Operation Manual

Microtector II – G450

4-Gas Detector

GfG Products For Increased Safety

Congratulations!

You decided for a high technology product of GfG. A good choice!

Our detectors are characterized by reliability, safety, best performance and economic efficiency.

They comply with national and international directives.

This manual will help you to operate the detector quickly and safely.

Please take note of the operational hints before putting into operation!

For any questions please feel free to contact us.

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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.
It must be read and adhered to by all persons who use, service, maintain and check this product. This detector can do the job designed to do only, if it is used, serviced, maintained and checked according to the instructions given by GfG Gesellschaft für Gerätebau.
The warranties made by GfG with respect to the product are voided, if the product is not used, serviced, maintained and checked in accordance with GfG's instructions. The above does not alter statements regarding warranties and liabilities in GfG's general conditions of sale and delivery. Repairs must only be done by skilled personnel resp. by trained persons. Modifications and changes of the product require GfG's permission. Unauthorized modification of the product result in the exclusion of any liability for possible damage. Make sure that only genuine GfG accessories are used with the product. Repairs require the use of spare parts released by GfG.

Application and purpose

The G450 is a handheld detector for personal protection from gas hazards. The detector measures permanently in diffusion mode and gives a visual and audible alarm, if a gas-induced danger builds up.

The G450 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 directive 94/9/EG (ATEX100a):

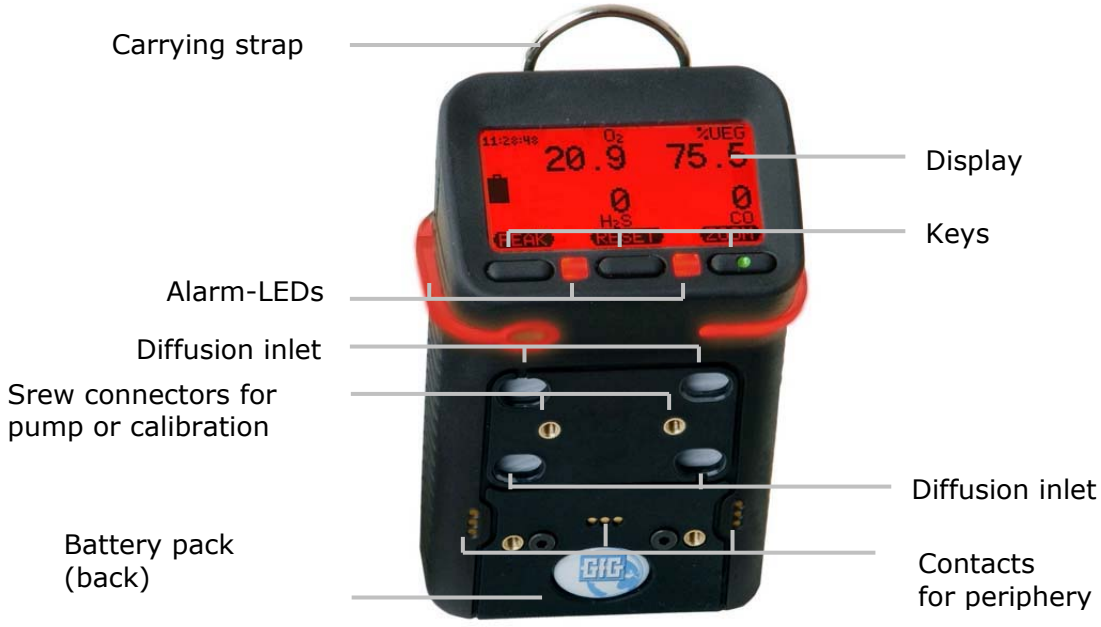
Certificate:	BVS 06 ATEX E 017 X		
Labelling:	⟨Ex⟩ II 2G	Ex ia d IIC T4	-20°C≤Ta≤+55°C (NiMH-II)
		Ex ia d IIC T3	-20°C≤Ta≤+55°C (NiMH)
		Ex ia d IIC T4/T3	-20°C≤Ta≤+45°/+55°C (Alkaline)

The temperature class of the detector depends on the supply module used. When using the „NiMH-II" accumulator, temperature class T4 is valid for ambient temperatures of –20°C to +50°C, while temperature class T3 is valid when using the „NiMH" accumulator. Both supply modules are identified by a black enclosure with an inside label showing the type and temperature class. When using the Alkaline batteries (grey housing), temperature class T4 is valid for ambient temperatures from -20°C to +45°C resp. temperature class T3 for ambient temperatures of -20°C to +55°C.

Special conditions for safe use

In explosion endangered areas the G450 must be used properly. This means that the detector must be carried at your body and must not be laid down unattended, to prevent an electrostatic charge of the clip.

Design

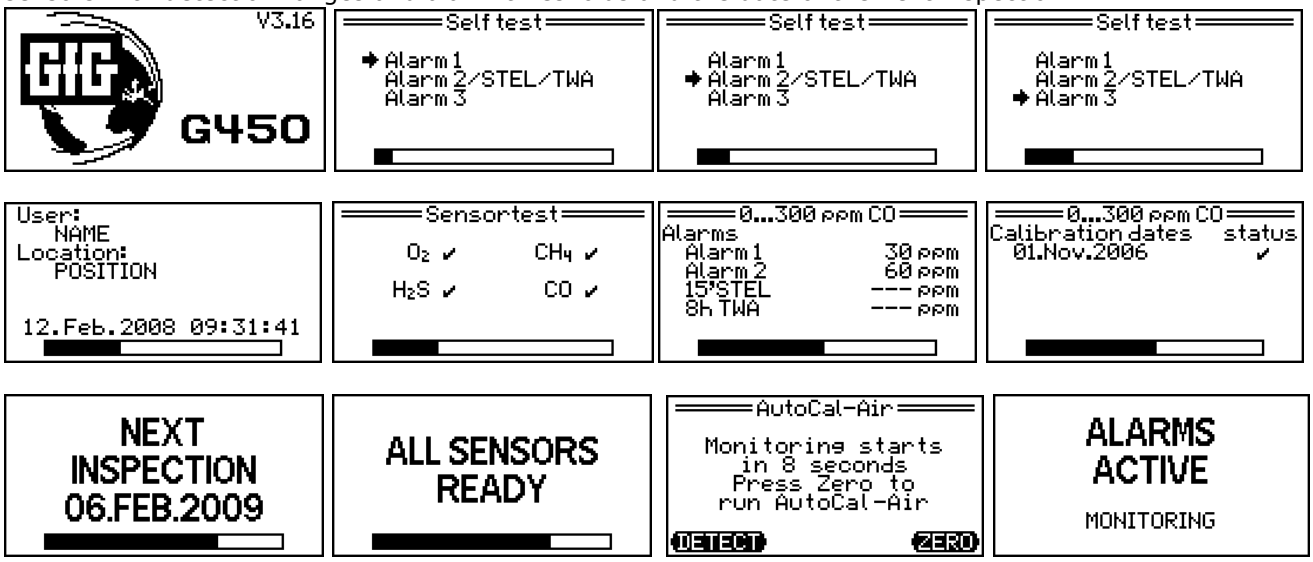


Operational Hints

Switching On and Off

Press the right key shortly to switch the G460 on ◆.
To switch the G460 off, press the right key ◆ for approx. 5 seconds. Release the key when the display reads **SWITCH-OFF 0.**

After switching the G450 starts a self-test and displays information about the firmware version, the built-in sensors with detection ranges and alarm thresholds and the date of the next inspection.

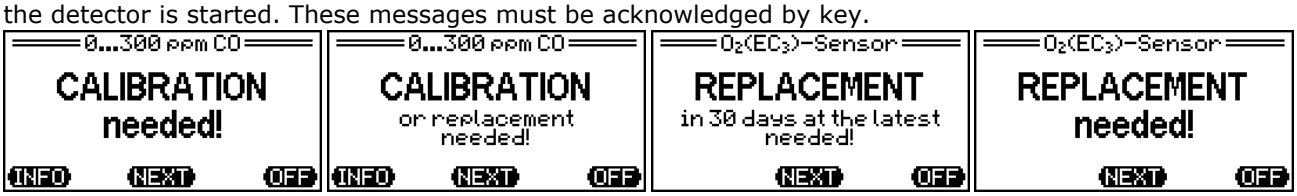


Alarm thresholds and calibration data are displayed for all sensors connected. Only as an example it is only CO which is being described here. Depending on the status of the sensors, the instrument may provide additional messages, which may have to be confirmed. Please refer to "Additional messages during detector start" for further information.

