

# Operating instructions



## GM 5

**Gas detection  
and  
measurement  
instrument**

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# 1 Introduction

## 1.1 Conservation

Repair work may only be done by the service of Schütz GmbH. Only original SCHÜTZ parts should be used.

## 1.2 Definitions according to DIN 31051 2003-06, EN13306 :

Inspection	= Measures to identify and assess the actual condition of an observation unit
Maintenance	= Measures to delay the degradation of the existing wear out reserve
Repair	= Measures taken to return an observation unit into the operational condition
Improvement	= Combination of all technical and administrative measures and actions taken by management to increase the functional security of an observation unit, without changing the function required of it

## 1.3 Definitions according to G 465-4 :

### 1.3.1 G465-4, Section 5,3 Steps

1. **Function check (Paragraph 5.1)**
2. **Examination of the display accuracy (calibration)**  
see the publications of the DVGW and manufacturers of the devices
3. **Conservation**

see [Schütz GmbH Messtechnik, Technische Info](#)

## 1.4 Liability for function or damages

Die The responsibility for the function of the instrument always passes over to the proprietor or operator when the instrument is not properly maintained or repaired by persons not belonging to the Service of Schütz GmbH, or in case the instrument is used for any purpose which does not correspond to the intended use.

The instrument may not be used for the exact evaluation of a gas concentration – it merely serves to locate gas accumulations. Avoid the intake of water, thus, the sensors can be destroyed. Turn on the instrument only in clean ambient air (no gas concentration present) since here the zero point for the sensors will be set.

## 1.5 Warranty

There is a 24 month warranty on all instruments, counting from the date of purchase.

**In case of missing or damaged warranty seals, the warranty is voided.**

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## 1.6 Storage

After a prolonged storage, charge the instrument to achieve the maximum operation time (self discharge).

# Operating instructions

## GM 5

The GM 5 is designed to search and pinpoint gas leaks in interior and exterior areas according to G465-4.

The GM 5 offers you the results of our long experience combined with the newest technology.

With our instrument you can minimize measurement errors. It fully complies with the growing requirements for measurement security and ease of use.

The GM 5 has a graphic display allowing a user friendly menu guidance.

The instrument's digital indication was designed specifically for the gas industry (combination: analogical and digital display).

Both the tendencies and the absolute values are easily recognized.

To encircle a leak point during gas detection work is considerably easier with an indicator that is similar to an analogical measurement instrument (analogical measurement of tendency). A closer reading through the digital display is essential to locate reliably as well as in estimating an hazard during a gas concentration measurement.

Both characteristics in one single instrument ensure optimum work and maximum security on the job.

When the automatic measurement range is turned on, the GM 5 selects the smallest possible range. It prevents overlooking a leak because of the choice of a too large measurement range. With very high concentrations of gas, the GM 5 prevents the sensor caused erroneous measurement in the 1 Vol.% and 5 Vol.% measurement range.

The instrument is also equipped with an electronically regulated pump, delivering app+rox. 90 litre/hour. Special filters are installed to protect the pump and the measurement chamber.

To read measurement values in the dark, the light of the LCD indicator turns on automatically.

## 1.7 Units ppm, Vol.%

**Alle All the following units refer to methane(CH<sub>4</sub>), unless stated otherwise.**

**The unit ppm refers to volume:**

1 ppm = 1 cm<sup>3</sup> 100 % test gas distributed in 1 m<sup>3</sup> of surrounding air

10 ppm = 10 cm<sup>3</sup> 100 % test gas distributed in 1 m<sup>3</sup> of surrounding air

**The unit Vol.%:**

0,1 Vol.% = 1 dm<sup>3</sup> 100 % test gas distributed in 1 m<sup>3</sup> of surrounding air

1 Vol.% = 10 dm<sup>3</sup> 100 % test gas distributed in 1 m<sup>3</sup> of surrounding air

**Conversion factors:**

dm <sup>3</sup>	=	cm <sup>3</sup>	=	m <sup>3</sup>	=	Liter
0,01	=	10	=	0,00001	=	1/100
0,1	=	100	=	0,0001	=	1/10
1	=	1.000	=	0,001	=	1
10	=	10.000	=	0,01	=	10
100	=	100.000	=	0,1	=	100
1000	=	1.000.000	=	1	=	1000

ppm	=	Vol.%	=	CH <sub>4</sub> in 1m <sup>3</sup> Luft
1	=	0,0001	=	1 cm <sup>3</sup>
10	=	0,001	=	10 cm <sup>3</sup>
100	=	0,01	=	100 cm <sup>3</sup>
1.000	=	0,1	=	1 dm <sup>3</sup>
10.000	=	1	=	10 dm <sup>3</sup>
100.000	=	10	=	100 dm <sup>3</sup>
1.000.000	=	100	=	1 m <sup>3</sup>



## 1.8 The applications







One of the most important innovations is the selection of the appropriate application from a menu. The different applications use their own settings, like alarm threshold and pump flow. These can be changed at any time by the user.

In addition, different sensors are active in the various applications.

The sensor principles used in the GM 5 are:

- Semiconductor sensor, SC (ppm range)
- Thermal tone sensor, TT (5% range / LEL)
- Thermal conductivity sensor, TC (100% range)
- Infrared sensor, IR (CO<sub>2</sub> evidence)

The following table provides an overview of various applications with the preset flow rates and alarm thresholds, and the sensors used.

