

**Operating Instructions**  
**- Gas measurement and  
detection device -**  
**GOLIATH (EN)**

[version 12/2016]  
[as of SW-version 23014806]



**Success for your business with quality products**  
from **Esders** 

We thank you for choosing an *ESDERS GmbH* product.

You are always assured an outstanding, thoroughly tested device with products from our comprehensive range. Our devices comply with laws and regulations applicable in Germany and thus guarantee an extremely high standard of safety.

We also offer an annual service for all our devices.

These operating instructions will help you to start using the device quickly and effectively. Take a few minutes to read them through, so you can operate the device safely and are able to use all the functions.

You can contact our expert team at any time with any queries or suggestions you may have.

Best regards



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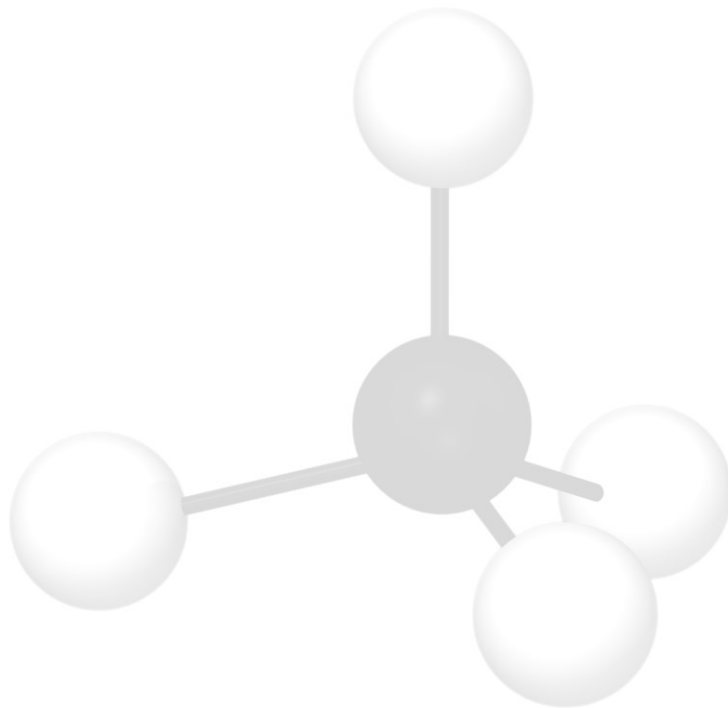
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[ METHANE-MOLECULE: CH<sub>4</sub> ]

## **1. SAFETY INSTRUCTIONS AND WARNINGS**

### **1.1. SAFETY ASPECTS**

To ensure maximum safety and prevent malfunction, you must follow the

**OPERATING INSTRUCTIONS CAREFULLY**

Using this device requires thorough knowledge of these operating instructions, which must be strictly adhered to.

References made to laws, directives and standards are based on the German legal system.

- The **GOLIATH** must only be used for the purpose described here.
- Note this device can only be used within an ambient temperature range of -10°C to +40°C.
- Ensure the room is adequately ventilated when using a test gas to set the device.
- Ensure you keep within the specified measurement range limits.

### **1.2. MAINTENANCE**

Repair work on the device must only be carried out by **Esders GmbH's** authorised service. Only original Esders replacement parts must be used.

According to DIN 31051:

<i>Maintenance</i>	= Servicing, inspection, repairs
<i>Servicing</i>	= measures taken to retain a specified state
<i>Inspection</i>	= measures taken to ascertain and evaluate the actual state
<i>Repairs</i>	= measures taken to restore to the specified state

### **1.3. USE AND STORAGE**

Depending on version and intended purpose, the **GOLIATH** measurement device can be used to detect, measure and alert of concentrations of gas (methane). The ethane analysis also makes it possible to distinguish between natural gas and biogas.

Furthermore, oxygen (O<sub>2</sub>), carbon dioxide (CO<sub>2</sub>), and up to two other toxic gases (carbon monoxide [CO] and hydrogen sulphide [H<sub>2</sub>S]) can be measured and displayed simultaneously, as long as the respective sensors have been installed.

As several sensors are used, measurements can be carried out within the following ranges:

Traces of gas: 0 – 1,000 ppm  
 Gas warning: 0 – 50% LEL  
 Measurement of gas: 0 – 100% vol.

Oxygen: 0 – 25% vol. O<sub>2</sub>  
 Carbon dioxide: 0 – 5% vol. CO<sub>2</sub> (20 Vol.-% at “Bar hole testing”)  
 Carbon monoxide: 0 – 1,000 ppm CO  
 Hydrogen sulphide: 0 – 1,000 ppm H<sub>2</sub>S

The sensors for oxygen, carbon monoxide and hydrogen sulphide measurement are optionally available for the following devices.

	Sensor as an option for ...						
	All.	All. E	PN	PN E	PW	LOC	W
O <sub>2</sub>	X	X	X	X	X	X	X
CO	X	X	X	X	X		X
H <sub>2</sub> S	X	X					X

The meaning of the device designations is described in Chapter 3.3.

The **GOLIATH** can also be optionally equipped with a pressure sensor up to 2,000 hPa and used to measure non-aggressive gases. Exposing the pressure sensor to liquids will permanently damage it and the warranty will become invalid.

If you do not intend to use the device for some time, remove the battery and store the device at a temperature between -25°C and +60°C.

#### 1.4. LIABILITY FOR USE OR DAMAGES

Liability for function and use of the device is transferred to the owner or operator if the device has been serviced or repaired incorrectly by persons who are not part of Esders GmbH's authorised maintenance service. This also applies if the device is not used in the intended way.

#### 1.5. SYMBOLS



##### Information

This symbol indicates additional useful information and tips for use.



##### Warning / Danger

This symbol indicates potential hazards or special circumstances which must be taken into consideration.



## 1.6. DEVICE TYPE

The **GOLIATH** portable gas warning and measurement device serves to measure various gases in the ambient air. The measurement is carried out by up to six gas sensors housed in the device. A visual and acoustic alarm is triggered when threshold values are exceeded.

The measurement device is fed from a power supply battery which is made up of four secondary cells (NiMH).

The **GOLIATH** gas warning and measurement device may only be loaded and the rechargeable battery pack may only be changed away from areas with explosion hazards (see instruction manual for further notices).

This measurement device is suitable for use within an ambient temperature range between - 10°C and + 40°C.

Device versions of the gas measurement and detection device type **GOLIATH**:

Variant	Type of protection	Ambient temperature range
Gas warning and measurement device Type GOLIATH with rechargeable battery (NiMH) and base plate with charging contacts	Ex ib d IIB T3	- 10°C ≤ T <sub>a</sub> ≤ + 40°C

Table 1: Device version GOLIATH

The GOLIATH can also be optionally equipped with an internal pressure sensor, so the device can also measure pressure.



Use is limited to measuring the pressure of non-aggressive gases. Exposing the pressure sensor to liquids will damage it permanently and the warranty will become invalid.

The maximum permitted pressure is 3,000 hPa!

The measurement device makes use of the active principles of semiconductor and infrared sensors for methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>), as well as the optional electrochemical sensors for carbon monoxide (CO), hydrogen sulphide (H<sub>2</sub>S) and oxygen (O<sub>2</sub>).

With semiconductor sensors, the measurement range runs from 0 to 1,000 ppm at intervals of 1 ppm for the gas methane. In addition, the infrared sensor functions within the measurement range of 0.1 to 100% vol. of methane (100% LEL in some cases). The interval amounts to 0.1% vol. and/or 0.5% LEL.

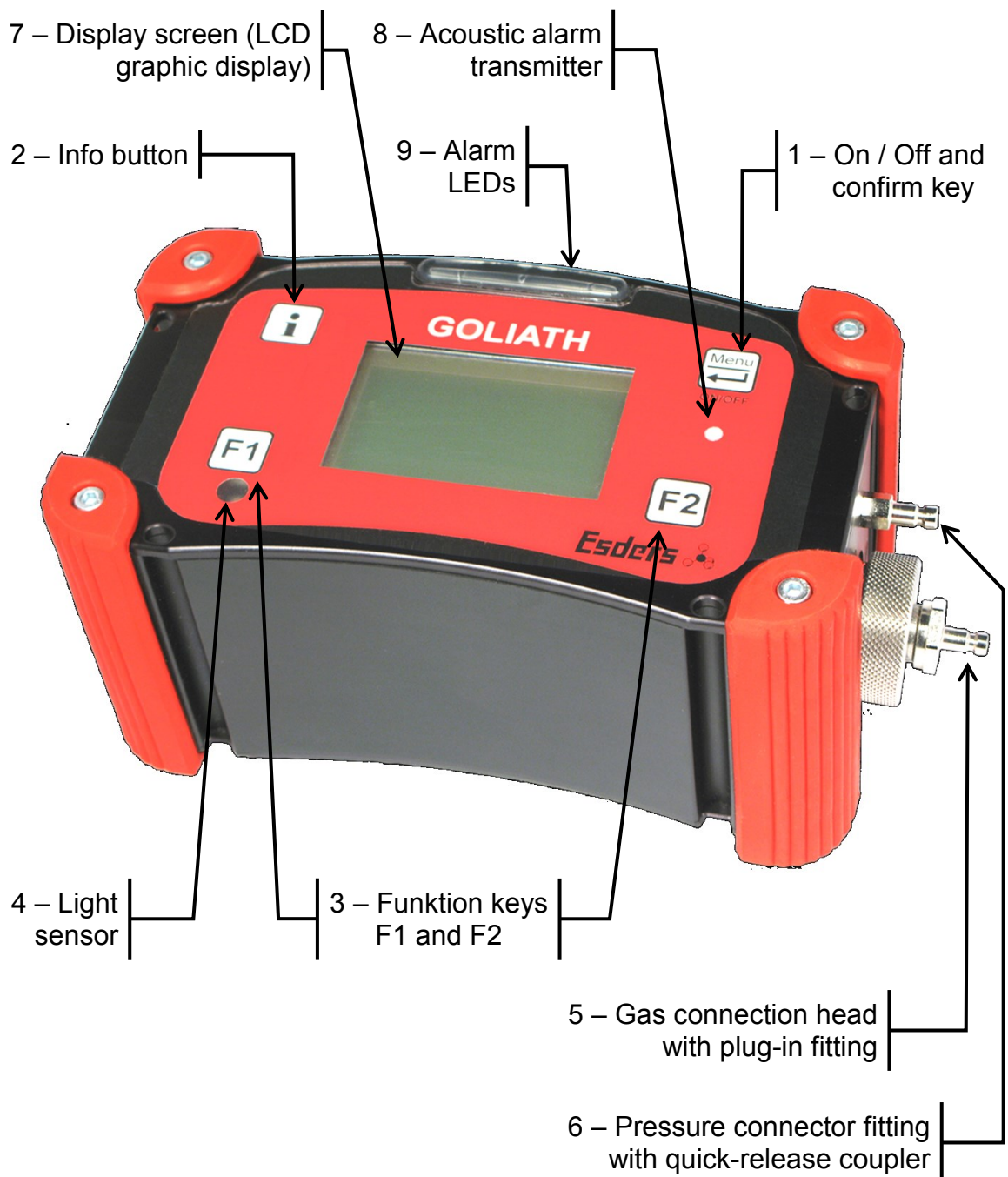


This instruction manual applies to the fully equipped version of the **GOLIATH**. However, Esders GmbH offers its customers other devices for different fields of application. This instruction manual was compiled for devices featuring software version 23014806 updated on 01.August.2011.

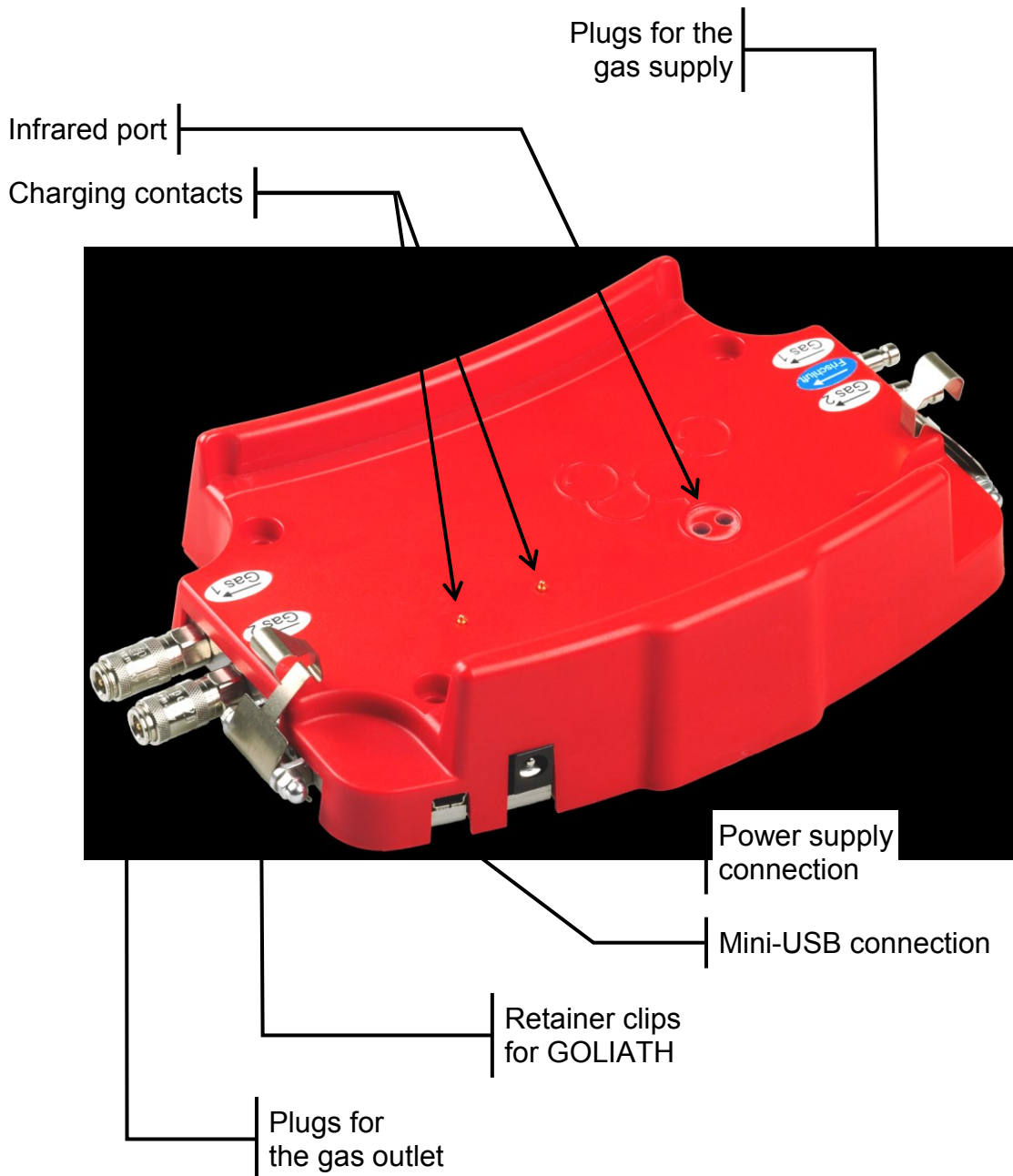
Modifications to the device or software are possible due to continual further development.

## 2. OPERATING COMPONENTS

### 2.1. DIAGRAM OF THE GOLIATH



## 2.2. DIAGRAM OF THE TESTING STATION AND CHARGING DOCK



Two other charging docks are available. One is not equipped with gas connections, while the other is not equipped with gas connections, USB port and infrared port. The retaining clips are available for all charging docks as an option.

## 2.3. FUNKTIONS

### 2.3.1. ON / OFF KEY



The menu key is used to turn the device on and off. Press for about 1 sec. to turn on and about 3 sec. to turn off. Once the device is switched on, the main menu appears on the screen. Submenus can be selected using the menu key. This key can also be used to return to the main menu.

### 2.3.2. INFO BUTTON



The info button can be pressed at any time and displays various device information such as date, time of day, software version, serial number, battery capacity and pump performance.

### 2.3.3. FUNCTION KEYS



The function keys F1 and F2 are used for the function displayed in the respective menu item. These functions are described in the bottom-most line on the LCD screen. The text on the left corresponds to F1 and the text on the right to F2.



If no text appears, then the corresponding key has no function.

### 2.3.4. LIGHT SENSOR

The light sensor ensures that the display screen backlighting turns on when the device is used in an environment which is too dark. This only works if the "Off" setting has not been selected under "Illumination" in the settings menu.

### 2.3.5. CONNECTION HEAD WITH PLUG-IN FITTING

Different probes can be quickly and easily connected to the connection head using the plug-in fitting. The probe intake features a water-repellent filter to protect the connection head from dirt and prevent moisture from getting in. The filter can be accessed by turning the filter screw connection counter clockwise. It should only be unscrewed by hand in order to avoid damaging the screw thread.

### 2.3.6. PRESSURE CONNECTOR FITTING

The pressure connector fitting is used to connect a measuring hose to gauge pressures between 0 and 2,000 hPa. The fitting is optionally and only available with measuring devices with pressure measurement integrated as an extra.



If the measurement device is not set to the 'Pressure measurement' submenu, the connector fitting must be left open as otherwise incorrect measurement readings may be displayed with regard to the flow rate!

**2.3.7. DISPLAY SCREEN**

The display screen consists of a LCD graphics display screen, which ensures measurement readings and text information are clearly displayed. The menu item currently being used is displayed in the top-most line of text. The top-most line is also used for warning and notification messages, such as 'Charge batteries'.

**2.3.8. ACOUSTIC ALARM TRANSMITTER**

The acoustic alarm sounds when the pre-set alarm thresholds are reached. It is linked to the optical alarm and can also be switched off if required to ensure people living in the vicinity are not disturbed.

**2.3.9. ALARM LEDs**

An optical alarm is indicated by several bright alarm LEDs above the display. The LEDs flash at the same frequency as the acoustic signal sounds.

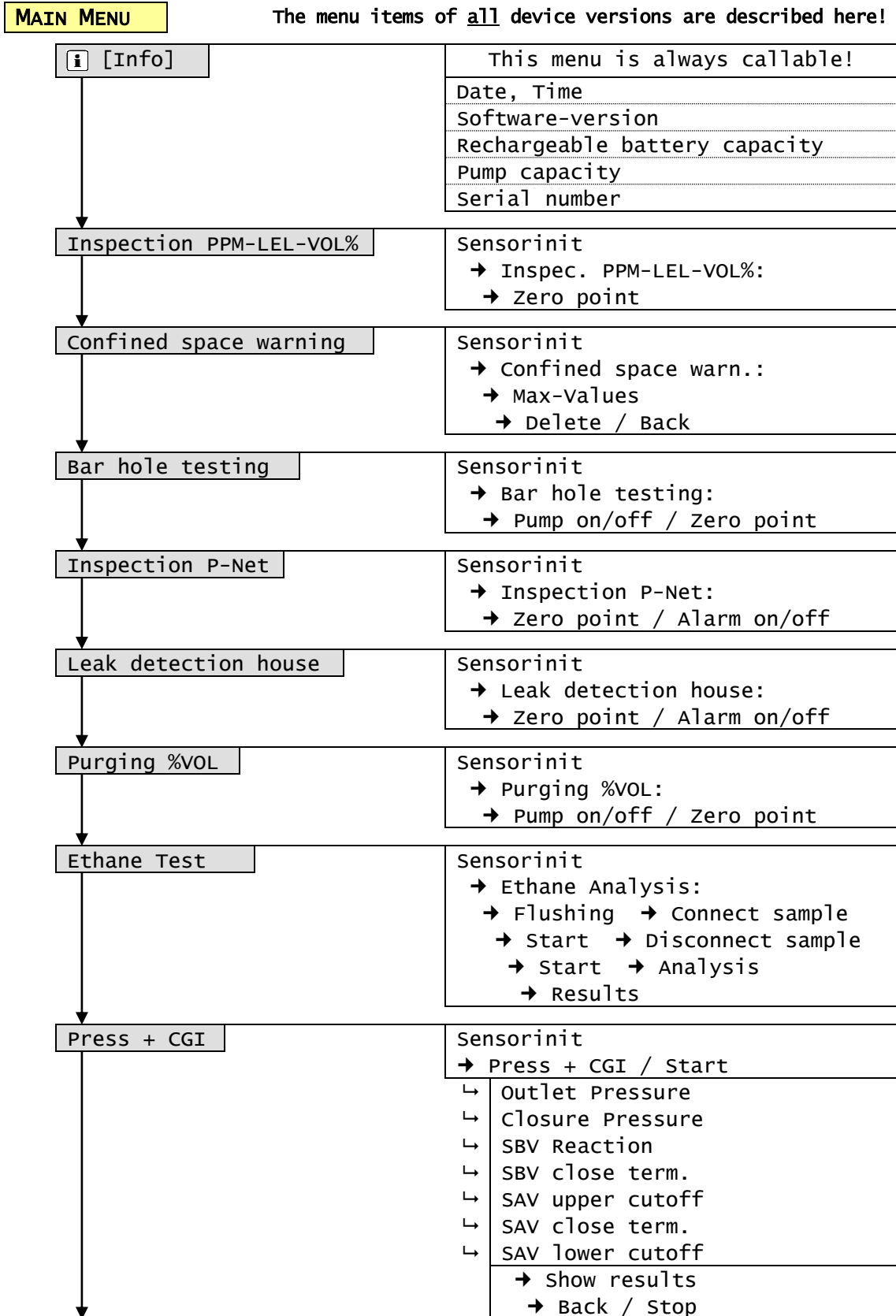
**2.3.10. INFRARED PORT**

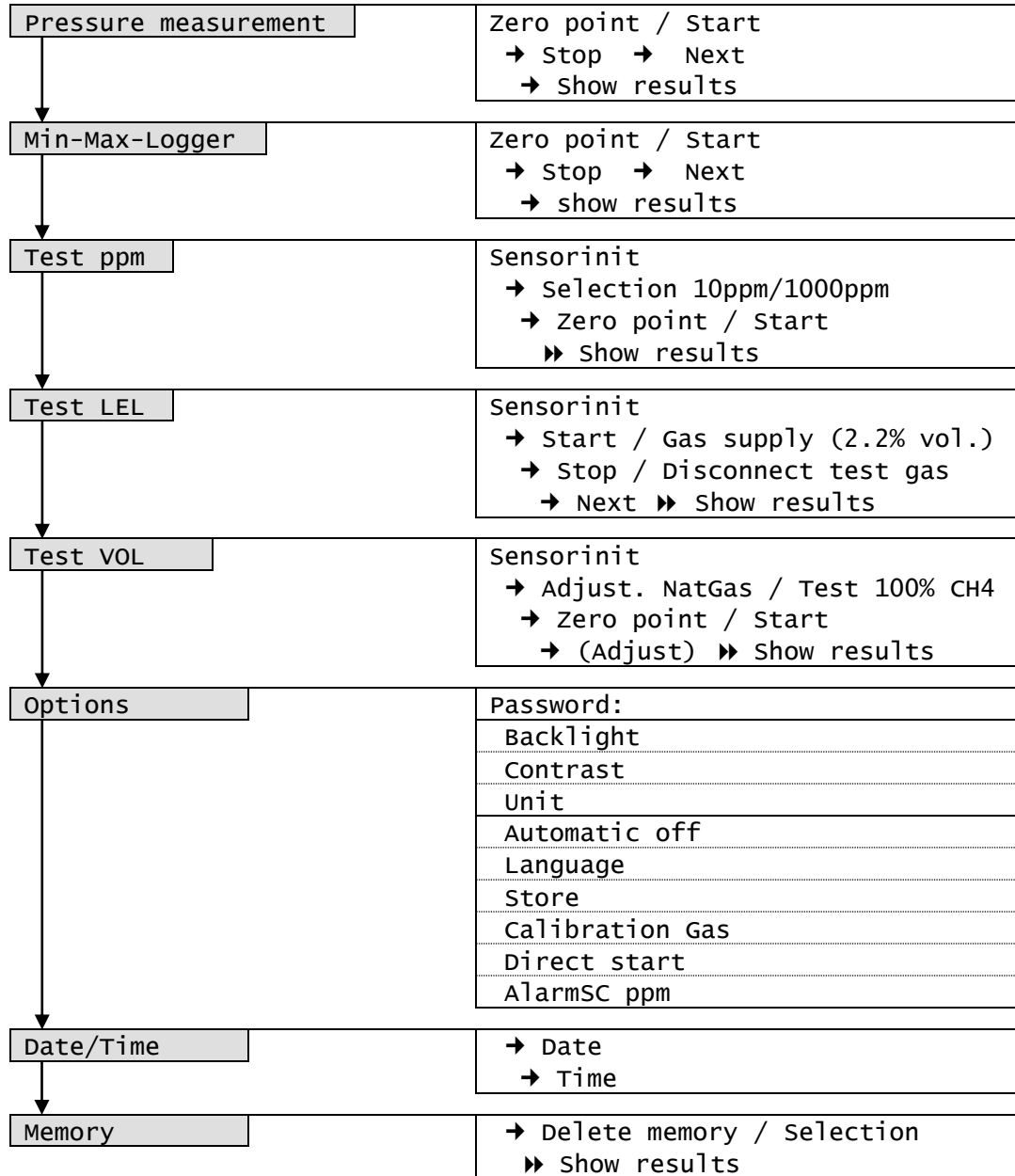
The GOLIATH features an infrared port on the bottom side which is used for data exchange as well as setting the device at the factory or during servicing. This port also allows the GOLIATH to communicate with the testing station / charging dock.

The infrared port can also be used to print out measurement readouts using a suitable printer.

### 3. MENU / FIELD OF APPLICATION

#### 3.1. MENU STRUCTURE





3.2. THE GOLIATH’S FIELDS OF APPLICATION

The GOLIATH’s field of application depends on the type of sensors it is installed with (aside from a semiconductor/infrared sensor for CH<sub>4</sub> and CO<sub>2</sub>, there are also sensors for CO, H<sub>2</sub>S and O<sub>2</sub>). Its potential applications are thus quite diverse.



The corresponding gas will only be indicated on the display if a sensor is installed in the device as well.

The respective fields of work can also be accessed in the main menu. Depending on the device and which sensors it is equipped with, several menu items may be missing, if they are not suited or intended for the application in question.

The **GOLIATH** is especially well-suited for the following applications:  
(see also DVGW – Technical Information Notification G 465-4 B1 | April 2006)

- Aboveground monitoring of underground gas lines:

Inspection of the gas pipeline network for flammable gases with carpet probe or bell probe. The detection of gas concentrations is already indicated acoustically and visually in the lowermost ppm range (~ 10 ppm methane), so that the user need not continuously watch the device when checking for gas.
- Soil gas inspection:

Localisation of suspected leakage points in the pipeline network by inspecting the soil are for flammable gas. To do this, pound multiple holes for probes in the ground. A borehole probe will extract and analyse the gas. The device automatically compensates for the effect of carbon dioxide on the measurement readout.
- Testing cavities and shafts:

Measurement of the gas concentration in cavities such as road installations or shafts and conduits in which flammable gas may be present.
- Testing indoors:

Gas installation inspection and localisation of the smallest concentrations of gas by thoroughly examining the pipes with special hand probes. Other applications include measuring the room air concentration to prevent hazards, as well as determining the leakage rate in the event of escaping gas.
- Purging to determine gas purity or absence of gas:


Measurement of the gas and oxygen concentration in a mixture in order to determine gas purity or absence of gas in a gas pipeline.
- Combustible gas monitoring LEL:

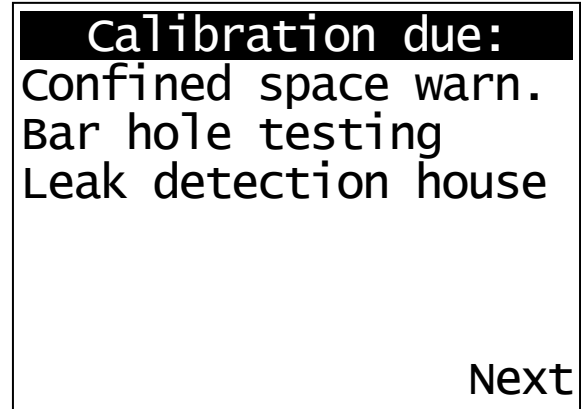
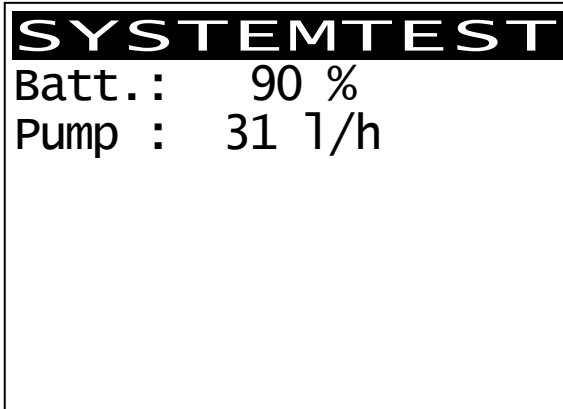
Continuous monitoring of the work environment for flammable gases, toxic gases or lack of oxygen, such as in shafts or regulator stations. Even extremely slight concentrations are measured and indicated by acoustic and visual alarms. The device is explosion-proof and can be used to monitor gas concentrations to determine whether the explosion limit is being approached.
- Distinguishing natural gas from biogas (ethane analysis):

The ethane analysis can be used to determine whether the gas sampled is natural gas (containing ethane) or biogas (which does not contain ethane). A gas chromatographic separation column in the device is used which breaks down the components of a sample into methane and ethane. This makes it possible to detect ethane clearly and unambiguously.