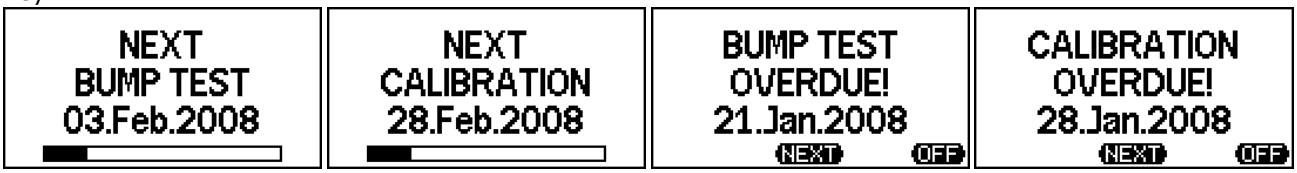
If you push the left key (**DETECT**), or if you do not hit any key, during the warm-up period, the detector goes to detection mode. By pressing the right key (**ZERO**) the automatic fresh air adjustment is started. When the detector is equipped with an oxygen sensor, its sensitivity is set to the normal 20.9Vol% oxygen which are present in fresh air.

Additional Messages during Detector Start

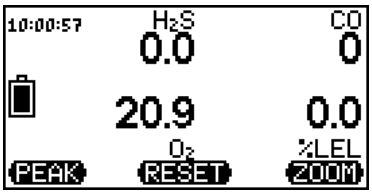
When started, the G450 tests the sensors and supervises their adjustment data. For sensors, which were not adjusted yet or whose adjustment is older than one year, the message "Calibration needed!" is displayed. The reduced adjustment interval of used-up sensors might result in the message "Calibration or replacement is needed!". Exhausted sensors are indicated by the message "Replacement needed!", when the detector is started. These messages must be acknowledged by key.



When a docking station is used for instrument check, the G450 may include intervals for bump test and calibration of sensors. The dates for the next bump test or for the next calibration are calculated automatically on the basis of the last check. Depending on what becomes necessary next, the date for the next bump test or for the next calibration will be indicated, when the detector is started. Should the relevant date be exceeded, the G450 indicates this as „overdue". This message must be acknowledged by key.



Detection mode



The G450 is ready for operation, if all measurement values, the unit, the gas, the battery capacity and the time are displayed.
The detector checks whether the preset thresholds for the individual gases are exceeded or deviated (O_2).

Battery Capacity and Battery Alarm

The fully charged battery pack of the G450 has a capacity of approx. 14-170 hours of continuous operation in diffusion mode depending on sensor combination and gas for combustible sensor (see technical data). The operational time may be reduced by activated alarms.
In the top left corner of the display the remaining battery capacity is indicated by a battery symbol. The black area represents the remaining capacity. When the capacity falls to 4%, the G450 gives a visual warning (red alarm LEDs and an "empty" battery symbol in the display).
In case of a hazardous gas concentration during such a low capacity the gas alarm is not indicated by the orange or red display illumination but only by means of the red alarm LEDs.

Alarms

Should the measured gas concentration exceed a pre-set threshold, the detector immediately gives an audible and visual alarm. The display indicates which gas has caused the alarm. An extremely loud accoustic alarm (103 dB at 30 cm) and bright flashing alarm LEDs provide reliable warning for dangerous gas concentrations.
In case of a gas alarm the colour of the whole display turns into orange or red depending on the alarm status. The G450 provides up to three alarm modes. The LO-alarm can be reset, while the HI-alarm is latching. There are three alarm levels for oxygen and combustible gases (e.g. CH_4), and two thresholds for toxic gases (CO, H_2S). For toxic gases the G450 provides additional alarms for exceeding of short term exposure level (STEL) and time weighted average (TWA).

Kind of alarm	Sensors	Number of Alarms	Description
Instantaneous value (AL)	oxygen combust. gases toxic gases	3 3 2	An instantaneous alarm is activated immediately, if the gas concentration exceeds resp. falls below (O_2) a pre-set threshold. The alarm thresholds are adjustable.
Short term exposure level (STEL)	toxic gases	1	The short term exposure level (STEL) is the average concentration over a period of 15 minutes. The STEL alarm is not latching. It resets automatically as soon as the concentration has fallen below the threshold.
Time weighted average (TWA)	toxic gases	1	The time weighted average (TWA) refers to an 8 hours shift and calculates the average concentration. The TWA alarm cannot be reset. It is only de-activated, if the detector is switched off.

A vibration alarm is available optionally.

Reset of Alarms

The latching alarms 2 and 3 are reset by pressing the **RESET** key. Alarm 1 is reset automatically as soon as the gas concentrations falls below resp. exceeds (O_2) the preset threshold. Alarm 1 is not latching and resets automatically, when the alarm condition does not exist any longer.

If the detection range of the CH_4 sensor is exceeded, the display additionally reads „OVER RANGE" instead of the value for gas concentrations above 110 % LEL. The audible and visual alarm and the message "OVER RANGE", however, will remain active. This alarm can only be reset by pushing the **RESET** key. Then the display asks:

Only if you made sure that **there is no combustible gas but only fresh air at the sensor, you may answer this question with YES.** In this case the sensor turns on again and indicates gas concentrations after a short warm-up time!

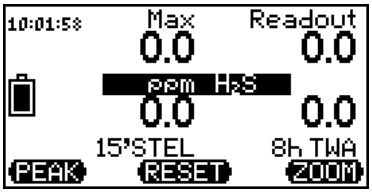
For further details please refer to „Special Notes for LEL Monitoring" .

STEL, TWA, Peak, Minimum values

After switching the detector on, measurement is effected continuously in diffusion mode. In this mode, all concentrations are shown in the display. In addition, short term and long-term averages (STEL and TWA) are calculated for toxic gases, and for non-toxic gases peak and minimum values (MAX and MIN) are stored. The stored values can be read from the display, if you turn to the relevant display mode by means of the right key (**ZOOM**, see below).

Flip-Flop Display, Zoom Display

The display can be turned by 180° by pressing the right and the left key simultaneously and then releasing them. This allows easy reading when carrying the detector on the belt.
For activating the zoom display, press the right key (**ZOOM**). Press the key shortly to display one value. Repeated pressing of this key displays the individual measurement values of the individual sensors in zoomed reading one after the other. When a zoomed value is displayed, press **ZOOM** long to change to the following detail reading:

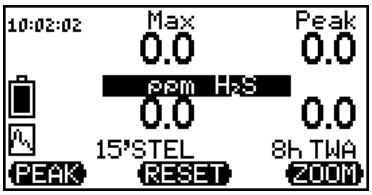


Example of zoom display for H_2S:

Top left: Peak value
Top right: Current gas concentration
Bottom left: STEL value (15 minutes)
Bottom right: TWA value (8 hours)

Pressing **ZOOM** long changes from one to the other zoom modes. After one zoom mode was activated, the display returns back to normal after approx. 10 seconds.

Peak – Display peak values



During peak mode (activation by left key **PEAK**) peak values can be monitored and displayed. The display shows an animated symbol in the left bottom corner.
Within *zoom display* the peak value will be displayed in the top right corner instead of the actual gas concentration.

Pressing **RESET** during peak mode, the peak memory will be reset to the current gas concentration.
Pressing **RESET** during zoom display, the peak memory and the peak value memory will be reset to the current gas concentration.
By pressing **PEAK** again, the peak mode is deactivated.

Turn On /Off Lights

The G450 is optionally available with a rechargeable battery pack with lights. The lights can be switched on by keeping the left key pressed for approx. 3 seconds, and turned off by pressing this key shortly. The lights are useful e.g. when the device is linked to a cord and let down into a sewer system. Using the lights can prevent the device from being dipped into water.