Application	Description	Sensors used	Alarm limit	Flow
Above-Ground 	Above-Ground survey of underground pipes	SC, TT, TC	Detection alarm (DA) 10 ppm	1,2 l/min
Ground-Air 	Survey of Ground-Air / locate	TC, IR		1,0 l/min
Lying exposed 	Survey of exposed gas pipes	SC, TT, TC	Localization alarm (LA) 100 ppm till 2,2 Vol% (concentration-related alarm impuls)	0,5 l/min
Building 	Survey inside building	SC, TT, TC	Pre alarm (PA) 0,45 Vol.% Main alarm(MA) 2,2 Vol.%	1,0 l/min
Cavity 	Survey of cavities	SC, TT, TC	Pre alarm (PA) 0,45 Vol.%	1,0 l/min
Gas purity 	Filling and emptying gas pipes	TC		0,8 l/min

## 1.9 Use of the device in areas with potentially explosive atmospheres

The GM 5 is classified into the temperature-class T3. A maximum surface-temperature of 200°C results from it.

Following table shows the ignition-temperature of the gases:

Gas	Temperature
Methane (CH <sub>4</sub> )	595°C
Propane (C <sub>3</sub> H <sub>8</sub> )	470°C
Butane (C <sub>4</sub> H <sub>10</sub> )	365°C
Hydrogen (H <sub>2</sub> )	560°C
Acetylene (C <sub>2</sub> H <sub>2</sub> )	305°C

According to EN 50014 clause 5.3, the lowest ignition-temperature of the possibly explosive atmosphere must be higher than the maximum surface-temperature.

### 1.9.1 Note:

The instrument must be loaded only outside the explosive area with the allowed charger.

Removing the batteries in the potentially explosive area is not allowed.

The device may be adjusted only outside the explosive area.

After unplugging the charger, wait at least 1 minute before using the instrument in explosive area!

## **1.10 After turning on the instrument and warm-up time**

- The application Above-Ground is started
- The automatic measurement selection is connected

## **1.11 The automatic measurement selection is connected**

***according to DVGW Technical Sheet G465I and G465-4***

At first, check the outer condition of the instrument including the probe system and the function of the control elements.

Check the pump and the suction way of the instrument.

Turn on the instrument (at zero gas), wait until after the warm up time the instrument is in the application Above-Ground, and make sure that the zero point is stable.

Check the available accumulator capacity.

To be ready for a day's work, the accumulator should be completely charged (showing approx. 100 % capacity).

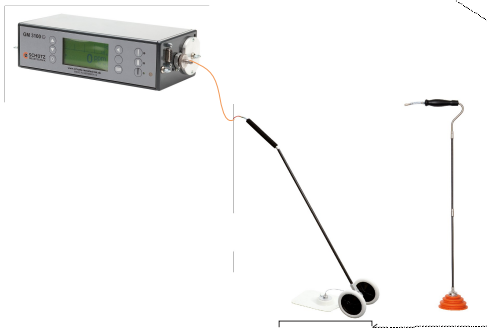
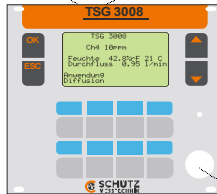
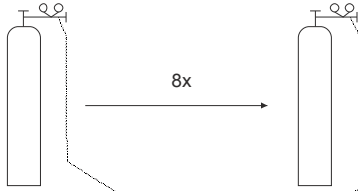
The measurement principle used by the GM 5 requires calibration of zero point at 10 ppm CH<sub>4</sub>.

Therefore you have to apply zero gas (synthetic air or ambient air) to the GM 5. Then you can apply 10 ppm CH<sub>4</sub> and make the sensitivity check. According to DVGW Technical Sheet G465-4, instruments with gas-sensitive semiconductor, susceptible to moisture, must be tested with conditioned (moistened) test gas. In most test stations there is an integrated filter to moisten the gas.

The sensitivity check may be done in different ways. If you have questions in this regard please call us. We will be glad to help you.

There might be various solutions, depending on your circumstances. To mention all the possibilities in this user manual could lead to misunderstandings. We will offer you a special instruction, adapted to your work conditions.

## 1.12 Test principle (example with 10 test gases)



This test configuration is needed to check the complete system. Leaks in measurement probes often cause measurement errors.

Sensitivity tests can be performed accurately only with a closed system.

Switching to the different test gases has to be done without intake of exterior air (drawing).

The probes used for work must also be included in the test.

### Error case measurement probe:

**Example:** Defective suction hose of carpet probe. Instrument shows no indication in spite of applying test gas.







**Consequence:** In real use you will overlook existing leaks!

## 2 Control unit of the GM 5



### 2.1 Operation and function of the different keys

#### 2.1.1 FUNCTION KEYS

The GM 5 has a user friendly menu to guide the operator, allowing selection of the different functions of the instrument. The six keys located immediately right and left of the display (       ) serve as so called function keys, which execute the function mentioned in the display text next to them.

#### 2.1.2 ON / OFF



Trike the key **ON/OFF** to turn the instrument on or off. After turning on the instrument, the zero point for flow is set and the pump turns on. This is followed by the sensor warm-up time.

At the end of the warm-up time all sensors are set to 0. This means that at this point fresh air should be taken in, not a gas concentration.

To turn the instrument off, press the **ON/OFF** key a longer time.

EA flashing green LED after warm-up indicates that the pump can't reach the desired gas flow. Replace the filter or clean the sintered filter to solve the problem (see 4.1 Filter replacement and 4.2 Cleaning a sintered filter).

### 2.1.3 MENU



This key accesses the main menu of the GM 5 in which the various functions of the device can be selected.

### 2.1.4 ZERO POINT



This key will set the zero point.

Please note, that it's not possible to set the zero point under certain circumstances (see 3.6.4).

**Note:** Press the zero-key in application Ground-Air before every measurement (outside of the bore hole).

### 2.1.5 UP / DOWN



The arrow keys can be used in the application screen to choose a different measurement range or to activate or deactivate the Automatic range selection.




In the menu, these keys allow selection and setting of different options.

### 2.1.6 LOUDSPEAKER



This key can be used to acknowledge active alarm signals of instrument.

The alarm sound then will be silenced but the flashing of the alarm LED can still be seen. The Acknowledgement of all active alarms is indicated in the application display (  ).

