICRO III can be modified according to the descriptive documents as mentioned in the pertinent test and assessment report. The gas measuring device type MICRO III receives the following marking / Ambient temperature range:


**II 2G EEx ib IIC T4/T3**     -20 °C ≤ Ta ≤ +45 °C (T4)     -20 °C ≤ Ta ≤ +55 °C (T3)

Furthermore the gas measuring device type MICRO III can be modified according to the descriptive documents as mentioned in the pertinent test and assessment report and shall then be marked as:

**Gas measuring device type MICRO IV**

The gas measuring device type MICRO IV receives the following marking / Ambient temperature range:


**II 2G EEx ib IIC T4/T3**     -20 °C ≤ Ta ≤ +45 °C (T4)     -20 °C ≤ Ta ≤ +55 °C (T3)

The measurement function for explosion protection is not subject of this EC-Type Examination Certificate.

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:  
 EN 50014:1997 + A1 - A2 General requirements  
 EN 50020:2002 Intrinsic safety 'i'

Page 1 of 2 to DMT 99 ATEX E 044 / N1  
 This certificate may only be reproduced in its entirety and without change.  
 DEKRA EXAM GmbH Dimendahlstrasse 9 44809 Bochum Germany Phone +49 234 3696-103 Fax +49 234 3696-110 E-mail zs-exam@dekra.com  
 (until 31.05.2007: EXAM BBG Prüf- und Zertifizier GmbH)



**Parameters**

1 Power supply battery pack for type MICRO III and type MICRO IV

1 Alkaline Battery Size AA 1,5 V,  
 The suitable battery type is determined by the Gesellschaft für Gerätebau mbH in the manufacturer's instruction.

2 Ambient temperature range for type MICRO III and type MICRO IV

-20 °C < Ta < +45 °C for temperature class T4  
 -20 °C < Ta < +55 °C for temperature class T3

**Special conditions for safe use**

None

**Test and assessment report**  
 BVS PP 99.2050 EG as of 04.10.2005

**EXAM BBG Prüf- und Zertifizier GmbH**  
 Bochum, dated 04. October 2005

Signed: Dr. Jockers  
 Certification body

Signed: Dr. Arnold  
 Special services unit

We confirm the correctness of the translation from the German original.  
 In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 11.07.2007  
 BVS-Rip/Ar E 0841/07

**DEKRA EXAM GmbH**

  
 Certification body

  
 Special services unit

Page 2 of 2 to DMT 99 ATEX E 044 / N1  
 This certificate may only be reproduced in its entirety and without change.  
 DEKRA EXAM GmbH Dimendahlstrasse 9 44809 Bochum Germany Phone +49 234 3696-103 Fax +49 234 3696-110 E-mail zs-exam@dekra.com  
 (until 31.05.2007: EXAM BBG Prüf- und Zertifizier GmbH)

## EC- Declaration of Conformity

## GfG Gesellschaft für Gerätebau mbH

### MICRO IV

G 221  
G 222  
G 223

Klönnestrasse 99  
D-44143 Dortmund  
Tel: +49 (231) 56400-0  
Fax: +49 (231) 516313  
E-Mail: info@gfg-mbh.com  
www.gfg.biz



Edited: 17.10.2005 Amended:

GfG Gesellschaft für Gerätebau mbH develops, produces and sells gas sensors and gas warning devices, which are subject to a **quality management system** as per DIN EN ISO 9001 : 2000 - Certificate-Register No. 0410030302 -.

Subject to supervision by means of a **quality system** -Certificate No. BVS 03 ATEX ZQS / E 187- issued by the notified body, EXAM BBG Prüf- und Zertifizier GmbH, is the production of electrical apparatus of instrumentation Group I and II, categories M1, M2, 1G and 2G for gas sensors, gas detectors, gas warning systems in ignition protection classes explosion- proof encasing, increased safety, encapsulation and intrinsic safety, as well as their measuring function.

The portable Detector **MICRO IV** complies with **directive 94/9/EC** for devices and protective systems for proper use in explosion endangered areas (ATEX directive) and with **council directive 89/336/EEC** for electromagnetic compatibility.

#### For electrical explosion protection Labelling

DMT 99 ATEX E 044  
⊕ II 2G EEx ib IIC T4 respectively T3  
-20°C ≤Ta ≤+45°C respectively +55°C  
CE<sup>0158</sup>

The directives have been complied with under consideration of the standards mentioned below:

#### ■ Electrical explosion protection

- Electrical apparatus for potentially explosive atmospheres.
- General requirements EN 50014 :1997 + A1-A2
  - Intrinsic safety „i“ EN 50020 :2002

#### ■ Electromagnetic compatibility

- Basic standard EN 50081 part 1
- Electrical apparatus for the detection and measurement of combustible gases, toxic gases and oxygen. EN 50270 1999
- Radio shielding: Type class 1
- Interference resistance: Type class 2

Standards marked \* are only valid for detectors subject to PFG-No. 41300498  
The evaluation of the basic safety and health requirements has been done, documented and filed by a notified body with register no. 0158 ( EXAM BBG Prüf- und Zertifizier GmbH, Dinnendahlstraße 9 D-44809 Bochum ).  
The EMC testing laboratory EM TEST GmbH, Kamen has been charged with testing and evaluation of the electromagnetic compatibility.

Always adhere to the safety notes of the operation manual 180-000.52 respectively 180-000.53.

Dortmund, 17.10.2005

.....  
MBA H.-H. Hübner  
President CEO