Display Illumination

The display illumination is turned on for approx. 10 seconds whenever you hit any key. It turns off automatically after that time. Should the battery or accumulator be almost exhausted, the display illumination cannot be activated any longer.

Special Notes for LEL Monitoring

For LEL monitoring the G450 may use a catalytic combustion (CC) sensor. Due to this principle the G450 cannot distinguish between measurement values in the LEL range and those in the high Vol.-% range (e.g. > 20 Vol.-% CH_4). Concentrations of more than 110 % LEL might also damage this sensor. To prevent such a damage, the sensor is turned off, when gas concentrations of more than 110 % LEL are measured. Only pressing the key **RESET** and confirming the question "Fresh Air?" by means of key **YES** the sensor is turned on again.
Oxygen concentrations of less than 10 Vol.% do not allow the CC sensor to correctly detect combustible gases and vapours. The next paragraph „Influence of Oxygen and Interfering Gases" provides additional information.

Influence of Oxygen and Interfering Gases

It is to be considered, that the measurement of gas and/or vapour concentrations in the range below 100% LEL cannot be done accurately, if the oxygen concentration at the same time is below 10 Vol.%. In this case the CC sensor suffers from a lack of oxygen, which is necessary for the "catalytic combustion". If the oxygen sensor detects such a low concentration, the display reads "????" instead of the LEL value. When the oxygen concentration exceeds 10 Vol.%, the LEL value will be displayed correctly again.
The EX-approval does not cover the use of the detector in oxygen enriched atmospheres.
Certain components, known as „sensor or catalyst poisons", may affect the signal behaviour of the CC sensor. The "sensitivity", i.e. the capability of the sensor to give signals, is reduced. Components of this kind are e.g. sulphuric, lead or silicone compounds.

Service Mode

In the service mode the G450 can be adjusted by changing of program parameters. Certain menu points require the access code „0011" to prevent modification of important functions accidentally of by unauthorized persons. During the service mode all alarms are deactivated.
Press the middle key (**RESET**) for approx. 5 seconds to activate the service mode. The main menu is the first menu point in the service mode.

Main Menu

The menu points of the main menu are:

1. **Location** (= Entering a location of G450)
2. **User** (= Free entering of identity)
3. **Data logger** (= Adjustment of data logger functions)
4. **Confidence bleep** (= Setting of stand-by signal intervals)
5. **Service** (= Starting the service menu)
6. **AutoCal**
7. **Options** (= Contrast, alarm volume)

Menu control: The functions of the keys are explained in bold letters in the bottom line of the display.

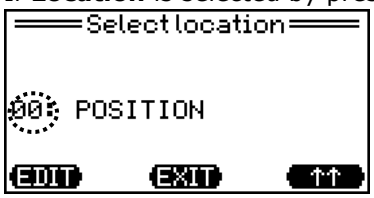
Here the keys have functions as follows:

Left key (↓↓) = Scroll down
Middle key (**SELECT**) = Selection of menu point
Right key (**DETECT**) = back to detection mode

Location – Entering a location

From a deposited table one location out of hundred possible locations can be selected. The first two digits stand for the number of the table entry. Except of the table entry "00" all other 99 entries can be edited by means of a PC.
Within the table entry "00" up to 15 letters / figures can be entered, which will be stored as "**operational place**" on the G450.

If **Location** is selected by pressing the middle key (**SELECT**), the following reading is displayed:



During location selection at first a running number will be determined:

EDIT = Confirming of running number
EXIT = Back to main menu
↑↑ = Changing of running number

After confirming the running number by pressing the left key **"EDIT"**, the location entry will follow:

The keys got following functions:

ABC↓↓ = Change of symbol – moving forward in alphabetical order
<<>> = Enters the blinking letter or figure and moves the cursor to the right
012↑↑ = Change of symbol – moving back in alphabetical order

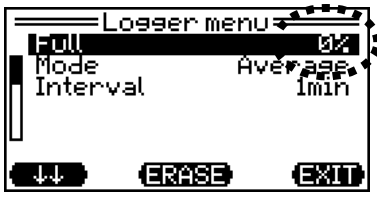
User - Entering user name

From a deposited table one entry out of ten possible entries can be selected. The first two digits stand for the number of the table entry. Except of the table entry "00" all other 9 entries can be edited by means of a PC.
Within the table entry "00" up to 15 letters / figures can be entered, which will be stored as "**IDENTIFICATION**" on the G450. Entry is completed automatically, when the cursor reaches the end mark "**>**".
The entry of the user name (ID) is effected similar to that of the location entry.

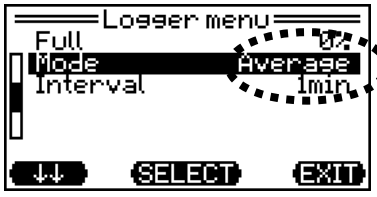
Data logger

Within the menu point **"Data logger"** different settings can be effected:

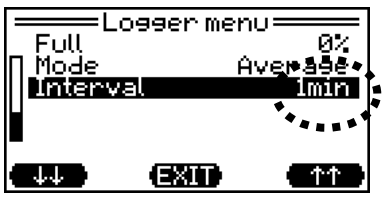
Full - Deleting data from data logger
Mode - Selection of instantaneous, average or peak value
Interval - Interval of data recording (adjustable from 1 second to 60 minutes)



Parameter **Full** shows the volume of the Data logger.
↓↓ = **Scroll** to next parameter
ERASE = Deletes data. A security check is effected (**Delete data?**) → confirm with **YES** right key, resp. deny with **NO** (left key).
EXIT = Back to main menu



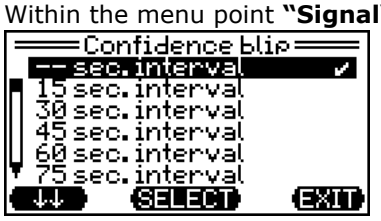
If parameter **Mode** was selected with **SELECT**, instantaneous value, average value and peak value (PEAK) can be chosen.
Press **EXIT** to return to the recorder menu. The selected mode will be kept.



Interval:
The data recording interval can be selected by ↓↓ and ↑↑ between 1 second and 60 minutes.

Signal – Entering confidence bleep

Within the menu point **"Signal"** the interval for releasing the confidence bleep can be chosen.

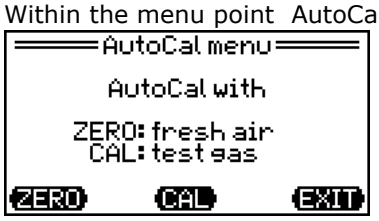


The confidence bleep can be set in intervals of 15 to 90 seconds or be deactivated (enter ☐☐).

↑↑ = Scroll up
EXIT = Confirm interval and back to main menu
↓↓ = Scroll down

AutoCal

The menu point AutoCal can be selected in the main menu and occurs automatically when the calibration adapter (Smart Cap) is connected.
Within the menu point AutoCal the device can be calibrated with fresh air (ZERO) or test gas (CAL).

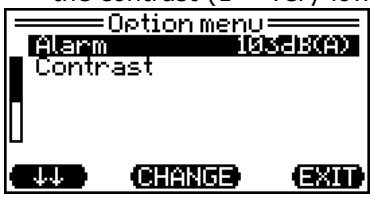


Standardly all sensors can be calibrated with fresh air without any further adjustments. For test gas calibration the sensors have to be set accordingly (see page 15!).

ZERO = AutoCal with fresh air
CAL = AutoCal with test gas
EXIT = Back to main menu

Options - Alarm volume, contrast

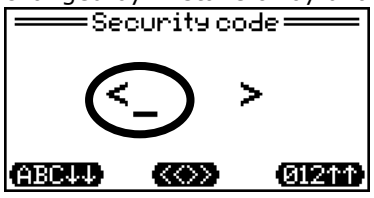
Within the menu point "Options" you can adjust
- the buzzer volume (90 dB or 103 dB)
- the contrast (1 = very low up to 15 = very high)



↓↓ = scroll down
CHANGE = Change selected parameter
EXIT = back to main menu

Service menu

Enter the service menu by selecting **"Service"**. Within the service menu the G450 can be adjusted by changing program parameters.
The menu points are only accessible with the code „0011". The code prevents important functions being changed by mistake or by unauthorised persons. In service mode no alarms can be released.