Please note, that some alarms are can not be acknowledged or only under certain circumstances (see 5.3).

### 2.1.7 ALARM



This key allows setting of the alarm limit for the current application (see 3.2).

### 2.1.8 BATTERY



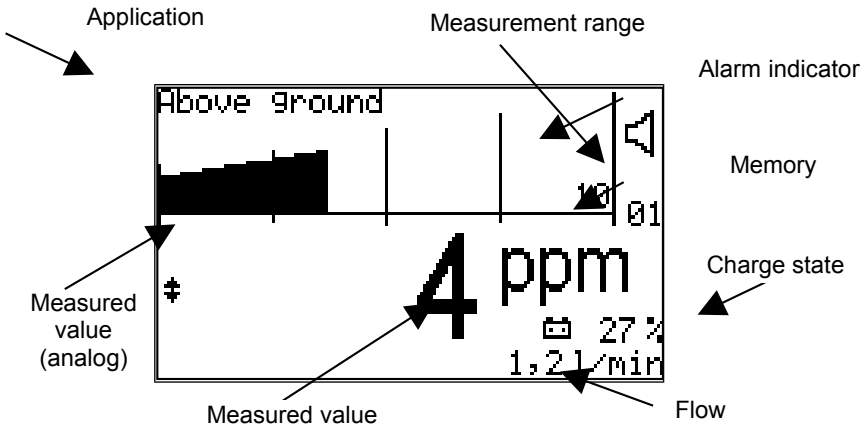
This key shows the present accumulator voltage and the accumulator capacity.

If the charge state of the instrument falls below 10%, the yellow LED starts flashing and an alarm sound is heard.

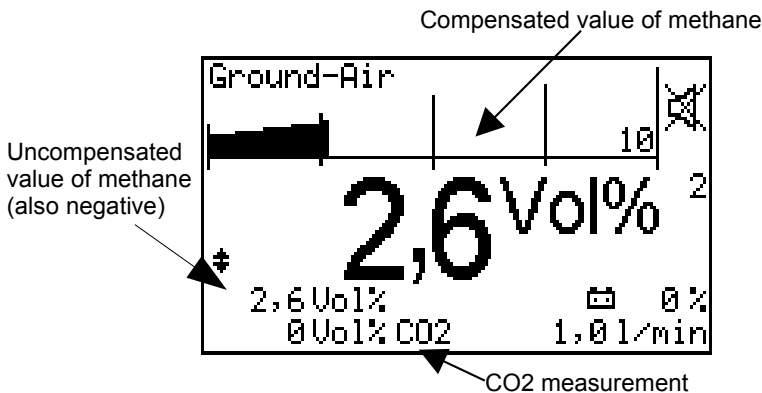
If the voltage drops below a critical value, the device turns ifs elfs off.



## 2.2 Structure of the measurement display



## 2.3 Structure of the measurement display Ground-Air



The compensated methane-value is calculated from the CO<sub>2</sub>-value and the uncompensated methane-value.

## 2.4 Information about CO<sub>2</sub> measurement

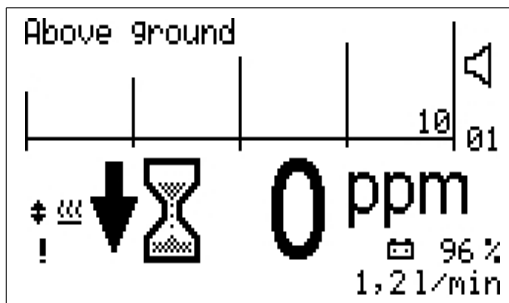
The CO<sub>2</sub>-value is measured by an infrared sensor. This measuring principle is characterized by a very low cross-sensitivity to other gases. However, at high concentrations (> 50%) this measuring method delivers a more strongly fluctuated measurement-value. But such high CO<sub>2</sub> concentrations are very unlikely.

## 2.5 Stability criterion

After each application launch a preliminary test of stability is carried out. During this stability test the display shows an hourglass and an arrow which indicates the measured value movement. During this test, lead only clean air to the device. The test is terminated as soon as this hourglass disappears. If the display then shows an exclamation point, the stability test was not successful. In this case, restart the device and make sure that it draws only clean air from the environment. If this exclamation point does not appear, the test was successful and the device is ready for use.

The renewed appearance of the stability arrow after the stability test indicates that the measured value fell below the zero-point. In this case the new zero-point will be set automatically.

The following symbols in the display are showing the state and the stability of the sensor:



Sensor is in warm-up phase, measurement is not yet active



The stability test was not successful





Measured value decreases or increases

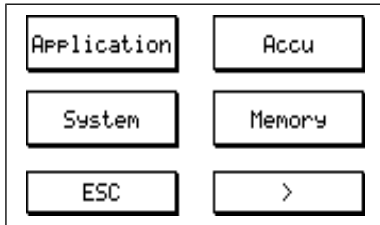



Stability test active → device not yet ready!

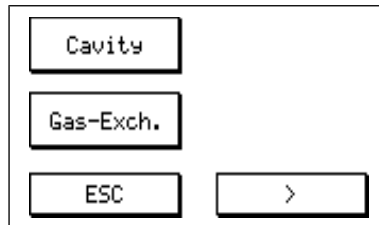
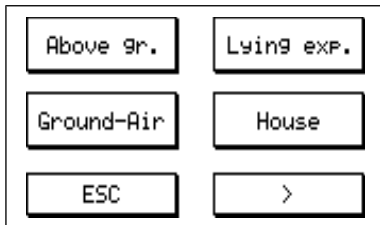
## 3 Functions of the GM 5

### 3.1 Selecting the application

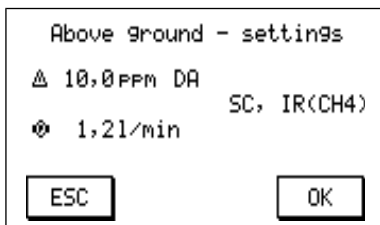
To select the desired application, first press de menu key  In the main menu, select **Application** (  - key).