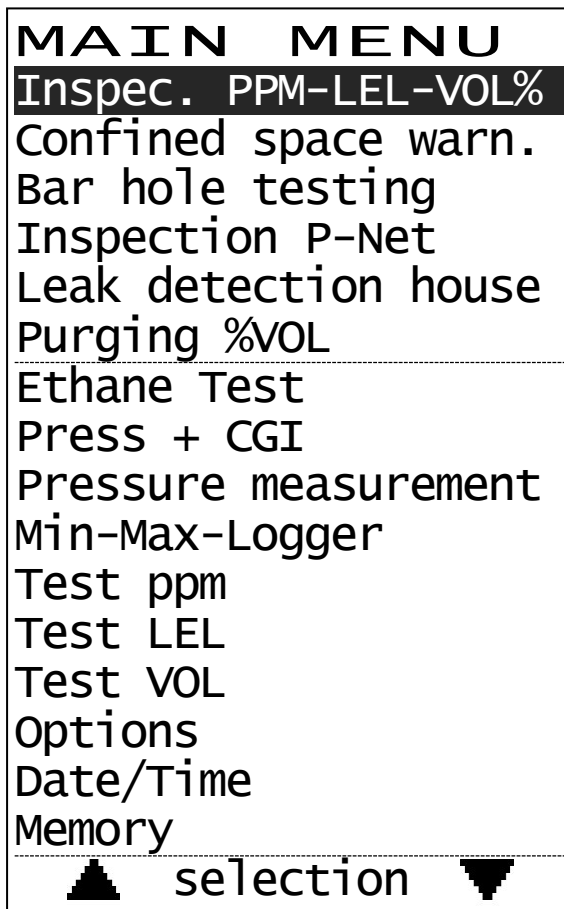


### 3.3. MAIN MENU

Once the device has been switched on using the  (On/Off) key, the system test appears on the display. The battery and pump performance is also shown. Once the system test is complete, the required calibrations are shown, e.g.:




Press the F2 (next) key to call up the main menu with the following menu items (some items may be missing depending on the GOLIATH version used.)



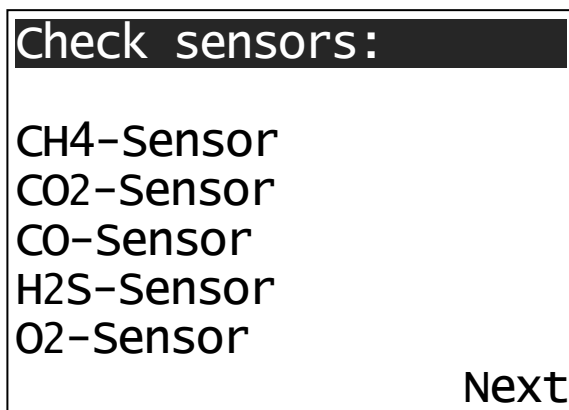
The individual menu items can be selected from the main menu. Select the menu item you require using the keys F1 (▲) and F2 (▼) to scroll up and down. The F1 key can now also be used to jump from the first menu item directly to the last menu item and the opposite with the F2 key.

The menu item currently selected is highlighted.

Six submenus are always displayed beside the "MAIN MENU" and the arrow keys.

Use the key  to access the appropriate menu.

When a measurement menu has been selected, a message is always shown first of all for the sensors to be tested. This depends on the sensors currently in use in the menu item and the equipment on the device.



If the immediate start has been activated in the settings, the device will start in the submenu last selected. Make sure that it is switched on in fresh air.

All of the possible menu items will be explained in the following chapters, including the ones which may be missing on your device. For that reason, there are always small graphics displayed on the menu items that indicate which device has the menu in question (see illustration).

The abbreviations stand for the following versions of the device:

All.	All. E	PN	PN E	PW	LOC	W
X	X			X		X

All. = GOLIATH Allround

All. E = GOLIATH Allround with ethane analysis

PN = GOLIATH Pipeline network


PN E = GOLIATH Pipeline network with ethane analysis

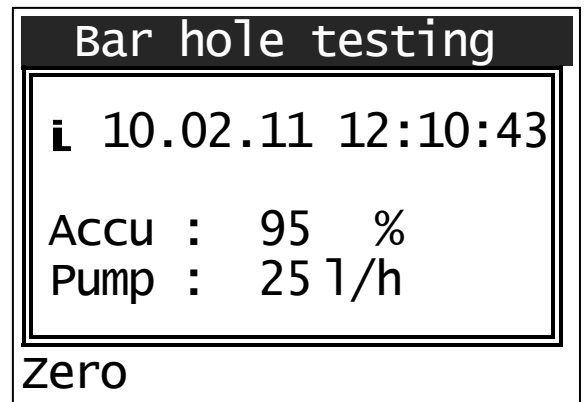
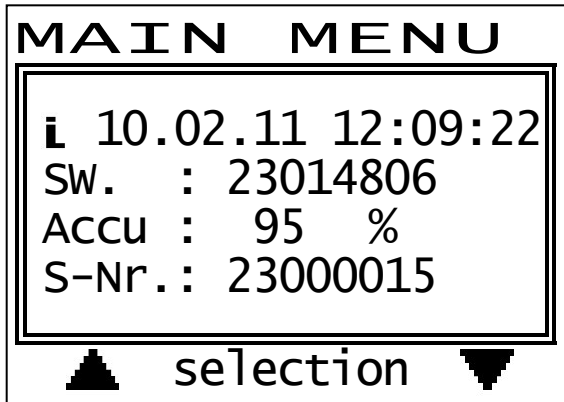
PW = GOLIATH Pipework

LOC = GOLIATH Localisation

W = GOLIATH Warning

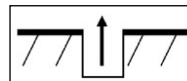
### 3.4. MENU – INFO

You can access the “Info” menu at any time by using the  button. Information such as date and time, software-version, rechargeable battery capacity, serial-number or pump performance will be shown on the display, depending on the menu which the device is in at the moment.



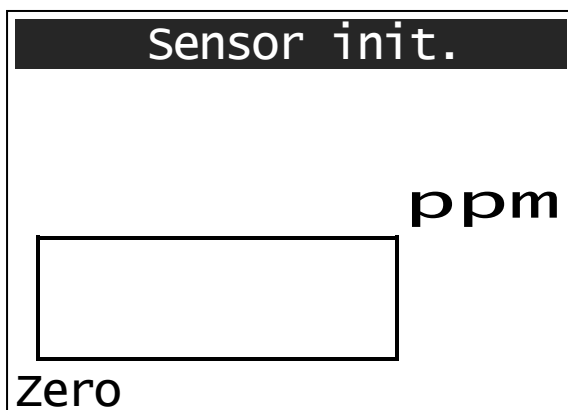
The readout will remain on the display for approx. 5 seconds, after which it will automatically disappear. You can also remove it during this time by using the “Info” button.

### 3.5. MENU – INSPEC. PPM-LEL-VOL%

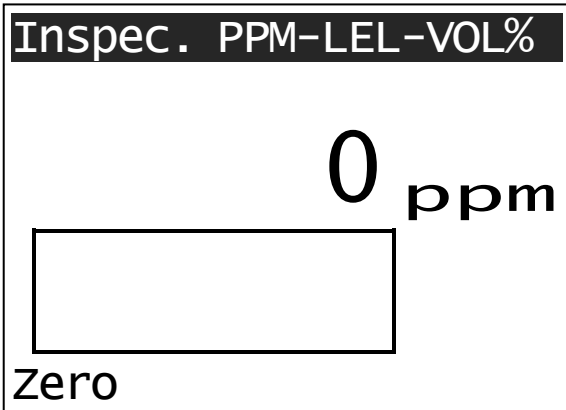


All.	All. E	PN	PN E	PW	LOC	W
X	X	X	X			

The “Inspec. PPM-LEL-VOL%” menu item enables the quick and effecting inspection of cavities such as road installations or shafts and conduits in which flammable gases such as natural gas or liquid gas may be present. Measurements are read between 0 ppm and 100% vol. for methane (CH<sub>4</sub>) with an automatic changeover between measurement ranges.

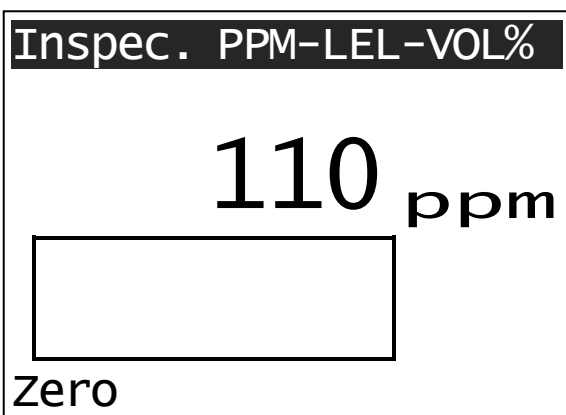


Once this menu item has been selected, the sensor start-up phase will begin. It will only last about 20 seconds and should always be conducted in fresh ambient air. The sensor start-up phase is also indicated by the flashing “Sensor init.” notice on the top line of the display. No measurement values are measured during this time.



After the sensor start-up phase, the device will show the current measurement value. In fresh air, this should read "0". If necessary, the zero point can be reset using the F1 key (Zero). The current menu "Inspec. PPM-LEL-VOL%" will then be shown on the display.

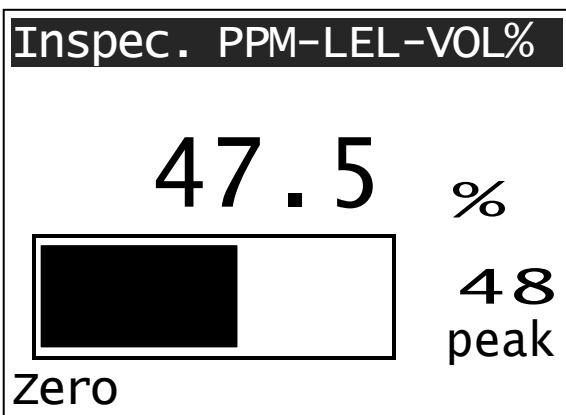
The measurement device can now be used to measure the concentration of gas in cavities and shafts.



The gas concentration is displayed in ppm within the range of 0 to 999 ppm. Beyond this range, the display changes over to % vol. (resolution: 0.1% vol.).


The concentration will also be represented in a bar graph display in a range from 0 to 100% vol.

The pump output should be reduced to approx. 15 l/h in this area.



The GOLIATH will increase the pump performance slightly starting at a gas concentration of > 50ppm.

The maximum value will also be displayed as "peak" starting at 0.1% vol. This readout can be set back after a short time by using the F1 key (Zero) if no gas is measured any longer. It will also automatically disappear from the display after about one minute if no gas is measured any longer.

The user can exit the "Inspec. PPM-LEL-VOL%" screen at any time by pressing the  key.



If the area has already been exposed to a gas leak, the concentration (within limits) can be set to zero by pressing the F1 key (Zero). This can lead to an incorrect estimation of gas concentrations present and is therefore not recommended.

The device should therefore be set to zero in clean ambient air only.

**3.6. MENU – CONFINED SPACE WARN.**



	All.	PN	PN	PW	LOC	W
All.	E	PN	E			
<b>X</b>	<b>X</b>			<b>X</b>		<b>X</b>

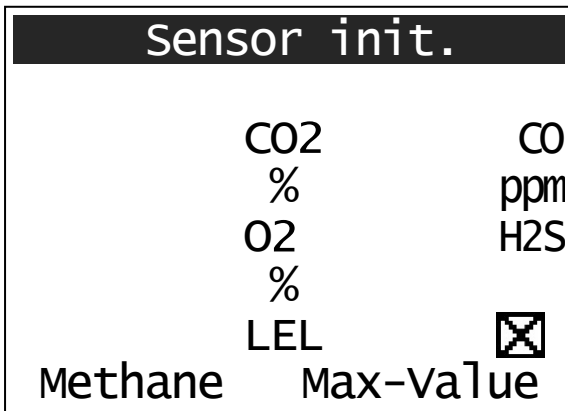
The “Confined space warning” menu item enables the user to monitor a space quickly and effectively for the presence of gases (inflammable gases such as natural gas or liquefied gas). The device emits an acoustic and optical signal about every 15 seconds to indicate it is working properly. If the battery is empty, this signal is emitted twice in rapid succession.

Measurement takes place within the range of 0 to 100% LEL (= 0–4.4% vol. methane). Furthermore, it’s also possible to measure the gases carbon dioxide (CO<sub>2</sub>), and, optionally, carbon monoxide (CO), oxygen (O<sub>2</sub>) and hydrogen sulphide (H<sub>2</sub>S). A measurement value will only appear on the display if the corresponding sensor has been installed.



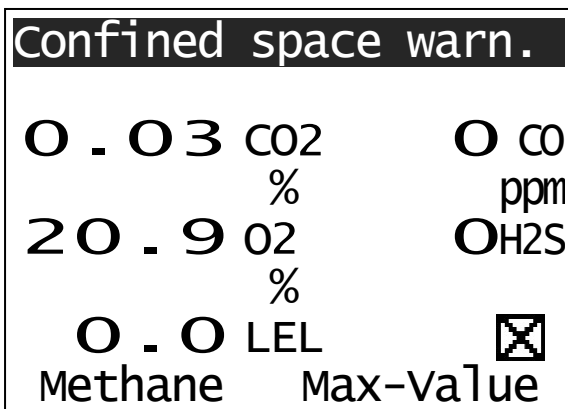
In accordance with DVGW Technical Information Notification G 465-4 dated March 2001 ‘Gas detection and gas concentration measurement devices for testing gas systems’, it is necessary to check the readout accuracy using test gas (Test LEL).

The user can exit the “Confined space warning” screen at any time by pressing the key.



Once this menu item has been selected, the sensor start-up phase will begin. It will only last about 20 seconds and should always be conducted in fresh ambient air. The sensor start-up phase is also indicated by the flashing “Sensor init.” notice on the top line of the display. No measurement values are measured during this time.

The selected gas type and the symbol for “Device tested” () are also shown. (See also section 3.16 “Test LEL”).



After the sensor start-up phase, the device will show the current measurement values. In fresh air, this should read “0” (except for O<sub>2</sub> and CO<sub>2</sub>).

The current menu “Confined space warning” will then be shown on the display.

The pump output should be reduced to approx. 15 l/h in this area.

**Confined space warn.**  
**\*\*\*MAXIMUMVALUES\*\*\***  
**1.75** CO2 **123** CO  
 % ppm  
**17.9** O2 **OH2S**  
 %  
**49.0** LEL   
 Delete Back

The measurement values reached (with O<sub>2</sub> min. values) can be displayed by using the F2 key (Max-Value). They can be reset with the F1 key (Delete). You can return to the “Confined space warning” menu without deleting by using F2 (Back).

The maximum values are saved during the measurement and can be called up again and printed out via the "Memory" menu.

**Gas alarm**  
**0.71** CO2 **0** CO  
 % ppm  
**20.9** O2 **OH2S**  
 %  
**17.0** UEG   
 Methane Alarm off

If the pre-alert (Alert 1) threshold is exceeded, an acoustic and an optical alarm is set off. The display will read “Gas alarm” and the back-lighting on the display will turn on.

As soon as the reading falls below the pre-alert threshold again, the alarm switches off automatically. The alarm can be switched off and on again by pressing the F2 key (Alarm off).

**Gas alarm**  
**1.12** CO2 **0** CO  
 % ppm  
**20.1** O2 **OH2S**  
 %  
**>>>** LEL   
 Methane Alarm off

If the main alert threshold is exceeded (Alert 2), this sets off a higher frequency acoustic and optical alarm. The alarm can only be deactivated using the F2 key (Alarm off) when the reading falls below the main alarm threshold again.

If the measurement range is exceeded by more than 100% LEL, it will be indicated by “>>>” on the display. This readout will appear in alternation with the concentration indicator.

**Gas alarm**  
**1.12** CO2 **40** CO  
**LZW** % **KZW** ppm  
**20.1** O2 **20** H2S  
 % **KZW**  
**0.0** LEL   
 Methane Alarm off

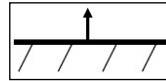
**STV and LTV alarm:**

The short-term value (STV) and long-term value (LTV) are alarms which are triggered if the workplace threshold values (WTV) are exceeded.

The STV is determined by adding up the concentrations and taking the resulting average value over 15 minutes. The LTV is the result of the average over 8 hours.

The alarms can only be ended by exiting the menu.

**3.7. MENU – BAR HOLE TESTING**



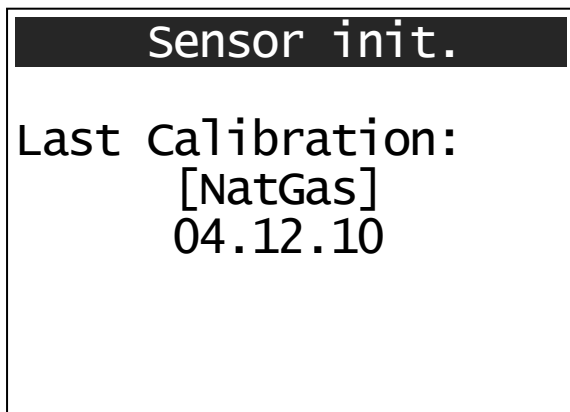
	All.	PN	PN	PW	LOC	W
	E		E			
<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	

The “Bar hole testing” menu item is for localising suspected leakage points in a pipeline network by measuring the gas concentration in probe holes. The pump operates with high output (approx. 35 l/h) and can be turned back on (pump on) and back off (pump off) with the F1 key.

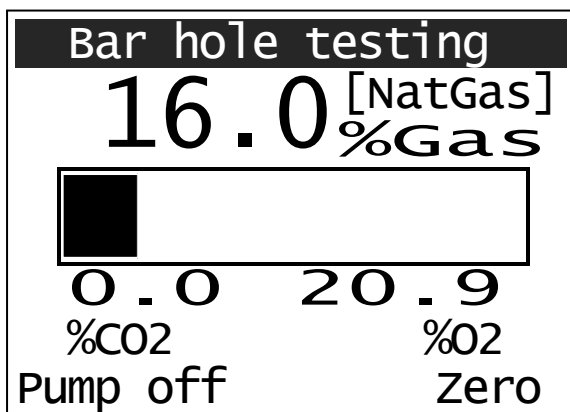
The carbon dioxide concentration is automatically indicated with the infrared sensor built into the GOLIATH.

The measurement is carried out from 0 to 100% vol. for methane (CH<sub>4</sub>), as well as from 0 to 20% vol. for carbon dioxide (CO<sub>2</sub>). Oxygen (O<sub>2</sub>) can also be measured up to 25% vol. as an option. The corresponding O<sub>2</sub> measurement value will only be shown on the display if an O<sub>2</sub> sensor is installed.

Natural gas can also be selected in the settings under “Calibration gas”. The device will then have to have been calibrated with natural gas (menu “Test VOL”) in order to receive a correct readout.



Once this menu item has been selected, the sensor start-up phase will begin. It will only last about 25 seconds and should always be conducted in fresh ambient air. The sensor start-up phase is also indicated by the flashing “Sensor init.” notice on the top line of the display. If the “natural gas” calibration was selected in the settings, the notice will also appear on the display. With “methane”, the display will remain empty.



After the sensor start-up phase, the device will show the current measurement values. In fresh air, this should read “0” (except for O<sub>2</sub> and CO<sub>2</sub>). If necessary, the zero point can be reset using the F1 key (Zero). The current menu “Bar hole testing” will then be shown on the display.

The pump can be turned back on (Pump on) and back off (Pump off) with the F1 key.

The concentration of [methane] or [natural gas] is additionally represented in a bar graph display in the range from 0 to 100% vol.

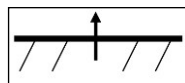
The user can exit the “Bar hole testing” screen at any time by pressing the key.



If the concentration readout does not return to zero after the measurement has been conducted in the probe hole, despite the suction of gas-free air, a zero-point correction can be carried out using the F2 (Zero) key.

A pump alarm will be triggered if the specified pump flow rate is not reached. The message “Pump alarm” will appear on the display. In this case, the F1 key (Pump off) can be used to shut off the pump and simultaneously turn off the alarm. The pump can also be turned back on using F1 (Pump on). Since water in the probe hole is often sucked in during the soil air test, the cause of the pump alarm should be found and rectified before the pump is turned back on.

**3.8. MENU – INSPECTION P-NET**



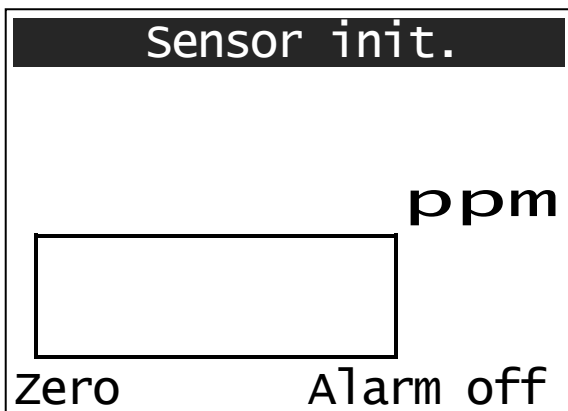
	All.		PN			
All.	E	PN	E	PW	LOC	W
<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>			

The menu item “Inspection P-Net” serves to detect the slightest concentrations of gas above ground (inspection of underground gas lines). This is where a carpet probe or bell probe can be used to collect the escaping gas. The gas is then sucked in by the device’s pump and fed to the sensors.



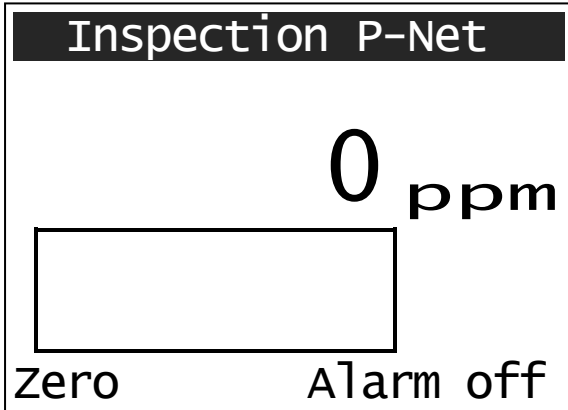
In accordance with DVGW Technical Information Notification G 465-4 dated March 2001 ‘Gas detection and gas concentration measurement devices for testing gas systems’, it is necessary to check the readout accuracy using test gas before starting work and, if necessary, after work interruptions.  
(Test ppm / Test LEL / Test VOL)

In order to minimise stress during long periods of work with the GOLIATH and a bell or carpet probe on the terrain, we recommend you to use the lap belt (item no. 202029) in order to distribute the weight of the device over a wide area, thus reducing strain on the back.



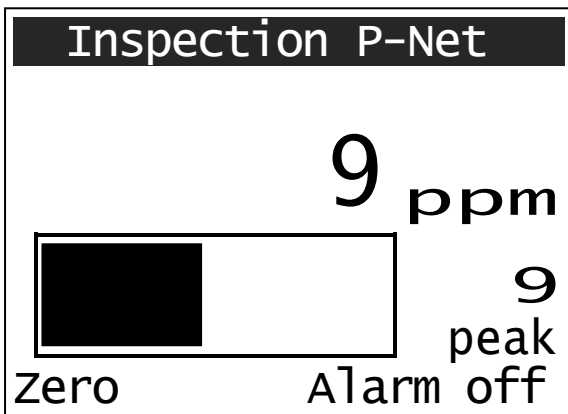
Once this menu item has been selected, the sensor start-up phase will begin. It will only last about 25 seconds and should always be conducted in fresh ambient air. The sensor start-up phase is also indicated by the flashing “Sensor init.” notice on the top line of the display. No measurement values are measured during this time.





After the sensor start-up phase, the device will show the current measurement value. In fresh air, this should read "0". If necessary, the zero point can be reset using the F1 key (Zero). The current menu "Inspection P-Net" will then be shown on the display.

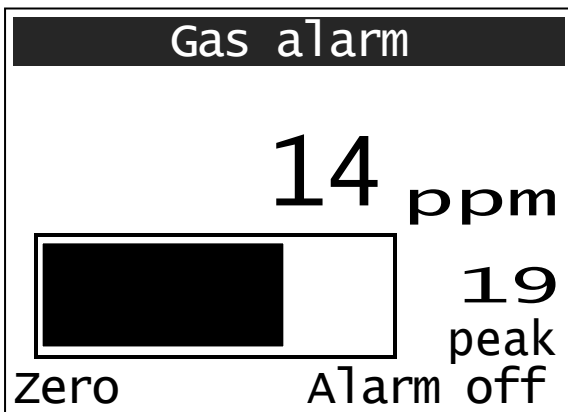
The measurement device can now be used to measure the concentration of gas above ground.



The gas concentration is displayed in ppm within the range of 0 to 999 ppm. Beyond this range, the display changes over to % vol. (resolution: 0.1% vol.).

The concentration will also be represented in a bar graph display in a range from 0 to 20 ppm.


The maximum value will also be displayed as "peak" (ppm / % vol.). This readout can be set back after a short time by using the F1 key (Zero) if no gas is measured any longer. It will also automatically disappear from the display after about one minute if no gas is measured any longer.



If the gas concentration exceeds the alarm threshold (which can be changed in the settings menu under the item "AlarmHL ppm"), an acoustic and visual alarm will be triggered. The display will read "Gas alarm" and the back-lighting on the display will turn on.

The alarm threshold from the settings menu is taken into account here and not the value from the PC1 software.

As soon as the reading falls below the alert threshold again, the alarm switches off automatically. The alarm can also be switched off and on again by pressing the F2 key (Alarm off/on).

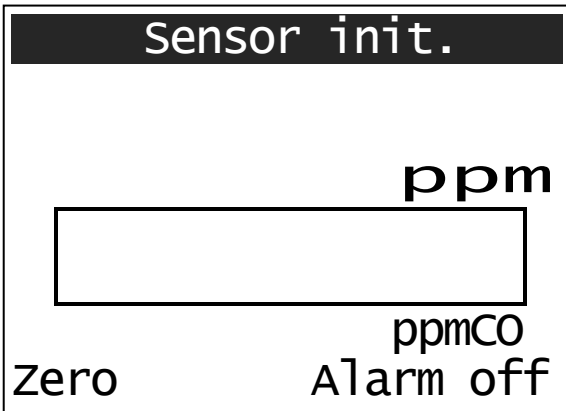
The user can exit the "Inspection P-Net" screen at any time by pressing the  key.

**3.9. MENU – LEAK DETECTION HOUSE**



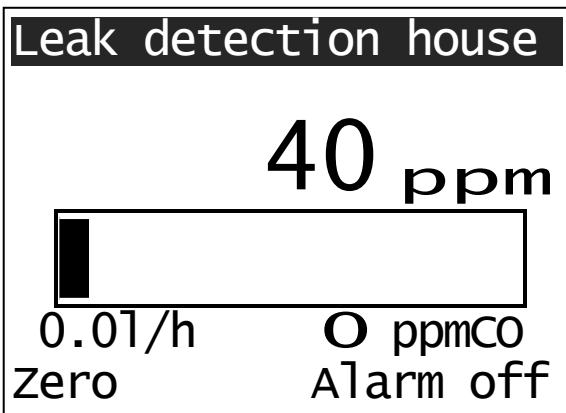
	All.		PN			
All.	E	PN	E	PW	LOC	W
X	X	X	X			

The menu item “Leak detection house“ enables the user to monitor a room quickly and effectively for the presence of gases (inflammable gases such as natural gas or liquefied gas). This mode is used for testing when a gas odour has been reported. Measurements are read between 0 ppm and 4.4% vol. for methane (CH<sub>4</sub>) with an automatic changeover between measurement ranges. The leakage rate (l/h) will also be shown. As an option, the carbon monoxid concentration (CO) can also be measured and shown on the display.