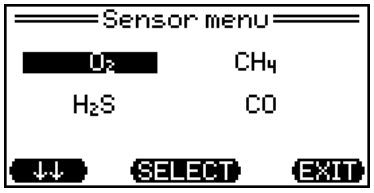
ABC↓↓ = one letter ahead
<<>> = confirms letter *(cursor moves automatically to the next digit)*. By holding the key the last entry will be deleted, the cursor moves one position backwards.
012↓↓ = one letter back

After entering code "0011" the display reads:

From here you reach the system menu (see section „system menu"), to perform general adjustments. Within the menu point **System** the individual sensors can be zeroed or calibrated. Information can be called up or alarm thresholds can be adjusted.
Select **Sensors** for adjustment of sensor specific functions. With **DETECT** you leave the service menu and return to detection mode

Sensor menu – sensor specific functions

Following functions refer to individual sensors of the G450. In service menu every sensor can be selected individually. The adjustments are only valid for the selected sensor.
For function description of the sensor specific adjustments the CH_4 sensor resp. the O_2 sensor is being mentioned as an example. The adjustment possibilities, however, are valid for all sensors.



↓↓ = move to next sensor
SELECT = Select sensor
EXIT = Back to service menu

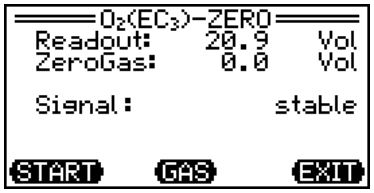
For each sensor following adjustments can be done:

Zero Zero	(= Zeropoint adjustment)
Calibrate	(= Sensitivity adjustment)
Alarms	(= Adjustment of alarm thresholds)
Calibration dates	(= Date & status of last calibration und zeroing)
Information	(= Sensor information: MK type, serial number, detection range, temperature range)

↓↓ = move to next menu point
SELECT = Select menu point
EXIT = Back to service menu

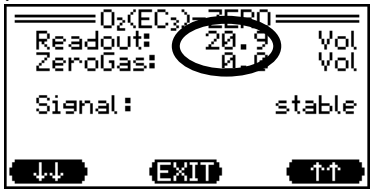
Zeroing – Adjust zeropoint

To adjust the zeropoint the sensor menu point „ZeroGas" can be selected. The display reads:



START = Start zeropoint adjustment
GAS = Enter zero gas concentration
EXIT = Back to „O_2 menu"

Normally zero gas is 0.0, so that this concentration does not need to be changed. In special cases, however, you may push the key GAS to slightly increase the zero gas concentration; please refer to the following picture:



↓↓ = Decrease zero gas value by one unit
EXIT = Confirm value and back to the „O_2 menu"
↑↑ = Increase zero gas value by one unit

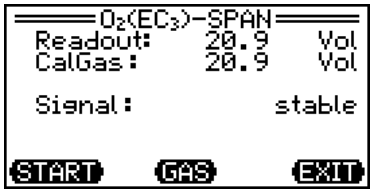
Calibration – Sensitivity calibration

During calibration the gas sensitivity of the sensor is adjusted. Before starting sensitivity calibration, a zeropoint adjustment has to be effected.
For calibration you need a suitable test gas, e.g.:

Detection range	Test gas
TOX	Carbon monoxide (CO), Hydrogen sulphide (H_2S)
OX	Fresh air or test gas with 20.9 Vol% oxygen (O_2) in nitrogen (N_2)
EX	Methane (CH_4) or other combustible gases

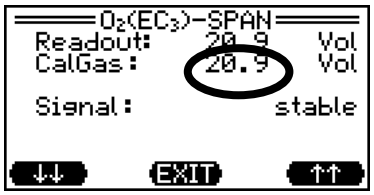
You can see the recommended test gas from the test report of your G450. For sensitivity calibration the test gas concentration should be between 30% and 70% of full scale.

For adjusting the sensitivity the sensor menu point „Calibration" has to be selected.



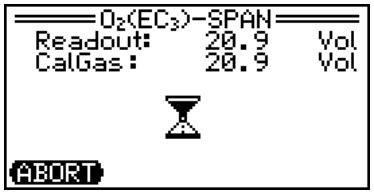
START = Start sensitivity calibration
GAS = Enter test gas concentration
EXIT = Back to „O_2 menu"

After entering "GAS" you can define the test gas concentration:



↓↓ = Decreases calibration gas value by one unit
↑↑ = Increases calibration gas value by one unit
EXIT = Confirms value and goes back to „O_2 menu"

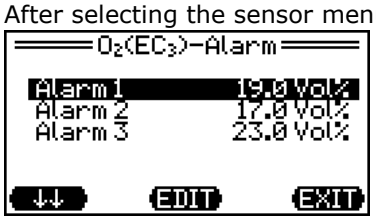
After entering **Start** the sensitivity calibration procedure is started:



ABORT = Stop calibration and back to "O_2" menu

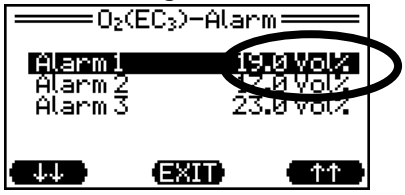
Alarms – Adjusting the alarm thresholds

The G450 provides 3 alarm thresholds for each non-toxic gas (O_2, CH_4). For the toxic gases (H_2S, CO) the G450 provides 2 alarm thresholds. The alarms will be released when the gas concentration exceeds or falls below the threshold. For toxic gases an additional alarm for exceeded long-term (TWA) and short-term (STEL) averages can be released.
After selecting the sensor menu point "**Alarms**" the following reading is displayed (here: selection of O_2):



↓↓ = Scroll down
SELECT = Select menu point
EXIT = Back to sensor menu

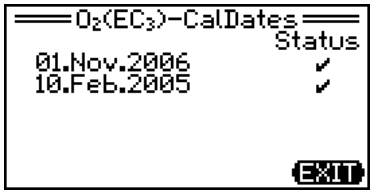
After selecting the alarm thresholds (e.g.: Alarm 1) the value can be entered:



The selected alarm threshold is flashing, the value can be changed now:

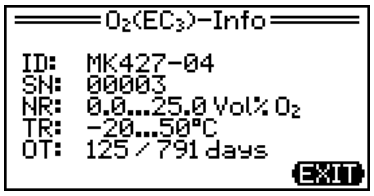
↓↓ = decreases alarm value by one unit
EXIT = Back to sensor menu
↑↑ = increases alarm value by one unit

Calibration data - Date & status of the last calibration and zeroing



Within the sensor menu point „CalDates" the date of the last sensitivity calibration and if calibration was successful (√)
or not (✗) can be displayed.

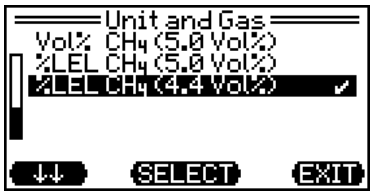
Information – Sensor information



In this sensor menu point specific information for the sensor are displayed:

ID = Type of sensor
SN = Serial number
MB = Nominal detection range
TR = Temperature range
OT = Operating time, days running / maximum lifetime ,
e.g. 125 of 791 days

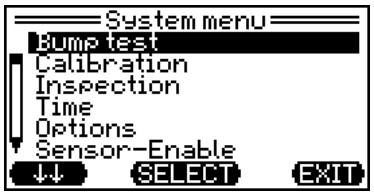
Unit and Gas (catalytic combustion only)



In this menu point you can set the unit for CH_4 to %LEL or %Vol.
The volume concentrations in brackets correspond to full scale deflection.
This allows to set the detection range to the country-specific LEL value.