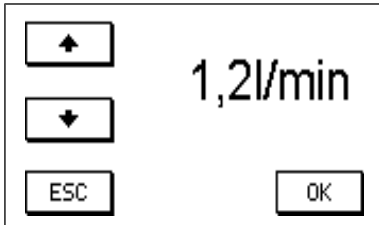
In the next display you can choose the desired application. With the > button (  - Key) you get to the next selection screen.







After selecting the desired application (for instance Above-Ground) you go to the settings menu for the chosen application. It will show the sensors used and the alarm limit and pump flow set for the application.



To change the predetermined alarm limit or pump performance, press the corresponding key next to the entry (e.g..  - key for pump performance).




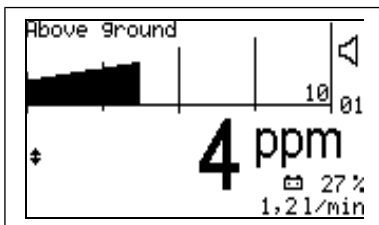
Here you may adjust the desired pump performance with the UP/DOWN keys ( ).

OK ( - key) saves the set value, ESC ( - key) exits without saving.

Changes in pump performance level are only saved for a particular selected application.

The means to change alarm thresholds is discussed in detail in section 3.2.

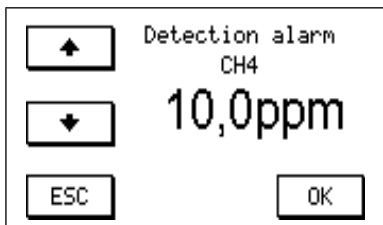
After pressing the **OK key** ( - key) in the settings menu, you finally navigate to the measurement menu of the selected application.



### 3.2 Adjustable alarm limit

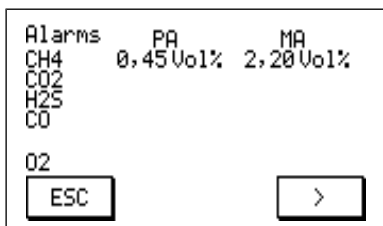
One can navigate to the alarm settings screen either via the settings dialog menu in the application screen or by pressing the alarm key (ⓘ - key).

Should an application have only one alarm threshold level to be adjusted, the applicable settings for this threshold will be displayed directly on screen (i.e. A gas sensing alarm from an above ground application) where necessary adjustments can be made.

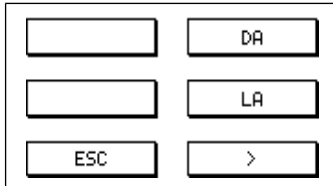
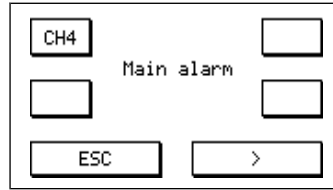
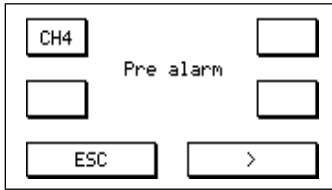


Here you may adjust the desired value with the **UP/DOWN key** (⬆️/⬇️). **OK** (⊖ - key) saves the set value, **ESC** (0 - key) exits without saving.

An overview of all active alarm threshold level settings is displayed on screen when a selected application has more than one or multiple alarm threshold levels for a specific instrument.



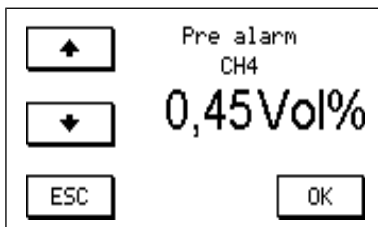
By using the > - control (⊖ - button) one can access the various settings pages of the various alarms.



**The following alarms are adjustable:**

- Pre alarm (PA)
- Main alarm (MA)
- Detection alarm (DA)
- Localization alarm (LA)

By selecting one of the touch areas defined as function keys, the corresponding display for level adjustment of an alarm threshold will be opened.





Here you may adjust the desired value with the **UP/DOWN key** (▲ ▼). The **OK** (⊞ -key) saves the set value, **ESC** (0 -key) exits without saving.

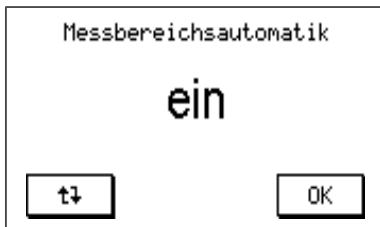
The display of an alarm threshold listing and the selection of individual alarm threshold levels is independent of the actively used alarms of any presently selected application. Navigate into the application settings menu to display the alarm threshold level settings used by the active application.


An acoustic alarm and blinking red LED will signal that an alarm has been triggered when the measured value has exceeded a pre-defined threshold setting used by the active application (please see section 5.2 - Alarms).


### 3.3 Automatic range selection

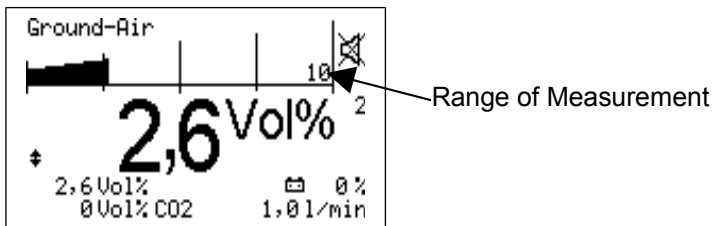
The GM 5 has an automatic measurement range. It will choose the adequate measurement range depending on the measured gas concentration. The symbol  $\ddagger$  in the display shows that the automatic measurement range is active.