Once this menu item has been selected, the sensor start-up phase will begin. It will only last about 20 seconds and should always be conducted in fresh ambient air. The sensor start-up phase is also indicated by the flashing “Sensor init.” notice on the top line of the display. No measurement values are measured during this time.

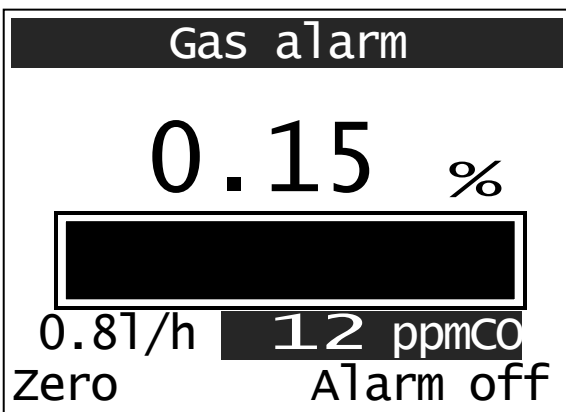
After the sensor start-up phase, the device will show the current measurement values. In fresh air, this should read “0”.



The current menu “Leak detection house” will then be shown on the display. If necessary, the zero point can be reset using the F1 key (Zero). The pump output should be reduced to approx. 15 l/h in this area in order to prevent potential gas leaks from being diluted.

The measurement device can now be used to measure the concentration of gas in a range from 0 to 4.4% vol. for methane.

The concentration will also be represented in a bar graph display in a range from 0 to 1,000 ppm.

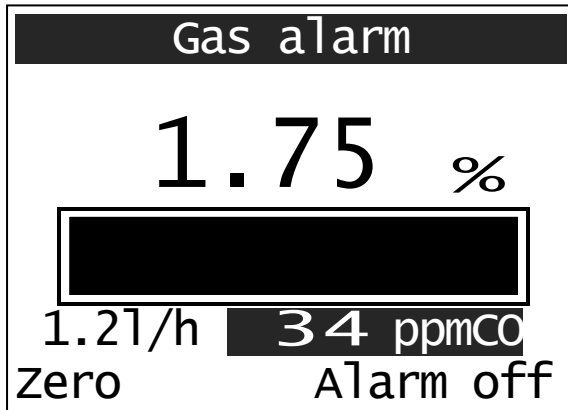


Beyond this range, the gas concentration is specified in % vol. at intervals of 0.01% vol.

The leakage rate is calculated at the same time and the value in l/h is shown on the display (see also section 3.21 “Evaluation of gas leakages”).

If the GOLIATH is equipped with the optional carbon monoxide (CO) sensor, this concentration will be measured as well.


If the CO concentration exceeds 10 ppm, this will be indicated by an inverted readout on the display.



If the gas concentration is greater than 50 ppm, a concentration-dependent acoustic and visual alarm will be triggered. The display will read "Gas alarm" and the backlighting on the display will turn on. If the concentration exceeds 999 ppm, the alarm will turn into a steady signal.

As soon as the reading falls below the alert threshold again, the alarm switches off automatically. The alarm can also be switched off and on again by pressing the F2 key (Alarm off/on).

If a high gas concentration is measured, the message "Wait for zero point!" may appear on the display. In this case, the device should not be used until the zero point has been reset and the message disappears.

The user can exit the "Leak detection house" screen at any time by pressing the  key.



If the area has already been exposed to a gas leak, the concentration (within limits) can be set to zero by pressing the F1 key (Zero). This can lead to an incorrect estimation of gas concentrations present and is therefore not recommended.

The device should therefore be set to zero in clean ambient air only.

### Warning!

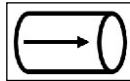
If a gas odour is detected on entering a room, assume there is danger of explosion and avoid all sources of ignition of any kind. In such a case, do not switch on any lights and enter the room with explosion-proof measurement devices only.

Acute danger can be eliminated by turning off the main shut-off valve and ventilating the room adequately.

The **GOLIATH** is explosion-proof and can be used in an explosive atmosphere.

Instructions on evaluating gas leakages are explained in section 3.21 "Evaluation of gas leakages".

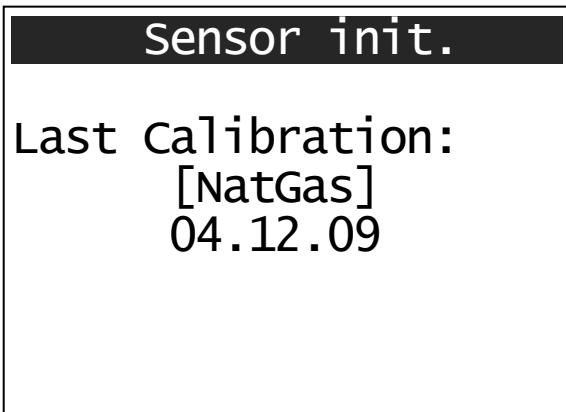
**3.10. MENU – PURGING %VOL**



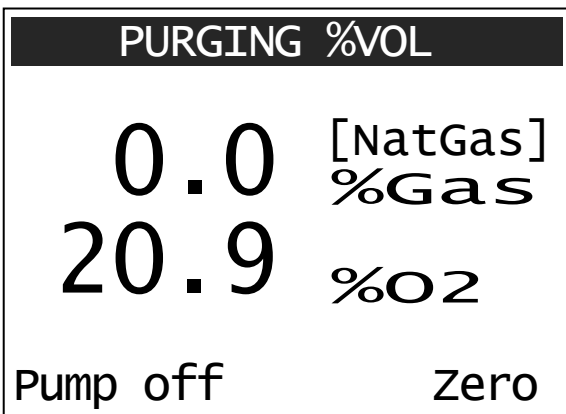
All.	All.	PN	PN			
X	X	X	X	X	X	

The menu item “Purging %VOL” enables gas concentrations to be quickly measured when filling or flushing (inerting) gas pipes. In order to avert explosion hazards, it is necessary to determine a gas line’s gas purity or absence of gas by measuring the gas and/or oxygen concentration. The measurement range lies between 0 and 100% vol. for methane (CH<sub>4</sub>). The GOLIATH can optionally be fitted with an oxygen sensor. The corresponding O<sub>2</sub> measurement value will only be shown on the display if an O<sub>2</sub> sensor is installed.

Natural gas can also be selected in the settings under “Calibration gas”. The device will then have to have been calibrated with natural gas (menu “Test VOL”) in order to receive a correct readout.




Once this menu item has been selected, the sensor start-up phase will begin. It will only last about 15 seconds and should always be conducted in fresh ambient air. The sensor start-up phase is also indicated by the flashing “Sensor init.” notice on the top line of the display. If the “natural gas” calibration was selected in the settings, the notice will also appear on the display. With “methane”, the display will remain empty.



After the sensor start-up phase, the device will show the current measurement values. In fresh air, this should read “0” (except for O<sub>2</sub> and CO<sub>2</sub>). If necessary, the zero point can be reset using the F1 key (Zero). The current menu “Purging %VOL” will then be shown on the display.

The pump can be turned back on (Pump on) and back off (Pump off) with the F1 key.

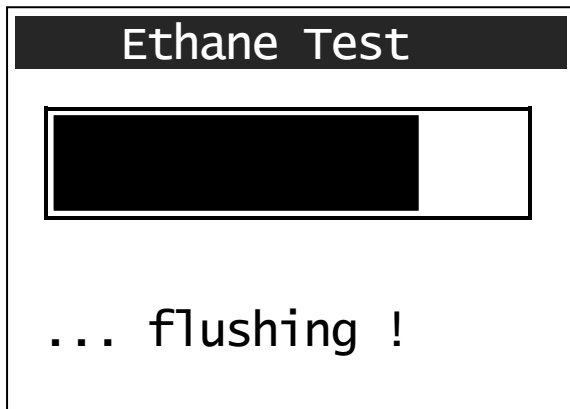
The measurement device can now be used to measure the concentration of gas in a range from 0 to 100% vol. [methane] or [natural gas]. As an option, the oxygen concentration can also be measured and displayed from 0 to 25% vol.

The user can exit the “Purging %VOL” screen at any time by pressing the  key.

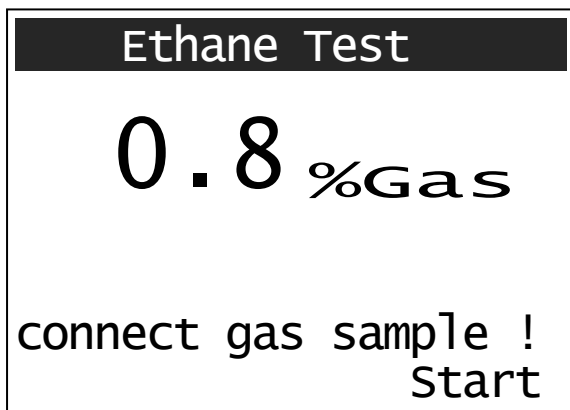
### 3.11. MENU – ETHANE TEST

All.	All. E	PN	PN E	PW	LOC	W
	<b>X</b>		<b>X</b>			

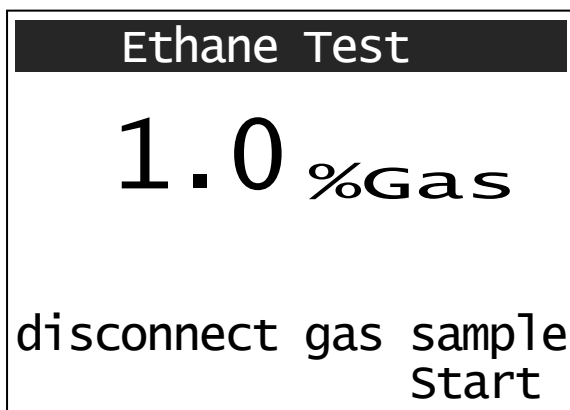
The GOLIATH offers reliable differentiation between natural gas and biogas (swamp gas/fermentation gas) thanks to its ethane analysis feature. In addition to methane (CH<sub>4</sub>), natural gas also contains a certain proportion of ethane (C<sub>2</sub>H<sub>6</sub>), among other things. Biogas does not contain this gas. The differentiation process is thus carried out by detecting ethane in the gas



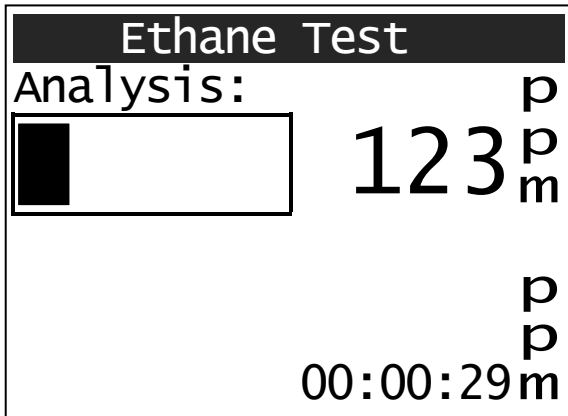
Once this menu item has been selected, the sensor start-up phase will begin. It will only last about 20 seconds and should always be conducted in fresh ambient air. After that, the GOLIATH will begin to flush the system, in order to ensure an absence of gas. The flushing phase takes about 2.5 minutes and is represented by a bar graph indicator on the display.



Once the device is ready, the sample can be connected. The current concentration of gas will be measured immediately and shown on the display. The GOLIATH will begin analysing the sample when the F2 key (Start) is pushed. The concentration measured also serves to determine the quantity of gas which the device will need to conduct the ethane test.

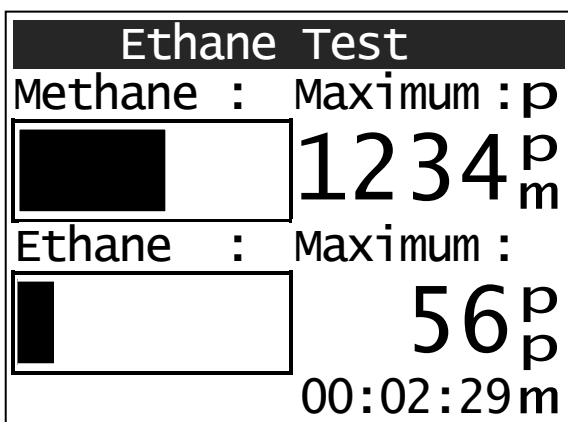


Once the sample has been sucked in, it can again be removed from the device. This is also pointed out by a short signal tone. When the F2 key (Start) is pushed again, the device will begin to force the gas through the separation column with fresh air (... flushing !). The gas concentration indicator will then be reset to zero. If possible, the start button should be pushed immediately after the sample has been removed.



The GOLIATH will commence the analysis shortly thereafter. First, the methane content of the sample will be measured and indicated on the display in ppm.

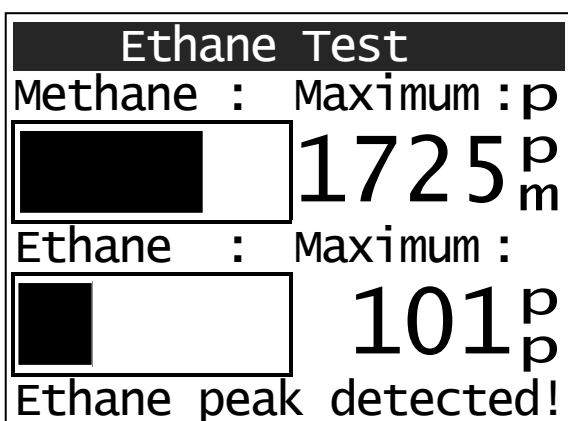
The time elapsed will also be specified in the lower right-hand corner.



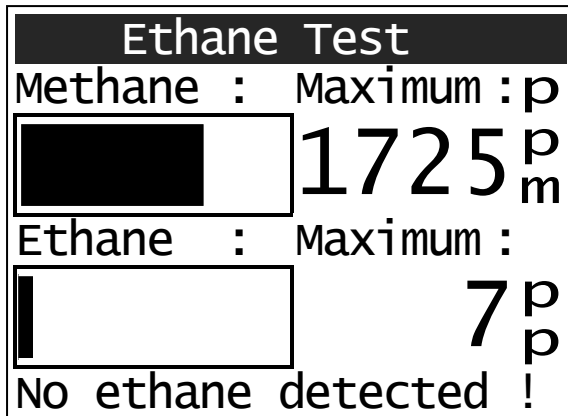
Once the methane content has been determined, the GOLIATH will commence with the analysis of the ethane content. The respective maximum value of the measurement (methane and/or ethane peak) will be saved and displayed.

The analysis will conclude after 2.5 minutes and the result will be displayed.

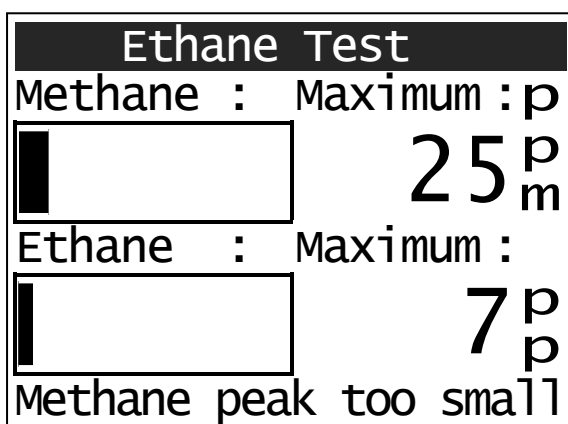
This can lead to the following results:




- „Ethane peak detected !“
- ⇒ Two peaks were measured in the sample.
- ⇒ In addition to methane, ethane was also detected in the sample. This indicates that the sample is natural gas!



- „No ethane detected !“
  - ⇒ Only one peak was measured in the sample.
  - ⇒ Therefore no ethane was detected. This shows that the sample is biogas!
  - ⇒ However, a slight ethane readout is still possible. This is attributable to sensor drift.



- „Methane peak too small“
  - ⇒ The methane peak was too small. It is necessary to suck in a greater concentration of gas in order to ensure a reliable analysis.

The user can exit the “Ethane Test” screen by pressing the  key.

The gas sample is forced through the gas chromatographic separation column using ambient air. The two gases methane (CH<sub>4</sub>) and ethane (C<sub>2</sub>H<sub>6</sub>) require different amount of time to pass through the separation column. This can then be seen at the various peak readouts.



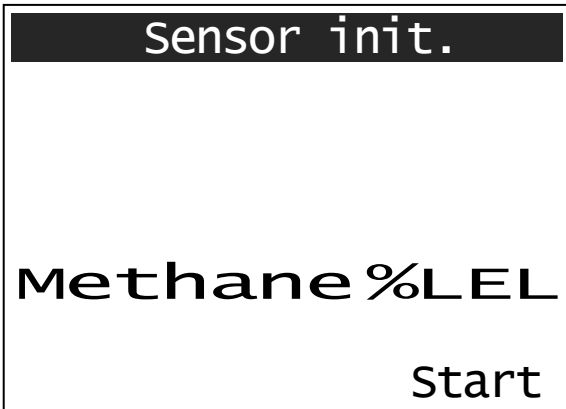
In order to increase the reliability of the device’s readouts, not only the ethane content (if any) is measured, but the ratio of the two gas concentrations (ethane to methane) is assessed as well. For that reason, the readout “*No ethane detected !*” may be displayed even a slight ethane content is present.

The gas concentration required for an analysis depends heavily on the ethane content in the natural gas. The higher the ethane content is, the lower the gas concentration for an analysis can be.

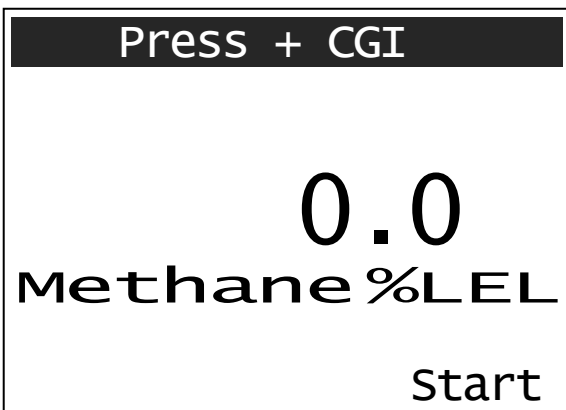
**3.12. MENU – PRESS + CGI**

as an option for ...							
All.	E	PN	PN	E	PW	LOC	W
X	X						X

In this menu item, a regulator test is conducted and the ambient air is simultaneously monitored for the presence of methane gas. Measurement takes place within the range of 0 to 100% LEL for methane. The device emits an acoustic and optical signal about every 15 seconds to indicate it is working properly. If the battery is empty, this signal is emitted twice in rapid succession.



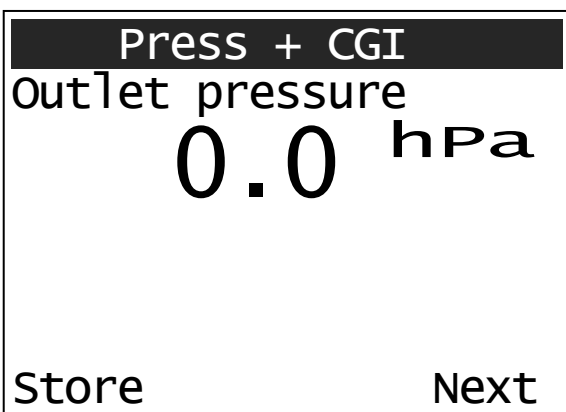
Once this menu item has been selected, the sensor start-up phase will begin. It will only last about 20 seconds and should always be conducted in fresh ambient air. The sensor start-up phase is also indicated by the flashing "Sensor init." notice on the top line of the display. No measurement values are measured during this time.



In addition to conducting a regulator test, the GOLIATH can also monitor the ambient air for methane gas in the "Press + CGI" menu. It is possible to measure a gas concentration from 0 to 100% LEL at intervals of 0.1% LEL.

The pump output should be reduced to approx. 15 l/h in this area.

The regulator test starts by pressing the F2 key (Start).



The REGULATOR TEST contains the following menu items:

- Outlet pressure
- Closure pressure
- SBV reaction (safety relief valve)
- SBV close termination (SRV)
- SAV upper cutoff (safety shut-off valve)
- SAV close termination (SSV)
- SAV lower cutoff (SSV)



**Press + CGI**

SBV close term.  
**0.0 hPa**

Validation:  
---.-

ChangeNext

The F1 key (Store) is used to save the current pressure and show it on the display. The saving process is confirmed by a short signal tone. Use the F2 key (Next) to proceed to the next menu item in the regulator test.

The user conducts a qualification with the menus „SBV close termination“ and „SAV close termination“. To do this, the F1 key (Change) must also be actuated. The assessment «OK!» / «not OK!» or «\_ \_ \_ \_!» (no assessment) will alternately appear.

Ausgangsd.	0.0
Schliesd.	0.0
SBV Anspr.	0.0
SBV dicht.	OK!
SAV obere.	0.0
SAV dicht.	not OK
SAV unter.	0.0
Back	Finish

If all points have been checked, an overview of the results will again appear on the display.

The measurement readings can be called up again and printed out via the "Memory" menu.

**Gas alarm**

outlet pressure

10.0

Methane %LEL

Alarm off

If the value for the pre-alarm (> 10% LEL) is exceeded during the measurement, an acoustic and visual alarm will be triggered. The display will read "Gas alarm" and the back-lighting on the display will turn on. During this time, the concentration will be displayed inverted.

As soon as the reading falls below the pre-alert threshold again, the alarm switches off automatically. The alarm can be switched off and on again by pressing the F2 key (Alarm off).

If the main alert threshold is exceeded (> 30% LEL), this sets off a higher frequency acoustic and optical alarm. The alarm can only be deactivated using the F2 key (Alarm off) when the reading falls below the main alarm threshold again.

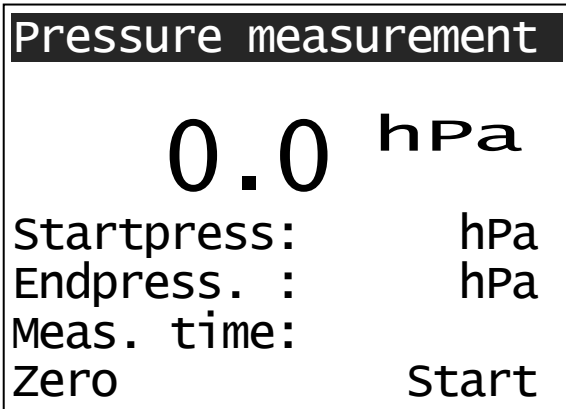
If the "Alarm off" button is pressed during the gas alarm, you can return to the current regulator test menu by pressing F2 (Back). If you wait until the value falls back below the alarm threshold, it will suffice to press the "Alarm off" button once.

The user can exit the "Press + CGI" screen by pressing the  key.

### 3.13. MENU – PRESSURE MEASUREMENT

as an option for ...						
All.	All. E	PN	PN E	PW	LOC	W
X	X					X

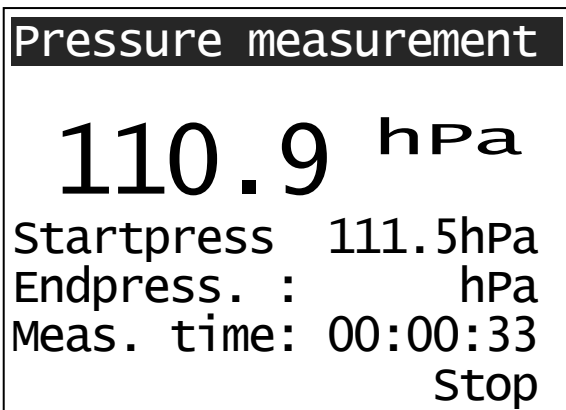
The “Pressure measurement“ menu item enables pressure to be read in the case of non-aggressive gases in the range between 0 and 2,000 hPa.



The GOLIATH immediately begins measuring pressure as soon as the “Pressure measurement” menu has been selected.

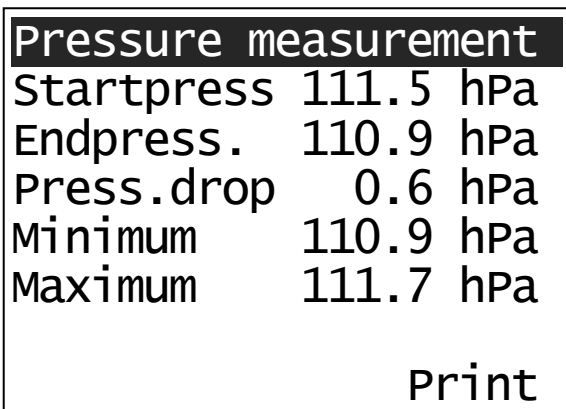
The F1 key (Zero) can be used to re-adjust the sensor zero setting. If a pressure of > 5 hPa is present during the zero point correction, it is indicated by the notice “Tolerance!” and a signal tone. But the zero point can still be set with F1. The alarm can be interrupted with the F2 key (Back) and no zero point will be set.

Press the F2 key (Start) to begin recording the pressure data.



In addition to the current pressure, the display always shows the starting pressure and measurement time as well. The interval amounts to 0.1 hPa at a pressure of up to 200 hPa; beyond that, the interval will be 1 hPa. If the measurement is ended with the F2 key (Stop), the final pressure will also be shown.

The following result overview can be obtained by pressing the F2 key (Next).



Once pressure measurement is completed, the following readings are shown again:

- Startpressure
- Endpressure
- Pressure drop
- Minimum
- Maximum

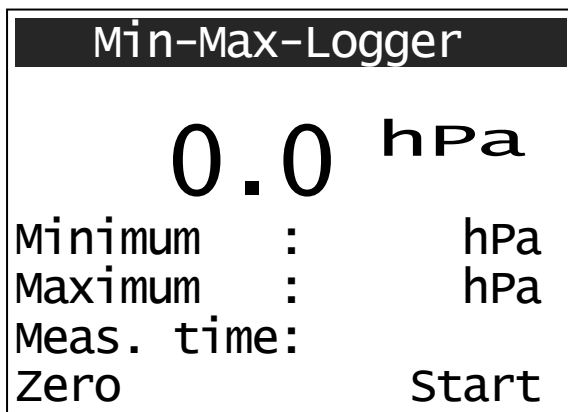
The measurement can now be printed out by pressing F2 (Print).

The user can exit the “Pressure measurement” screen by pressing the key.

### 3.14. MENU – MIN-MAX-LOGGER

as an option for ...						
All.	All. E	PN	PN E	PW	LOC	W
X	X					X

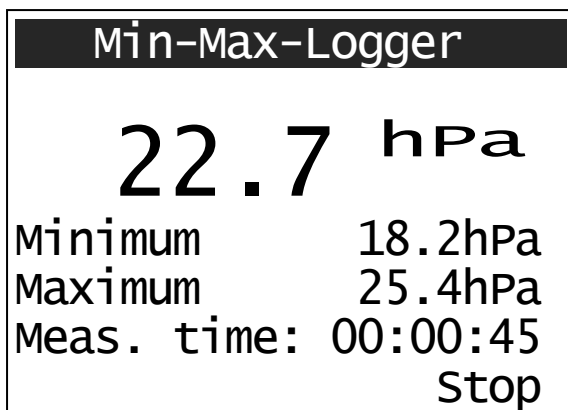
The “Min-Max-Logger” menu item indicates the minimum and maximum of a measurement. The pressure of non-aggressive gases can be measured within a range of 0 to 2,000 hPa.



The GOLIATH immediately begins measuring pressure as soon as the “Pressure measurement” menu has been selected.

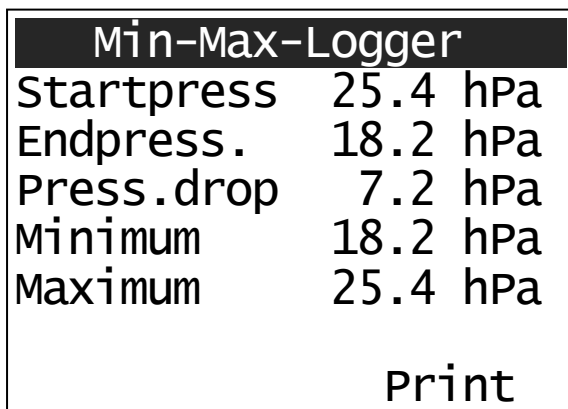
The F1 key (Zero) can be used to re-adjust the sensor zero setting. If a pressure of > 5 hPa is present during the zero point correction, it is indicated by the notice “Tolerance!” and a signal tone. But the zero point can still be set with F1. The alarm can be interrupted with the F2 key (Back) and no zero point will be set.