System menu – General settings

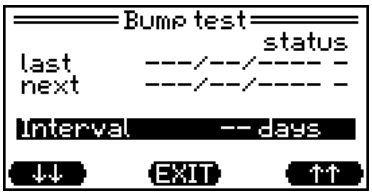
Selecting „System" in the system menu, following reading is displayed:



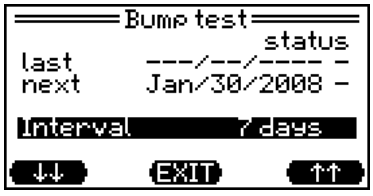
- **Bump test** (status, date of last and next bump test, interval)
- **Calibration** (status, date of last and next calibration, interval)
- **Inspection** (date of next inspection)
- **Time** (date + time)
- **Options** (selection of menu language, vibration alarm on/off, latching alarm on/off, autostore on/off)
- **Sensor selection** (activation resp. de-activation of indiviudual sensors)
- **AutoCal** – air (Adjustment with fresh air)
- **AutoCal** – gas (Adjustment with test gas)
- **- Information** (info about detector type, software version, serial number and battery type)

Bump test

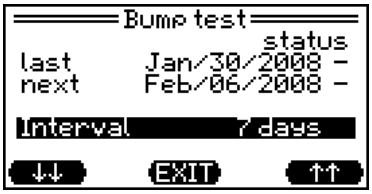
The bump test (check of sensor values and alarms) can be done quick and easy by means of the docking station DS400. The bump test is effected automatically; the intervals can be stored in the Microtector II. The bump test interval is activated by the first bump test in the docking station.



Bump test interval not activated



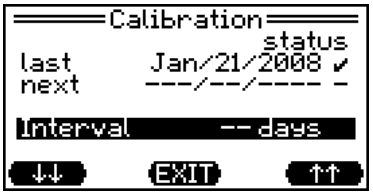
Bump test interval activated
next bump test required immediately



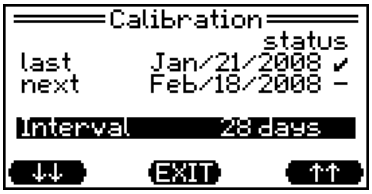
Bump test on January 30 2008 was alright
next bump test required in 7 days

Calibration (ZERO+CAL)

The fully automatic calibration (zeropoint and sensitivity adjustment) can be done quick and easy by means of the docking station DS400. The intervals for the calibration are stored in the G450 and activated by the first calibration in the docking station.



Calibration on January 21 2008 was alright Calibration interval not activated



Calibration on January 21 2008 was alright
Next calibration required in 28 days

Inspection - Date of inspection

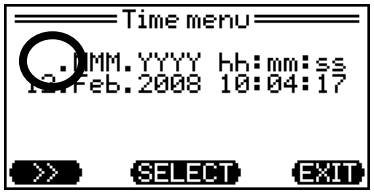
To remind you of the date for the next maintenance resp. inspection, you can enter a date. When it expires, the G450 automatically triggers an alarm. When the entered date is expired, the G450 reports a reminder every time it is switched on.
Within the service menu, "**Inspection**" has to be selected.

Here the parameter to be changed can be selected (day, month and year).

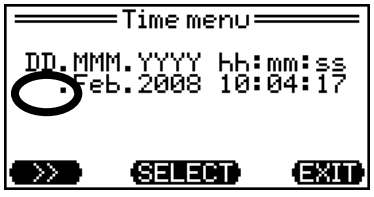
EXIT = Back to system menu
SELECT = Selects the blinking parameter
>> = moves to next parameter

To change a parameter, following options are available:
□□□ = decreases value
EXIT = confirms value
↑↑ = increases value

Time – Date and Time



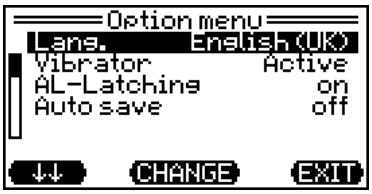
The blinking parameter is selected by pressing **SELECT**.
With **>>** you move to the next parameter.
With **EXIT** you go back to system menu.



To change a parameter, following options are available:
↓↓ = Decrease value
EXIT = Confirm value
↑↑ = Increase value

Options – Language, Vibration Alarm, Latching Alarm, Autostore

The system menu point "**Options**" provides information about the selected language, the status of the vibration alarm, the latching alarm function and the autostore function.

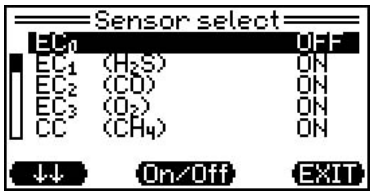


↓↓ = Scroll down
CHANGE = Change language resp. vibration alarm
BACK = Back to service menu

All options can be changed. „**Language**" allows to chose German, English (UK), English (US) and French. Under „**Vibrator**" you can turn the vibration alarm on or off. „**AL-Latching**" determines whether gas alarms 2 and 3 can only be reset by pressing the RESET key or whether these alarms reset automatically when the gas concentration has fallen below the thresholds. „**Autostore**" selects whether leaving the service mode saves all changes automatically or whether saving the changes must be confirmed by keystroke.

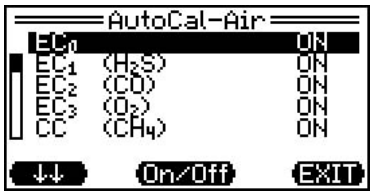
Sensor - Enable

Every sensor can individually be de-activated / activated for each measurement. This function is necessary for applications, in which a gas does not need to be measured or if the G450 is to be upgraded by further sensors or if a sensor is to be taken out and not being replaced.
Indicator being cramped – (ON) or (OFF) – sensor not available. Simulates how possible sensors would react. The display - - - discontinues. Prevails even for menus AutoCal-Air and AutoCal-Gas.



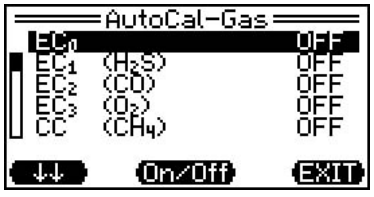
On = Sensor active
Off = Sensor inactive
If the indicator is in brackets, this means that the sensor is not available; it is indicated, however, how an additional sensor would react.
↓↓ = Scroll down to next sensor
On/Off = Activation / Deactivation of sensor
EXIT = Back to service menu

AutoCal-Air



Adjustment of which sensors are to be adjusted with fresh air. Generally all sensors will be adjusted and show "ON".
↓↓ = Scroll down to next sensor
On/Off = Calibration / non-calibration of sensor in program
EXIT = Back to service menu

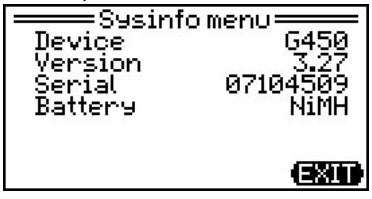
AutoCal-Gas



Adjustment of which sensors are to be adjusted with test gas. Generally no sensors will be adjusted with test gas and show "Off".
↓↓ = Scroll down to next sensor
On/Off = Sensitivity calibration / non-calibration of sensor in program
EXIT = Back to service menu

Information – Detector, Software version, Serial Number, Supply Module

Within the system menu point "**Information**" you gain information about the detector type, the software version, the serial number of the detector, and the kind of supply module.



EXIT = Back to service menu

Charging of battery pack

Caution: The detector must not be charged in hazardous locations.
The detector must not be charged when turned on (detection mode).

The rechargeable battery pack in the G450 can be recharged by means of the **drop-in charger (charger tray)**. There are two versions available, one with and one without fixing straps. The version with fixing straps can also be mounted to the wall.

Drop-in charger

The charger tray is being supplied either by a plug-in mains adapter or by a car charging cable. The charger tray limits the charging voltage for the G450 to max. 6V. The charging process is divided into quick and trickle charge mode. The green LED indicates that the charger tray is ready for operation. The yellow LED indicates the charging mode (off: no detector in charger tray, lit permanently: quick charge, flashing: trickle charge).

When the rechargeable battery pack is completely exhausted, it takes approx. 3 hours in quick charge mode. Then the charger tray automatically turns to trickle charge, so it is not possible to overcharge the battery pack. Both charging modes are indicated in the display of the G450. When the charger turns to trickle charge, the battery pack has reached at least 80 % of its capacity. To reach 100% capacity, you should allow another 7 hours in trickle charge mode.


