

# Microtector II G460

7-gas-detector with performance test approval



- Performance test approved multi-gas detector (290g)
- Extremely loud alarm, 103 dB(A) for optimum personnel protection
- Full featured, rugged design (IP67)
- Innovative optical alarm system with colour-change display
- PID sensor for direct reading of toxic volatile organic compounds (VOCs)
- Infra-red (IR) sensors for CO<sub>2</sub> and combustible gas (%LEL – %VOL)
- Wide range of additional sensors including SO<sub>2</sub>, HCN, Cl<sub>2</sub>, NH<sub>3</sub>, PH<sub>3</sub>, H<sub>2</sub>, NO, NO<sub>2</sub>, ClO<sub>2</sub>, ETO and more
- Highly configurable design using smart sensor

# Your safety is our priority

## The smallest all-rounder

The Microtector II G460 is the world's smallest 7-gas detector with the following key features: With five sensor positions, the G460 offers more than previously possible in an instrument of comparable size. The main innovation of the G460 is the continuous and selective measurement of seven gases simultaneously. Thus, it warns of dangers of toxic, combustible gases and vapours, but also oxygen deficiency and surplus. With a wide range of sensors and accessories, the G460 satisfies all applications and requirements.

## Performance tested for maximum safety

For confined space measurement, where highly combustible gases/vapours, toxic gases and oxygen deficiency hazards may be present. It is a legal requirement in EU countries that gas detectors with functional performance, tested and approved to European standards must be used.

The G460 is certified to EN 60079-29-1 (combustible gas performance), EN 50104 (oxygen) and EN 45544 (toxic).

In addition the performance test approval of the G460 includes methane, propane, hexane and n-nonane so the user is protected against the whole range of combustible gases that may be encountered. This means better protection, and improved safety.

The G460 performance test approval was issued by DEKRA and EXAM, who are leading European notified bodies, and independent experts licensed to certify instrumentation under the ATEX directive 94/9/EC and also to conduct the performance test approvals to EN standards that are required by the ATEX directive.

Using performance tested gas detectors gives the user confidence that the instrument will perform correctly even under extreme conditions, and in harsh applications and environments.

## Large display with zoom function

The large, easy-to-read graphic display can be rotated 180° by just pushing a button – this allows the display to be read easily even if the detector is carried, or worn at the belt. Pushing any button activates the backlight for 10 seconds, be-



Full-scale G460

fore it is deactivated automatically to save energy. The zoom-function allows easy reading of single measurement values and shows additional information on the selected gas.

## Award-winning design

The G460 is not only highly innovative and powerful instrument, but has also won design awards for its appearance, size and ease of use.



This was acknowledged by the Design Centre NRW with the **red-dot design award** for outstanding achievements in design and functionality. In addition, users from

all over Europe voted for the G460 for its practical and user-friendly features with the **GIT Security Award** in 2009.



reddot design award



## Intuitive handling

A large graphic display provides clear readings of all data. With only three soft-keys the G460 allows intuitive and user friendly handling via a simple menu. Sensitive device configurations and functions are protected against unauthorized access.

## Smart sensor technology

The G460 uses pre-calibrated, smart plug-in sensors which can be combined in different combinations (see table). All sensors have their critical information stored (i.e. gas type, detection range, alarm set-points, date of calibration etc.) in a memory chip attached to the sensor. This means that sensors can be easily swapped or replaced when required.

Typical characteristics of sensors used in GfG instruments are long lifetime, fast response, high measurement accuracy and high specificity to the target gas.

## Patented CO<sub>2</sub> and CH<sub>4</sub> detection

The G460 can be equipped with our new, patented, low-power multi-frequency NDIR sensor. This sensor can detect up to four wavelengths simultaneously. This means that CO<sub>2</sub> can be detected in ranges from ppm to %VOL, and combustible gases in the %LEL and %VOL range if required.

Cross-sensitivities to other gases, and damage to the sensor by typical poisons such as Silicone compounds or Hydrogen Sulphide can be removed.

