Operation Manual

MICRO IV

Single Gas Detector

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INFO@GFG-MBH.COM ▌ WWW.GASDETECTION.BIZ ▌ AMTSGERICHT DORTMUND HR B 2742 ▌ CERTIFIED AS PER DIN EN ISO 9001:2000 ▌ ATEX QM CERTIFICATE

Content

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.

Bump test must be performed before each day´s use, and calibration at least every 4 months.

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 pocketsize 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 DEKRA EXAM GmbH, according to regulation 2014/34/EU:

Certificate:	DMT 99 ATEX E 044
Labelling:	⟨Ex⟩ II 2G Ex ib IIC T4 resp. T3 Gb -20°C ≤ T_a ≤ +45°C resp.+55°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 atmospherical 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 continous operation of 6 months, depending on alarm and display conditions.

Turn OFF	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		
Toxic Gases	AL 1	Alarm 1,	exceeding	⇑
	AL 2	Alarm 2,	exceeding	⇑
	AL 3	Alarm 3,	exceeding	⇑
	STEL	Short Term Exposure Limit,	exceeding	⇑
	TWA	Time Weighted Average,	exceeding	⇑
Oxygen	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 thresholds STEL and TWA are exposition alarms that can be adjusted within the configuration program. For the Short Term Exposure Limit (STEL) a time of 15 minutes will be related and averaged. The STEL is non-latching. It will turn itself off automatically when falling belowthe STEL threshold. The Time Weighted Average (TWA) a time of 8 hours of a working shift will be related and averaged. The TWA alarm cannot be reset. It shuts off only when monitor turned off.

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, STEL	Medium sound and flash frequency	4 x 4 x ...	medium
AL 3, TWA	Fast sound and flash frequency	8 x 8 x ...	high

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

Display	**27.5 AL2**	alternating	**27.5 H2S**

Special Notes for Oxygen Monitoring

Sour gases like CO_2 and SO_2 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_2. The oxygen sensor, therefore, cannot be recommended for continuous measurement in concentrations above 25 Vol.-% CO_2. 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 types are:

Duracell PROCELL MN 1500 LR6 AA or INDUSTRIAL [BY] DURACELL ID1500 AA (LR6).

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 capacitiy „**XX bAT**“, e.g.

Display	**5 bAT**

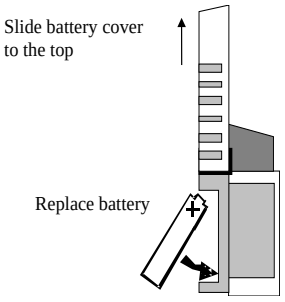
The remaining capacity after the first battery alarm allows detection for at least another 15 minutes. For safe operation the battery is to be replaced as soon as possible.

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 battery types “Duracell PROCELL MN 1500 LR6 AA” and “INDUSTRIAL [BY] DURACELL ID1500 AA (LR6)” 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 displays 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 automaticly 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

Activation of Service Menu	Press first button **QUIT** and keep pressed. Then press button ▼ 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		
▼		Press both keys for approx. 3 seconds
	SERVICE	Activation of service mode.
▼		
	BEEP	
▼		
	AUTO ZPT	
▼		
	AUTO CAL	
▼		
	EXIT	Quit Service mode by pressing QUIT
▼		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 – AUTO ZPT

The adjustment of the zeropoint sets the MICRO IV to its nominal zeropoint value 0. For toxic gases (e.g. CO, H_2S) 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 instantenous 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 sensor is adjusted sucessfully, detection is started automatically.
	ZPT ERR	Indication of sensor error.
QUIT		Confirmation of error. Starting detection.

Calibration – Sensitivity Calibration – AUTO CAL

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

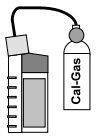
Test gases are:

For toxic gases, e.g. carbon monoxide (CO), hydrogen sulfide (H_2S) 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 IV 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.

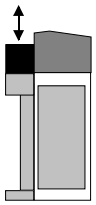
Key	Display	Information
QUIT		
▼		Press both keys approx. 3 seconds
	SERVICE	Activation of service mode.
▼		
	bEEP	
▼		
	AUTO ZPT	
▼		
	AUTO CAL	
QUIT		Selection of sensitivity calibration.
	CAL 200	Display of programmable nominal value.
▼ , ▲		Reduction or increase of nominal value.
QUIT		Starting of 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 sensor is adjusted sucessfully, detection is started automatically.
	CAL ERR	Indication of sensor error.
QUIT		Confirmation of error. Starting detection.