To disconnect the automatic measurement range you press the **UP** or **DOWN key** (   ). This will open the automatic measurement range menu.





By pressing the  $\ddagger$  - button (  - key), you can enable or disable the automatic measurement range mode.

Pressing **OK** (  - key) is used to confirm entry of a made setting and returns to the measurement menu.



With automatic range measurement disabled you can manually select the desired measurement range with the **UP** or **DOWN keys** (   ). The measurement ranges selected depend on the choice of selected application made.

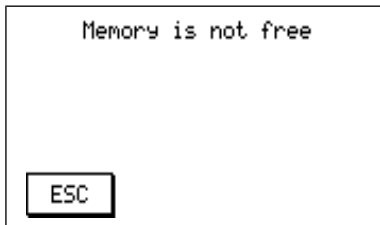
To re-enable the automatic measurement range mode you need to press the **UP** or **DOWN keys** (   ) until you once again reach the automatic measurement range menu.

### 3.4 Memory

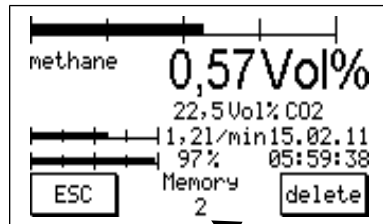
The GM 5 has a memory with a total of memory places 40. The saving process saves all present measurement values, like present gas concentration, time, date, flow,...

#### 3.4.1 Deleting a memory location

To save a set of data in a memory location, the location needs to be empty. If it isn't empty, the save dialogue will give an error message.



To delete one or several memory locations, after pressing the menu key (☰) you select the menu point **Memory** (●). This will open the save menu dialogue.

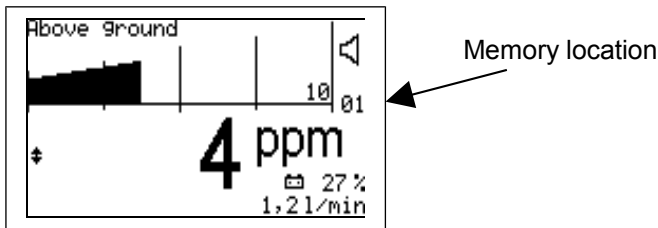


Memory location

Here the stored records are shown. Using the **UP** or **DOWN** navigation keys (▲ ▼) you select the desired memory location. Pressing the **Delete** key (☰) will delete the present memory location and the next lower memory location will show. This allows fast deletion of all memory locations, starting with the highest one and deleting them one after the another. The **ESC** key (0) exits the menu.



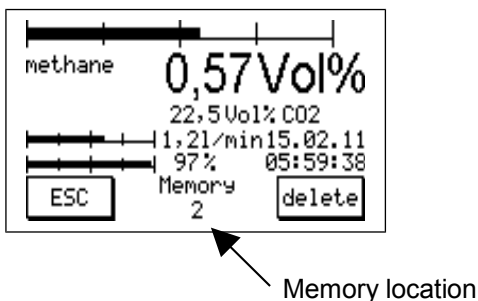
### 3.4.2 Saving a set of data





Pressing the key next to the present memory place (●) you can save the present set of data. If the memory place is not free, it needs to be deleted (see 3.5.1) or you need to select an available memory place. After saving, the next higher memory place is selected automatically, so you can save several sets of data successively, without having to select a new memory place each time.

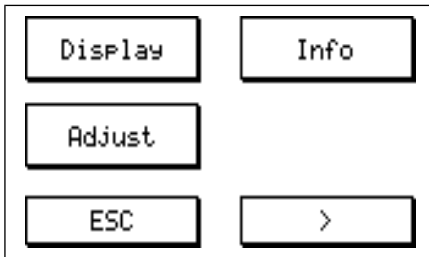
### 3.4.3 Opening a set of data

Pressing the menu key (≡) and selecting the option **Memory** (●) in the main menu, you get to the save menu. Here you may select the different memory places and view the save data sets with the **UP/DOWN** key (▲▼).

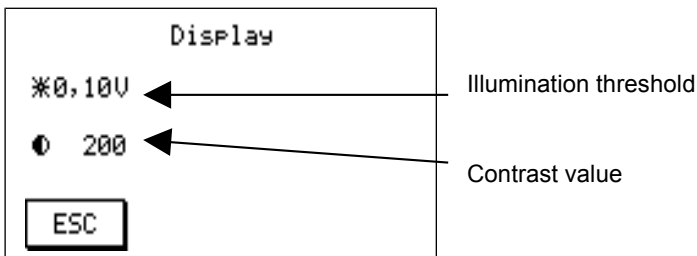



### 3.5 Display settings

The display settings are in the second screen of the main menu. To get to this screen, in the main menu (press ) to change to the second screen with the symbol >I ()




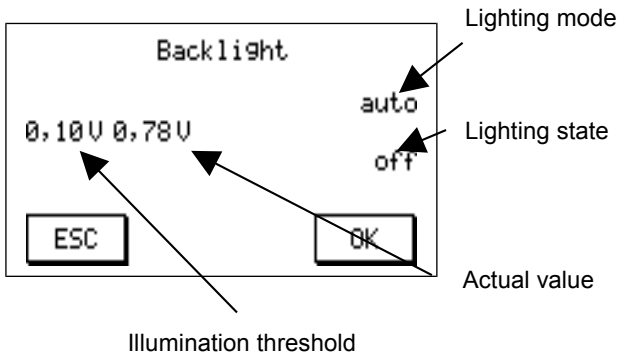
Selecting the option **Display** () you open the display menu.





It shows the value of the illumination limit for the display light and the contrast value. The **ESC key** () exits the menu.

### 3.5.1 Adjust illumination limit and automatic illumination



Open the menu for the display illumination parameters pressing the key next to the illumination (  ).



To change between manual and automatic display back-light, press the key next to lighting mode (  - key).