Press the F2 key (Start) to begin recording the pressure data.



In addition to the current pressure, the display always shows the lowest and highest pressure measured, as well as the measurement time. The interval amounts to 0.1 hPa at a pressure of up to 200 hPa; beyond that, the interval will be 1 hPa.

Press the F2 key (Stop) to finish taking measurement readings. The following result overview can be obtained by pressing the F2 key (Next).



Once pressure measurement is completed, the following readings are shown again:

- Startpressure
- Endpressure
- Pressure drop
- Minimum
- Maximum

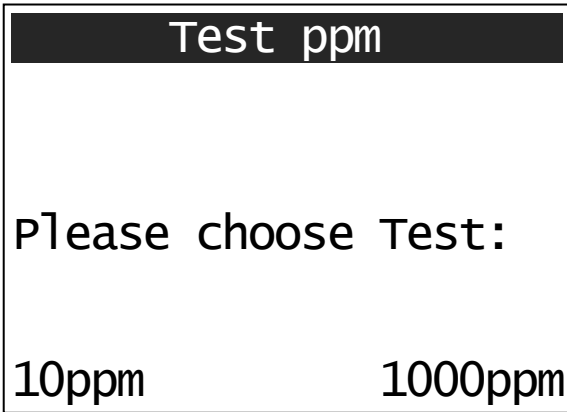
The measurement can now be printed out by pressing F2 (Print).

The user can exit the “Min-Max-Logger” screen by pressing the  key.

**3.15. MENU – TEST PPM**

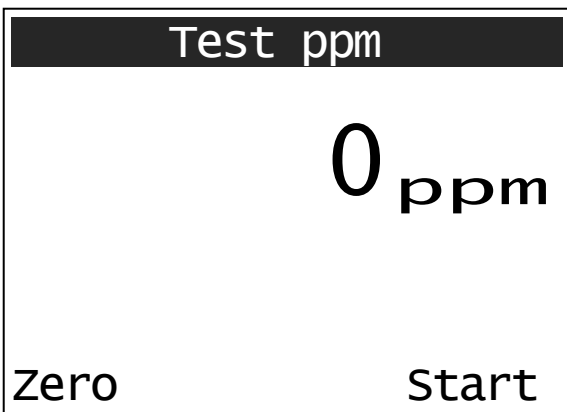
All.	All. E	PN	PN E	PW	LOC	W
X	X	X	X			

The “Test ppm” menu item can be used to conduct a sensitivity check on the semi-conductor sensor with test gas (10ppm and 1,000ppm methane).



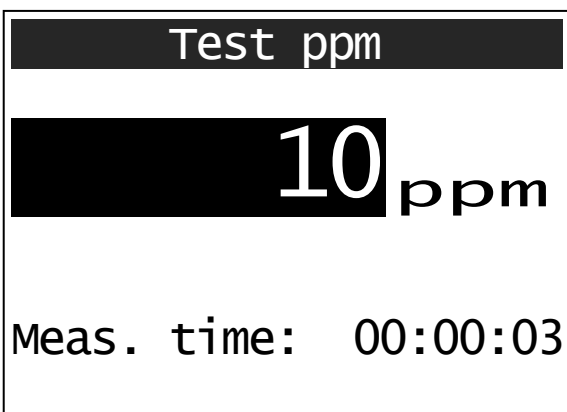
Once this menu item has been selected, the sensor start-up phase will begin. It will only last about 30 seconds and should always be conducted in fresh ambient air. The sensor start-up phase is also indicated by the flashing “Sensor init.” notice on the top line of the display.

The “Test ppm” menu will follow. Here, the test gas can be selected with F1 (10ppm) or F2 (1,000ppm). Both tests perform the same.



If necessary, the zero point can be reset using the F1 key (Zero).


The measurement time to reach the required concentration starts with a push of the F2 key (Start). For that reason, the test gas must be connected immediately thereafter.



The GOLIATH will now display the measurement value in ppm. In doing so, the device measures the time until 1,000ppm (10ppm) are reached. The maximum value of the test gas is also recorded.

If the test gas concentration is reached **within 10 seconds** during the 10 ppm test, the display is shown with a dark background and the test is passed. For the 1000 ppm test, it is sufficient if the measurement reading lies within the tolerance limits.


The test will automatically end after 30 seconds.

The test gas can also be removed as soon as the measurement value stops rising. In this case, the measurement can be ended prematurely by using the key  (Menu).

Test ppm	
Testgas [ppm]:	10
Maximum [ppm]:	14
T alarm [sec]:	3
Restart	Finish

The test result will then be shown on the display. In addition to the test gas selected, the maximum value and the time elapsed until the concentration (10ppm or 1,000ppm) is reached are also shown.

The F1 key (restart) can be used to repeat the test and pressing the F2 key (end) shows the result on the following display. The result can be printed out by pressing the F2 key (print) again.

The user can exit the “Test ppm” screen at any time by pressing the  key.

### 3.16. MENU – TEST LEL

All.	All. E	PN	PN E	PW	LOC	W
X	X	X	X	X		X

The “Test LEL” menu item can be used to conduct a sensitivity check on the infra-red sensor and the electrochemical sensors (if installed). A measurement value will only appear on the display if the corresponding sensor has been installed.

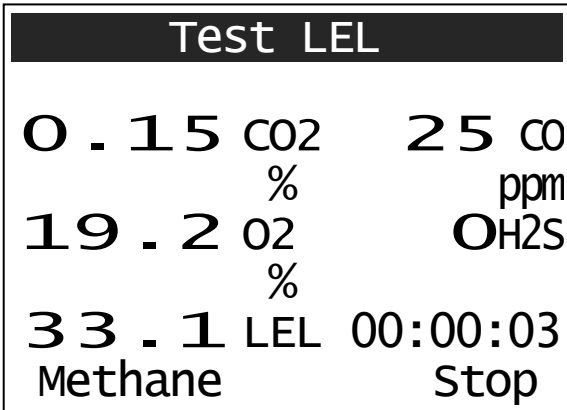
Sensor init.	
CO2	CO ppm
%	
O2	
%	
LEL	
Methane	

Once this menu item has been selected, the sensor start-up phase will begin. It will only last about 25 seconds and should always be conducted in fresh ambient air. The sensor start-up phase is also indicated by the flashing “Sensor init.” notice on the top line of the display.

Test LEL	
0 . 00 CO2	0 CO ppm
%	
20 . 9 O2	
%	
0 . 0 LEL	
Methane	Start

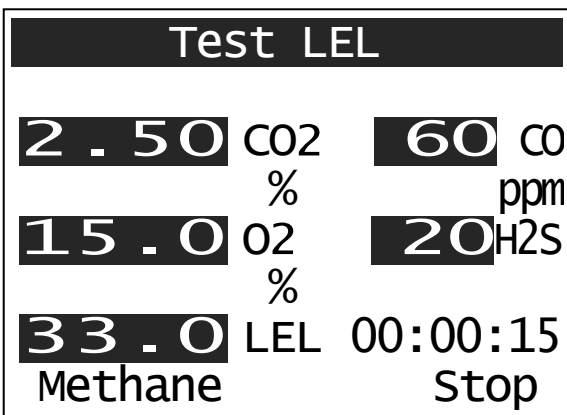
After the sensor start-up phase, the device will show the current measurement values. In fresh air, this should read “0” (except for O<sub>2</sub> and CO<sub>2</sub>).

The device is now ready for the sensor test and can be started using the F2 key (Start).



The GOLIATH is tested using a special gas mixture. This test gas contains 2.2% vol. methane (=50% LEL), 2.0% vol. carbon dioxide, 150 ppm carbon monoxide and 17.5% vol. oxygen. Once the "Test LEL" has been started, the time measurement will begin and the test gas can then be connected with a flow rate of 35 l/h or pressure-free by means of a bypass with 50 l/h.

The respective concentration of the gases will be shown on the display.



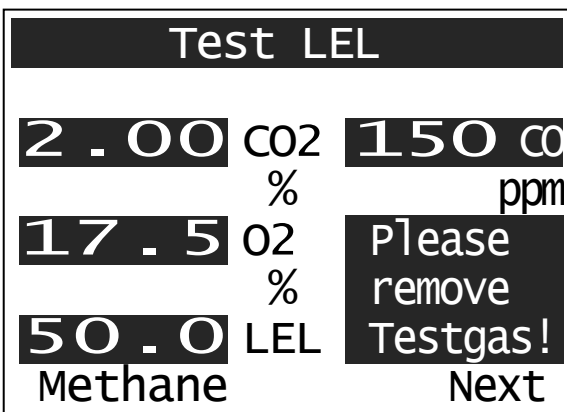
If the H<sub>2</sub>S-sensor is to be tested as well, the 5-component test gas with 1,45 Vol.-% CH<sub>4</sub> (=33%LEL), 2,5 Vol.-% CO<sub>2</sub>, 60 ppm CO, 20 ppm H<sub>2</sub>S und 15 Vol.-% O<sub>2</sub> must be used. As soon as the measured concentration lies within the tolerances, the measurement reading is shown with a dark background on the display.



For this, the 5-component test gas must first be selected in the PC1 software to save the relevant values in the device.

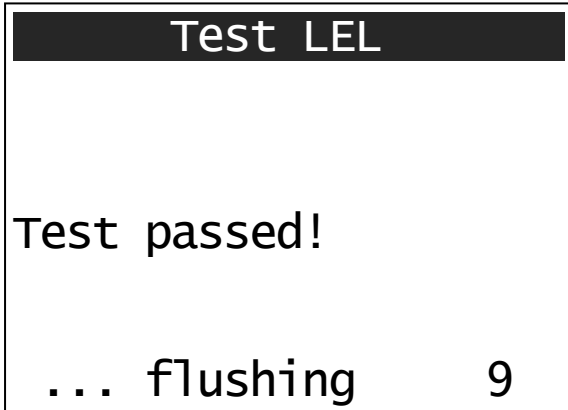


Test gas can be supplied to the measuring instrument in two ways. With direct connection of the measuring device, the test gas flow rate must be approx. 35 l/h. However, if the test gas is freely aspirated, e.g. through a probe, the test gas flow rate must definitely be larger than the flow rate sucked through the pump. Otherwise, by the suction of secondary air, a too low gas concentrations will be displayed.



If the concentrations lie within a particular tolerance range, the notice "Please remove Testgas!" will appear. The test will end automatically after a certain amount of time (approx. 30 seconds) even if sufficient values cannot be measured.

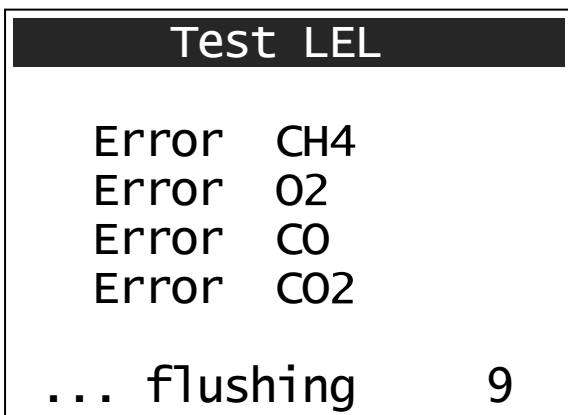
The F2 key (Next) will end the "Test LEL" and one of the following messages will appear.



If the test was successful, the message “Test passed!” will appear on the display and the check mark for “Device tested” (☒) will appear and will remain in place for the next 24 hours (see also sect. 3.6 “Confined space warning”).


The device will then be purged of gas using fresh ambient air for approx. 10 seconds.

The measurement readings are saved during the measurement and can be called up again and printed out via the "Memory" menu.



If the values lied outside of the tolerance range, an error message will be given. The “Device tested” indicator will not appear.

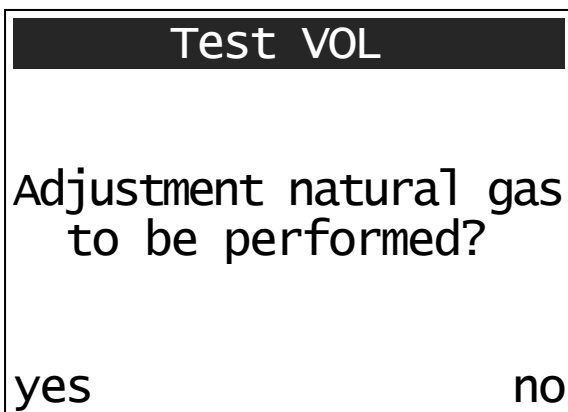
Here, too, the device will be purged of gas using fresh ambient air for approx. 10 seconds.

The user can exit the “Test LEL” screen at any time by pressing the  key.

### 3.17. MENU – TEST VOL

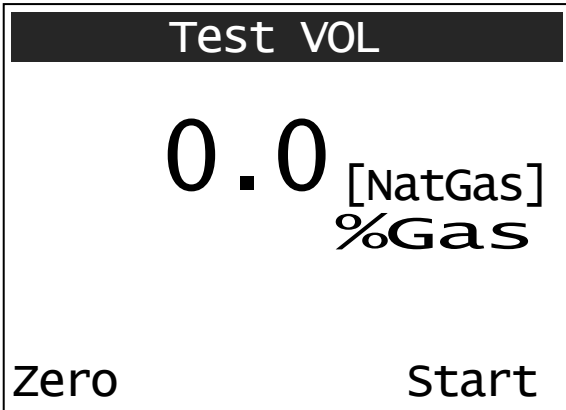
	All.		PN			
All.	E	PN	E	PW	LOC	W
X	X	X	X	X	X	

The menu item “Test VOL” can be used to conduct a sensitivity check of the infra-red sensor with test gas (100% vol. methane) or adjust it to natural gas.



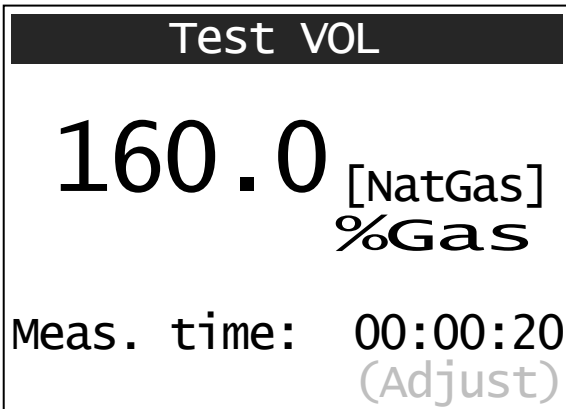
Once this menu item has been selected, the sensor start-up phase will begin. It will only last about 15 seconds and should always be conducted in fresh ambient air. The sensor start-up phase is also indicated by the flashing “Sensor init.” notice on the top line of the display.

After that, you can select whether you would like to adjust the GOLIATH to natural gas (yes) or conduct a test with 100% vol. methane (no).



If the adjustment natural gas is to be performed, the zero point can still be set beforehand using the F1 key (Zero).

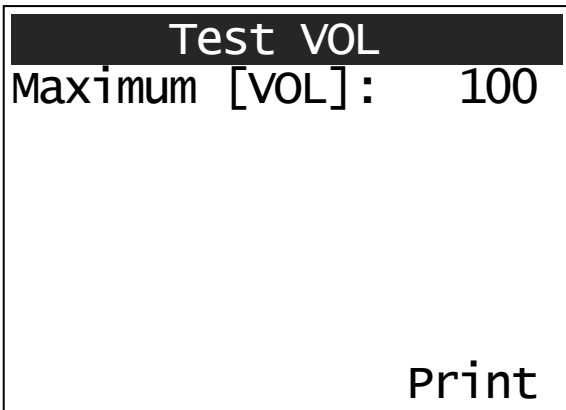
The measurement time will begin running once the F2 key (Start) has been pushed and the test gas can be released.



The GOLIATH now shows the measurement value in % vol. natural gas. The test will automatically end after 30 seconds and the adjustment can be conducted with the F2 key (Adjust).

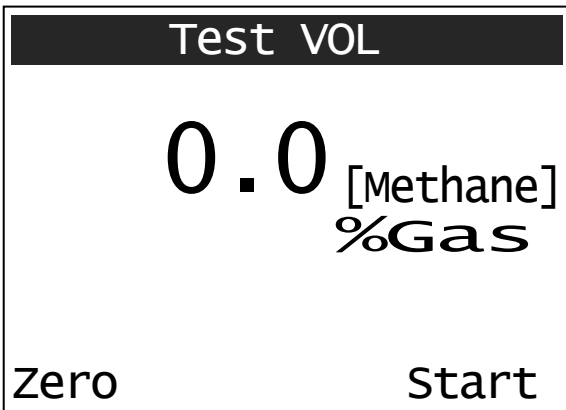
The notice "Adjustment natural gas performed!" will appear on the display.

The adjustment is then concluded with the F2 key (Finish).



The maximum value will be saved during the measurement process and can be retrieved using the "Memory" menu.


The measurement can now be printed out by pressing F2 (Print).



The zero point can still be reset using the F1 key (Zero) when testing for 100% vol. methane.

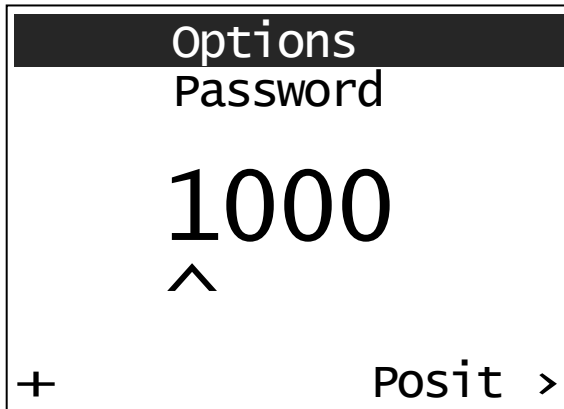
The measurement time will begin running once the F2 key (Start) has been pushed and the test gas can be released.

The measurement will automatically end after 30 seconds and the maximum concentration will be shown on the following screen. It should be at > 100% vol.

The user can exit the "Test VOL" screen at any time by pressing the  key.



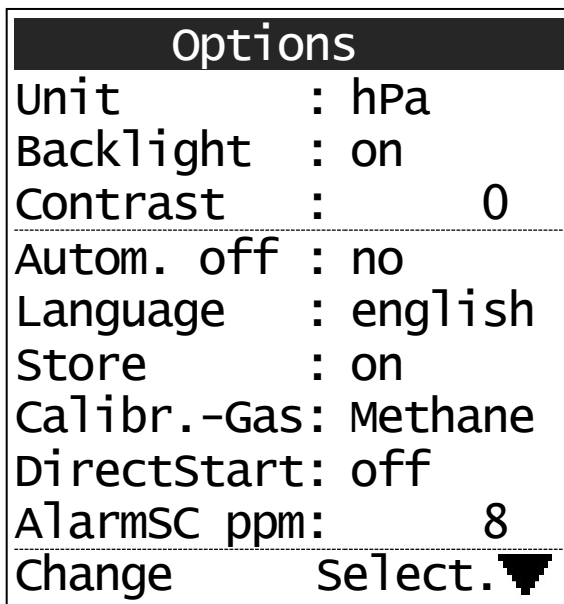
### 3.18. MENU – OPTIONS



The options menu enables the user to make various adjustments to the device. To do so, the user must first enter the password. The F1 key (+) is used to increase the selected digit (0-9) and the F2 key (Posit >) to select the next digit. The password is confirmed by pressing the "Menu" key. The password is pre-set at <1000> and can be changed using a special software application.

If the password is entered correctly, all settings can be changed. If the password is incorrect, only the first three settings (standard settings) can be changed. Use the F1 key (Change) to change the settings value and the F2 key (Select. ▼) to move on to the next setting.

The following 9 items can be changed in all:



Some setting options may also be missing in the settings menu depending on the device and sensor equipment!



Further settings can only be conducted with PC1 software.

### 3.18.1. UNIT

The unit of measurement can be in *hPa* or *mbar*.

The following settings can only be changed after entering the correct password!

### 3.18.2. BACKLIGHT

- ⇒ on: Backlight is permanently on
- ⇒ off: Backlight remains off
- ⇒ Time specification: The light will automatically switch off after the specified period of inactivity.

The following times can be set:

5sec, 10sec, 30sec, 1min, 5min, 10min, 30min, 60min



The set light time also applies to the charge mode. This means that, when the light is switched on permanently, the device is permanently lit in charge mode too.

### 3.18.3. CONTRAST

This menu item can be used to adjust contrast on the screen. Use the F1 key (Change) to set contrast to the required level between 0-30 in increments of 5.

### 3.18.4. AUTOMATIC OFF

Automatic device switch-off setting for when user is inactive.

- ⇒ no: The device will *not* switch off automatically.
- ⇒ 15min / 30min:

The device will switch off after the pre-set period of time if no button is being used and it is in the main menu.

### 3.18.5. LANGUAGE

Other languages can be selected here in addition to the standard language of English, provided they have been implemented.

### 3.18.6. STORE

- ⇒ on: Measurement readings are automatically saved on completion.
- ⇒ off: No measurement readings are saved.

### 3.18.7. CALIBRATION GAS

Use this item to select the gas (methane or natural gas) which is to be used for calibration.

### 3.18.8. DIRECT START

- ⇒ on: When the device is turned on, it immediately switches to the menu last used.
- ⇒ off: The device starts in the main menu when switched on.

### 3.18.9. ALARMSC PPM


The alarm threshold for the semiconductor sensor can be set within a range from 3 to 100 ppm CH<sub>4</sub>. Up to 20 ppm, the value will appear in increments of 1. Beyond 20 ppm, it will appear in increments of 5. The device's default setting is 8 ppm.

Use the  key to return to the main menu.

## 3.19. MENU – DATE/TIME

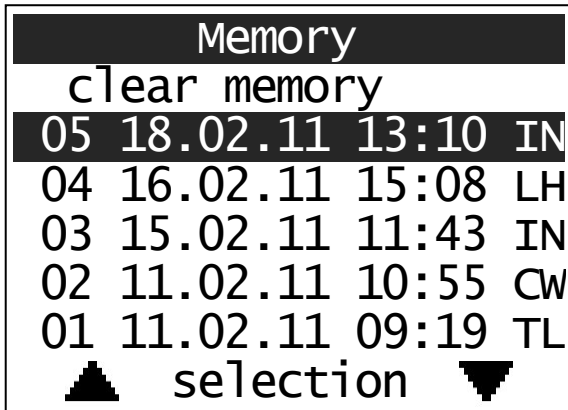
The device date and time can be set or changed in the “Date/Time” menu. Press the F1 key (+) to increase the digit currently marked by a “^”. Use the F2 key (Posit >) to skip to the next digit.

Date/Time		
Date	:	10.02.11
		^
Time	:	14:07.19
+		Posit >

Use the  key to return to the main menu.


### 3.20. MENU – MEMORY

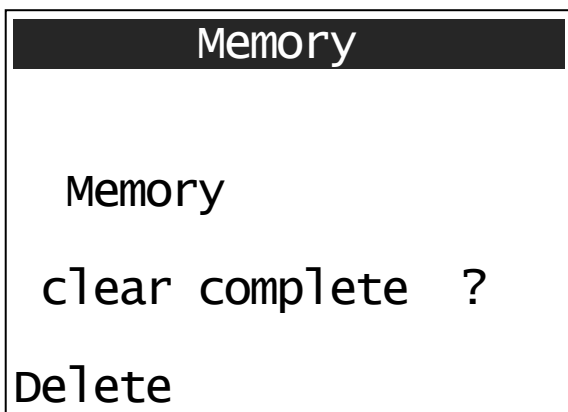
This menu can be used to display old measurement readings and subsequently print them out.




The saved measurement readings are displayed in chronological order with the most recent reading being shown first. They are displayed with a number plus the time and the date when the measurement was read. Abbreviations are also given for the type of measurement.

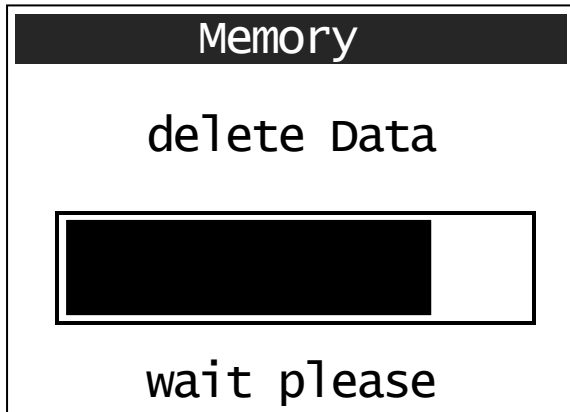
- IN = Inspec. PPM-LEL-VOL% (readout with PC1)
- CW = Confined space warning
- BT = Bare hole testing (PC1)
- IP = Inspection P-Net (PC1)
- LH = Leak detection house (PC1)
- PV = Purging %VOL (PC1)
- ET = Ethane Test
- PC = Pressure + CGI
- PM = Pressure Measurement
- MM = Min-Max-Logger
- TP = Test ppm
- TL = Test LEL
- TV = Test VOL

The two arrow keys (▲/▼) are used to select the reading you require and the  key (menu) to show it.

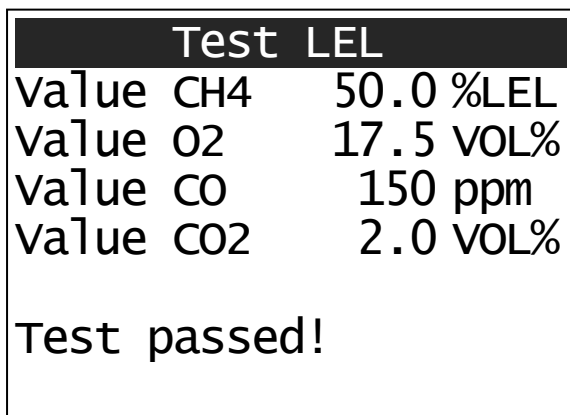


If the menu item “clear memory” is selected, the entire memory can be erased using the following menu item. The F1 key (Delete) will permanently erase the entire data storage, and thus all measurements along with it. It is not possible to delete messages individually.

If you press the  key (menu), the process is stopped and you return to the main menu.




The process of erasing the data storage takes an instant and is depicted by a bar graph indicator on the display.



Different results are shown depending on the reading you selected. This is the result of a "Test LEL" with the individual measurement values.

Several measurements can only be read out with PC1 software, since only measurement curves are saved there, for instance.

Pressing the F1 key (back) returns to the "Memory" menu and another measurement can be displayed.

The user can exit the "Memory" screen by pressing the  key.

### 3.21. EVALUATION OF GAS LEAKAGES

Evaluating detected leaks is not a straightforward matter. In practice, it is difficult to assess whether a gas leak presents a hazard and therefore requires repair, or even calls for a gas system to be shut down.



If the gas installation is in a general bad state of repair and shows signs of extensive corrosion, the piping is inadequately fastened, or other defects are present, repair is always necessary.

In the menu item "Leak detection house", the GOLIATH shows the leakage rate as well as the gas concentration measured. The leakage rate is the result of the ratio of the measured concentration to pump suction capacity and is specified in litres per hour (l/h).

The leakage rate is only valid for the respective measuring point and not for the whole installation. It should therefore serve as an estimated leakage rate for the point in question and not as a substitution for a serviceability test. It must always be assumed that the real leakage rate is higher than the rate measured at a single point!

In the event of doubt, the installation should always undergo a serviceability test, where the amount of gas leakage is determined using a leak rate measurement device (preferably certified in accordance with DVGW test regulation VP 952 [German Technical and Scientific Association for Gas and Water]).

The following dispositions are included in the DVGW Technical Regulations for Gas Installations 2008 with regard to gas leakage rates:

#### **5.6.4.3 Serviceability test**

Operating pipe systems with operating pressures up to 100 hPa should be handled in accordance with their degree of serviceability.

- **Unlimited serviceability:**

Gas leakage rate < 1 litre per hour, no other defect present

→ The pipe system can continue in operation.

- **Restricted serviceability:**

Gas leakage rate  $\geq 1$  and < 5 litre per hour

→ The pipe system must be repaired within 4 weeks.

- **No serviceability:**

Gas leakage rate  $\geq 5$  litre per hour

→ The pipe system must be shut down immediately.  
It must be repaired.