The display readings during and after the sensitivity calibration are the same as for the zeropoint 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 sensor calibration with fresh air and test gas
- 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 bleep (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 meaasuring 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 leat 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 adapter incl. magnet	1318202
Sampling pump	1318215
Configuration software with adapter cable for PC	on request

Spare Parts

	Description				Part No.
1.	Alkaline-Battery INDUSTRIAL BY DURACELL ID1500 AA (LR6)				1318201
2.	Battery cover				1318315
				Sensor Type	
3.	Ammonia sensor	0 .. 200 ppm	NH_3	MK393-5	on request
4.	Ammonia sensor	0 .. 500 ppm	NH_3	MK399-5	on request
5.	Ammonia sensor	0 ..1000 ppm	NH_3	MK399-6	on request
6.	Ammonia sensor	0 .. 200 ppm	NH_3	MK453-5	1318279
7.	Ammonia sensor	0 ..1000 ppm	NH_3	MK454-5	1318280
8.	Chlorine sensor	0 ... 10 ppm	Cl_2	MK390-5	1318246
9.	Chlorine dioxide sensor	0 … 2 ppm	ClO_2 (CLO)	MK391-5	1318247
10.	Hydrogen chloride sensor	0 ... 30 ppm	HCl	MK392-5	1318249
11.	Hydrogen cyanide sensor	0 ... 50 ppm	HCN	MK409-5	1318255
12.	Ethylene oxide sensor	0 ... 20 ppm	C_2H_4O (ETO)	MK379-5	1318241
13.	Hydro flouoric sensor	0... 10 ppm	HF	MK412-5	1318265
14.	Hydro flouoric sensor	0 … 10 ppm	HF	MK412-6	1318271
15.	Carbon monoxide sensor	0 .. 300 ppm	CO (reduced H_2-sensitivity)	MK369-5	on request
16.	Carbon monoxide sensor	0 .. 500 ppm	CO (reduced H_2-sensitivity)	MK369-6	on request
17.	Carbon monoxide sensor	0 …500 ppm	CO	MK443-5	1318275
18.	Carbon monoxide sensor	0 ..2000 ppm	CO	MK443-6	1318276
19.	Ozone sensor	0 … 1 ppm	O_3	MK411-5	1318257
20.	Phosgene sensor	0 … 2 ppm	$COCl_2$ (PGN)	MK349-5	1318248
21.	Phosphine sensor	0 ... 10 ppm	PH_3	MK353-5	1318242
22.	Oxygen sensor	0 .. 25 Vol.%	O_2 (2-year sensor)	MK383-5	1318266
23.	Sulfur dioxide sensor	0 ... 10 ppm	SO_2	MK440-5	1318269
24.	Sulfur dioxide sensor	0 ... 50 ppm	SO_2	MK440-6	1318270
25.	Hydrogen sulfide sensor	0 .. 100 ppm	H_2S	MK445-5	1318277
26.	Hydrogen sulfide sensor	0 .. 500 ppm	H_2S	MK445-6	1318278
27.	Silane sensor	0 ... 40 ppm	SiH_4 (SIL)	MK439-5	1319262
28.	Nitrogen dioxide sensor	0 ... 30 ppm	NO_2	MK348-5	1318238
29.	Nitrogen monoxide sensor	0 .. 100 ppm	NO	MK347-5	1318244
30.	Hydrogen sensor	0 .. 2000ppm	H_2	MK396-5	1318250
31.	Hydrogen sensor	0 … 1 Vol.%	H_2	MK402-5	1318258
32.	Hydrogen sensor	0 … 4 Vol.%	H_2	MK403-5	1318259

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.