IR sensors are also not affected by extremes of temperature and exposure to very high gas concentra-

# Field-proven features



Reversible display always visible

tions, so working life and maintenance requirements are minimized. This gives the user far lower servicing and operating costs.

## 45 years data-logging capacity

The standard integrated memory records gas concentrations and alarms detected at a 1 minute interval for 30 hours. This storage capacity can be significantly increased by inserting an SD-memory card, which at a data-logging interval of 1 minute can store data for up to 45 years! Therefore, for the first time, a lifetime of worker's exposure data can be stored on one instrument.

## Innovative alarm system

Alarm situations are notified with distinct multi-frequency alarm sounds. The 103 dB(A) audible alarm is the loudest available on the market today.

The unique "traffic light" visual alarm of the G460 helps the user to quickly and simply understand alarm status. In alarm, the whole instrument display changes colour as shown below:



**Red**  
High alarm  
Red alert!



**Yellow/Orange**  
Low alarm  
Caution!



**Green**  
All gas values  
measured are  
within normal  
range

An optional vibration alarm also increases the chances of the alarm being acknowledged by the user.

## Alarm limit values

Each channel (flammable, oxygen, toxic) has 3 programmable alarm values. In addition Occupational Exposure Limit (OEL), Time-Weighted Average (TWA) and Short-Term Exposure Limit (STEL) are auto-



SD-cards: permanent data-logging for up to 45 years

matically monitored and the average values are stored. All alarm settings are password protected, so that they can only be configured by the appropriate person.

## Intrinsically safe and water resistant

The G460 has a rugged, high-quality rubberized housing and is shock resistant and water resistant to IP67.

## Docking-station DS400

The DS400 docking-station is an innovative instrument management system, which can be used to check and calibrate GfG detectors automatically. Instruments can be bump tested or calibrated quickly and automatically, which substantially reduces management time and costs. The instrument is ready for use in no time. The DS400 works autonomously (no PC is required), and can be linked to multiple docking-stations.

Compared with performing bump testing and calibration manually, the time taken and therefore gas used is reduced by more than 50%, giving a significant cost reduction. Bump test and calibration status is easily seen, and is "fool-proof" so user errors are excluded. After each test there is an indication of the result, "OK" or "Error" according to the traffic light principle – green means good, red means stop. Data stored in the instruments can also be transferred to an SD-card in the DS400, or to a PC.

## Smart Pump G400-MP2

The smart high-performance pump G400-MP2 can take gas samples from distances of up to 100m. The new pump communicates with the gas detectors G450/G460 and allows fault indication via the detector display. This is the perfect solution for applications such as clearance measurements of confined spaces, tanks, basements, or trenches.

The G400-MP2 is the only attachable pump available which may remain fixed to the detector and provides enormous flexibility.

When the pump is turned on the diffusion inlets are covered and the measurement results are not affected by air flows. An additional filter system in the sampling line protects the pump and sensors from dust and moisture. When the pump is turned off, the gas detector can be operated as usual. The diffusion



## Accessories for every application



chemicals or sewage. The existing battery unit of the G460 can be replaced with an integrated lamp battery unit if necessary. Thus, an easy upgrade is guaranteed.

### Flexible power supply

Also, the battery packs used in the pump are directly interchangeable with the instrument battery packs, giving still more flexibility.

The G460 NiMH-battery pack gives an operation time of up to 30 hours (depending on sensor configuration), and minimum 8-9 hours. If battery capacity is low, an automatic battery alarm is triggered.



inlets now allow all gases to enter the sensor chamber. The G400-MP2 is operated on its own power supply, independently from the gas detector, i.e. the pump does not affect the operational time of the G460 and allows at least 10 hours of continuous operation.

### Built-in flashlight

The G460 can be equipped with an integrated ATEX approved flashlight. This can be extremely useful when working in dark, confined spaces.