The indication switches between **automatic** and **manual**. In the **manual** mode you can connect or disconnect the display light with the key next to the present light condition (  ).

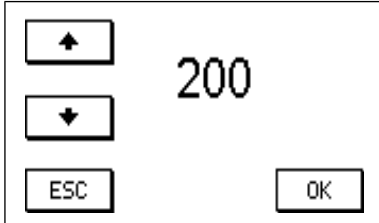
In the automatic illumination mode the display light is turned on as soon as the real value for illumination limit is not reached.





When exceeding the limit, the light turns off. To set the lighting limit, press the **UP/DOWN key** (   ).

**OK** (  ) saves the set value, **ESC** (  ) exits without saving.

### 3.5.2 Set contrast

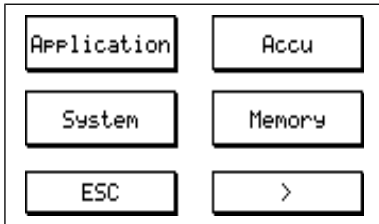
To set the contrast press the key next to the contrast value (  ) in the display menu (see 3.6).




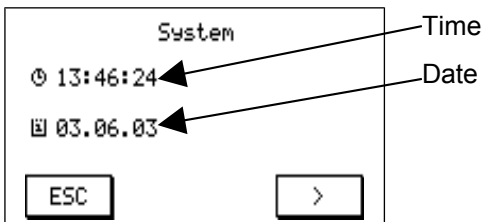
Now you may adjust the desired value with the **UP/DOWN key** (   ). **OK** (  ) saves the set value, **ESC** (  ) exits without saving.

## 3.6 System settings

The system settings are in the first screen of the main menu, that can be reached by pressing the menu key (  ) in the application screen.

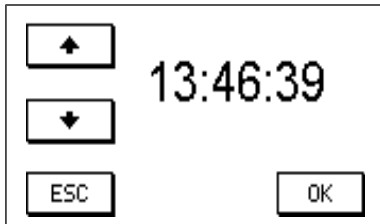


Pressing the key next to **System** (  ) will open the system menu.



### 3.6.1 Set time and date

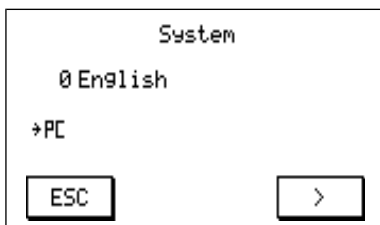
To set the time or the date press the corresponding key next to time or date (▲ or ▼) in the system menu. This will open the corresponding settings menu.



Here you may adjust the desired value (i.g. the present time) with the **UP/DOWN key** (▲ ▼). Holding down the key, the value begins changing slowly and then increasingly faster. This allows to make a big change relatively fast. **OK** (⊞) saves the set value, **ESC** (⊞) exits without saving. The instrument has a clock with its own buffer accumulator, so time and date are not erased when taking out the accumulators.

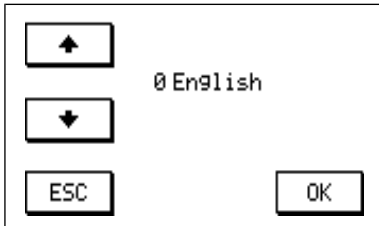
### 3.6.2 Selecting the language

In the system menu (see 3.7), press the key next to to the > symbol (⊞), to open the second screen of the system menu.



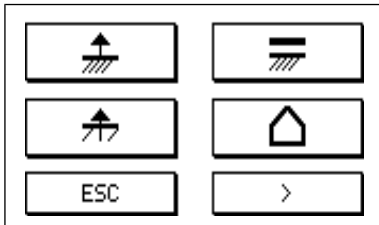
It shows the presently active language.

To change language, press the key next to the entry (▲). This will open the language selection menu.



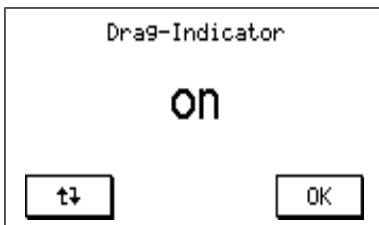
Here you may select the desired language with the **UP/DOWN key** (⏮⏭). **OK** (⏹) saves the set value, **ESC** (⏏) exits without saving.

With the language **Symbols** you can change to the symbol view of the applications according to the DVGW.




### 3.6.3 Drag indicator

Pressing the ⏮ key in the third screen of the system menu (see 3.7.4) you will reach the menu to activate or deactivate the drag-indicator. If activated, in the measure screen a drag-indicator will be displayed in the measuring bar of the gas measuring value.




### 3.6.4 Set Zeroing Function

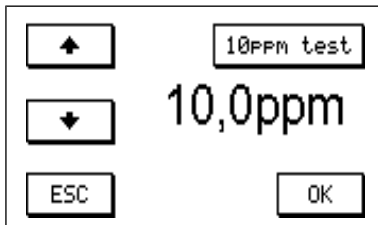
The zeroing function can be set by navigating to the fourth page of the system menu dialogue. Press the upper direction arrow (  - button) to open the settings screen. Operating the control with the text designated "monitor zeroing", one can either activate or deactivate zeroing.

If activated, gas concentrations higher than 1000 ppm in the application Above-Ground can not be set to zero.