Sensor Specification

MK347-5 Electrochemical Sensor for Nitrogen monoxide NO		
Max. detection range		0…100 ppm
T-Band / Resolution		±3 (2.0) ppm / ± 1 (0.5) ppm
Response time		t_{90}: <30 sec
Pressure	80...120 kPa:	max. ±1ppm or ±7% of display (regarding 100 kPa)
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_2: <30% , H_2S: ≈10% , CO: 0% , SO_2: 0% (*1)
Expected lifetime:		2..3 years
Warm-up time:		3 minutes up to 1 day – depending on time the detector has been turned off
MK348-5 Electrochemical Sensor for Nitrogen dioxide NO_2		
Max. detection range		0…30 ppm
T-Band / Resolution		± 0.6 ppm / 0.2 ppm
Response time		t_{90}: <30 sec
Pressure	80...120 kPa:	max. ±0,3ppm or ±5% of display (regarding 100 kPa)
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_2: ≈100% , H_2S: ≈8% , CO: 0% , SO_2: 0% , NO: 0% (*1)
Expected lifetime:		3 years
MK349-5 Electrochemical Sensor for Phosgene $COCl_2$ (CLO)		
Max. detection range		0…2 ppm
T-Band / Resolution		± 0.02 ppm / 0.01 ppm
Response time		t_{90}: <150 sec
Pressure	80...120 kPa:	max. ±0,02ppm or ±10% of display (regarding 100 kPa)
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:		ClO_2: -300%, HCl: 250%, AsH_3: 90%, Cl_2: 40%, NO_2: -10%, O_3: 10% (*1)
Expected lifetime:		1..1,5 years
MK353-5 Electrochemical Sensor for Phosphine PH_3		
Max. detection range		0…10 ppm
T-Band / Resolution		±0.05 ppm / 0.05 ppm
Response time		t_{90}: <90 sec
Pressure	80...120 kPa:	max. ±0,05ppm or ±10% of display (regarding 100 kPa)
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:		SiH_4:90%, GeH_4: 90%, AsH_3: 65%, Cl_2: 40%, NO_2: -10%, O_3: 10% (*1)
Expected lifetime:		2..3 years
MK369-5 /-6 Electrochemical Sensor for Carbon monoxide CO		
Max. detection range		0…300 ppm / 500 ppm
T-Band / Resolution		±3 ppm
Response time		T_{50}: <20 sec T_{90}: <50 sec
Pressure	80...120 kPa:	max. ±3ppm or ±10% of display (regarding 100 kPa)
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_2: <10% , NO: <9% , H_2S: 0% , SO_2: 0% (*1)
Expected lifetime:		2..3 years
MK379-5 Electrochemical Sensor for Ethylene oxide C_2H_4O (ETO)		
Max. detection range		0…20 ppm
T-Band / Resolution		±0.3 ppm / 0.1 ppm
Response time		t_{90}: <120 sec
Pressure	80...120 kPa:	max. ±1ppm or ±15% of display (regarding 100 kPa)
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_4O: ≈150% , C_2H_2: ≈125% , CH_2O: ≈120% , CH_4S: ≈100% , C_2H_4: ≈80% , C_2H_6O: ≈55% , $C_4H_{10}O$: ≈40% , C_7H_8: ≈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
MK 383-5 Electrochemical Sensor for Oxygen O_2		
Max. detection range		0…25 vol. %
T-Band / Resolution		±0.3 vol. % / 0.1 vol. %
Response time		t_{20}: <8 sec T_{90}: <20 sec
Pressure	80...120 kPa:	max. ±0,2Vol.% or ±2,5% of detection range (regarding 100 kPa)
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:		2 years in air
MK390-5 Electrochemical Sensor for Chlorine Cl_2		
Max. detection range		0…10 ppm
T-Band / Resolution		±0.1 ppm / 0.1 ppm
Response time		t_{90}: <30 sec
Pressure	80...120 kPa:	max. ±0,2ppm or ±10% of display (regarding 100 kPa)
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:		ClO_2: 50% , F_2: 40% , NO_2: 20% , O_3: 20%, SO_2: 18% , CO_2: 0% , H_2S: 0% , H_2: 0% (*1)
Expected lifetime:		2..3 years

MK391-5 Electrochemical Sensor for Chlorine dioxide ClO_2		
Max. detection range		0…2 ppm
T-Band / Resolution		±0.03 ppm / 0.01 ppm
Response time		t_{90}: <120 sec
Pressure	80...120 kPa:	max. ±0,05ppm or ±10% of display (regarding 100 kPa)
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_2: 60% , O_3: -280% , H_2S: -25% , H_2: 0% , CO: 0% (*1)
Expected lifetime:		1..2 years