Also, if the instrument is lowered into a tank, sewer etc. to check the atmosphere prior to entry, the flashlight can be used to illuminate the water surface, avoiding immersing the instrument in potentially damaging or dangerous



### Drop-in charger

Intelligent charging technology detects the battery condition and provides a maximum operating time while conserving battery life. The drop-in charger communicates with the gas detector. Even frequent charging will be recognized and the battery pack will not be overcharged unnecessarily.

For instruments with an attached G400-MP2 smart pump, a second charger is available in which both, the instrument and the pump, can be charged simultaneously.



### Mounting options

The G460 can be secured to the person using either a robust crocodile clip, or a steel belt clip to ensure hands-free operation in confined spaces.

### Two smart caps

A smart calibration cap is used for manual instrument calibration. A smart charger cap (blue) is also available, which performs the following functions:



- Gas calibration
- Location-independent charging
- Connection to 230V power supply
- or
- Connection to 12/24V vehicle charger
- or
- Connection to a data cable for data transmission

### Vehicle charger for 12/24V

The G460 can be charged via the smart charger cap, which is screwed onto the instrument and connects via a 12V plug or a cigarette lighter socket in the vehicle.

### Battery and battery packs with additional features

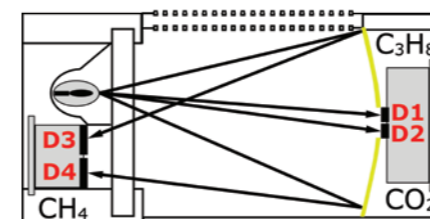
An alkaline battery pack is available for the G460, ensuring that work can continue even if the user has not charged the instrument.

The G460 battery pack can also be supplied with vibration alarm, or built-in ATEX approved flashlights if required.

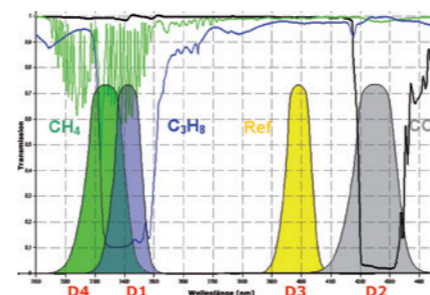
## High performance sensors mean maximum safety

### Multi-channel IR sensors

Using GfG's unique, patented multi-IR sensor both carbon dioxide (CO<sub>2</sub>) and flammable gases can be measured at the same time. The IR sensor uses up to 4 detectors.



Part of the IR radiation passes through the measuring chamber once, then meets the two detector elements (D1, D2) to measure CO<sub>2</sub> and e.g. propane.



For measurement of methane the IR radiation passes through the measuring chamber twice and is detected on two additional detectors (D3, D4). For the first time, with only one measuring chamber, it is possible to detect CO<sub>2</sub> concentrations from ppm to %VOL range, in addition to methane or other hydrocarbons from the %LEL to %VOL range.

### Photo ionization (PID) sensors

Volatile organic compounds (VOCs), for example gasoline, diesel, fuel oil, kerosene etc. are toxic and dangerous to health even at very low (ppm) levels. These low detection levels cannot be achieved by using a conventional catalytic combustion sensor, which detects flammable gas concentrations at the %LEL level.

There are STEL (Short-Term Exposure Limit) and TWA (Time-Weighted Average) exposure limits set by international law for VOCs, some of which are at concentrations below 1 ppm.

The GfG PID sensor can be used to detect hundreds of different VOCs. The industry standard is that the sensor is calibrated on isobutylene. Different calibration gases can also be selected by the user.