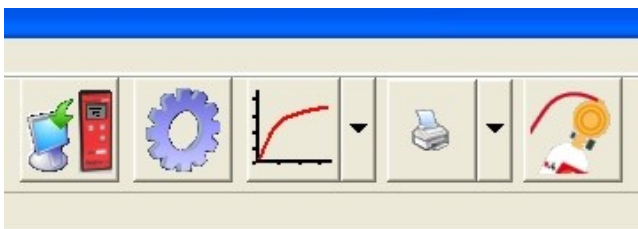
If there is a gas odour, serviceability criteria do not apply. The cause must be eliminated immediately.

The visible state of the gas installation (e.g. corrosion) and the functional capability of components should be included in the evaluation.

#### 4. CALIBRATION / ADJUSTMENT AND SETTINGS WITH PC1-SOFTWARE

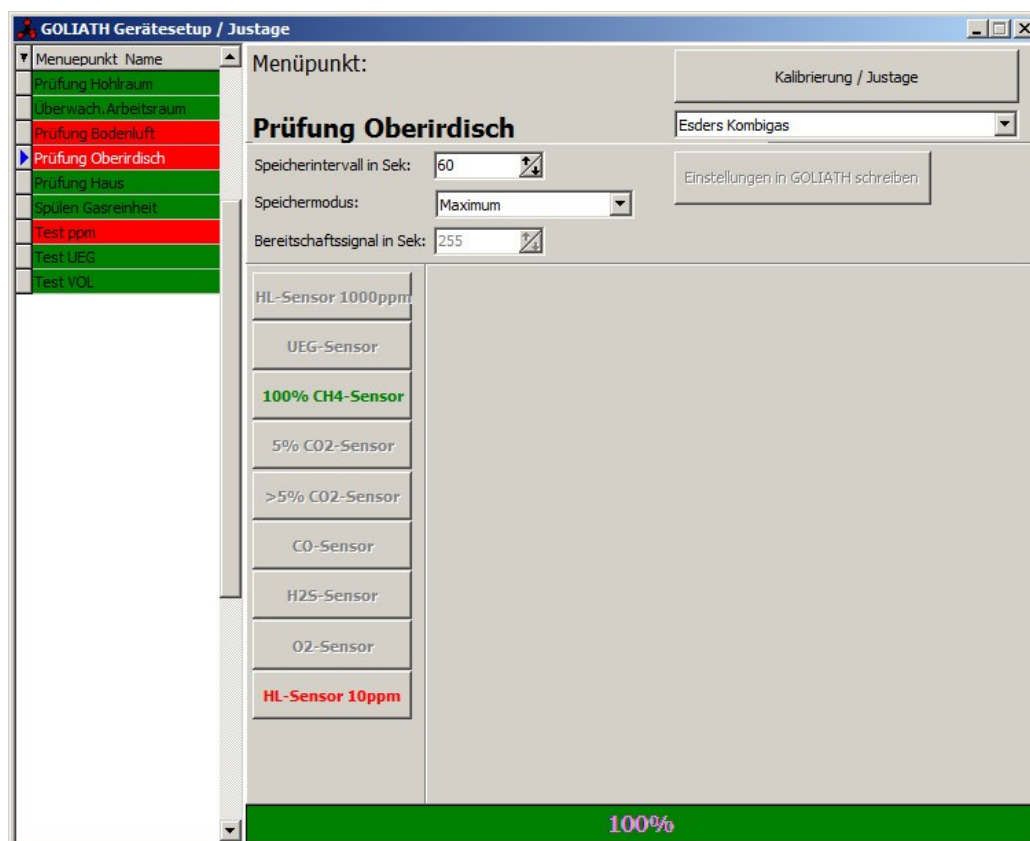
The GOLIATH “biogas” can be calibrated and adjusted with the Esders PC1 software. Furthermore, the software can be used to do Basic settings such as the data storage interval. The PC1-Software is explained by an example of the GOLIATH “Allround”.

First select the GOLIATH icon to start the appropriate program. Put the instrument in the charging cradle and start it. Take care to connect the cradle via an USB cable with the computer. The instrument should be started and has to be in the main menu. After inserting the device into the cradle you have the possibility to start a communication record for 60 seconds, than the charging function is activated. If this time is too short, you have to remove the power to the charging cradle. A communication is possible as long as the GOLIATH is in the main menu.



Now select  “Geräteeinstellungen Kal./Justage” to start the window for calibration and adjustment.

First all settings will be downloaded from the instrument and the available menu points and associated sensors are shown in the table.





▼ Menuepunkt Name
Prüfung Hohlraum
Überwach. Arbeitsraum
Prüfung Bodenluft
▶ Prüfung Oberirdisch
Prüfung Haus
Spülen Gasreinheit
Test ppm
Test UEG
Test VOL

The green highlighted menu items indicate that no calibration is necessary. The red highlighted menu items indicate however that at least one sensor needs a calibration/adjustment.

The arrow in front of the menu indicates which menu item is selected.

HL-Sensor 1000ppm
UEG-Sensor
100% CH4-Sensor
5% CO2-Sensor
>5% CO2-Sensor
CO-Sensor
H2S-Sensor
O2-Sensor
HL-Sensor 10ppm

In each sub-menu, the individual sensors are marked with colored text. The red text marks the sensors which require a calibration/adjustment and the sensor indicated by green text don't need a calibration/adjustment at this time. The gray sensors are not used in this menu item and can not be selected.

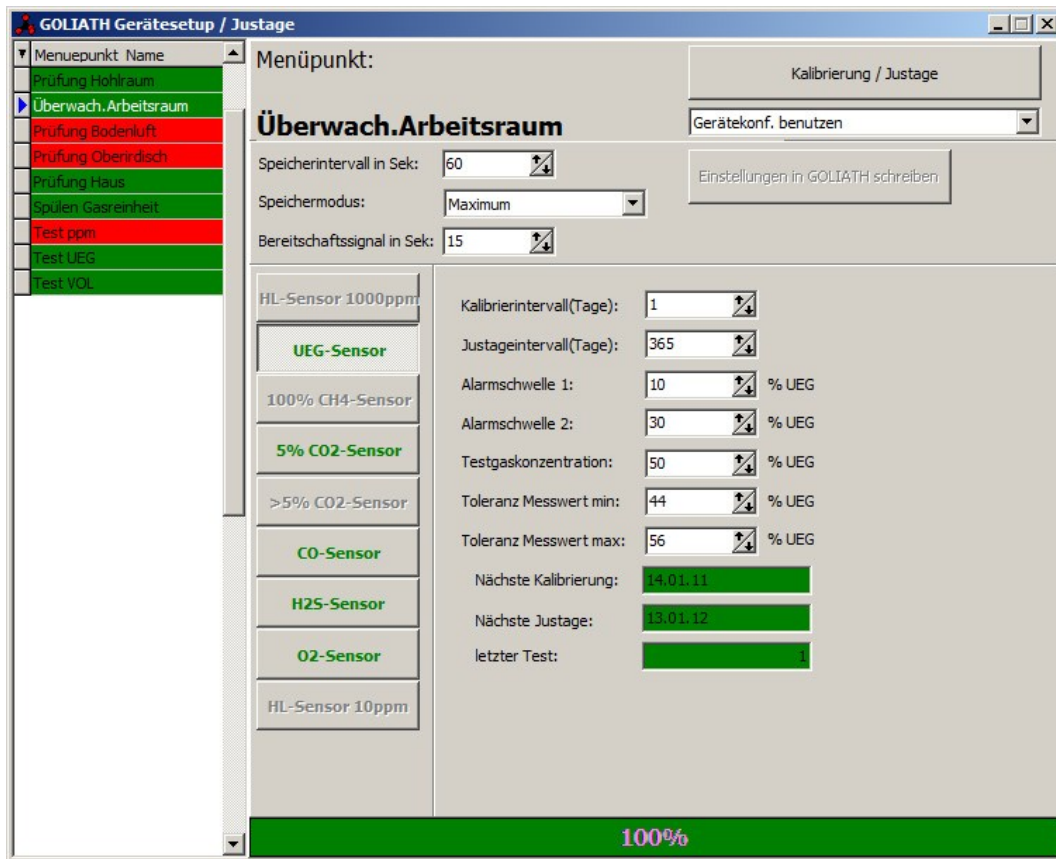
Speicherintervall in Sek:	<input type="text" value="60"/>	
Speichermodus:	<input type="text" value="Maximum"/>	
Bereitschaftssignal in Sek:	<input type="text" value="255"/>	

For all available applications (menu points) the following settings can be adjusted

- Storage interval in seconds
- Storage mode
- Ready signal in seconds (not in every application available)

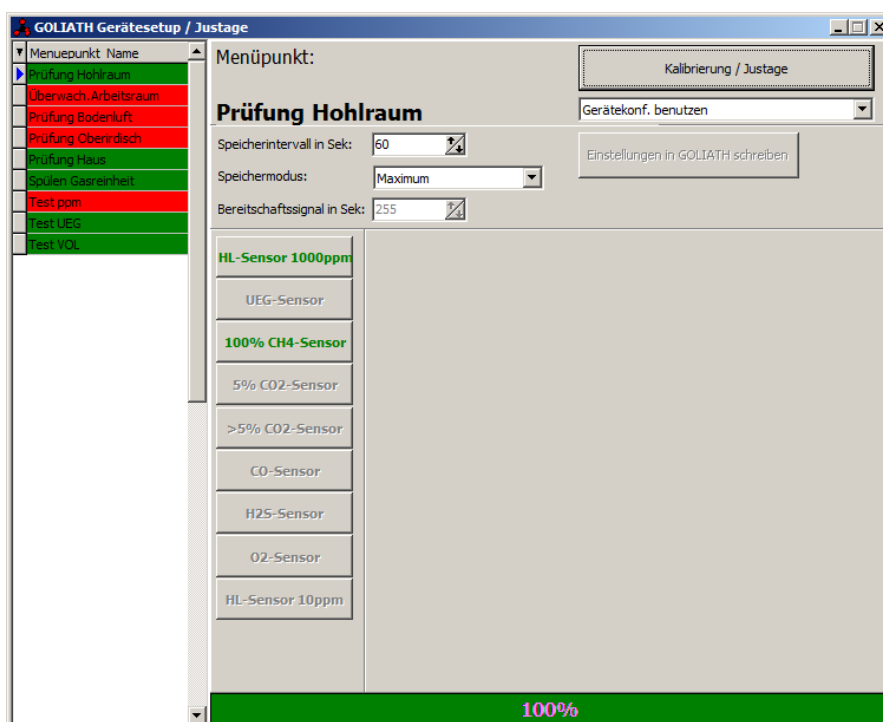
The interval of testing and calibration, the test gas concentration and the permitted measuring tolerances can be chosen and set for each sensor.



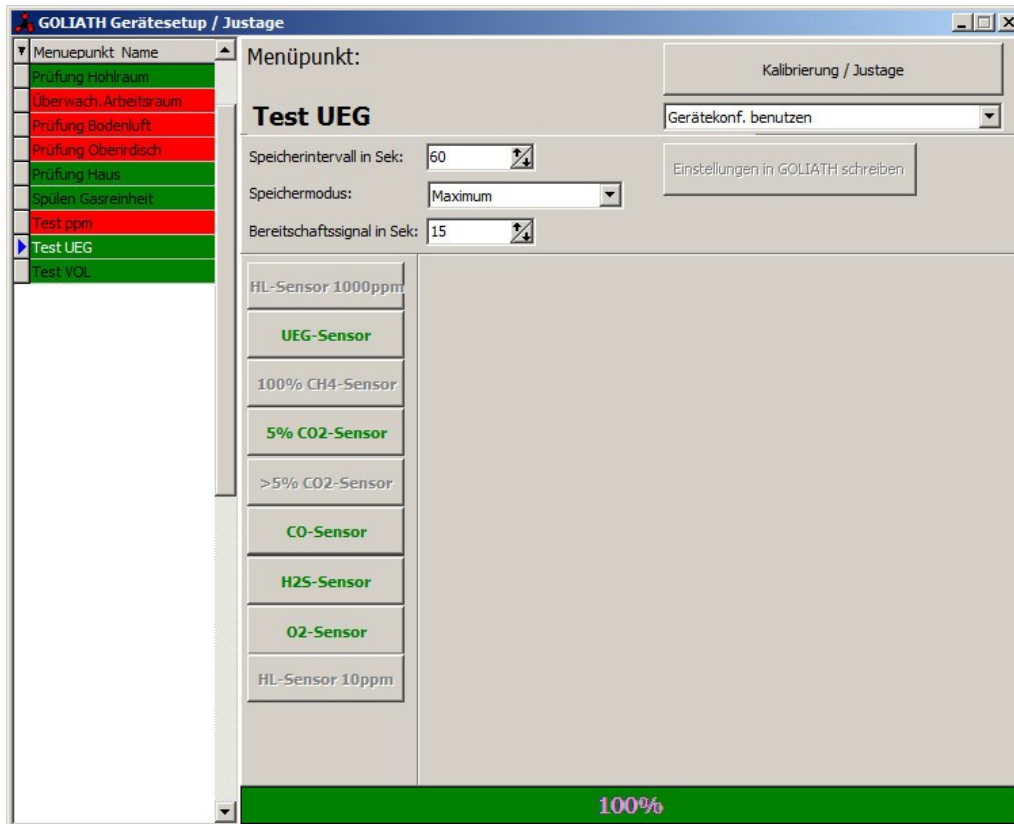


#### 4.1. EQUIPMENT SETUP - CALIBRATING THE UNIT

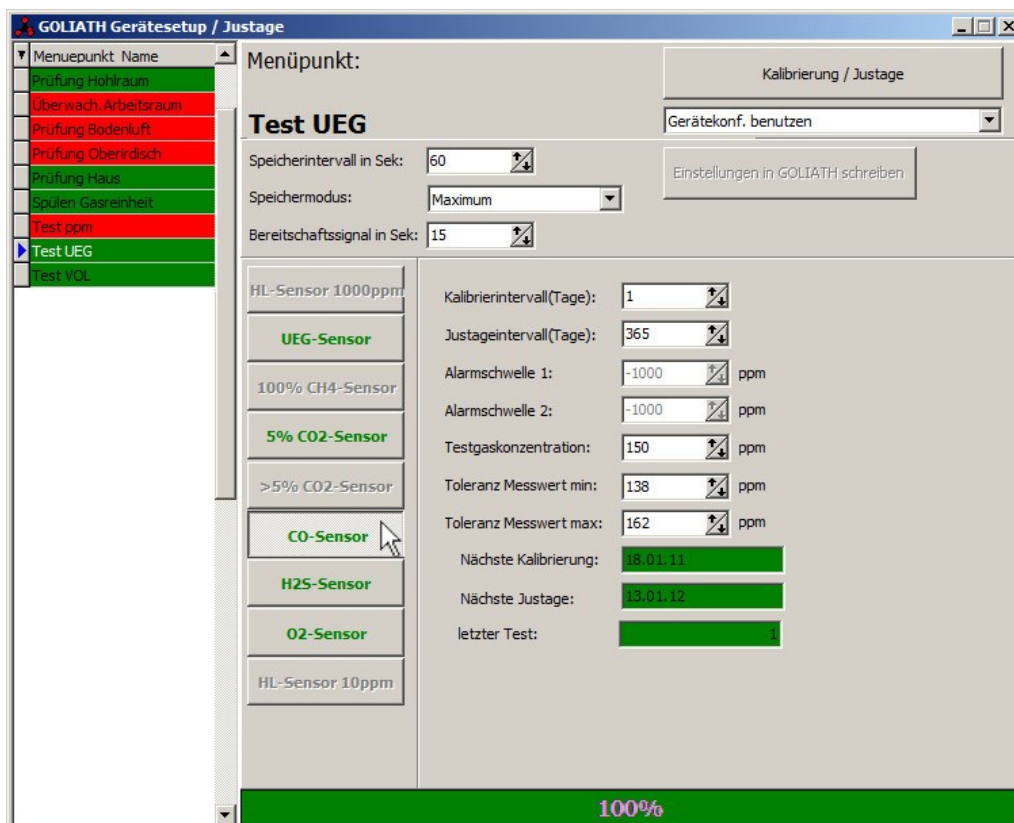
With the GOLIATH menu “Test LEL” for example you can test the values of the sensors in practice, which were previously saved by the PC1-Software. These values can be changed by software, as you can see in the following example. Fit the instrument in the charging cradle and start it. Take care to connect the cradle via an USB cable to the computer. The software starts with reading out the GOLIATH.



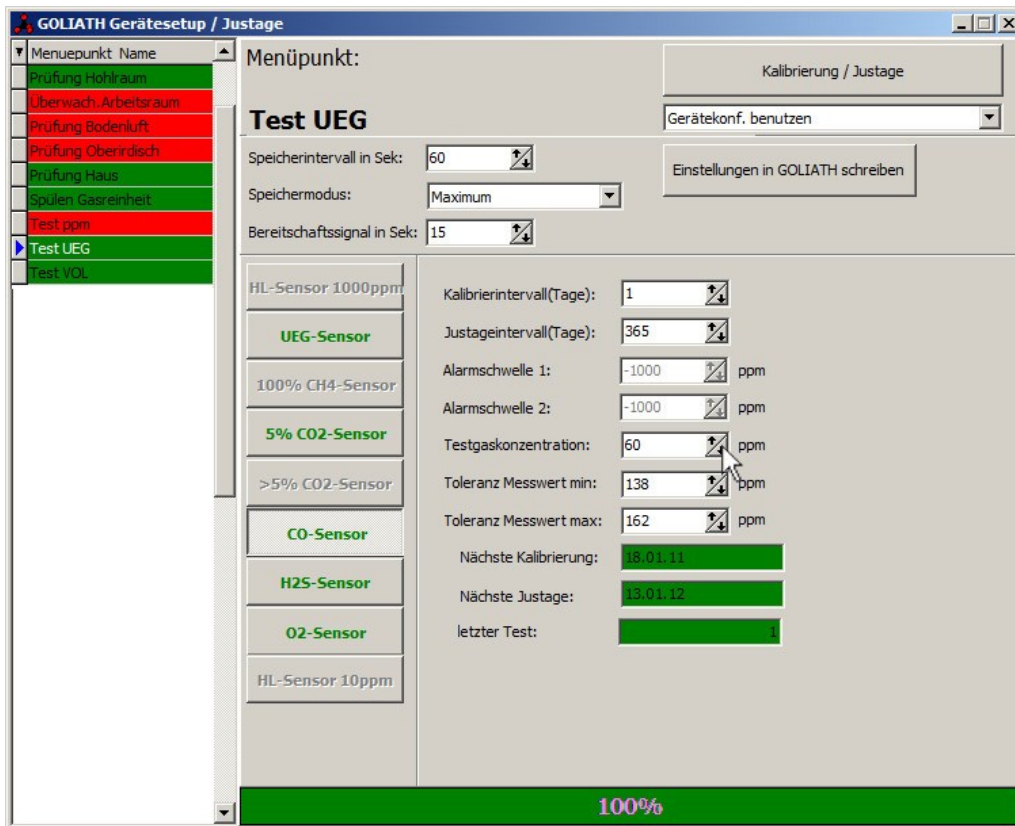
Now you can choose the required item (in this case „Test UEG“).



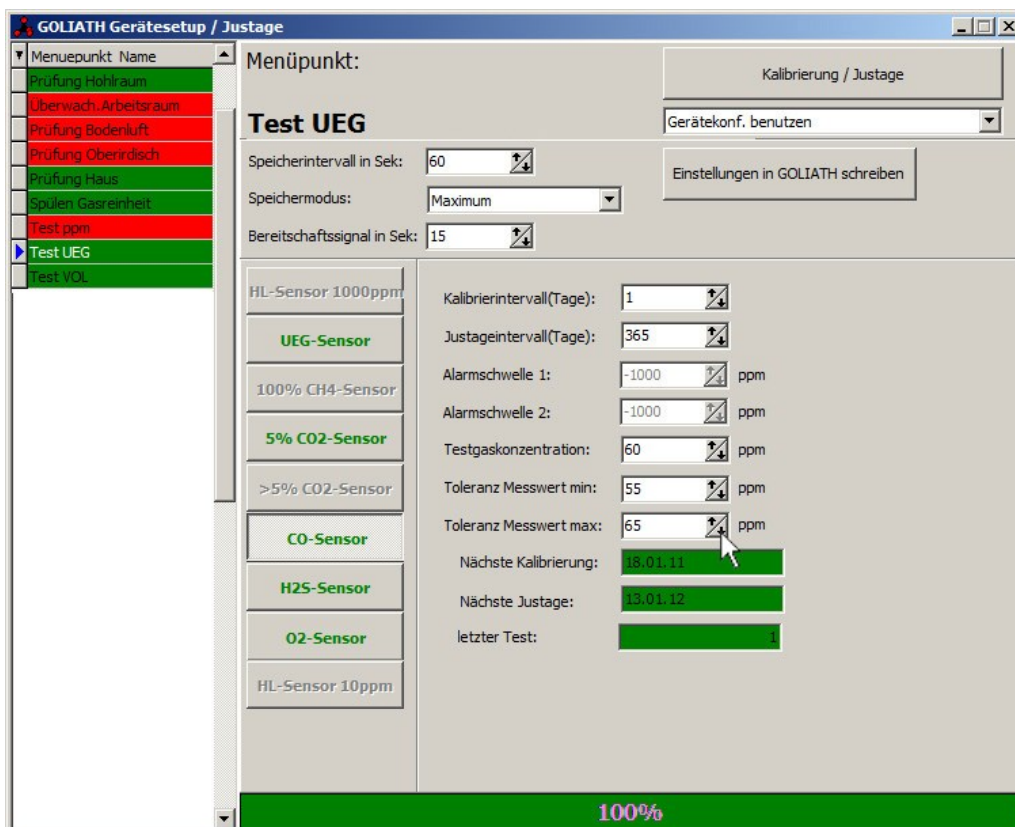
Next, the sensor is selected, which shall be calibrated (in this case the CO-sensor).



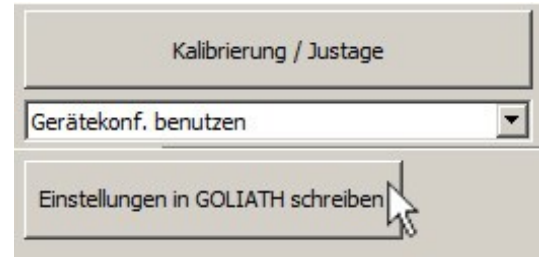
In the sensor menu you can change every value with the arrow button (in this case we will change the testgas concentration down to 60ppm).



You can also change the tolerance values in this menu item with the arrow button .



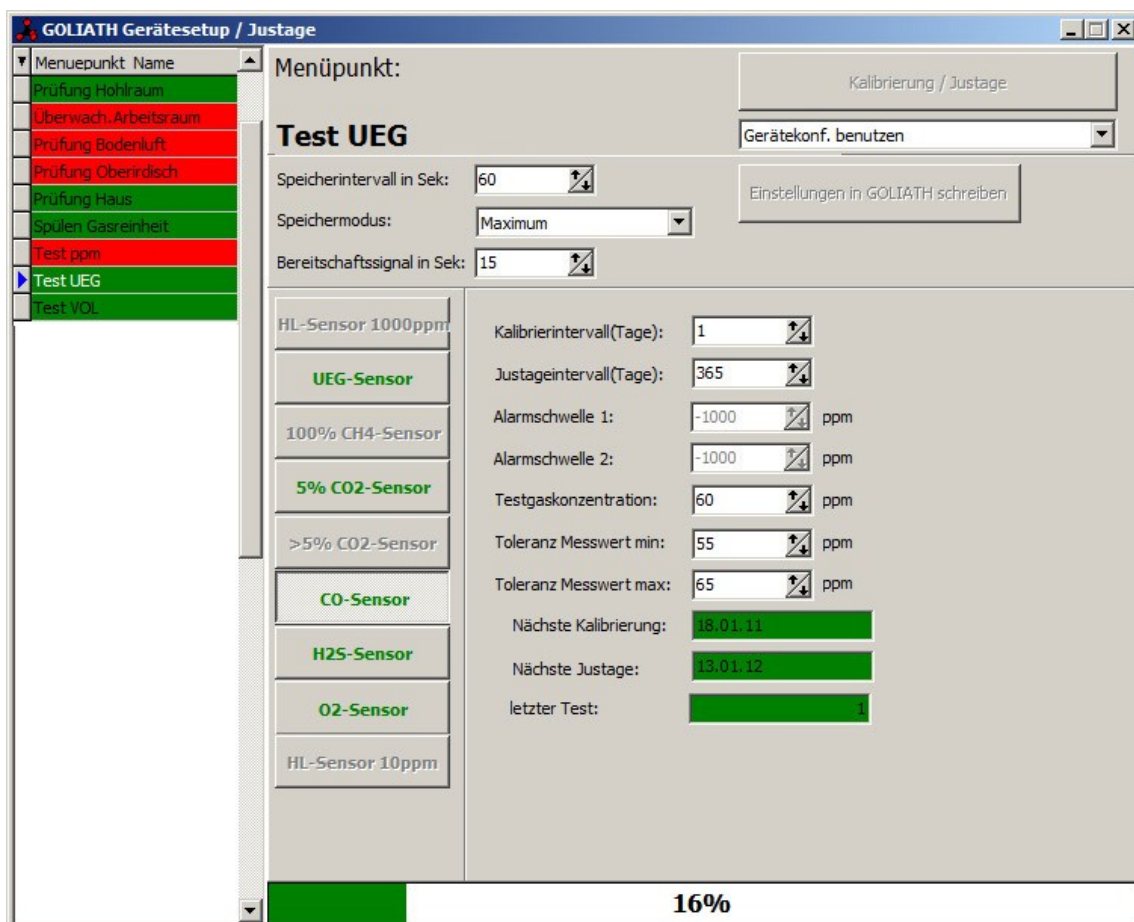
Save all data in the instrument by pressing Button “Einstellungen in GOLIATH schreiben”.



**Information!**

The button “Einstellungen in GOLIATH schreiben” will only be visible if a value is changed with the arrow keys

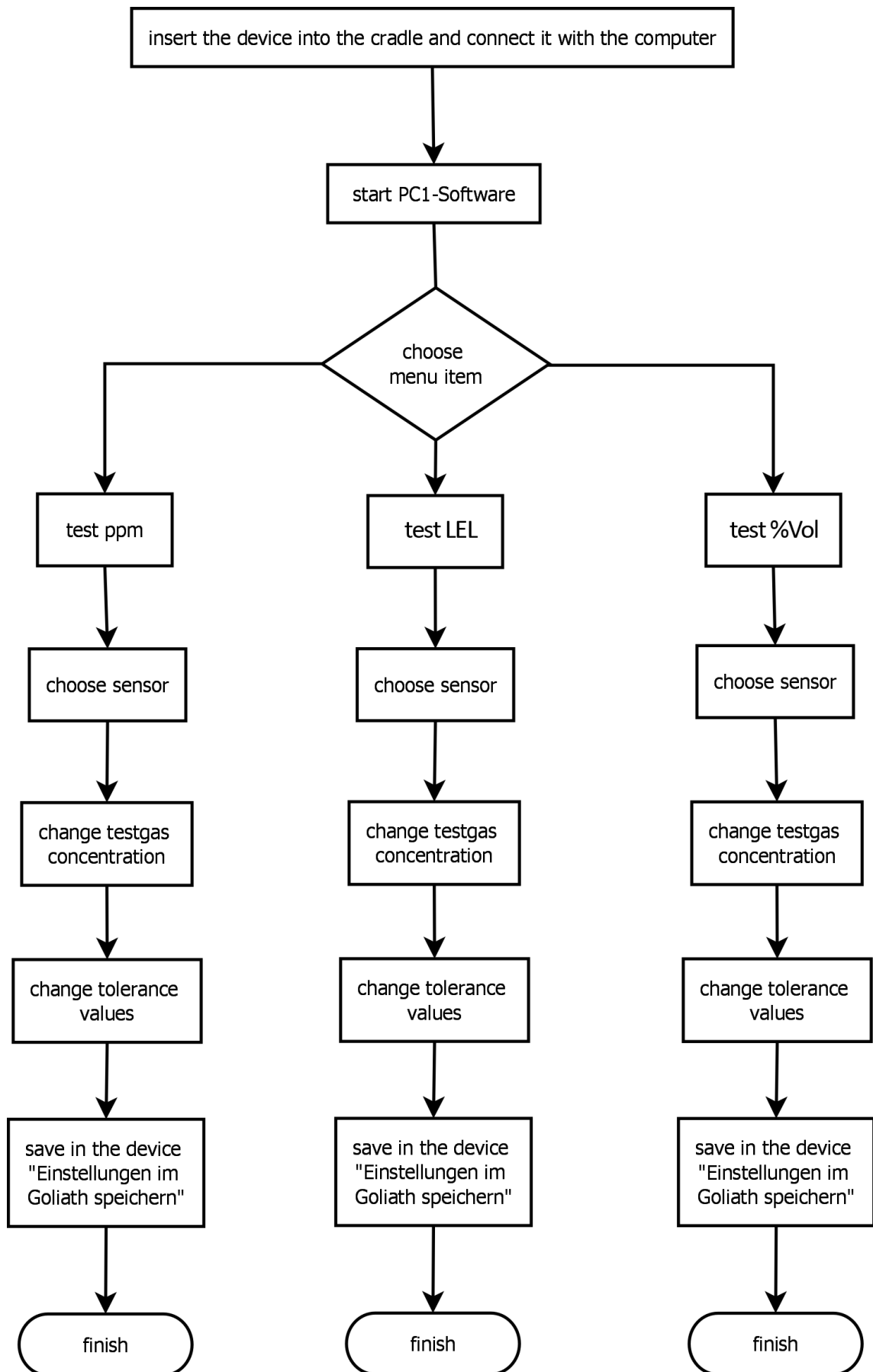
The entered values are stored in GOLIATH, this process takes a moment. When the green bar at the bottom stops at 100%, the values are successfully saved in GOLIATH.