Drop-in charger
c/w fixing strap -Charge

With an optional USB adapter cable, the charger tray allows to download the data from the G450 data logger and to transfer them to a PC.

Alternatively the rechargeable battery pack module in the G450 can be charged with the **Smart Charger Cap**. The Smart Charger Cap is to be fixed to the G450 by means of two knurled screws.

The Smart Charger Cap is also supplied by a plug-in mains adapter or by a car charging cable. The Smart Charger Cap limits the charging voltage for the G450 to max. 6V. The charging process and the signals from the green and yellow LEDs are identical to what was described for the charger tray.

The Smart Charger Cap and an optional USB adapter cable also allow to download data from the G450 data logger and to transfer them to a PC.

The Smart Charger Cap also allows to recalibrate the detector (see picture at right). This should not be done, however, during charging.


Smart Charger

Replacement of batteries and rechargeable battery pack module

Caution: The detector must not be opened in hazardous locations and the battery resp. rechargeable module must not be changed.

Turn the detector off before you replace the battery or the rechargeable battery pack module. For replacing the supply module unscrew the two screws at the front of the detector and pull the complete module backwards, or push it through one of the screw holes.

When the alkaline batteries have to be replaced in a battery module, use a thin subject to push the two battery cells out through the PCB holes. Take care of the correct polarity when fitting the new 1.5V AA Alkaline batteries (see battery holder). These batteries have 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 MN1500 LR6 AA**.

The battery module or a new rechargeable battery pack module can now be fit. Fix the new supply module by means of the two screws.

Annex

Cleaning

Polluted enclosures can be cleaned with a damp cloth. Do not use solvents and detergents!

Maintenance and inspection

Maintenance and inspection include a regular check and adjustment of sensitivity and zeropoint. A function test of the device is necessary as well. Gas monitoring devices can react differently on environmental conditions. It is important, independent from maintenance duties, to test the device before putting into operation (in Germany see BG-Chemistry, Guideline T 023). This test comprises following checks:

- Charging status of battery / rechargeable battery pack
- Display with zero gas and with test gas

Service - Repair

Service comprises in Germany the "Explosionsschutz-Richtlinien", the „BGR 500, chapter 2.33" (formerly: UVV Gase), the maintenance, inspection and repair of gas monitoring devices. Guideline T 023 of the BG Chemistry describes the proper measures. The function test has to be executed before first operation and at least once a year and comprises:

- Status of the zeropoint
- Charging status of the battery
- Pump and diffusion inlet
- Display with zero gas and standard test gas and adjustment, if necessary
- Alarm signal release, e.g. with alarm test gas
- Constantly amplified signal with standard test gas
- Response time

The check must be done by an expert, and the result must be confirmed in writing. Any repair of the G450 must generally be done according to the manufacturer's instructions and with genuine spare parts.

Test with Docking Station DS400

The bump test required by T023 as well as the adjustment of the Microtector II can be done easily and quickly by means of the docking station DS400.
The bump test is started and effected automatically. The effective time amounts to approx. 20 seconds. Adjustment is started by just pushing one button, and is completed within a few minutes. The test result is indicated by means of a green resp. red LED. Detailed values are shown in the display of the detector (bump test report, AutoCal-Air report, AutoCal-Gas report). You do not need a PC; all relevant data are automatically stored on a SD card in the docking station.
The first bump test of a Microtector II G450 in the docking station can activate the interval for bump test and adjustment automatically. For additional information about the functions of the docking station please refer to the operation manual for the docking station DS400.

Accessories, spare parts

	Description	Part No.
1.	Alkaline battery pack (without batteries)	1450200
2.	Alkaline battery pack with vibrator (without batteries)	1450202
3.	Alkaline battery (pack of 10)	1450204
4.	Rechargeable NiMH battery pack with lights	1450212
5.	Rechargeable NiMH battery pack with vibrator and lights	1450213
6.	Smart Charger Cap (charge, calibrate, data transfer)	1450215
7.	Plug-in charger 100-240VAC	1450216
8.	Charging cable for cars	1450218
9.	USB Interface cable for PC	1450232
10.	Calibration cap, „smart cap"	1450225
11.	Transportation and storing case (plastic)	1450229
12.	MK369-0 Carbon monoxide sensor	1450701
13.	MK376-0 Oxygen sensor, 2-years, 25 Vol.%	1450702
14.	MK221-0 Methane sensor, 100 %LEL	1450703
15.	MK429-0 Hydrogen sulfide sensor	1450705
16.	MK380-0 Sensor for Carbon monoxide and Hydrogen sulfide sensor	1450706

The spare parts and the accessories should be stored at ambient temperatures of 0...30°C. Storage time should not be longer than 5 years. Electrochemical sensors should not be stored for more than ½ year. When you store oxygen sensors be aware of the fact that storage reduces the expected lifetime of the sensor. When storing spare sensors, make sure that the ambient atmosphere is free from corrosive media and sensor poisons.

Sensor type and detection range

Slot	Sensor type (ID)	Detection range	Gas	Resolution	T-Band *
EC1	MK 429-0	0 .. 100 (200) ppm	H_2S Hydrogen sulfide	0.2 ppm	±1.0 ppm
EC1	MK 380-0	0 .. 500 ppm 0 .. 100(200) ppm	CO Carbon monoxide H_2S Hydrogen sulfide	1 ppm 0.5 ppm	±3.0 ppm ±1.5 ppm
EC2	MK 369-0	0 .. 500(1000)ppm	CO Carbon monoxide	1 ppm	±3 ppm
EC3	MK 376-0	0 .. 25 Vol%	O_2 Oxygen	0.1 Vol%	±0.2 Vol%
PL	MK 221-0	0 .. 100% LEL	CH_4 Methane	0.5 %LEL	±2.5 %LEL
PL	MK 221-0	0 .. 100% LEL	C_3H_8 Propane	0.5 %LEL	±2.5 %LEL

at (*1): T-Band = Tolerance band
zu (*2): or one of the following combustible gases and vapours

MK221-0	CH_4 (Methane), C_3H_8 (Propane), C_4H_{10} (Butane), C_5H_{12} (Pentane), C_6H_{14} (n-Hexane), H_2 (Hydrogen), CH_4O (Methanol), C_2H_6O (Ethanol), C_3H_8O (Isopropanol), $C_4H_{10}O$ (n-Butanol), C_3H_6O (Acetone), $C_3H_6O_2$ (Methylacetate), $C_4H_8O_2$ (Ethylacetate), C_4H_8O (Methylethylketone MEK), C_7H_8(Toluene), $C_6H_{12}O$ (Methylisobutylketone MIBK), C_7H_{16}(Heptane), C_9H_{20}(n-Nonane)
MK221-1	CH_4 (Methane), C_3H_8 (Propane), C_4H_{10} (Butane), C_5H_{12} (Pentane), C_6H_{14} (n-Hexane), H_2 (Hydrogen)

Sensor specification

MK221-1 Catalytic combustion sensor for combustible gases and vapours (with increased poison resistance)

Response time:		t_{50}: ≤10 s t_{90}: <25 s for CH_4
		t_{50}: ≤10 s t_{90}: <35 s for C_3H_8
Pressure	800...1100 hPa:	max. ±5% of detection range or ±15% of display (referrred to 1000 hPa)
Humidity	5%...90% r.h.:	max. ±5% of detection range or ±15% of display (referrred to 50% r.h.)
Temperature	-20...+50°C:	max. ±5% of detection range or ±10% of display (referred to 20°C)
Cross sensitivities		May vary from sensor to sensor and depend on the gas concentration and on the age of the sensor.
Detection range CH_4	at 50%LEL:	2.20Vol% CH_4: = 100%; 0.85Vol% C_3H_8: approx. 65%; 0.70Vol% C_5H_{12}: approx. 55%; 2.00Vol% H_2: approx. 130%; 0.70Vol% C_4H_{10}: approx. 60%; 0.50Vol% C_6H_{14}: approx. 50%;
Cross sensitivities		May vary from sensor to sensor and depend on the gas concentration and on the age of the sensor.
Detection range C_3H_8	at 50%LEL:	2.20Vol% CH_4: approx. 150%; 0.85Vol% C_3H_8: = 100%; 0.70Vol% C_5H_{12}: approx. 85%; 2.00Vol% H_2: approx. 200%; 0.70Vol% C_4H_{10}: approx. 92%; 0.50Vol% C_6H_{14}: approx. 77%;
Expected lifetime:		3 years