Sensor Type		Sensor Position				
Test gas	Range	1	2	3	4	5
Ammonia NH <sub>3</sub>	0-200 ppm	EC	EC	EC		
Flammable Gases: Methane, Propane, Hexane, Nonane	0-100 %LEL				CC	IR
Chlorine Cl <sub>2</sub>	0-10 ppm		EC	EC		
Chlorine Dioxide ClO <sub>2</sub>	0-2 ppm		EC	EC		
Hydrogen Chloride HCl	0-30 ppm	EC	EC	EC		
Ethylene Oxide C <sub>2</sub> H <sub>4</sub> O	0-20 ppm		EC	EC		
VOC - Isobutylene C <sub>4</sub> H <sub>8</sub>	0-500 ppm		PID			
VOC - Isobutylene C <sub>4</sub> H <sub>8</sub>	0-2000 ppm		PID			
Carbon Dioxide CO <sub>2</sub> and Methane	0-5 %VOL 0-100 %LEL 0-100 %VOL					IR
Carbon Dioxide and Methane, Propane, Nonane	0-5 %VOL 0-100 %LEL					IR
Carbon Dioxide and Methane, Propane, Nonane	0-25 %VOL 0-100 %LEL					IR
Carbon Monoxide CO	0-300 ppm	EC	EC	EC		
Carbon Monoxide CO with low H <sub>2</sub> -sensitivity	0-300 ppm 0-500 ppm	EC	EC	EC		
Carbon Monoxide CO	0-1000 ppm	EC	EC	EC		
Carbon Monoxide CO	0-2000 ppm	EC	EC	EC		
Carbon Monoxide CO and Hydrogen Sulphide H <sub>2</sub> S	0-500 ppm 0-100 ppm	2x EC				
Methane CH <sub>4</sub>	0-100 %LEL				CC	IR
Phosphine PH <sub>3</sub>	0-10 ppm	EC	EC	EC		
Propane C <sub>3</sub> H <sub>8</sub>	0-100 %LEL				CC	IR
Oxygen O <sub>2</sub> (2 years)	0-25 %VOL	EC	EC	EC		
Oxygen O <sub>2</sub> (3 years)	0-25 %VOL	EC	EC	EC		
Sulphur Dioxide SO <sub>2</sub>	0-10 ppm	EC	EC	EC		
Hydrogen Sulphide H <sub>2</sub> S	0-100 ppm	EC	EC	EC		
Hydrogen Sulphide H <sub>2</sub> S	0-500 ppm	EC	EC	EC		
Nitrogen Monoxide NO	0-100 ppm		EC	EC		
Nitrogen Dioxide NO <sub>2</sub>	0-30 ppm		EC	EC		
Hydrogen H <sub>2</sub>	0-2000 ppm	EC	EC	EC		
Hydrogen H <sub>2</sub>	0-1 %VOL	EC	EC	EC		
Hydrogen H <sub>2</sub>	0-4 %VOL	EC	EC	EC		

Other gases and ranges available on request

### The G460 has 5 sensor positions:

- 1x Catalytic Combustion (CC)
- 1x Infrared (IR)
- 2x Electrochemical (EC)
- 1x Photo ionization detector (PID) or Electrochemical (EC)

Some sensors respond to several gases. By selecting the sensor combination carefully, a number of different gases can be detected.

# Microtector II G460 Technical Data

## Sensors and detection range:

See table page 5  
(further gases on request)

## Detection principle

### Electrochemical (EC) (up to 4):

Toxic gases and oxygen  
(ppm / %Vol)

### Catalytic combustion (CC):

Flammable gases and vapours  
(to 100 %LEL)

### Photo Ionisation (PID):

10,6 eV  
Toxic gases and vapours (ppm)  
Calibration gas: Isobutylene

### Infrared (IR):

Carbon dioxide (%Vol / ppm)  
Flammable gases and vapours  
(100 %LEL and %Vol)

## Expected sensor lifetime:

Up to 5 years, depending on sensor

## Test gas supply:

Diffusion, attachable, electrical pump  
for up to 10 hours continuous operation  
and up to 100m sample draw

## Pump performance:

0,50 l/min. at 0 bar (0 mmWC)  
0,25 l/min. at 0,06 bar (600 mmWC)  
0,00 l/min. at 0,13 bar (1300 mmWC)

## Display:

Illuminated full-graphic LCD with  
colour change for alarm, automatic size  
adjustment for optimal readout, zoom  
function for maximum readability,  
gas concentration at current value  
and peak level, indication of battery  
capacity and real time clock

## Alarms:

Depending upon gas type, 3  
instantaneous and 2 calculated  
exposure alarms, battery alarm

## Optical alarm:

Colouring of the display depending  
upon alarm condition of the equipment  
(green/orange/red), 360° circulating  
red LED

## Audible alarm:

103 dB(A)  
can be reduced to 90 dB(A)

## Vibration:

Vibrating alarm (optional)

## Temperature:

Operation: -20°C .. +55°C  
Storage: -25°C .. +55°C  
(recommended 0 .. +30°C)

## Humidity:

Operation and storage:  
5 .. 95 % r. h.