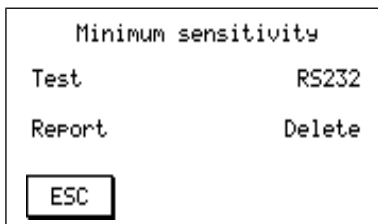
## 3.7 Minimum sensitivity test

**The minimum sensitivity test is only a documentation help. It does not substitute the daily, written documentation of the minimum sensitivity test!**

Pressing the alarm key  in the application **Above-Ground**, you will reach the following menu:




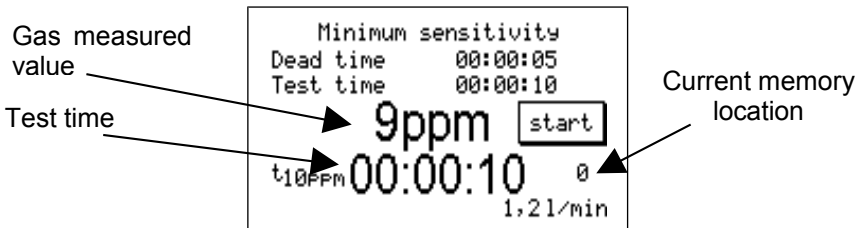
With the  key you will reach the menu for the minimum sensitivity test.




**Here you can select the following functions:**




### 3.7.1 Test minimum sensitivity

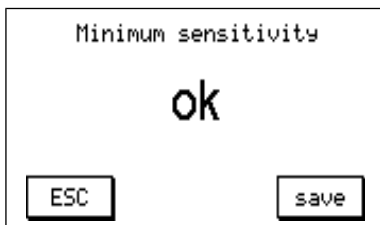
Pressing the  key in the menu (see 3.7) the following menu is the minimum sensitivity menu.





Testing the minimum sensitivity (10 ppm test), the measured gas value is tested after the test time has elapsed (test time + dead time). The following parameters are defined:

- Minimum sensitivity: 10 ppm
- Test time: 10 s
- Dead time: editable in menu (  )




You can set the zero point by pressing the  key if it is not stable. You can go back to the application Above-Ground with the **menu key** (  ). For testing the minimum sensitivity you have to press the **start key** (  ) and give the gas (10 ppm) to the device at the same time. After this, the measuring time is taken and counts down. After the time elapsed, the gas value will be tested (gas measured value > 10 ppm) and shown in the display. Saving the result, the memory will count up automatically.

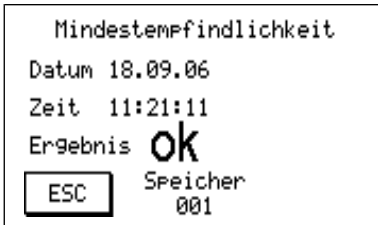


Here you can decide if you want to save the result (save key  ) or not (ESC,  ).



### 3.7.2 Evaluate minimum sensitivity tests


To evaluate the test results you have to choose the entry **Evaluate** (  ) in the selection menu (see section 3.7 Minimum sensitivity test). In the evaluation menu you can open the different saved test results with the **UP/DOWN key** (   ).



Here you can open all of the up to 200 results. If a memory place is not used (no result saved), this is indicated by the date 00.00.00 and the time 00:00:00 and the result "not ok". The next display shows this case:



### 3.7.3 Delete minimum sensitivity test results

To delete all test results you have to select the entry **Delete** (  ) in the selection menu (see section 3.7 Minimum sensitivity test). Thus all test results will be deleted and the memory counter will be set to zero. During erasing (approx. 30 s) the red alarm led is shining.

### 3.8 Info-Display

Version information for software and hardware is shown on the info display screen.

### 3.9 Charge accumulators

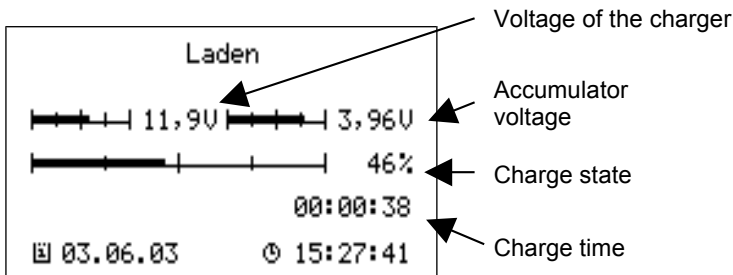
**REMOVE AND CHARGE THE ACCUMULATORS ONLY OUTSIDE OF AREAS WITH EXPLOSION RISK – USE THE CORRESPONDING CHARGER!**

**AFTER UNPLUGGING THE CHARGER, WAIT AT LEAST 1 MINUTE BEFORE USING THE INSTRUMENT IN EXPLOSIVE AREA!**

**To charge the accumulators, the instrument has to be turned off!**

- Connect the supplied charger to the charging jack of the GM 5. Plug the charger into a 230V outlet.
- With the 12V charger wire you make the connection between the charge socket and the cigarette lighter.
- On the car charger, check the green control LED. When the green control LED is lit, establish the connection with the GM 5.

As soon as this connection is established, the instrument emits a signal sound and shows the charge menu with the charge parameters.



**Fasten the plug with the knurl thumbscrews!**

The indication of continuous charge time shows the active charge process. After reaching the maximum charge time or the maximum charge voltage, the charge process is finalised and turned to trickle charge. At the operation of the instrument and at the charge the current is measured all the time (positive and negative) and stored. So it is possible to calculate the capacity of the accumulators very exactly (quite more than by measuring the voltage).

When working with the instrument, the operator can view the charge condition in the display. Upon falling below the minimum voltage, the instrument will emit an alarm sound and the LED of the accumulator key (①) will flash. To avoid deep discharge, the instrument automatically turns off at a minimum voltage.

When the instrument is off, the accumulator capacity display is not updated. So, if the instrument is not used for a long time, there can be a difference between the displayed accumulator capacity and the real capacity of the accumulators, because the leakage current of the accumulators could not be measured and analysed. Therefore the instrument can turn off because of reaching the minimum voltage although the accumulator capacity display shows enough capacity. When the instrument is charged completely again (over the whole charging time), the displayed capacity will be synchronized and the real accumulator capacity will be displayed. We recommend to put the unused instrument to the charger all the time or to charge the instrument once a week to always have a functional instrument.