**Information!**

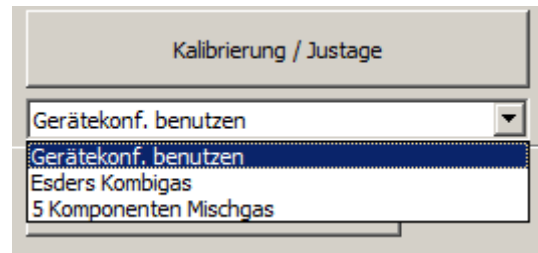
A check of the values is only visible through a renewed reading of the device in the software, the device itself can not display the changed values.

**4.1.1. FLOW CHART - CALIBRATING THE UNIT**

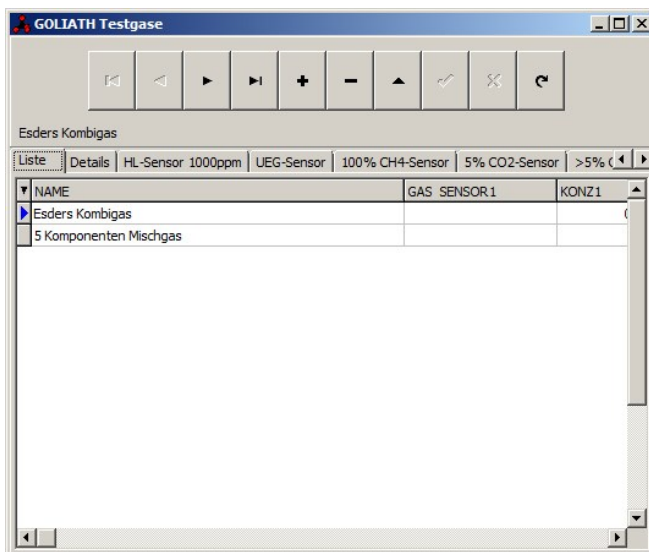
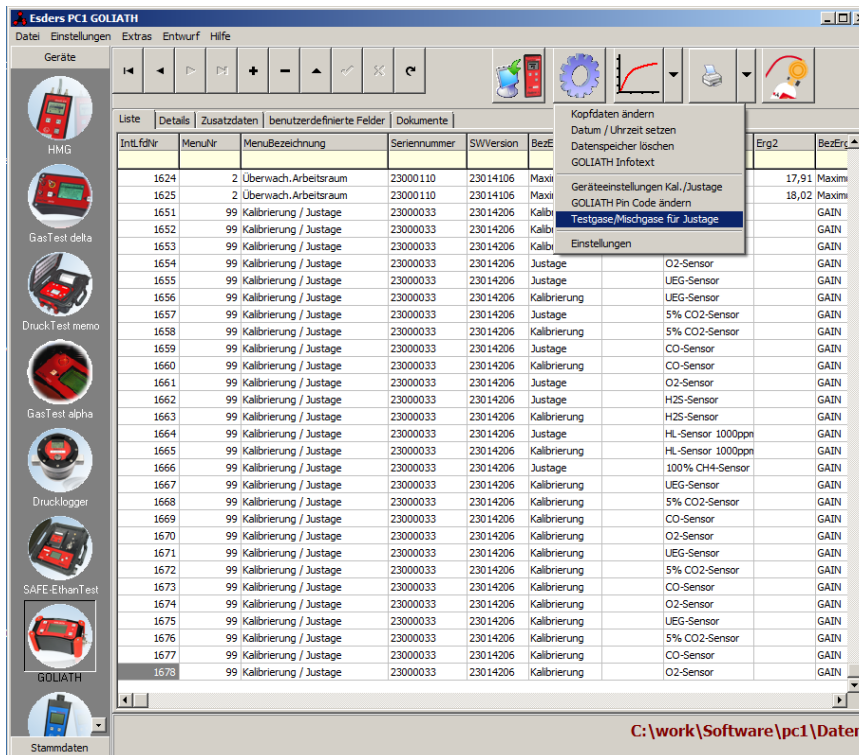


## 4.2. TESTGAS SETUP

In the software there are two gases pre-programmed (see right). There is also the possibility to save other gases or change the existing test gases.




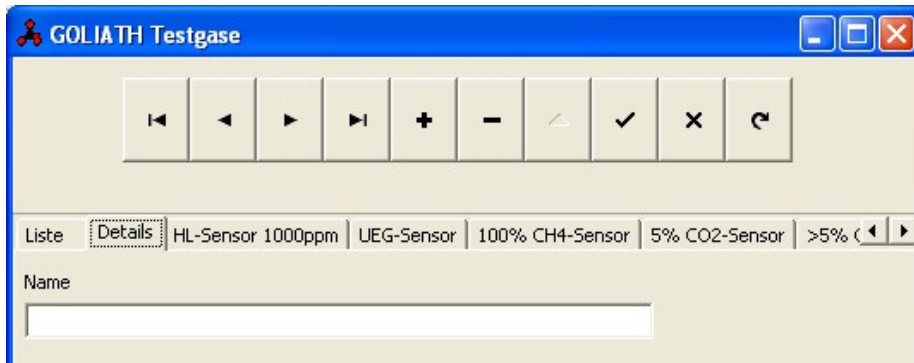
With the button (settings) you can perform the settings of the test gases. To add a new gas, you have to select the menu item "Test gases / gas mixtures for calibration".



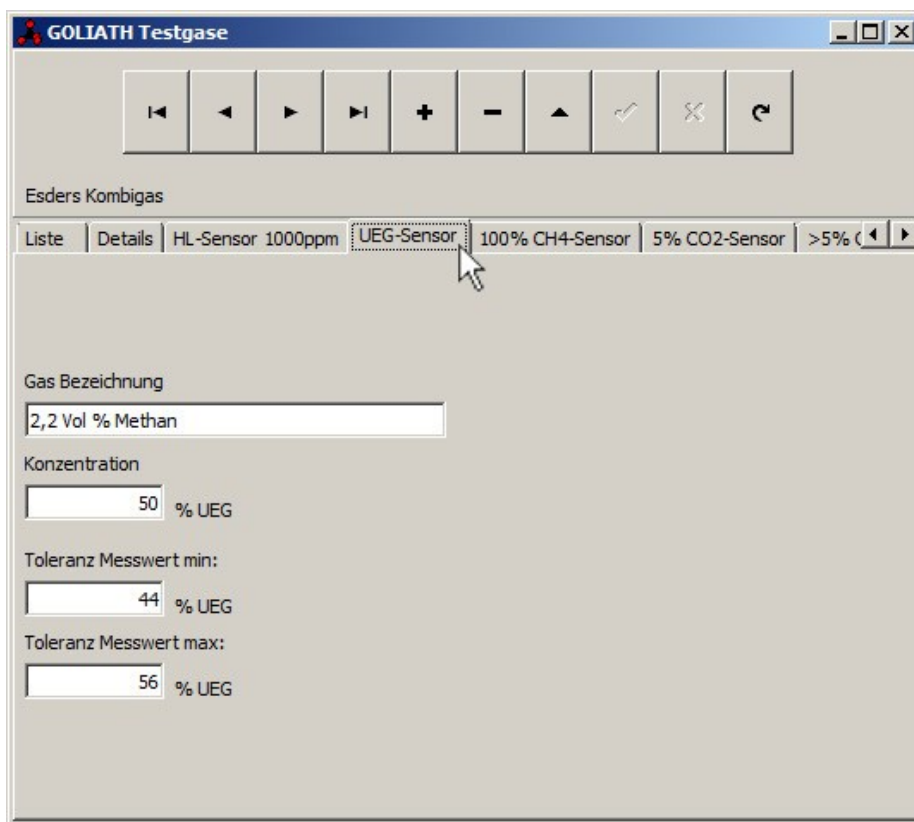
You will see a new screen window, where the already pre-programmed gases are listed.

The little blue arrow shows the name of the test gas, which is selected and where you can edit the concentration and the gases of the mixture.

Through the button  you can create a new record for a new test gas.




You can go through the list of sensors and provide the required values. This can be done even with the existing gases in order to modify the values.



**Warning/Danger!**

If you haven't create a new record and you will change some values, an existing test gas will be overwritten.

Values must be entered only at the corresponding sensors which is also a component in the test gas, for example 50% LEL for the LEL sensor. The software detects when nothing is entered for some sensors that this sensor can not be switched on. If all necessary values have been changed or newly created, the data

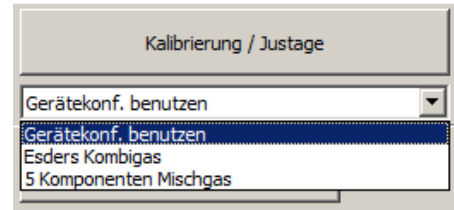
can be saved by pressing the confirmation button .

### 4.3. CALIBRATION AND ADJUSTMENT

It is possible to do a test or calibration for each sensor itself or by using combination gases for more than one sensor at the same time. The type of testing can be chosen by the drop down list for combination gases or the instrument setting (if you want to test each sensor by a single gas).

There are the following pre-programmed selections:

- Gerätekonf. benutzen (nur ein Gas wird benutzt, welches im Gerät hinterlegt ist)
- Esders Kombigas
- 5 Komponenten Mischgas

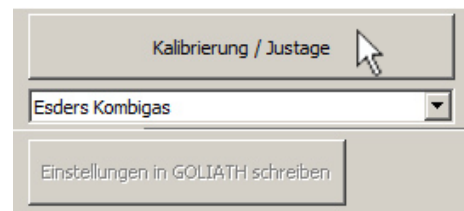


It is also possible to program other gases or to change the existing gases, as you can see on chapter **4.2 Testgas setup**.

#### 4.3.1. EXAMPLE COMBI GAS BALANCE

To start a test or calibration choose the wanted gas or the instrument setting and press the button “Calibration / Adjustment”.

As you can see in this example, „**Esders Kombigas**“ is chosen. The test gas evaluated several sensors at the same time, which are included in the gas.



The procedure is started with a warm up phase and a new screen which shows the selected gas, the measurement value and pump flow. Follow the instructions on the screen to go on. It is essential that instrument can suck fresh air to set a correct zero.



**Warning/Danger!**

Especially at the adjustment of the CO<sub>2</sub> sensor it is recommended to suck fresh air from outside! The enriched CO<sub>2</sub> by breathing leads to errors in the adjustment of zero.



**GOLIATH Gerätesetup / Justage**

Menüpunkt: Kalibrierung / Justage

Speichermodus: Esders Kombigas

Speicherintervall in Sek: 2 Einstellungen in GOLIATH schreiben

Speichermodus: Maximum

Bereitschaftssignal in Sek: 0

HL-Sensor 1000ppm

UEG-Sensor

**100% CH4-Sensor**

5% CO2-Sensor

>5% CO2-Sensor

CO-Sensor

H2S-Sensor

O2-Sensor

HL-Sensor 10ppm

**100%**

**Sensoreinlauf**

19,2 % O2
6 ppm CO
0,09 % CO2
0,0% UEG

**Pumpe: 29 L/h**

Bitte Gerät im Hauptmenü betreiben, und Gerät Gasfrei (Frischluff) halten.

Abbruch

**GOLIATH Gerätesetup / Justage**

Menüpunkt: Kalibrierung / Justage

Speichermodus: Esders Kombigas

Speicherintervall in Sek: 2 Einstellungen in GOLIATH schreiben

Speichermodus: Maximum

Bereitschaftssignal in Sek: 0

HL-Sensor 1000ppm

UEG-Sensor

**100% CH4-Sensor**

5% CO2-Sensor

>5% CO2-Sensor

CO-Sensor

H2S-Sensor

O2-Sensor

HL-Sensor 10ppm

**100%**

**Test**

17,8 % O2
140 ppm CO
1,95 % CO2
50,7% UEG

**Pumpe: 27 L/h**

Bitte Kombigas freigeben

Abbruch

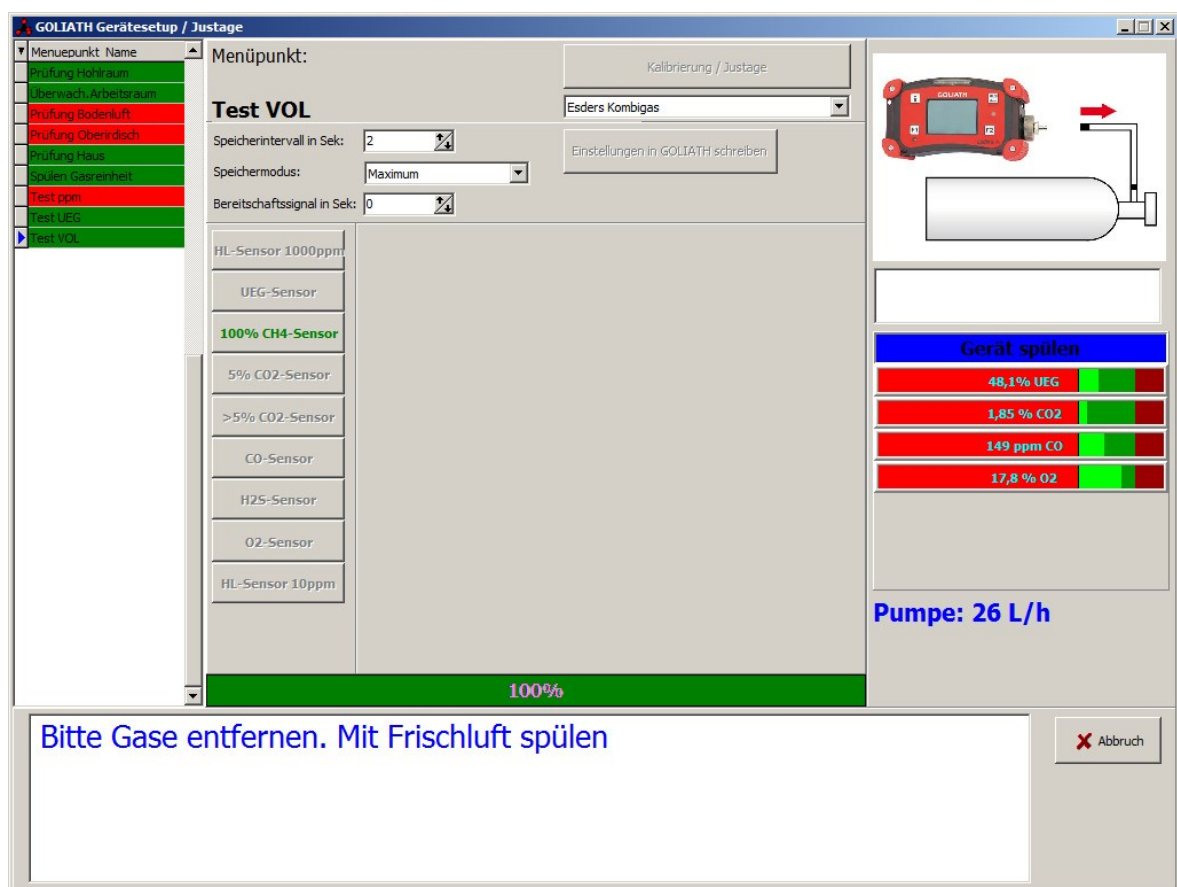
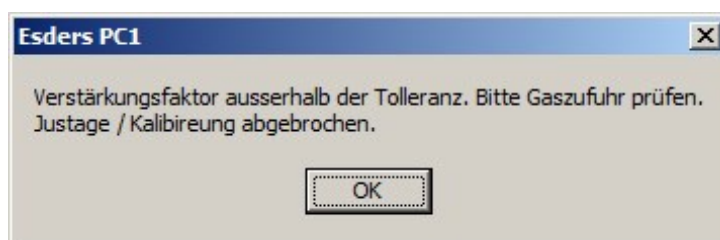
After completing the warm-up phase the image and text information show that you have to connect the gas. With it you will hear a beep and the text information flashes on color. The software detects the released gas and the test runs automatically.

Every sensor reading is displayed in a bar graph and if the reading is within the pre-set limits the bar graph color changes to green.



### Information!

If no adequate gas supply is available, an error message appears and the adjustment / calibration is aborted.



The picture and text information will advise you to disconnect the gas and the instrument flushes to come back to zero.

The software will adjust the readings if they are not within the limits.

Confirm the procedure by pressing “OK”. Now you can go on with a different sensor for the same menu point or choose the next menu point.



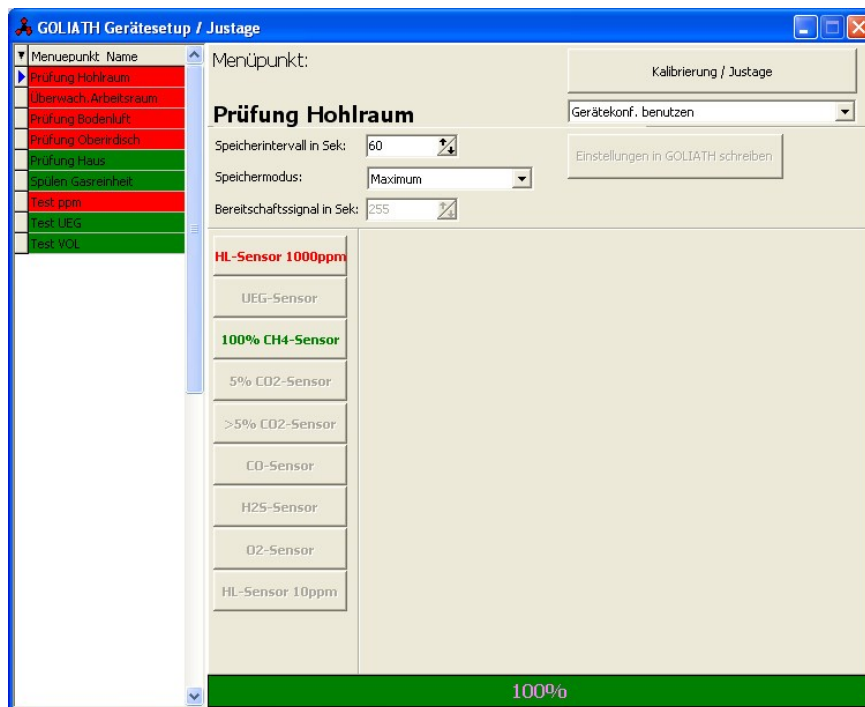
If all menu items are highlighted in green, all the necessary sensors have been calibrated / adjusted.

For each calibration / adjustment is a record for each sensor applied in the PC1 software. Through this it can always be detected when a calibration / adjustment was performed.

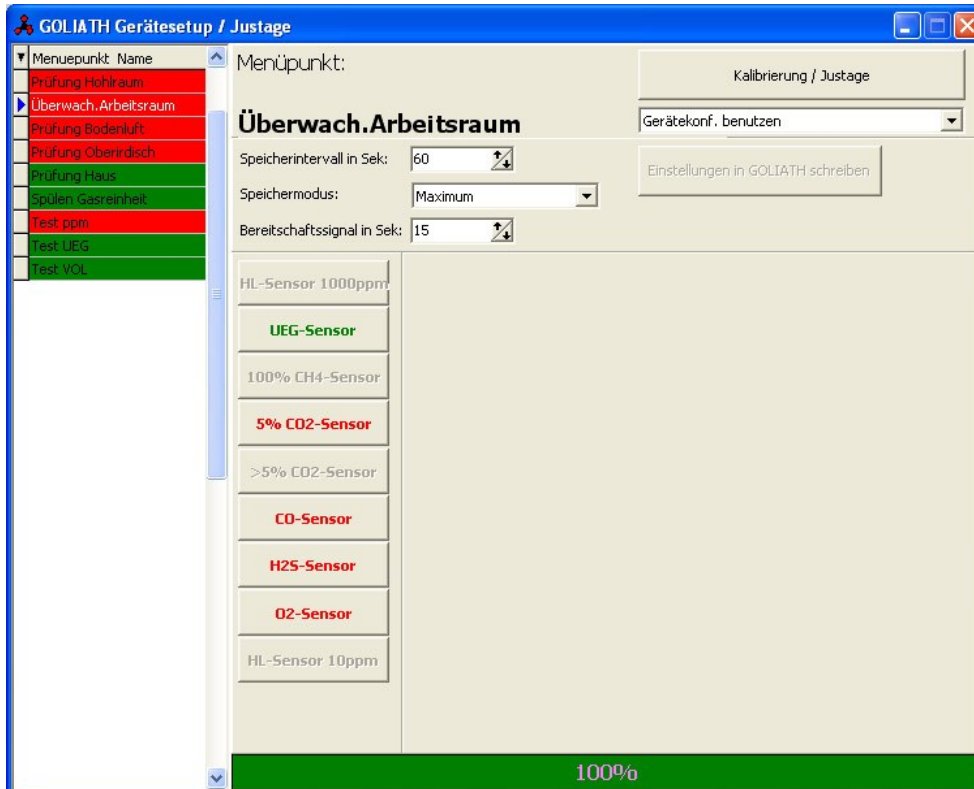
The menu item “Geräteeinstellungen Kal./Justage” has been available since the **Esders PC1 software version 2.0.0.40**.

#### 4.3.2. EXAMPLE SINGLE GAS CALIBRATION

In the single-gas calibration, you connect the charging cradle via USB cable with the PC and put the device in the charging cradle. The software starts with reading out the GOLIATH.



Now you can choose the required item  
(in this case „Überwach. Arbeitsraum“).



Next, the sensor is selected, which shall be calibrated  
(in this case the CO-sensor).



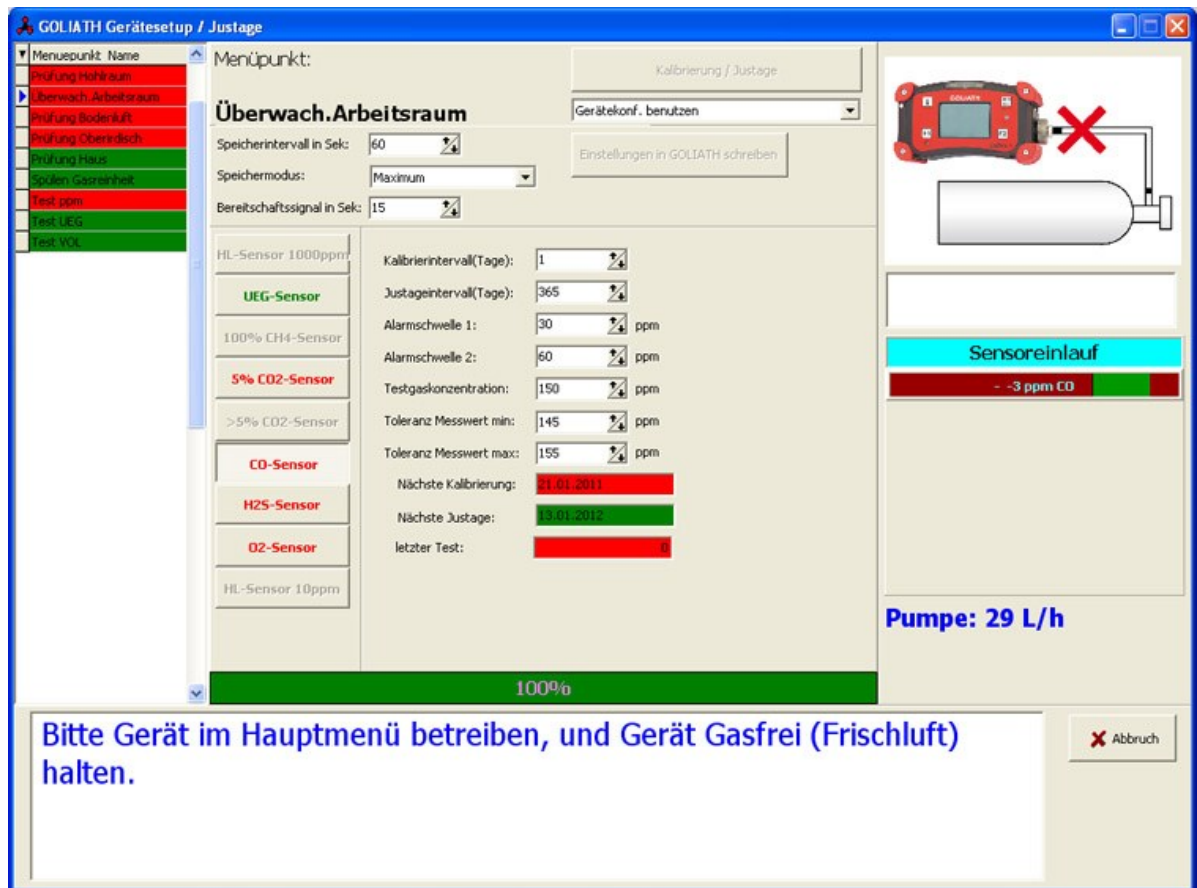
To start the test or calibration you have to choose the gas or device setting and press the button „Kalibrierung/Justage“.



In this example **“Gerätekonf. benutzen”** is selected. With this single-gas setting, a single sensor can be tested.

The procedure is started with a warm up phase and a new screen which shows the selected gas, the measurement value and pump flow.

The following graphic shows the warm up phase.



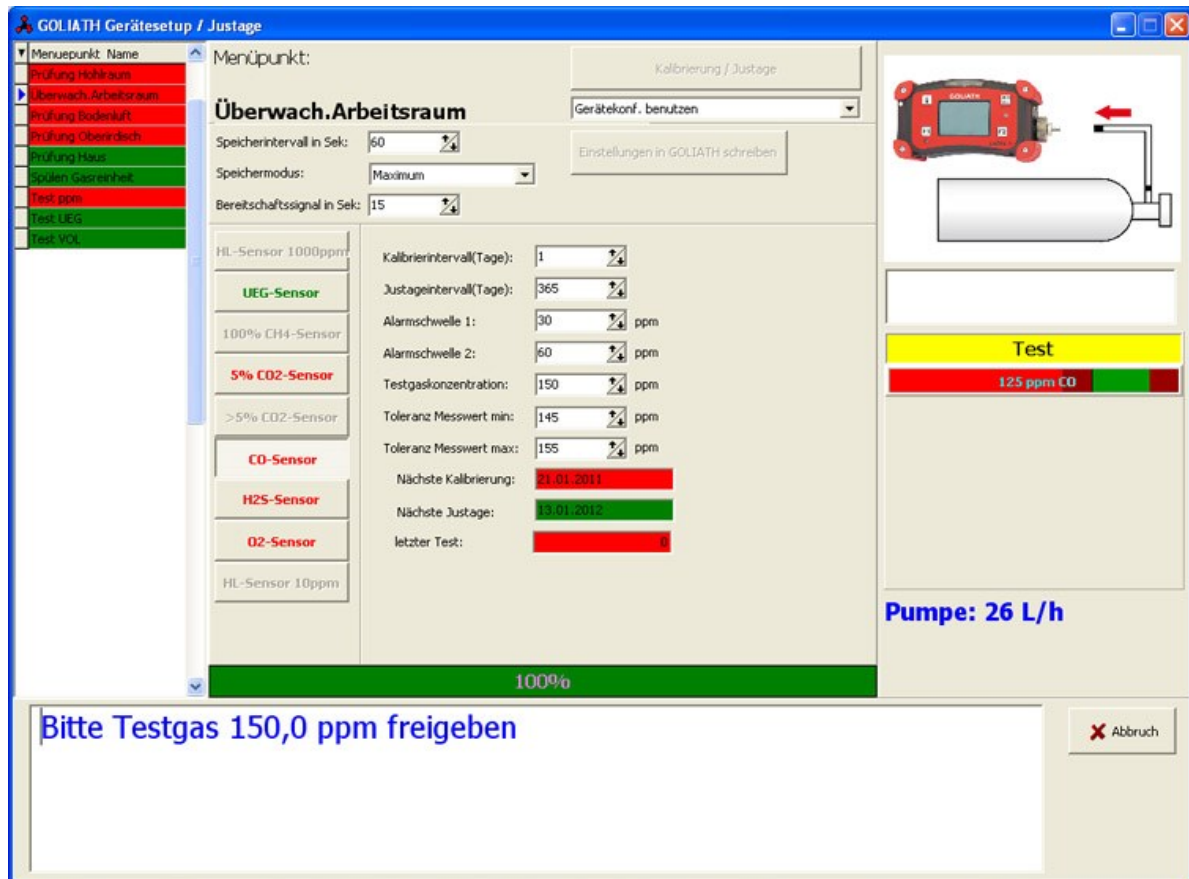
Follow the instructions on the screen to continue. It is essential that instrument can suck fresh air to set a correct zero.