MK392-5 Electrochemical Sensor for Hydrogen chloride HCl		
Max. detection range		0…30 ppm
T-Band / Resolution		±0.4 ppm / 0.2 ppm
Response time		t_{90}: <90 sec
Pressure	80...120 kPa:	max. ±1ppm or ±10% of display (regarding 100 kPa)
Humidity	10%...95% r.h.:	max. ±1ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±1ppm or ±10% of display (regarding 20°C)
Cross sensitivities:		AsH_3: 350% , PH_3: 300% , H_2S: 65% , NO: 45% , SO_2: 40% , HCN:35% , Cl_2: 6% , NO_2: 3% , NH_3: 0.1% , CO: 0% , CO_2: 0% , H_2: 0% (*1)
Expected lifetime:		2..3 years

MK393-5 Electrochemical Sensor for Ammonia NH_3		
Max. detection range		0…200 ppm
T-Band / Resolution		±3 ppm / 1 ppm
Response time		t_{90}: <60 sec
Pressure	80...120 kPa:	max. ±1ppm or ±10% of display (regarding 100 kPa)
Humidity	10%...95% r.h.:	max. ±1ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±1ppm or ±15% of display (regarding 20°C)
Cross sensitivities:		H_2S: 10% , CO: 0% , CO_2: 0% , H_2: 0% (*1)
Expected lifetime:		2..3 years

MK396-5 Electrochemical Sensor for Hydrogen H_2 (*2)		
Max. detection range		0…2000 ppm
T-Band / Resolution		±50 ppm / 2 ppm
Response time		t_{90}: <90 sec
Pressure	80...120 kPa:	max. ± 5ppm or ±10% of display (regarding 100 kPa)
Humidity	15%...90% r.h.:	max. ± 5ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±10ppm or ±20% of display (regarding 20°C)
Cross sensitivities:		C_2H_4:80% , NO: 35% , HCN: 30% , CO: 20% , H_2S: 20%, NO_2=SO_2=Cl_2=HCl=0% (*1)
Expected lifetime:		2..3 years

MK399-5 / -6 Electrochemical Sensor for Ammonia NH_3		
Max. detection range		0…500 ppm / 1000 ppm
T-Band / Resolution		±10 ppm / 5ppm
Response time		t_{90}: <90 sec
Pressure	80...120 kPa:	max. ± 5ppm or ±10% of display (regarding 100 kPa)
Humidity	10%...95% r.h.:	max. ± 5ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±10ppm or ±20% of display (regarding 20°C)
Cross sensitivities:		NO_2:65% , H_2S:60% , Cl_2:20% , SO_2:-10%, CO=NO=H_2=0% (*1)
Expected lifetime:		2..3 years

MK402-5 Electrochemical Sensor for Hydrogen H_2 (*2)		
Max. detection range		0…1 vol. %
T-Band / Resolution		±0.02 vol. % / 0.01 vol. %
Response time		t_{90}: <90 sec
Pressure	80...120 kPa:	max. ±0,01Vol.% or ±10% of display (regarding 100 kPa)
Humidity	10%...90% r.h.:	max. ±0,01Vol.% or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±0,02Vol.% or ±20% of display (regarding 20°C)
Cross sensitivities:		NO_2:-400% , CO:150% , H_2S:20% , C_2H_4:yes , NH_3=CO_2=Cl_2=SO_2=HCN=0% (*1)
Expected lifetime:		2..3 years

MK403-5 Electrochemical Sensor for Hydrogen H_2 (*2)		
Max. detection range		0…4 vol. %
T-Band / Resolution		±0.05 vol. % / 0.01 vol. %
Response time		t_{90}: <90 sec
Pressure	80...120 kPa:	max. ±0,01Vol.% or ±10% of display (regarding 100 kPa)
Humidity	10%...90% r.h.:	max. ±0,01Vol.% or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±0,02Vol.% or ±25% of display (regarding 20°C)
Cross sensitivities:		H_2S: 220% , C_2H_4: yes , CO: 0% (*1)
Expected lifetime:		2..3 years

MK409-5 Electrochemical Sensor for Hydrogen cyanide HCN		
Max. detection range		0…50 ppm
T-Band / Resolution		±1.5 ppm / 0.5 ppm
Response time		t_{90}: <60 sec
Pressure	80...120 kPa:	max. ±0,5 ppm or ±10% of display (regarding 100 kPa)
Humidity	10%...95% r.h.:	max. ±0,5 ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±0,5 ppm or ±15% of display (regarding 20°C)
Cross sensitivities:		NO_2: -70% , NO: -5% , H_2S: 0…200% (according to filter saturation), CO=CO_2=H_2=0% (*1)
Expected lifetime:		2 years