## Pressure:

Operation and storage:  
700 .. 1300 hPa

## Zero point / calibration adjustment:

User-friendly, calibration via AutoCal  
function (pre-programmed function via  
service menu), manual calibration via  
service menu (code necessary)

## Power supply:

1. NiMH battery module  
(colour: black), rechargeable
2. Alkaline battery module  
(colour: grey) non-rechargeable  
2x AA 1,5 V type:  
DURACELL PROCELL MN1500 LR6 AA

## Operating time:

with NiMH battery module  
approx. 130 hours 4xEC  
approx. 30 hours IR+EC  
approx. 40 hours PID+EC  
approx. 20 hours EC+CC<sub>CH4</sub>  
approx. 14 hours PID+EC+CC<sub>CH4</sub>  
approx. 12 hours IR+EC+CC<sub>CH4</sub>  
approx. 11 hours EC+CC  
approx. 9 hours PID+EC+CC  
approx. 8 hours IR+EC+CC

with alkaline battery module  
approx. 170 hours 4xEC  
approx. 40 hours PID+EC  
approx. 28 hours IR+EC  
approx. 14 hours EC+CC<sub>CH4</sub>  
approx. 9 hours PID+EC+CC<sub>CH4</sub>  
approx. 8 hours EC+CC  
approx. 6 hours IR+EC+CC<sub>CH4</sub>  
approx. 6 hours PID+EC+CC  
approx. 5 hours IR+EC+CC

## Larger energy consumers:

The operating time varies with the  
usage of the user and the equipment  
of the device. The following factors  
influence the run time:

1. CC-sensor
2. Alarm 3 (maximum intensity of:  
Sounder, 10x alarm-LEDs, Display  
illumination; latching)
3. Alarm 2 (increased intensity of:  
Sounder, 10x alarm-LEDs, Display  
illumination; latching)
4. Alarm 1 (normal intensity of:  
Sounder, 16x alarm-LEDs, Display  
illumination; non-latching)
5. Display illumination (whenever 6  
LEDs are activated for 12 seconds)
6. IR sensor
7. PID sensor

## Charging:

Charge and trickle charge via Smart  
Charger Cap, drop-in charger and  
dockingstation

## Dimensions:

75 x 110 x 36 mm (WxHxD)  
Display diagonal 55 mm

## Weight:

290 g - 350 g depending upon sensor  
configuration

## Material:

Rubberised polycarbonate

## Protection class:

IP67

## Inspection date:

Displayed after activation

## Datalogger:

30 hours (interval of 1 minute)  
1800 measured values per gas,  
adjustable intervals (1 s - 60 min)  
recording of average, peak or  
instantaneous values selectable,  
plug-in SD-memory card for permanent  
data capture for lifelong use of  
equipment (up to 45 years)

## Approval:

⊕ II 2G Ex ia de IIC T4  
-20°C ≤ T<sub>a</sub> ≤ +50°C  
with NiMH battery module (black)

⊕ II 2G Ex ia de IIC T4/T3  
-20°C ≤ T<sub>a</sub> ≤ +45°C/+50°C  
with alkaline battery module (grey)

## EC Type Examination Certificate / EEC Performance Test Approval:

BVS 06 ATEX E 017 X  
PFG 09 G 001  
EN 60079-29-1 (combustible gases)  
EN 40104 (oxygen)  
EN 45544 (toxic gases)

## Electromagnetic compatibility:

DIN EN 50270:1999  
Radio shielding: Type class I  
Interference resistance: Type class II



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