**Warning/Danger!**

Especially at the adjustment of the CO<sub>2</sub> sensor it is recommended to suck fresh air from outside! The enriched CO<sub>2</sub> by breathing leads to errors in the adjustment of zero.

After completing the warm-up phase the image and text information show that you have to connect the gas. With it you will hear a beep and the text information flashes on color. The software detects the released gas and the test runs automatically.

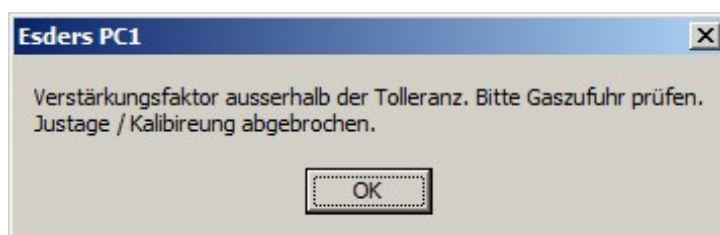


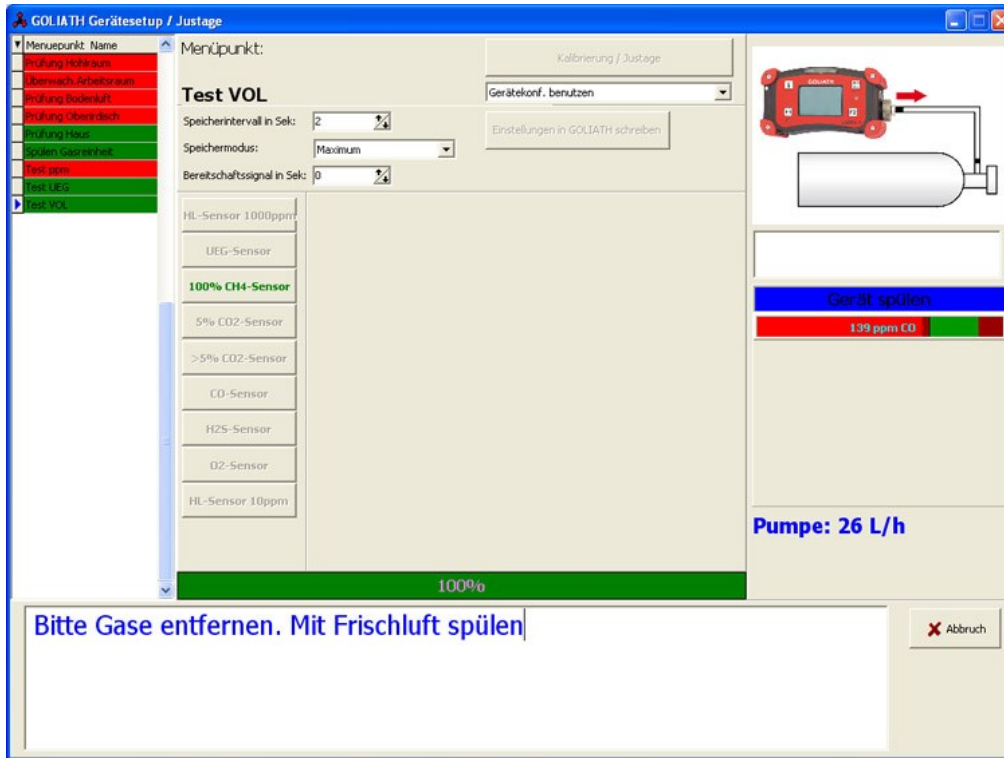
Every sensor reading is displayed in a bar graph and if the reading is within the pre-set limits the bar graph color changes to green.



### Information!

If no adequate gas supply is available, an error message appears and the adjustment / calibration is aborted.

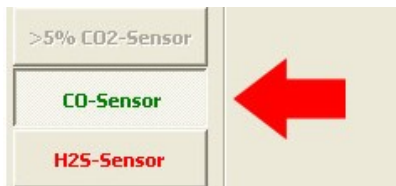




The picture and text information will advise you to disconnect the gas and the instrument flushes to come back to zero.

The software will adjust the readings if they are not within the limits.

Confirm the procedure by pressing “OK”.  
The CO sensor is shown in green.



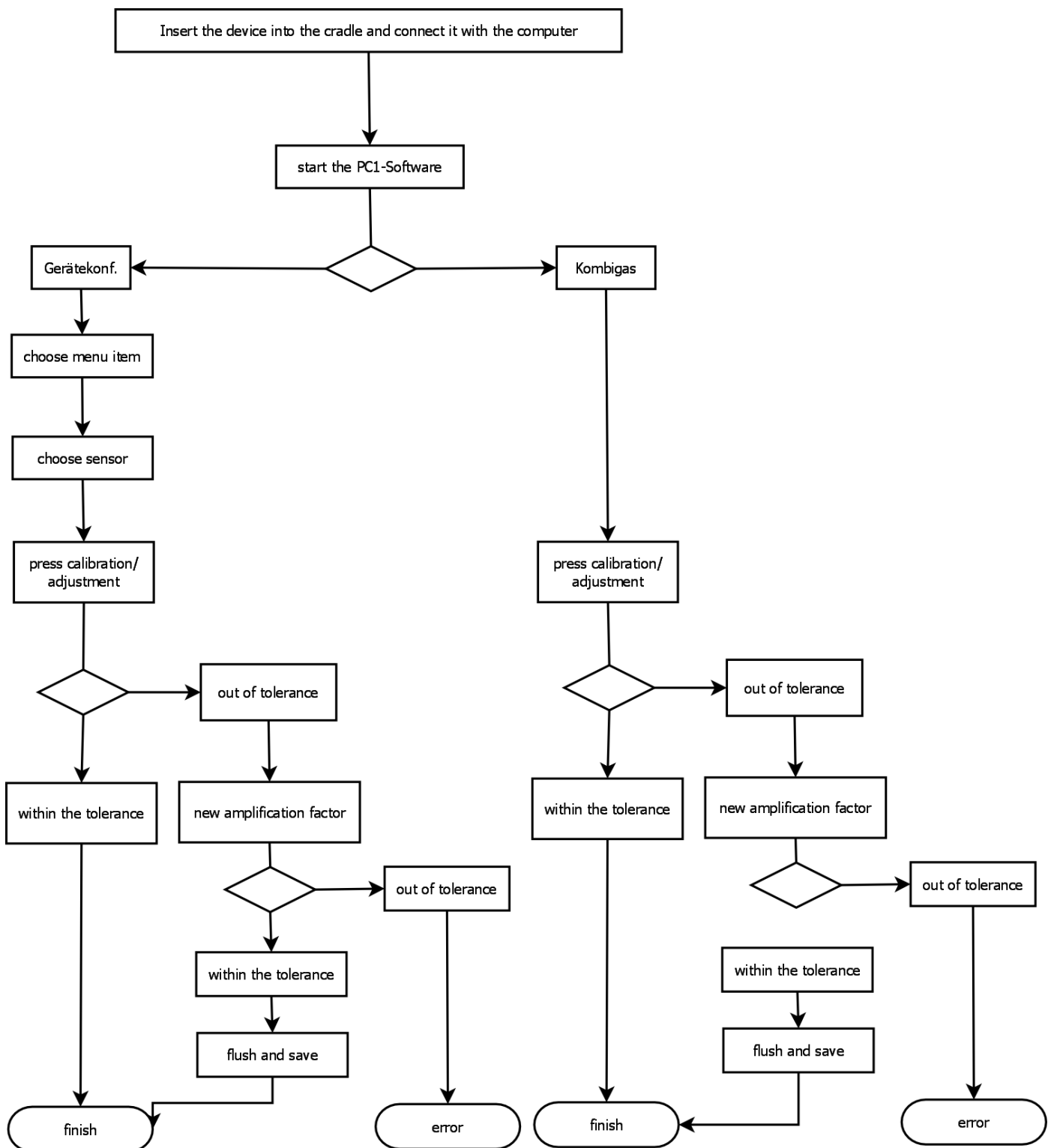
Now you can go on with a different sensor for the same menu point or choose the next menu point.

If all menu items are highlighted in green, all the necessary sensors have been calibrated / adjusted.

For each calibration / adjustment is a record for each sensor applied in the PC1 software. Through this it can always be detected when a calibration / adjustment was performed.

The menu item “Geräteeinstellungen Kal./Justage“ has been available since the **Esders PC1 software version 2.0.0.40**.

### 4.3.3. FLOW CALIBRATION / ADJUSTMENT





## **5. RECHARGING GOLIATH AND THERMAL PRINTER**

### **GOLIATH:**

The GOLIATH contains a NiMH battery, which can be recharged in a charging dock using a power supply unit or car charger leads.

Connect the charging dock to the power supply (12 V DC / 1.1 A) and place the device in the charging dock. The battery will then be automatically recharged.

The device can also be left in the charging dock after it has been completely recharged as it is fitted with overload protection.



The measurement device should only be charged using the designated Esders GmbH charging dock (item no. 202019/202020/202021). It contains a Wickmann series 425 type safety fuse (or similar) with a maximum rated current of 2A to protect the device.

### **Thermal printer:**

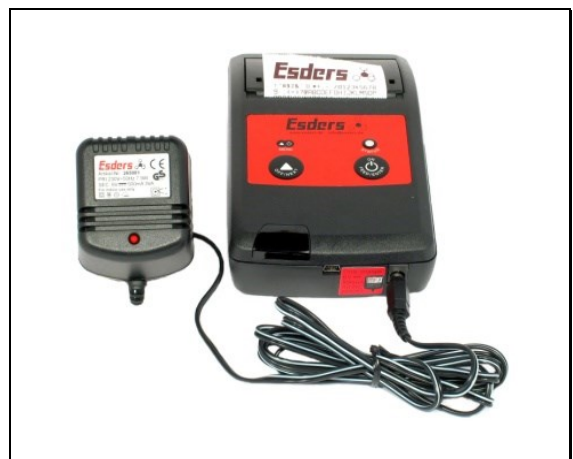
The thermal printer contains a NiMH rechargeable battery and can be recharged using a special power supply unit (6 V DC / 500 mA).

As the printer is charged with a voltage of 6 volts, you may only use this power supply unit.

In order to prevent any confusion, the following warning is displayed on the thermal printer:



The printer can be permanently damaged if another power supply unit is used, such as the recharging dock for the GOLIATH.



## **6. RECHARGEABLE BATTERY OPERATION**

The **GOLIATH** is powered using a rechargeable battery.


### **Warning!**

Only use the following rechargeable battery type by Esders (item no. 202050) in order to ensure explosion:

- 4 NiMH secondary cells in a pre-cast battery pack, rated voltage: 4.8 volts, rated capacity: 2,100 mAh

Recharging the **GOLIATH** is not allowed in explosive areas. Replacing the battery pack is also not allowed in explosive areas.

The device can operate for at least 8 hours when battery is fully charged (depending on mode, without backlight).

The current battery capacity can be displayed using the info button (). It is specified in increments of 5% and depends on the voltage of the batteries. The capacity indicator is only capable of representing tendencies and can thus fluctuate slightly from time to time.

If the “**Battery empty**” notice appears on the display, the GOLIATH should be recharged. The device can still be used for a limited time after this message appears. The device switches off automatically when reliable measurement can no longer be guaranteed.

The battery is charged using a maximum adapted charging current of 1,000 mA. A fully discharged device can be recharged in about 3 hours. Once the battery is fully charged, the device automatically switches to conservation charging. The integrated overload protection enables you to leave the device in the charging dock until you need it.



### **Warning!**

The device also consumes a small amount of power when switched off. Even if you are not using the device, recharge the battery on a regular basis (approx. every 4 weeks).

If the battery discharges too much, it will become permanently damaged.



### **Information!**

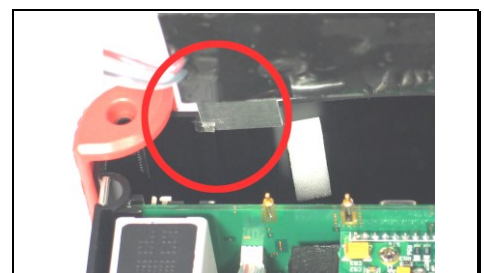
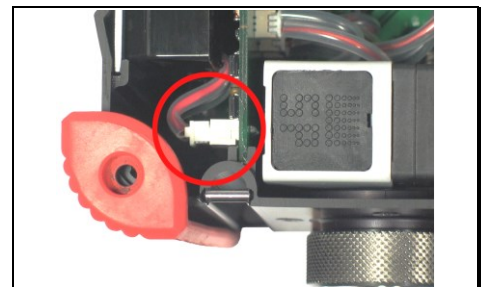
When the battery has discharged and the device can no longer be switched on, place the device in the charging cradle. After about 5 minutes, a message stating “Accu full” will appear on the device. Take the device out again and then replace to charge ‘properly’ for approx. 3 hours.

## 6.1. REPLACING THE BATTERY PACK

The battery pack only requires replacement in exceptional circumstances (e.g. due to a defect or considerable reduction in battery performance).

**Replace the battery pack as follows:**

- ⇒ First, shut off the GOLIATH and then loosen the four Allen screws (3 mm) on the base plate.
- ⇒ The protective rubber can now be pushed to the side and the base plate can be removed.
- ⇒ After that, the plug connector will have to be carefully removed from the circuit board.
- ⇒ The rechargeable battery pack can now be pulled upward and out of the device.
- ⇒ Check the battery and connector for corrosion on contacts and damage to connections.
- ⇒ Carefully insert the new rechargeable battery pack into the guide on both sides and push it downwards. The plug connector can now be reconnected to the circuit board. Care must be taken to ensure that none of the components are damaged in the process.
- ⇒ Then screw the base plate back on firmly.
- ⇒ After connecting the new rechargeable battery, it will be necessary to reset the current time of day and date in the “Options” menu!



When replacing a battery pack, take note of the new serial number and inform Esders GmbH of it.

## 6.1. BATTERY DISPOSAL



Used batteries should not be thrown away with household waste. As a consumer, you are legally obliged to return used batteries. You can deposit your used batteries at your local recycling point, or at places where the respective battery type is sold.

We will also gladly accept your used primary or rechargeable batteries. Mark them as '**used**' and send them back to us at the following address:

**Esders GmbH**

Keyword:

Battery disposal

Hammer-Tannen-Str. 26

49740 Haselünne

## **7. MAINTENANCE AND REPAIR**

The **GOLIATH** is a very low-maintenance, easy-to-use, measurement device, which is equipped with several gas sensors and, optionally, with a pressure sensor.

### **7.1. GAS SENSORS**

The sensors are used to measure gas concentration and detect gas leaks. The device houses several sensors which are used to measure the various gases, even at very low concentrations, up to 100% vol. for methane. Gases are sucked in by a membrane pump at a flow rate of approx. 45 l/h. No maintenance work can be carried out on the actual sensors.



The SC-sensor's sensitivity may be temporarily reduced or permanently damaged by the effects of sensor toxins or inhibitors.

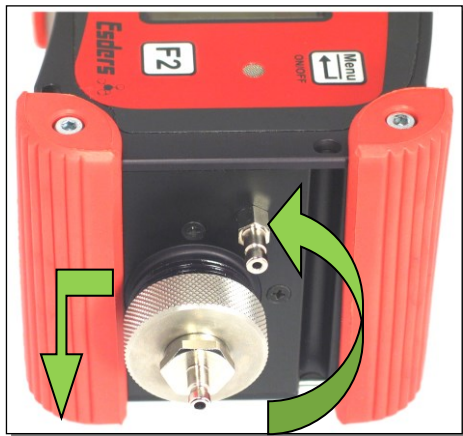
You should therefore avoid sucking in hydrogen sulphide (except for measurements in the "Confined space warning" menu), silicon vapours, oils, phosphate esters, halogens and other chemical substances. If the GOLIATH is exposed to such substances, you must test sensor sensitivity!

Check the water-repellent filter in the connection head filter screw connection on a regular basis. The measurement device will only work properly if the gas can get through to the sensor unimpeded. Heavy soiling and/or water getting into the device may set off the pump alarm.

Filters and filter connection o-rings should also be checked on a regular basis. Damaged o-rings must be replaced to prevent moisture getting into the device.

## 7.2. REPLACING FILTERS

There is a water-repellent filter on the measuring device connection head to prevent water infiltration.



To replace the water-repellent filter, unscrew the connection head on the **GOLIATH**. To undo the connection head, turn the knurled screw to the left and then remove from the device.



If water or large amounts of dust and dirt have got into the head, the device should be held with the connection head pointing downward when it is unscrewed!



After the connection head is unscrewed and the filter disc removed, check the o-ring and the integrated dust filter. If the o-ring is damaged, it must be replaced to ensure the measurement device will work correctly.

The dust filter should be replaced by Esders Service Department only.



Check the o-ring on the connection head for any tears. The o-ring can be coated with Vaseline on the outside to make it easier to screw on.

In doing so, ensure the inner attachment face remains clean so the filter does not stick.



When inserting the filter, ensure it lies in the middle of the section to make certain no gas can pass by the filter. The glossy, structured side should face inwards and the plain side outwards.



Water will only be kept out if the knurled screw is firmly tightened (by hand). If water or a large amount of dust is present in the filter, ensure water or dust is prevented from getting into the device when the filter is removed. For that reason, the device should be held with the connection head facing downward and the dust and moisture should be removed before the filter out is taken out.



A damp filter (water-repellent filter disc) can be dried so it is fit for further use if it is not contaminated. Use tweezers to replace the filter. Ensure you do not damage it when doing so.

When inserting the filter, place carefully into the device as it can be easily damaged. Do not use sharp instruments. The glossy, structured side with the supporting tissue should face inwards and the plain side outwards.

### 7.3. SERVICING ADDRESS

Esders GmbH service workshop and mobile service are at your disposal for repairs and servicing of the **GOLIATH**.

#### **Esders GmbH**

Hammer-Tannen-Str. 26

D - 49740 Haselünne

Tel.: 05961-9565-0

Fax: 05961-9565-15

[www.esders.de](http://www.esders.de)

[info@esders.de](mailto:info@esders.de)

## **8. ADJUSTMENT AND FUNCTIONS TESTING**

**When using the GOLIATH as a gas warning device, please note the following:**

According to the German Chemical Industry Employer's Liability Insurance Association information sheet BGI 518 – 1/2003 (replaces information sheet T 023) 'Gas warning devices for explosion protection', a minimum of one test should be carried out by a user before each work shift.

This test includes the following checks as minimum:

- Battery charge status
- Display messages with zero gas and test gas

**When using the GOLIATH for**

- Combustible Gas Indicator (CGI) LEL
- Testing exposed gas pipes and installation piping
- Testing cavities
- Measuring concentration when changing gas type

**take into account:**

Devices must undergo different tests and servicing in accordance with DVGW Technical Information Notification G 465-4 dated March 2001 "Gas detection and gas concentration measurement devices for testing gas systems".

1. Functional testing and sensitivity tests before starting work or after interrupting work.
2. Testing of display message accuracy (Adjustment) by qualified staff.
3. Servicing by a qualified person from the utility company, a specialist firm or the manufacturer (at least once a year).

Tests must be documented and documentation kept on file for at least a year.

### **8.1. FUNCTIONAL TESTS AS PER G 465-4**

Functional testing and sensitivity tests before starting work or after interrupting work must be carried out by the user.

Such testing includes the following items:

- State of device on the outside, including probe systems
- Functioning of operational controls
- Battery status
- Electrical zero point



- Checking the pump and the suction path
- Testing the display message sensitivity by exposing device to test gas



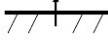
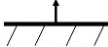
Exposing the device to the test gas using the corresponding test adapter; the test should be undertaken in a depressurised state.

This means:

- measuring the pump capacity and adjusting the test gas flow rate, or
- setting the test gas flow rate higher than the pump capacity and letting the remaining test gas disperse using a by-pass.

Refer to the corresponding paragraphs in these operating instructions to use the individual menu items.

**Case of application and test frequencies:**

Function GOLIATH	Symbol	Operating principle	Gas	Measurement range	Test gas*	DVGW G 465-4	Recommendation Esders GmbH
Inspec. PPM-LEL-VOL%		Semi-conductor (SC)	CH <sub>4</sub>	0 to 1,000 ppm	1/2	weakly to ½-yearly	weakly
		Infrared (IR)	CH <sub>4</sub>	0.1 to 100% vol.	4		
Confined space warning		Infrared (IR)	CH <sub>4</sub>	0 to 100% LEL	3/7	weakly to ½-yearly	before starting work
			CO <sub>2</sub>	0 to 5% vol.	3/7		
		Electro-chemical (EC)	CO	0 to 500 ppm	3/7		
			H <sub>2</sub> S	0 to 100 ppm	3/7		
			O <sub>2</sub>	0 to 25% vol.	3/7		
Bare hole testing		Infrared (IR)	CH <sub>4</sub>	0.1 to 100% vol.	3/7	weakly to ½-yearly	¼-yearly
			CO <sub>2</sub>	0 to 20% vol.	3/7		
		Electro-chemical (EC)	O <sub>2</sub>	0 to 25% vol.	3/7		
Inspection P-Net		Semi-conductor (SC)	CH <sub>4</sub>	0 to 1,000 ppm	1/2	before use and after work interruptions	weakly
		Infrared (IR)	CH <sub>4</sub>	0.1 to 100% vol.	4		


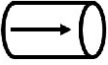
Leak detection house		Semi-conductor (SC)	CH <sub>4</sub>	0 to 1,000 ppm	1/2	weakly to ½-yearly	weakly
		Infrared (IR)	CH <sub>4</sub>	0.1 to 4.4% vol.	3/7		
		Electro-chemical (EC)	CO	0 to 500 ppm	3/7		
Purging %VOL		Infrared (IR)	CH <sub>4</sub>	0.1 to 100% vol.	3/7	weakly to ½-yearly	¼-yearly
		Electro-chemical (EC)	O <sub>2</sub>	0 to 25% vol.	3/7		
Ethan-analyse		Chromatographic separation column	minimum detection sensitivity: 10 ppm C <sub>2</sub> H <sub>6</sub>		6	weakly to ½-yearly	at least monthly or prior to use

Table 2: Main cases of application and prerequisites for gas concentration measurement devices

Note:

The test cycle should be adjusted to frequency of use.



The device start-up phase should always take place in fresh air.

- \* Test gas 1: 10 ppm CH<sub>4</sub>
- \* Test gas 2: 1,000 ppm CH<sub>4</sub>
- \* Test gas 3: 4 components – 2.2% vol. CH<sub>4</sub>; 150 ppm CO; 2.0% vol. CO<sub>2</sub>; 17.5% vol. O<sub>2</sub>
- \* Test gas 4: 2.2% vol. CH<sub>4</sub>
- \* Test gas 5: 100% vol. CH<sub>4</sub>
- \* Test gas 6: 50 ppm C<sub>2</sub>H<sub>6</sub>; 1.0% vol. CH<sub>4</sub>
- \* Test gas 7: 5 components - 1,45 %Vol. CH<sub>4</sub>; 60 ppm CO; 2,5 %Vol. CO<sub>2</sub>; 15 %Vol. O<sub>2</sub>, 20 ppm H<sub>2</sub>S

## 8.2. TESTING OF DISPLAY MESSAGE ACCURACY (ADJUSTMENT)

Testing of display reading accuracy is dependent on how the measurement device is used. Tests can take place on a daily basis or up to half-yearly basis (also see table 2 “Main cases of application and prerequisites for gas concentration measurement devices” in section 7.1 “Functional tests as per G 465-4”).

Display reading accuracy must be tested by a qualified person from the gas utility company, a specialist firm or the manufacturer.




Operating principle	Gas	Zero point tolerance	Test gas [in synth. air]	Display set point	Display tolerance
Semi-conductor (SC)	CH <sub>4</sub>	0 – 1 ppm	1,000 ppm	1,000 ppm	900 – 1,300 ppm
		0 – 1 ppm	10 ppm	10 ppm	≥ 10 ppm
Infrared absorption (IR)	CH <sub>4</sub>	0 – 1% LEL	2.2% vol.	50% LEL	45 – 55% LEL
		0 – 0.2% vol.	100% vol.	100% vol.	98 – 102% vol.
	CO <sub>2</sub>	0 – 0.2% vol.	2% vol.	2% vol.	1.8 – 2.2% vol.
Electro-chemical (EC)	CO	0 – 2 ppm	150 ppm	150 ppm	140 – 160 ppm
	H <sub>2</sub> S	0 – 2 ppm	50 ppm	50 ppm	45 – 55 ppm
	O <sub>2</sub>	20.6 – 21.1% vol.	17.5% vol.	17.5% vol.	17.2 – 17.7% vol.

Table 3: Test gases and readout accuracies in various gas and concentration ranges

The test must be carried out using the test gas specified in this table. Fresh air (ambient air) is to be used for the zero point calibration of the CO<sub>2</sub> sensor. Calibration using synthetic air will result in measurement errors!

If deviances are greater than those specified in the table, the sensor requires adjustment.

It is easiest to feed the test gas using a pressure and flow rate restrictor (item no. 331020). Ambient air must be fed in directly with a flow rate of about approx. 35 litres per hour. Test gas can also be fed in without pressure by means of a bypass with a flow rate of ≥ 50 l/h.

Procedure for checking sensitivity		
1.	Check the water-repellent filter for dirt and change the filter if necessary	
2.	Switch on the GOLIATH and check rechargeable battery capacity in the "Info" menu. It should be at least 40 %.	
3.	One of the following menu items can now be selected in order to check sensitivity for the sensor in question: «Test ppm»: Semiconductor sensor (SC) «Test LEL»: Infrared sensor (IR) and electrochemical sensor (EC) «Test VOL»: Infrared sensor (IR)	 → 
4.	After the sensor start-up phase, the test gases are fed in as per table 3 (see above).	
5.	The test gases must be released directly at approx. 35 l/h. While doing so, observe the message on the screen.	
6.	Once values have stabilised, the reading should not exceed the values specified in the table. If the reading lies outside the range, the sensor must be re-adjusted.	
7.	The sensitivity check should be documented. (You can find a sample test record in the appendix)	

### **8.3. MAINTENANCE**

The GOLIATH must only be serviced by Esders GmbH Service Department or other authorised persons. Only original Esders replacement parts must be used.

The device should undergo servicing and repairs after one year at the latest. Such maintenance includes expert servicing of devices, replacement of components with a limited service life and device adjustment.

You must adhere to applicable regulations for devices with explosion protection.

The GOLIATH measurement device is adjusted for use within its respective specified measuring range.

A sensitivity check should be carried out on the sensor on a regular basis using a suitable test gas (see also Technical Information Notification G 465-4 dated March 2001 "Gas detection and gas concentration measurement devices for testing gas systems").

A test record should also be issued regarding sensitivity check (see appendix).