MK369-0 Electrochemical sensor for carbon monoxide CO

Response time		t_{50}: <10 sec t_{90}: <30 sec
Pressure	800...1200 hPa:	max. ±3ppm or ±10% of display (referred to 1000 hPa)
Humidity	15%...90% r.h.:	max. ±3ppm or ±10% of display (referred to 50% r.h.)
Temperature	-(20)10...+40[50]°C:	max. ±3[5]ppm or ±10(15)% of display (referred to 20°C)
Cross sensitivities:		H_2S < ± 3%; C_2H_4: 60%; NO: 35%; NO_2 < 10%; H_2 < 5%; SO_2: 0%; (*1)
Expected lifetime:		2...3 years

MK376-0 Electrochemical sensor for Oxygen O_2

Response time		t_{20}: <5 sec t_{90}: <20 sec
Pressure	800...1200 hPa:	max. ±0.2Vol% or ±2.5% of detection range (referred to 1000 hPa)
Humidity	10%...90% r.F.:	max. ±0.2Vol% or ±2.5% of detection range (referred to 50% r.h.)
Temperature	-20...+50°C:	max. ±0.5Vol% or ±2.5% of display (referred to 20°C)
Expected lifetime:		2 years in air

MK380-0 Electrochemical sensor for carbon monoxide CO and hydrogen sulfide H_2S (COSH)

Response time		t_{50}: <15 sec t_{90}: <45 sec
Pressure	800...1200 hPa:	max. ±3(1)ppm or ±7(10)% of CO (H_2S) display (referred to 1000 hPa)
Humidity	15%...90% r.h.:	max. ±3(1)ppm or ±7(10)% of CO (H_2S) display (referred to 50% r.h.)
Temperature	-20...+50°C:	max. ±3(1)ppm or ±15(10)% of CO (H_2S) display (referred to 20°C)
Cross sensitivities	CO display:	H_2S: 0...40%; H_2 ≈ 20%; SO_2 < 20%; NO_2 < 2%; NO < 0.3%; Cl_2: 0%; (*1)
Cross sensitivities	H_2S display:	CO < 2%; NO_2 ≈ -20%; SO_2: 8...20%; NO < 3%; H_2: 0.03%; Cl_2:0%; (*1)
Expected lifetime:		3 years

MK427-0 Electrochemical sensor for Oxygen O_2

Response time		t_{20}: <5 sec t_{90}: <20 sec
Pressure	800...1200 hPa:	max. ±0.2Vol% or ±2.5% of detection range (referred to 1000 hPa)
Humidity	0%...90% r.h.:	max. ±0.2Vol% or ±2.5% of detection range (referred to 50% r.h.)
Temperature	-20...+50°C:	max. ±0.5Vol% or ±2.5% of display (referred to 20°C)
Expected lifetime:		3 years in air

MK429-0 Electrochemical sensor for hydrogen sulfide H_2S

Response time		t_{50}: <15 sec t_{90}: <45 sec
Pressure	800...1200 hPa:	max. ±1,0ppm oder ±10% der Anzeige (bezüglich 1000 hPa)
Humidity	15%...90% r.h.:	max. ±1,0ppm oder ±10% der Anzeige (bezüglich 50% r.F.)
Temperature	-20...+50°C:	max. ±1,0ppm oder ±10% der Anzeige (bezüglich 20°C)
Cross sensitivitoies:		SO_2 ≈ 20%; NO_2 ≈ -20%; CO < 1%; NO < 0.2%; H_2 < 0.1%; (*1)
Expected lifetime:		3 years

(*1) Displayed value with reference to the supplied gas concentration

Alarm thresholds – Standard setpoints

Standard setting of alarm thresholds for toxic gases without exposition alarm

Detection range	Alarm 1	Alarm 2	STEL	TWA
0...100/200 ppm H_2S	10 ppm	20 ppm	-	-
0...300/500/1000 ppm CO	30 ppm	60 ppm	-	-

Standard setting of alarm thresholds for toxic gases with exposition alarm following to TRGS900

Detection range	Alarm 1	Alarm 2	STEL (15')	TWA (8h)
0…100/200 ppm H_2S	10 ppm	20 ppm	10 ppm	10 ppm
0...300/500/1000 ppm CO	30 ppm	180 ppm	120 ppm	30 ppm

Standard setpoints of alarm thresholds for combustible gases and oxygen

Detection range	Alarm 1	Alarm 2	Alarm 3
0...25.0 Vol% O_2	19.0 Vol% (⇓)	17.0 Vol% (⇓)	23.0 Vol% (⇑)
0...5.0 Vol% CH_4	1.00 Vol%	2.00 Vol%	3.00 Vol%
0...100 %LEL CH_4 *1	20.0 %LEL	40.0 %LEL	100.0 %LEL

zu (*1): oder ein anderes der nachfolgend aufgeführten brennbaren Gase und Dämpfe

LEL-values according to DIN EN 61779-1 (Ausg.2000) resp. data base CHEMSAFE	
4.0Vol.% H_2 (Hydrogen)	5.5Vol.% CH_4O (Methanol)
4.4Vol.% CH_4 (Methane)	3.1Vol.% C_2H_6O (Ethanol)
2.5Vol.% C_2H_6 (Ethane)	2.5Vol.% C_3H_6O (Acetone)
1.7Vol.% C_3H_8 (Propane)	3.2Vol.% $C_3H_6O_2$ (Methylacetate)
1.4Vol.% C_4H_{10} (Butan)	2.0Vol.% C_3H_8O (Isopropanol)
1.4Vol.% C_5H_{12} (Pentane)	1.8Vol.% C_4H_8O (Methylethylketone MEK)
1.0Vol.% C_6H_{14} (n-Hexane)	2.2Vol.% $C_4H_8O_2$ (Ethylacetate)
1.1Vol.% C_7H_{16} (Heptane)	1.7Vol.% $C_4H_{10}O$ (n-Butanol)
0.7Vol.% C_9H_{20} (n-Nonane)	1.2Vol.% $C_6H_{12}O$ (Methylisobutylketone MIBK)
	1.1Vol.% C_7H_8 (Toluene)

Technical Data

Type:	G450
Detection principle:	Electrochemical (EC): for toxic gases and oxygen Catalytic combustion (CC): for combustible gases and vapours (up to 100 %LEL)
Detection range:	See section „Sensor type and Detection range"
Response time:	See section „Sensor specification"
Expected sensor lifetime:	2...3 years - see section „Sensor specification"
Gas supply:	Diffusion or Pump by means of attachable electrical sampling pump G400-MP1
Display:	Illuminated full-graphic LCD, automatical size adjustment for optimal read out, display of battery capacity, gas concentration as instantaneous and peak value
Alarm:	Depending on gas type 3 or 2 instantaneous and 2 dosimeter alarms, battery alarm. visual and audible warning and display indication, colouring of display depending on alarm status (orange/red) Buzzer: 103 dB (reduceable to 90 dB)
Zeropoint and sensitivity calibration:	Manually or automatically with calibration program test gas supply with 0.5..0.6 l/min.
Power supply:	1. NiMH battery module (colour: black), 2500Ah, rechargeable Im=600mA (max. charging current) Um=6V DC (max. voltage) or 2. Alkaline battery module (colour: grey), non-rechargeable with 2x mignon 1.5V Type: DURACELL PROCELL MN1500 LR6 AA
Operational time NiMH-II:	approx. 30h (EC+WT_{CH4}); approx. 17h (EC+WT); approx. 130h (EC)
Alkaline:	approx. 25h (EC+WT_{CH4}); approx. 14h (EC+WT); approx. 170h (EC)
Climate conditions:	
for operation:	-20...+55°C | 5...95% r. h. | 700...1300hPa
for storage:	-25...+55°C | 5...95% r. h. | 700...1300hPa (recommended 0...+30°C)
Casing:	
Material:	Rubberized plastic
Dimensions:	75 x 110 x 55 mm (WxHxD)
Weight:	290 g
Protection:	IP 67
Approvals and tests:	
Labelling and ignition protection:	⟨Ex⟩ II2G Ex ia d IIC T4 -20°C≤Ta≤+55°C for NiMH-II (black) Ex ia d IIC T3 -20°C≤Ta≤+55°C for NiMH (black) Ex ia d IIC T4/T3 -20°C≤Ta≤+45°C/+55°C for Alkaline (grey)
EC-Type Examination Certificate:	BVS 06 ATEX E 017 X (without measuring function)
EMC Test:	DIN EN 50270 : 2006 Radio shielding: Type class I Interference resistance: Type class II