MK411-5 Electrochemical Sensor for Ozone O_3		
Max. detection range		0…1 ppm
T-Band / Resolution		±0.02 ppm / 0.01 ppm
Response time		t_{90}: <60 sec
Pressure	80...120 kPa:	max. ±0,03 ppm or ±10% of display (regarding 100 kPa)
Humidity	10%...95% r.h.:	max. ±0,03 ppm or ±10% of display (regarding 50% r.F.)
Temperature	-10...+45°C:	max. ±0,03 ppm or ±15% of display (regarding 20°C)
Cross sensitivities:		ClO_2: 150% , Cl_2: 120% , NO_2: 60% , H_2: 0% , H_2S: -8% (*1)
Expected lifetime:		2 years

MK412-5 / 6 Electrochemical sensor for Hydrogen fluoride HF		
Max. detection range		0…10 ppm
T-Band		±0.3 ppm / ±0,5ppm with MK412-6
Resolution		0.1 ppm / 0,5ppm with MK412-6
Response time		t_{50}: <40 s t_{90}: <90 s
Pressure	80...120 kPa:	Max. ±0,2ppm or ±10% of display (related to 100 kPa)
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_2≈40% , NO_2>1% , CO=CO_2=H_2S=H_2=0% (*1)
Expected lifetime:		1..2 Years
MK439-5 Electrochemical Sensor for Silane SiH_4 (SIL)		
Max. detection range		0…40 ppm
T-Band / Resolution		±0.2 ppm / 0.1 ppm
Response time		t_{90}: <60 sec
Pressure	80...120 kPa:	max. ±0,1ppm or ±10% of display (regarding 100 kPa)
Humidity	10%...95% r.h.:	max. ±0,2ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±0,3ppm or ±10% of display (regarding 20°C)
Cross sensitivities:		PH3:175% , B2H6:135% , AsH3:125% , H2S:45% , SO2:40% , H2Se:25% , NO2:23% , Cl2:12% , HCN:6% , HCl:5% , CO=H2=HF=0% (*1)
Expected lifetime:		2..3 years
MK440-5 /-6 Electrochemical Sensor for Sulfur Dioxide SO2		
Max. detection range:		0...10ppm / 50ppm
Resolution:		0,1ppm
T-Band:		±0,2ppm
Response time:		t_{90} <30 sec
Pressure	80...120kPa:	max. ±0,2ppm or ±5% of display (regarding 100kPa)
Humidity	15%...90% r.F.:	max. ±0,3ppm or ±3% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±0,3ppm or ±5% of display (regarding 20°C)
Cross sensitivities:		C2H2:<300% , NO2:<-170% , C2H4:<90% , HCN:<50% , Cl2:<-40% , NO:<10% , CO:<0,5% , H2S:<0,5%, H2:<0,5% , NH3:0% (*1)
Expected lifetime:		3 years
MK443-5 /-6 Electrochemical Sensor for Carbon Monoxide CO		
Max. detection range:		0...500ppm / 2000ppm
Resolution:		1ppm
T-Band:		±3ppm
Response time:		t_{50} < 10sec t_{90} ≤30 sec (regarding 20°C)
Pressure	80...120kPa:	max. ±3ppm or ±10% of display (regarding 100kPa)
Humidity	15%...90% r.F.:	max. ±3ppm or ±5% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±3ppm or ±5(10)% of display (regarding 20°C)
Cross sensitivities:		C_2H_4:96%; C_2H_2:90%; H_2<30% (typ. 15%); NO<20%; Cl_2<7%; C_2H_6O<0,5%; SO_2=NH_3=H_2S=0% (*1)
Expected lifetime:		3 years
MK445-5 /-6 Electrochemical Sensor for Hydrogen sulphide H_2S		
Max. detection range:		0...100ppm / 500ppm
Resolution:		0,1ppm / 0,5ppm
T-Band:		±0,5ppm / ±1,0ppm
Response time:		t_{50} < 10sec t_{90} < 30 sec
Pressure	80...120kPa:	max. ±0,2ppm or ±5% of display (regarding 100kPa)
Humidity	15%...90% r.F.:	max. ±0,2ppm or ±5% of display (regarding 50% r.F. @ 20°C)
Temperature	-20...+50°C:	max. ±0,2ppm or ±5(10)% of display (regarding 20°C)
Cross sensitivities:		NO_2<10%, CO<2%, NO<1%, CO_2=SO_2=Cl_2=NH_3=C_2H_4=0%, low methanol cross sensitivity (*1)
Expected lifetime:		3 years
MK453-5 Electrochemical Sensor forAmmonia NH_3		
Max. detection range:		0...200ppm
Resolution:		1ppm
T-Band:		±3ppm
Response time:		t_{90} < 45 sec
Pressure	80...120kPa:	max. ±1ppm or ±10% of display (regarding 100kPa)
Humidity	15%...90% r.F.:	max. ±1ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±1(2)ppm or ±15(20)% of display (regarding 20°C)
Cross sensitivities:		H2S: 120%, NO2≈ -100%, SO2: -30%, CO=NO=CO_2=H_2=C_2H_4O=0% (*1)
Expected lifetime:		2..3 years
MK454-5 Electrochemical Sensor for Ammonia NH_3		
Max. detection range:		0...1000ppm
Resolution:		5ppm
T-Band:		±10ppm
Response time:		t_{90} < 60 sec
Pressure	80...120kPa:	max. ±5ppm or ±10% of display (regarding 100kPa)
Humidity	15%...90% r.F.:	max. ±5ppm or ±10% of display (regarding 50% r.F.)
Temperature	-20...+50°C:	max. ±10ppm or ±20% of display (regarding 20°C)
Cross sensitivities:		H_2S: 140%, NO_2≈ -100%, SO_2: -30%, CO=NO=CO_2=H_2=C_2H_6O=0% (*1)
Expected lifetime:		2...3 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	STEL (15`)	TWA (8h)	Cal.-Gas
25,0 Vol.% O_2	Oxygen	19,0 ⇓	17,0 ⇓	23,0 ⇑			20,9
1,00/4,00 Vol.%	H_2 Hydrogen (*2)	0,20 (*2)	0,40 (*2)	0,60 (*2)			1,00
2000 ppm	H_2 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_2S	Hydrogen sulphide	10,0	20,0	100,0			100
100 ppm H_2S	Hydrogen sulphide	5,0	10,0	100,0			50
10 ppm HF	Hydrogen fluoride	1,0	2,0	10,0			10,0
200 ppm NH_3	Ammonia	20	40	200			100
500/1000 ppm NH_3	Ammonia	50	100	200			200
100 ppm NO	Nitrogen monoxide	25	50	100			50
10,0/50,0 ppm SO_2	Sulphur dioxide	1,0	2,0	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_2H_4O	Ethylene oxide (ETO)	2,0 (*3)	4,0	20,0			20,0
40,00 ppm SiH_4	Silane (SIL)	5,00	10,00	20,00			5,00
10,00 ppm PH_3	Phosphine	0,30 (*3)	0,40 (*3)	10,00			5,00
1,00 ppm $COCl_2$	Phosgene (PGN)	0,10 (*3)	0,20 (*3)	1,00			1,00
100,0 mg/m^3 C_4H_8S	Tetrahydrothiophen (THT)	25,0	50,0	100,0			37,0
30,0 ppm NO_2	Nitrogen dioxide	5,0	10,0	30,0			20,0
10,0 ppm Cl_2	Chlorine	0,5	1,0	10,0			5,0
1,00 ppm O_3	Ozone	0,10	0,20	1,00			0,70
2,00 ppm ClO_2	Chlorine dioxide	0,10	0,20	1,00			1,00