## **9. ACCESSORIES**

### **9.1. CONNECTION TECHNOLOGY**

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#### **Testing Device PED 80 GOLIATH**

Item no. 331021

- For limiting pressure and flow rate to regulate in-feed of test gas
- Flow regulator for connecting directly to pressure gas cylinders
- With pressure gauge



#### **Testing Device PED 120 l/h - 10ppm test**

Item no. 331019

- With test gas conditioning and probe adapter
- For limiting pressure and flow rate to regulate in-feed of test gas
- Flow regulator for connecting directly to pressure gas cylinders
- With pressure gauge



#### **Carpet probe TS10**

Item no. 232113

- Carpet probe with optimised intake dome
- Highly flexible intake hose with quick release coupler
- Telescoping handle rod



#### **Bell probe carbon GOLIATH**

Item no. 232086

- For surface measurement on impassable terrain
- With dust filters 8 x 15 mm



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**Borehole probe carbon GOLIATH**

Item no. 232085

- For use in probe holes
- With dust filter and easily replaceable water-repellent filter

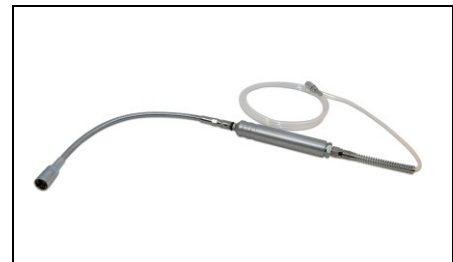



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**Flexible hand probe V2**

Item no. 271118

- With flexible plug-in probe




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**Floating probe GOLIATH**

Item no. 232080

- With 3 m probe tube and water barrier




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**Test Gas Cylinder 5 components  
(1.45% CH<sub>4</sub>, 60ppm CO, 2.5% CO<sub>2</sub>, 15% O<sub>2</sub>,  
20ppm H<sub>2</sub>O)**

Item no. 372011

- Contents 1.65 Litre, pressure 35 bar

**Test Gas Cylinder 4 components  
(2.2% CH<sub>4</sub>, 150ppm CO, 2% CO<sub>2</sub>, 17.5% O<sub>2</sub>)**

Item no. 372002

**Test Gas Cylinder 10 ppm methane**

Item no. 372007

**Test Gas Cylinder 1,000 ppm methane**

Item no. 372004

**Test Gas Cylinder 2.2% vol. methane**

Item no. 372006

**Test Gas Cylinder 100% vol.methane**

Item no. 372009

- Contents 1 Litre, pressure 12 bar
- 



**Filter Set hydrophobic for SIGI EX / DAVID / SAFE GOLIATH**

Item no. 271112

- 10 hydrophobic 1µm filter discs

**Filter Set for Carbon Probe System**

Item no. 271111

- 25 dust filters, 8 x 15 mm

**Filter Set for SIGI EX / GOLIATH Flexible Plug-in Probe**

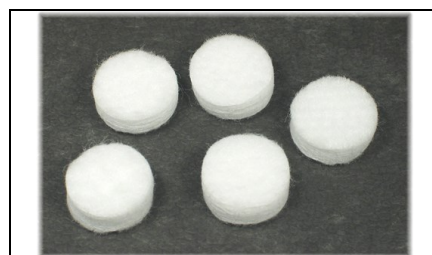
Item no. 271113

- 25 dust filters, 6 x 15 mm

**Dust Filter 23,5 mm (50 Stück)**

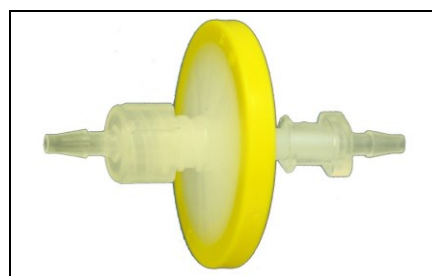
Item no. 202008

- Filter for GOLIATH carpet probe

**Hydrophobic filter 30/1.0 µm, yellow**

Item no. 505020

- For GOLIATH floating probe and borehole probe





## 9.2. CHARGING TECHNOLOGY

### **GOLIATH charging station**

Item no. 202019

### **GOLIATH communication charging station**

Item no. 202020

### **GOLIATH test and charging station**

Item no. 202021

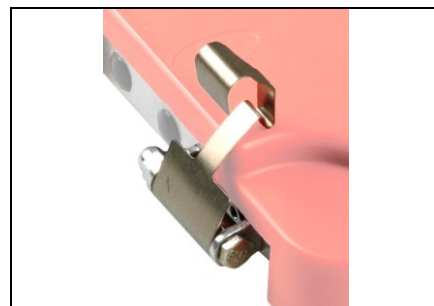
- Power supply unit or car charging cable required
- Charging station with connection for 2 gases, mini-USB and retainer clips available
- With infrared data transmission for analysis on PC



### **GOLIATH charging station fastening set**

Item no. 202025

- 2 retainer clips for fastening the GOLIATH securely



### **230 V Power Supply Unit**

Item no. 202002

- For recharging GOLIATH in the charging station
- Supplies 12 V DC / 1,100 mA



### **Car Charger Lead for 12 V socket**

Item no. 202003

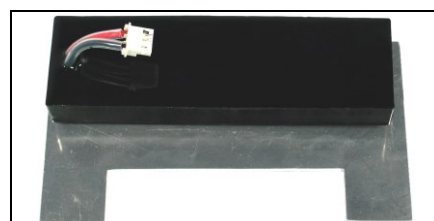
- For connecting GOLIATH with charging station in cars
- Supplies 12 V DC / 1,100 mA



### **Rechargeable battery pack for GOLIATH**

Item no. 202050

- Pre-cast battery pack with mounting plate
- Rated voltage: 4.8 volts
- Rated capacity: 2,100 mAh



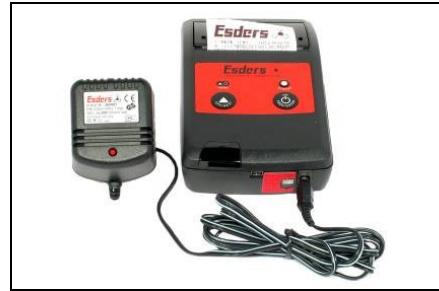
### 9.3. OTHER ACCESSORIES

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#### **Thermal Printer IR 58 mm (with power supply unit)**

Item no. 262009

- NiMH rechargeable batteries
- With IR port for GOLIATH
- Incl. power supply unit 6 V DC, 500 mA



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#### **Paper for 58 mm IR Thermal Printer**

Item no. 265082

- Paper roll 11 m in length

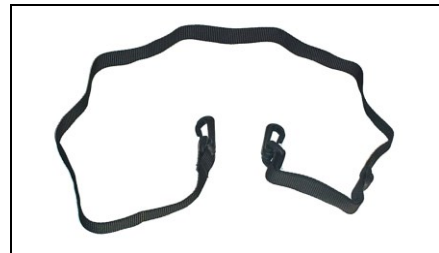


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#### **GasTest alpha / GOLIATH abdominal belt**

Item no. 202012

- For fastening the GOLIATH in front of the abdomen (in combination with the carrying strap)



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#### **GOLIATH carrying strap**

Item no. 202028

- Length adjustable
- With grommets for the abdominal belt
- For easily hooking in the GOLIATH



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#### **GOLIATH lap belt**

Item no. 202029

- Easily adjustable with quick-release fastener
- Ideal for transport in a lateral position on the body (when inspecting pipeline networks, for instance)



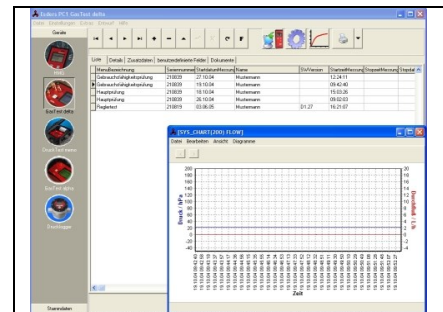
## For processing with a PC:

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### Data Evaluation Software for measurement devices V. PC1

Item no. 262007

- Licence for 1 workstation
  - PC software for easy evaluation of the measurements conducted
  - Graphic display and printout of measurement data
  - Menu items can be faded in and out easily
  - Extra fields for entering details such as
    - customer's name and address
    - meters or regulator numbers, etc.
- 



## **10. ALARMS, AND TROUBLE-SHOOTING**

### **10.1. ALARM MESSAGES**

During operation, special operational statuses may arise due to specific circumstances and incidents. These are indicated by a flashing message in the top row on the display screen. As only one message can be shown on the display at any one time, such messages will take precedence. If several messages are pending, only the most urgent one will be displayed.

Gas alarm
Sensor init.
Pump alarm
Range overflow
Condensation risk!
Low batt.
Memory overflow!

Potential messages on the display screen; listed according to priority.

#### **10.1.1. GAS ALARM**

This alarm message is displayed as soon as the respective threshold value of a gas concentration in the menu item is exceeded.

#### **10.1.2. SENSOR INIT**

This message flashes until the sensors have been set and a valid sensor measurement signal is present.

#### **10.1.3. PUMP ALARM**

This alarm will be triggered if the pump flow rate is below a certain value (depending on menu item). As soon as the flow rate rises above this level, the alarm is automatically re-set.

#### **10.1.4. RANGE OVERFLOW**

This message appears as soon as the current reading goes above the valid measurement range. As soon as the reading is back within the valid range, the message is automatically re-set.

**10.1.5. CONDENSATION RISK!**

This notice will appear on the display if too much moisture is registered during a measurement.

**10.1.6. LOW BATT.**

This message appears when there is only 5% battery capacity left, which guarantees remaining operational time of 15 minutes. The message is re-set when battery is re-charged.



**10.1.7. MEMORY OVERFLOW!**

This message indicates that the device memory is full and measurement readings can no longer be displayed. This message is deactivated as soon as the memory data is uploaded and/or deleted.

## 10.2. TROUBLESHOOTING

Problem	Possible cause	Solution
Rechargeable battery is not charged (GOLIATH)	- Charging contacts corroded or contaminated	- Clean charging contacts (do not use any sharp instruments when doing so)
"	- Rechargeable battery is extensively discharged	- Place GOLIATH in the charging dock and take out again after 5 min (when "Accu full" message is displayed) - Then recharge as usual
Rechargeable battery is not charged (charging dock / car charger leads)	- Fuse in charging station defect - Charging contacts contaminated - Power supply unit defect	- Send device to Esders Service Department - Clean contacts (do not use any sharp instruments when doing so) - Replace power supply unit
The device switches off when being used	Automatic switch-off has been selected in the device menu (not apply to the menu "Confined space warning")	Disable automatic switch-off
"	Battery capacity too low	Recharge battery
Pump alarm	Filter damp or dusty and blocked	Replace or dry filter (DO NOT turn filter over)
"	GOLIATH sucking in negative pressure through disconnected hose, or sensor hose quick-release coupling is closed as the sensor has not been connected	Ensure intake can flow unhindered
Gas reading during test gas exposure too low	Sensor drift due to inhibitor such as H <sub>2</sub> S (substance which reduces sensitivity temporarily)	Expose device to test gas several times. If reading increases each time exposed to test gas, adjustment often not necessary.
"	Sensor sensitivity permanently reduced due to sensor toxin	Re-adjust device
Device does not respond when key is pressed	- Key defect	Send device to Esders Service Department
Display does not light up	- "Backlight off" selected in device menu - Backlighting defect	- Set to "Backlight on" or for required period of time - Send device to Esders Service Department

## **11. TECHNICAL DATA**

<b>Description:</b>	<b>GOLIATH</b>
<b>Dimensions:</b>	175 x 100 x 87 mm (without connection couplings)
<b>Weight:</b>	~ 1,200 g
<b>Pump:</b>	Membrane pump with flow rate of approx. 45 l/h, Negative pressure > 100 hPa
<b>Display:</b>	illuminated LCD graphic display with 128 x 64 pixel
<b>Power supply:</b>	4 NiMH secondary cells in a pre-cast battery pack, rated voltage: 4.8 volts, rated capacity: 2,100 mAh
<b>Charging time:</b>	approx. 3 hours until fully charged
<b>Charging voltage:</b>	max. 8.5 V DC
<b>Charging current:</b>	max. 1 A (fused)
<b>Operating time:</b>	at least 8 hours (depending on mode, without backlight), warning message when recharging required, automatic switch-off when voltage is too low
<b>Ambient temperature:</b>	- when operating: -10°C to +40°C - when in storage: -25°C to +60°C (without battery pack)
<b>Readouts and messages:</b>	- visual: digital concentration readouts, (ppm, % vol., % LEL, optional: hPa/mbar) and concentration-dependent alarm LEDs - acoustic: concentration-dependent audio signal
<b>Memory:</b>	Flash memory 4 Mbyte for more than 1 Mio. measurement values (measurement data is also retained when batteries are removed)
<b>Service life:</b>	12 month warranty, expected service life > 5 years
<b>Explosion protection:</b>	EC-Type Examination Certificate
Testing Centre:	<b>DEKRA EXAM GmbH</b>
Test number:	<b>BVS 09 ATEX E 079 X</b>
Identification code:	 <b>II 2G Ex ib d IIB T3</b> (NiMH)
	 <b>II 2G Ex ib d IIB T4</b> (Alkaline)

**Gas sensors:**

Operating principle	Gas	Measurement range	Resolution	Gas type
Semiconductor sensor (SC)	CH <sub>4</sub>	0 to 2,000 ppm	1 ppm	Methane
Infrared sensor (IR)	CH <sub>4</sub>	0 to 100% LEL	0.5% LEL	Methane
		0 to 100% vol.	0.1% vol.	Methane
Electrochemical sensor (EC)	CO	0 to 500 ppm	1 ppm	Carbon monoxide
	H <sub>2</sub> S	0 to 100 ppm	1 ppm	Hydrogen sulphide
	O <sub>2</sub>	0 to 25% vol.	0.1% vol.	Oxygen

Operating principle	Gas	Setting time T <sub>90</sub>	Display precision
Semiconductor sensor (SC)	CH <sub>4</sub>	≤ 5 sec.	± 20 % of end value
Infrared sensor (IR)	CH <sub>4</sub>	≤ 5 sec.	± 2% LEL (up to 4.4% vol.)
	CH <sub>4</sub>	≤ 5 sec.	± 2 % (up to 100% vol.)
	CO <sub>2</sub>	≤ 5 sec.	± 0.2 %
Electrochemical sensor (EC)	CO	≤ 30 sec.	± 10 ppm
	H <sub>2</sub> S	≤ 40 sec.	± 4 ppm
	O <sub>2</sub>	≤ 15 sec.	± 0.3 %

Operating principle	Gas	Relevant cross sensitivities
Semiconductor sensor (SC)	CH <sub>4</sub>	All flammable gases, Changing in air humidity, Changing in oxygen content
Infrared sensor (IR)	CH <sub>4</sub>	All hydrocarbon gases C <sub>x</sub> H <sub>y</sub>
	CO <sub>2</sub>	None known
Electrochemical sensor (EC)	CO	<u>Reference values</u> for gases and their displayed values: Hydrogen sulphide 20 ppm, display < 5 ppm CO Sulphur dioxide 20 ppm, display < 5 ppm CO Hydrogen 200 ppm, display ~ 25 ppm CO Nitrogen oxide 50 ppm, display < 25 ppm CO Nitrogen dioxide 20 ppm, display approx. -5 ppm CO Ethylene 100 ppm, display 100 ppm
	H <sub>2</sub> S	<u>Reference values</u> for gases and their displayed values: Carbon monoxid 100 ppm, display < 2 ppm H <sub>2</sub> S Sulphur dioxid 2 ppm, display 0 ppm H <sub>2</sub> S Ethylene 100 ppm, display 0 ppm Nitrogen oxide 25 ppm, display 0 ppm H <sub>2</sub> S Nitrogen dioxide 3 ppm, display 0 ppm H <sub>2</sub> S



**Pressure sensor:**

**Operating principle:** Piezo resistive (PR) – for non-aggressive gases

**Measurement range and resolution:**

0 to 200 hPa → 0.1 hPa resolution  
200 to 2,000 hPa → 1 hPa resolution

**Measurement precision:**

± 0.5% of end value

**Setting time:**

$t_{90} \leq 2$  seconds



The maximum capacity amounts to 3,000 hPa positive pressure.

## **12. WARRANTY CONDITIONS**

We thank you for choosing the **GOLIATH**. All devices are carefully checked by our technicians before they leave our production facilities.

We offer a 12-month warranty on all our devices if they are used as intended.

Our liability is limited to repairs or adjustment of the device, which should be returned to the factory for such purposes.

Consumables such as batteries are expressly excluded from this warranty. Likewise, damage to the gas sensor caused by improper handling of the device is also excluded.

If a malfunction is brought about by incorrect handling or by abnormal operating conditions, repairs are carried out at a charge.

In such cases, you will be informed of the expected cost before repairs are started.

## 13. APPENDIX

### 13.1. EC-TYPE EXAMINATION CERTIFICATE



- (1) **EG-Baumusterprüfbescheinigung**
- (2) **- Richtlinie 94/9/EG -  
Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung  
in explosionsgefährdeten Bereichen**
- (3) **BVS 09 ATEX E 079 X**
- (4) **Gerät:** Gaswarn- und Gasmessgerät Typ GOLIATH
- (5) **Hersteller:** Esders GmbH
- (6) **Anschrift:** 49740 Haselünne
- (7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.
- (8) Die Zertifizierungsstelle der DEKRA EXAM GmbH, benannte Stelle Nr. 0158 gemäß Artikel 9 der Richtlinie 94/9/EG des Europäischen Parlaments und des Rates vom 23. März 1994, bescheinigt, dass das Gerät die grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllt.  
Die Ergebnisse der Prüfung sind in dem Prüfprotokoll BVS PP 09.2095 EG niedergelegt.
- (9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit:
- |                  |                          |
|------------------|--------------------------|
| EN 60079-0:2006  | Allgemeine Anforderungen |
| EN 60079-1:2007  | Druckfeste Kapselung 'd' |
| EN 60079-11:2007 | Eigensicherheit 'i'      |
- (10) Falls das Zeichen „X“ hinter der Bescheinigungsnummer steht, wird in der Anlage zu dieser Bescheinigung auf besondere Bedingungen für die sichere Anwendung des Gerätes hingewiesen.
- (11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf die Konzeption und die Baumusterprüfung des beschriebenen Gerätes in Übereinstimmung mit der Richtlinie 94/9/EG. Für Herstellung und Inverkehrbringen des Gerätes sind weitere Anforderungen der Richtlinie zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.
- (12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

 **II 2G Ex ib d IIB T3/T4** Details siehe Kenngrößen

**DEKRA EXAM GmbH**  
Bochum, den 23. Juni 2009

  
\_\_\_\_\_  
Zertifizierungsstelle

  
\_\_\_\_\_  
Fachbereich

Seite 1 von 3 zu BVS 09 ATEX E 079 X  
Dieses Zertifikat darf nur vollständig und unverändert weiterverbreitet werden.  
DEKRA EXAM GmbH Dinnendahlstraße 9 44809 Bochum Telefon 0234/3696-105 Telefax 0234/3696-110 E-mail zs-exam@dekra.com

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(13) Anlage zur

(14) **EG-Baumusterprüfbescheinigung**

**BVS 09 ATEX E 079 X**

(15) 15.1 Gegenstand und Typ

Gaswarn- und Gasmessgerät Typ GOLIATH

15.2 Beschreibung

Das tragbare Gaswarn- und Gasmessgerät Typ GOLIATH dient zur Messung unterschiedlicher Gase in der Umgebungsluft. Die Messung erfolgt über bis zu 5 Gas-Sensoren, die in dem Gerät untergebracht sind. Bei Überschreitung von Grenzwerten wird ein visueller und ein akustischer Alarm abgegeben.

Das Messgerät wird aus einer Stromversorgungsbatterie gespeist, die wahlweise aus 4 Primärzellen (Alkaline, Mignon AA) oder aus einem Akkumulator (NiMH) besteht. Bei Betrieb mit 4 Primärzellen wird ein Bodengehäuseteil ohne Ladekontakte verwendet, um ein versehentliches Laden der Primärzellen zu verhindern.

Das Gaswarn- und Gasmessgerät Typ GOLIATH darf nur außerhalb des explosionsgefährdeten Bereiches geöffnet werden. Die Stromversorgungsbatterie darf nur außerhalb des explosionsgefährdeten Bereiches geladen bzw. gewechselt werden (Weitere Hinweise siehe Betriebsanleitung).

15.3 Kenngrößen

15.3.1 Zündschutzart und Umgebungstemperaturbereich des Gaswarn- und Gasmessgerätes Typ GOLIATH bei unterschiedlichen Kombinationen der Einzelteile:

	Zündschutzart	Umgebungstemperaturbereich
Gaswarn- und Gasmessgerät Typ GOLIATH mit Akkumulator (NiMH) und Bodenplatte mit Ladekontakten	<b>Ex ib d IIB T3</b>	- 10 °C ≤ T <sub>a</sub> ≤ + 40 °C
Gaswarn- und Gasmessgerät Typ GOLIATH mit 4 Primärzellen (Alkaline, Mignon AA) und Bodenplatte ohne Ladekontakte	<b>Ex ib d IIB T4</b>	

15.3.2 Stromversorgungsbatterie (4 Primärzellen Alkaline - Batteriehalter)

Nennspannung

6 V

Der zulässige Batterietyp ist von der Esders GmbH in der Bedienungsanleitung festgelegt.

« page 3 »



## 15.3.3 Stromversorgungsbatterie (4 Sekundärzellen NiMH - Akkupack)

Nennspannung			4,8 V
Nennkapazität			2080 mAh
Maximale Ladespannung	$U_m$	DC	8,5 V

(16) Prüfprotokoll

BVS PP 09.2095 EG, Stand 23.06.2009

(17) Besondere Bedingungen für die sichere Anwendung

Die Messfunktion für den Explosionsschutz ist nicht Gegenstand dieser EG-Baumusterprüfbescheinigung.

## « 3. Nachtrag, page 1 »



### (1) 3. Nachtrag zur EG-Baumusterprüfbescheinigung

- (2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - Richtlinie 94/9/EG Ergänzung gemäß Anhang III Ziffer 6
- (3) Nr. der EG-Baumusterprüfbescheinigung: **BVS 09 ATEX E 079 X**
- (4) Gerät: **Gaswarn- und Gasmessgerät Typ GOLIATH**
- (5) Hersteller: **Esders GmbH**
- (6) Anschrift: **Hammer-Tannen-Str. 26-28, 49740 Haselünne**
- (7) Die Bauart dieser Geräte sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu diesem Nachtrag festgelegt.
- (8) Die Zertifizierungsstelle der DEKRA EXAM GmbH, benannte Stelle Nr. 0158 gemäß Artikel 9 der Richtlinie 94/9/EG des Europäischen Parlaments und des Rates vom 23. März 1994, bescheinigt, dass diese Geräte die grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllen. Die Ergebnisse der Prüfung sind in dem Prüfprotokoll BVS PP 09.2095 EG niedergelegt.
- (9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

**EN 60079-0:2012**      **Allgemeine Anforderungen**  
**EN 60079-1:2007**      **Druckfeste Kapselung „d“**  
**EN 60079-11:2012**      **Eigensicherheit „i“**

- (10) Falls das Zeichen "X" hinter der Bescheinigungsnummer steht, wird in der Anlage zu dieser Bescheinigung auf besondere Bedingungen für die sichere Anwendung des Gerätes hingewiesen.
- (11) Dieser Nachtrag zur EG-Baumusterprüfbescheinigung bezieht sich nur auf die Konzeption und die Baumusterprüfung der beschriebenen Geräte in Übereinstimmung mit der Richtlinie 94/9/EG. Für Herstellung und Inverkehrbringen der Geräte sind weitere Anforderungen der Richtlinie zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.
- (12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

 **II 2G Ex ib d IIB T3/T4 Gb**

DEKRA EXAM GmbH  
Bochum, den 07.01.2014

  
Zertifizierungsstelle

  
Fachbereich

## « 3. Nachtrag, page 2 »



(13) Anlage zum

(14) **3. Nachtrag zur EG-Baumusterprüfbescheinigung  
BVS 09 ATEX E 079 X**

(15) 15.1 Gegenstand und Typ

Unverändert

15.2 Beschreibung

Das Gaswarn- und Gasmessgerät Typ GOLIATH kann auch nach den im zugehörigen Prüfprotokoll aufgeführten Prüfungsunterlagen gefertigt werden.

15.3 Kenngrößen

Unverändert

(16) Prüfprotokoll

BVS PP 09.2095 EG, Stand 07.01.2014

(17) Besondere Bedingungen für die sichere Anwendung

Die Messfunktion für den Explosionsschutz ist nicht Gegenstand dieses Nachtrags zur EG-Baumusterprüfbescheinigung.

Seite 2 von 2 zu BVS 09 ATEX E 079 X / N3

Dieses Zertifikat darf nur vollständig und unverändert weiterverbreitet werden.

DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Telefon +49.234.3696-105, Telefax +49.234.3696-110, zs-exam@dekra.com

**13.2. EU-CONFORMITY DECLARATION**

## EU-Conformity Declaration

We: **Esders GmbH**  
Address: **Hammer-Tannen-Str. 26 - 30**  
**D - 49740 Haselünne**  
**Germany**

declare, on our own responsibility, that the product described below fulfils the applicable basic safety and health requirements of the EC Guidelines on the basis of its design and construction and the models put into commercial circulation by us.

This declaration is not valid for units which have been modified without our authorization.

Device type: **Gas measurement and detection device**

Type/Name: **GOLIATH**

Revision: **1**

**EU-Guidelines:** Electromagnetic Compatibility (2014/30/EU)  
ATEX (2014/34/EU)

DEKRA EXAM GmbH located in D-44809 Bochum, notified body no. 0158 issued the examination certificate of the above listed types according to the examination certificate number **BVS 09 ATEX E 079 X**.

**The following harmonized standards were applied:**

EN 50270:2015/AC:2016  
EN 60079-0:2012  
EN 60079-1:2007  
EN 60079-11:2012

Date: **12.12.2016**

Place: **Haselünne**

For the manufacturer:



\_\_\_\_\_  
Dipl.-Ing. Bernd Esders

### 13.3. COMPARISON OF UNITS

The following table shows the different units of gas concentration for **methane** calibration.

<b>METHANE CALIBRATION</b>		
<b>% LEL</b>	<b>% vol.</b>	<b>ppm</b>
100	4.4	44,000
<b>50</b>	<b>2.2</b>	<b>22,000</b>
22.7	1.0	10,000
10	0.44	4,400
1	0.044	440
0.1	0.0044	44

Comparative table for *methane* calibration,  
classified according to LEL (lower explosion limit)



### 13.4. TEST PROTOCOLS GOLIATH

#### 13.4.1. METHANE GAS SENSORS

Device check: <b>GOLIATH</b>		Sensor: CH <sub>4</sub>		Serial-No.: _____					
Date	Accu	Pump	Menu "Test ppm"		Menu "Test LEL"		Menu "Test VOL"	Examiner	Note
			Zero point	Test gas	Zero point	Test gas			
Set point	> 40%	> 30 l/h	Zero point	Test gas	Zero point	Test gas	Zero point		
Tolerance			0-1 ppm	10 ppm CH <sub>4</sub>	0-1% LEL	2.2% vol. CH <sub>4</sub>	0-0.2% vol.		
15.01.10	o.k.	o.k.	0	≥ 10 ppm	0	[ 45-55% LEL ]	100% vol. CH <sub>4</sub>	A.B.	./.
			0	0-1 ppm	0	[ 900-1.300 ppm ]	[ 98-102% vol. ]		
			10	1,000 ppm CH <sub>4</sub>	0	50.0			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			
			0	0-1 ppm	0	1,000			



### 13.4.3. SENSOREN FÜR CH<sub>4</sub>, O<sub>2</sub>, CO, CO<sub>2</sub> UND H<sub>2</sub>S

Gerätekontrolle: <b>GOLIATH</b>		Sensoren: CH <sub>4</sub> - O <sub>2</sub> - CO - CO <sub>2</sub> - H <sub>2</sub> S		Serien-Nr.: _____				
Datum	Akku	Pumpe	Vol.-% / ppm-Bereich (5 Komponenten-Prüfgas)				Prüfer	Bemerkung
			33 % UEG <b>CH<sub>4</sub></b>	15,0 % UEG <b>O<sub>2</sub></b>	60 ppm <b>CO</b>	2,5 Vol.-% <b>CO<sub>2</sub></b>		
Sollwerte:	> 40%	> 30 l/h	27 - 39 % UEG	14,5 - 16,0 % UEG	48 - 72 ppm	2,3 - 2,7 Vol.-%		
Toleranz:								
15.03.11	o.k.	o.k.	33	15,0	60	2,5	A.B.	./.

**Notice:**


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**Manufacturer:**




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