GfG Gesellschaft für Gerätebau mbH
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Internet: www.gasdetection.biz

EC-Type Examination Certificate

EXAM
BBG Prüf- und Zertifizier GmbH

Translation

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

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

(3) **BVS 06 ATEX E 017 X**

(4) **Equipment:** **Gas detector type G 450**

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

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

(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 EXAM BBG Prüf- und Zertifizier 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 06.2017 EG.

(9) The Essential Health and Safety Requirements are assured by compliance with:

EN 50014:1997+A1-A2	General requirements	
EN 50018:2000 +A1	Flameproof enclosure	'd'
EN 50020:2002	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 ia d IIC T4/T3

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, dated 17. February 2006

Signed: Dr. Jockers — Certification body

Signed: Dr. Eickhoff — Special services unit

Dinnendahlstrasse 9 44809 Bochum Germany Phone +49 234/3696-105 Fax +49 234/3696-110

EXAM
BBG Prüf- und Zertifizier GmbH

(13) Appendix to

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

BVS 06 ATEX E 017 X

(15) 15.1 Subject and type

Gas detector type G 450

15.2 Description

The gas detector type G450 is a portable instrument with built-in power supply battery. It is used for detection of gases in ambient air under atmospheric conditions. The measurement values are shown in a built-in display. If the presetted limits are reached, a visual alarm and an audible alarm and optionally a vibrating alarm is produced.

The gas detector type G450 is powered either by a NiMH battery pack, which has to be charged and replaced only outside the hazardous location or by an alkaline battery pack. The alkaline battery pack includes 2 cells (size AA), which have to be replaced only outside the hazardous location. The supply units are coloured marked for differentiation when mounted.

15.3 Parameters

15.3.1 Type of protection and ambient temperature range of the complete device type G450 with different combination of individual components:

	Type of protection	Ambient temperature range
Gas detector with NiMH battery pack (colour: black)	EEx ia d IIC T3	-20 °C ≤ T_a ≤ +55 °C
Gas detector with alkaline battery pack (colour: grey)	EEx ia d IIC T4 EEx ia d IIC T3	-20 °C ≤ T_a ≤ +45 °C -20 °C ≤ T_a ≤ +55 °C

15.3.2 NiMH battery pack:

Nominal voltage		2.4	V
Nominal capacity		2300	mAh
Maximum charging voltage	U_m	DC 6	V

15.3.3 Alkaline battery pack:

Nominal voltage	3	V

The approved Alkaline battery types are listed in the manufacturer instructions from the GfG Gesellschaft für Gerätebau mbH.

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EXAM
BBG Prüf- und Zertifizier GmbH

(16) Test and assessment report
BVS PP 06.2017 EG as of 17.02.2006

(17) Special conditions for safe use
The measurement function for explosion protection is not the subject of this EC-Type Examination Certificate.

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, 09.03.2006
BVS-Rip/Mi E0340/06

EXAM BBG Prüf- und Zertifizier GmbH

Certification body

Special services unit

Dinnendahlstrasse 9 44809 Bochum Germany Phone +49 234/3696-105 Fax +49 234/3696-110

DEKRA

Translation

3rd Supplement

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

to the EC-Type Examination Certificate
BVS 06 ATEX E 017 X

Equipment: **Gas detector type G450 and type G460**

Manufacturer: **GfG Gesellschaft für Gerätebau mbH**

Address: **44143 Dortmund, Germany**

Description
The gas detectors type G450 and type G460 can be modified according to the descriptive documents as mentioned in the pertinent test and assessment report

The gas detectors can also be powered by the NiMH battery pack (Ex ia IIC T4). The electrical circuit as well as the inserted sensors were partially modified.

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

EN 60079-0:2006	General requirements
EN 60079-1:2004	Flameproof enclosure 'd'
EN 60079-7:2003	Increased safety 'e'
EN 60079-11:2007	Intrinsic safety 'i'

The marking of the equipment shall include the following:

II 2G Ex ia d IIC T4/T3 for type G450

II 2G Ex ia de IIC T4/T3 for type G460

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Germany Phone +49 234/3696-105 Fax +49 234/3696-110 E-mail zs-exam@dekra.com

DEKRA

3 NiMH and NiMH-II battery pack:

Nominal voltage			2.4	V
Nominal capacity			2500	mAh
Maximum charging voltage	U_m	DC	6	V

4 Alkaline battery pack:

Nominal voltage			3	V

The approved Alkaline battery types are listed in the manufacturer instructions of GfG Gesellschaft für Gerätebau mbH.

Special conditions for safe use

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

Test and assessment report

BVS PP 06.2017 EG as of 01.09.2008

DEKRA EXAM GmbH
Bochum, dated 01. September 2008

Signed: Dr. Jockers	Signed: Dr. Eickhoff
Certification body	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, 07.07.2009
BVS-Rip/Ar E 1036/09

DEKRA EXAM GmbH

Certification body	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

DEKRA

Parameters

1 Type of protection and ambient temperature range of the complete device **type G450** with different combination of individual components:

	Type of protection	Ambient temperature range
Gas detector with NiMH battery pack (marking Ex ia IIC T3) (colour: black)	Ex ia d IIC T3	-20 °C ≤ T_a ≤ +55 °C
Gas detector with NiMH-II battery pack (marking Ex ia IIC T4) (colour: black)	Ex ia d IIC T4	-20 °C ≤ T_a ≤ +55 °C
Gas detector with Alkaline battery pack (colour: grey)	Ex ia d IIC T4 Ex ia d IIC T3	-20 °C ≤ T_a ≤ +45 °C -20 °C ≤ T_a ≤ +55 °C

2 Type of protection and ambient temperature range of the complete device **type G460** with different combination of individual components:

	Type of protection	Ambient temperature range
Gas detector with NiMH battery pack (marking Ex ia IIC T3) (colour: black)	Ex ia de IIC T3	-20 °C ≤ T_a ≤ +50 °C
Gas detector with NiMH-II battery pack (marking Ex ia IIC T4) (colour: black)	Ex ia de IIC T4	-20 °C ≤ T_a ≤ +50 °C
Gas detector with Alkaline battery pack (colour: grey)	Ex ia de IIC T4 Ex ia de IIC T3	-20 °C ≤ T_a ≤ +45 °C -20 °C ≤ T_a ≤ +50 °C

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EC- Declaration of Conformity

G450 MICROTECTOR II

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Edited: 03.03.2006 Amended: 26.03.2007

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 intrinsical safety, as well as their measuring function.

The portable Detector **G450** 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	BVS 06 ATEX E 017 X
Labelling	Ⓔx II 2G Ex ia d IIC T4 / T3 (NiMH = T3)
	-20°C ≤ Ta ≤ +45°C / +55°C
	CE 0158

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 60079-0: 2004
- Flameproof enclosure „d“	EN 60079-1: 2004
- Intrinsic safety „i“	EN 60079-11: 2007
Sensor MK 221	EN 50014: 1997 / EN 50018: 2000

■ **Electromagnetic compatibility**

- 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

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, Dinnerdahlstraße 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 205-000.34.

Dortmund, 29.03.2007

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MBA H.J. Hübner
President CEO

ATEX EG-Kon042/H. Siebrecht