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

Technical Data

Detector type:	MICRO IV
Detection principle:	electrochemical sensor (EC)
Detection ranges:	see section „Type of Sensors and Detection Ranges“
Response time t_{90}:	see section „Sensor Specification“
Expected sensor life:	see section „Sensor Specification“
Climatic effects:	see section „Sensor Specification“
Display:	LCD Display with backlight illumination
Alarm:	Visual and audible warning 3 instantaneous concentration alarms and 2 exposition alarmssee section „Basic Adjustment of Alarm Thresholds“
Gas supply:	Diffusion
Zeropoint/Calibration:	With calibration adapter at a flow rate of 0.5...0.6 l/min
Climate conditions:	
for operation:	-20...+55(45)°C / 5...95% r.h. / 80...120 kPa see section „Sensor specification“
for storage:	-25...+55°C / 10...95% r.F. / 70...130 kPa (recomm. 0...+30°C)
Power supply:	1 AA Mignon 1,5V Type: DURACELL PROCELL MN1500 LR6 AA or INDUSTRIAL BY DURACELL ID1500 AA (LR6)
Operational time:	6 months, maybe reduced depending on alarm frequency
Casing	
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_2 sensor
Protection:	IP54
Approval:	
Electromagnetic Compatibility:	DIN EN 50270:2006 Type class 1 and Type class 2
Labelling and ignition protection:	Only when used with DURACELL PROCELL MN1500 LR6 AA or INDUSTRIAL BY DURACELL ID1500 AA (LR6) Ex II 2G EEx ib IIC T4 resp. T3 Gb -20°C ≤ T_a ≤ +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 - DEKRA EXAM)

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DEKRA

Translation

EC-Type Examination Certificate

(1)

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

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

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

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

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

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

(8) 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.

(9) 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'

(10) 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.

(11) 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

(12) 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 — Certification body
Signed: Dr. Dill — Special services unit

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Germany Phone +49 234/3696-105 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)

DEKRA

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'

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Germany Phone +49 234/3696-105 Fax +49 234/3696-110 E-mail zs-exam@dekra.com
(until 31.05.2007 EXAM BBG Prüf- und Zertifizier GmbH)

DEKRA

(13) Appendix to

(14) **EC-Type Examination Certificate**

DMT 99 ATEX E 044

(15) 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

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(until 31.05.2003: Deutsche Montan Technologie GmbH Am Technologiepark 1 45307 Essen Germany)

DEKRA

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

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(until 31.05.2007 EXAM BBG Prüf- und Zertifizier GmbH)

DEKRA

Translation

2nd 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 and MICRO IV**

Manufacturer: **GfG Gesellschaft für Gerätebau mbH**

Address: **44143 Dortmund**

Description

The gas measuring devices specified above were tested in accordance to the standards EN 60079-0: 2009 and EN 60079-11: 2007.

The gas measuring devices type MICRO III and type MICRO IV received the following marking/ambient temperature range:

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

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

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:

EN 60079-0:2009 General requirements
EN 60079-11:2007 Intrinsic safety 'i'

The marking of the equipment shall include the following:

II 2G Ex ib IIC T4/T3 Gb

Parameters

Unchanged

Special conditions for safe use

Unchanged

Test and assessment report

BVS PP 99.2050 EG as of 03.09.2010

DEKRA EXAM GmbH
Bochum, dated 03. September 2010

Signed: Simanski — Certification body
Signed: Dr. Wittler — Special services unit

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EU Declaration of Conformity

MICRO IV

G221
G222
G223

Edited: 17.10.2005 Amended: 08.08.2017

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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. Subject to supervision by means of a **quality system**, surveilled by the notified body, DEKRA EXAM GmbH (0158), 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 types of protection flameproof enclosures, increased safety, encapsulation and intrinsic safety, as well as their measuring function.

The portable detector **MICRO IV** complies with directive **2014/34/EU** (ATEX) for devices and protective systems for proper use in potentially explosive atmospheres, directive **2014/30/EU** for electromagnetic compatibility and with directive **2011/65/EU** (RoHS) on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

For electrical explosion protection	DMT 99 ATEX E 044
Labelling	⟨Ex⟩ II 2G Ex ib IIC T4/T3 Gb

EC-Type Examination Certificate according to directive 94/9/EG

- General requirements	EN 60079-0 : 2009
- Intrinsic safety "i"	EN 60079-11 : 2007

Certified by the notified body with ID number 0158 (DEKRA EXAM, Dinnendahlstraße 9, D-44809 Bochum).

The directive 2014/34/EU is complied considering the following standards:

- General requirements	EN 60079-0 : 2012 +A11 :2013
- Intrinsic safety "i"	EN 60079-11 : 2012

The rating of the danger of ignition was done and documented.

The directive 2014/30/EU is complied considering the following standard:

- Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen	EN 50270 : 2006
Emitted interference	Type class 1
Interference immunity	Type class 2

The EMC test laboratory EM TEST GmbH at Kamen has tested and certified the electromagnetic compatibility.

The directive 2011/65/EU is complied considering the following standard:

- Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances	EN 50581 : 2012

Dortmund, 14 September 2017

i.V. .....

B. Siebrecht
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ATEX EU-Kon040/Siebrecht