## Advice regarding back-up battery

An additional battery is built into the instrument for retaining the time and the saved measurements. This battery is **\*not\*** rechargeable! If the instrument is stored without its rechargeable batteries, or if these are completely depleted, then the necessary power will be drawn from the back-up battery. This will last for a period of around 90 days.

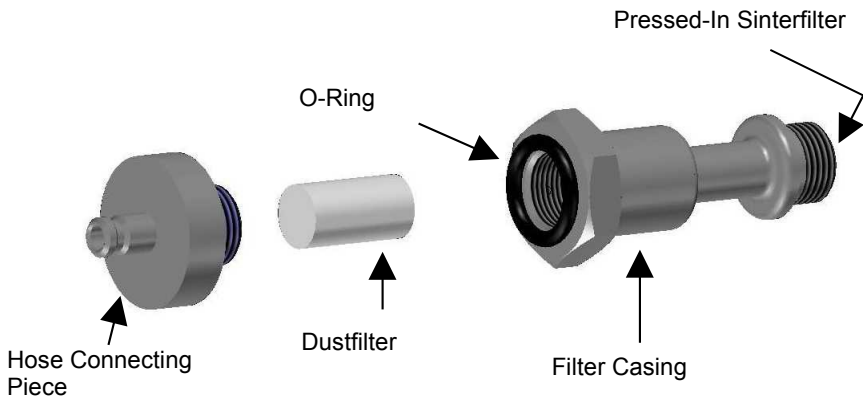
If the 90-day supply has been used up, then this battery will have to be replaced through servicing of the instrument.

**The back-up battery is a consumable and is not covered by guarantee.**

## 4 Maintenance

### 4.1 Filter Replacement

The dust filter should be replaced after approximately 40 to 50 operating hours of use, or even earlier when reduced pump performance sets in from operation in a dusty environment.

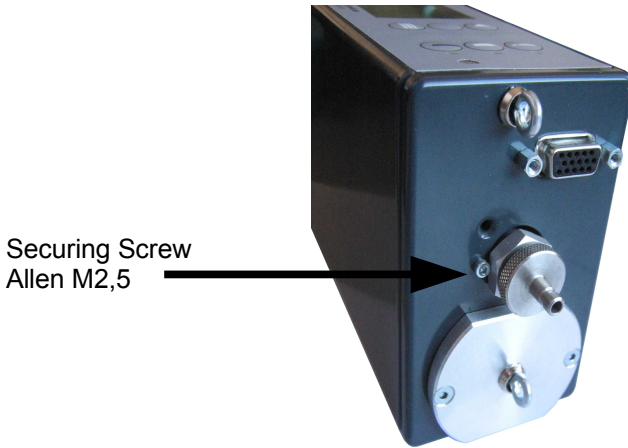


If replacing the filter is not sufficient in achieving a required flow rate, please follow the instructions found in section 4.2 describing the cleaning of a sintered filter.

### 4.2 Cleaning a Sintered Filter

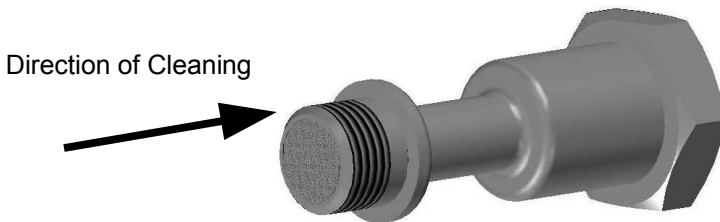
**The following work steps should only be performed outside of an explosion hazardous area with a properly switched off device.**

Unscrew the filter housing from the side panel held in place by M2.5 Allen screws. Keep these screws in a safe place, because without these screws the device automatically loses its Ex- explosion-proof device approval.



Now you can unfasten the filter housing using a #17 spanner wrench. Please make sure that a secondary O-ring is located along the threading. This O-ring has to be present during reassembly of the unit. Should this O-ring somehow be lost, air tightness of the unit cannot be guaranteed. The unit will possibly suck in outside ambient air during operation causing an overflow condition during detection of fine leaks.

Use air from a compressor with an air stream direction inverse to the suction direction, blowing vigorously through the sintered filter in order to properly clean it.



Upon completing the last steps, reassemble all of the parts previously taken apart in reverse order. Check for proper air tightness of the GM 5 by blocking the feed opening of the intake nozzle while operating the unit in above ground detection mode. During this test, the display should indicate a flow rate of 0.0 l/min. Should this not be the case, please recheck the intake for unobstructed flow.

## 4.3 Changing accumulators

**Attention !** The accumulators may not be removed or charged in an area with explosion danger!

**Attention !** Always turn the instrument off to change the accumulators!

**Attention !** To preserve the declaration of warranted explosion protection only batteries officially endorsed by Schütz Messtechnik (Measurement Technologies) should be used!

Unscrew the cover of the battery compartment on the side of instrument and remove the individual batteries. Observe the polarity when inserting batteries. The previously mentioned battery capacity display is adopted here. The unit should be charged before re-synchronizing the battery capacity display.

# 5 Miscellaneous

## 5.1 Zero point automatic

The normal ambient air contains different hydrocarbons. The composition of the air changes with varying weather, temperature and environment (industry) conditions. Nevertheless, reliable finding of gas leaks have to be ensured.

The zero point automatic prevents faulty indications when gas concentration in the surrounding air decreases. If the measured value drifts into the negative range, the automatic regulation of the zero point will readjust the zero point.

## 5.2 Alarms

Depending on the application selected, the device allows various kinds of alarms triggered by certain events. These alarms are signalled by an audible acoustic sound as well as by the blinking of an appropriate alarm LED.

Additionally a loudspeaker symbol will appear in the application display screen as unacknowledged alarms remain active.

### 5.2.1 Acknowledgement of Alarms

Acknowledgement of an active alarm is initiated by pressing the speaker button at which point the acoustical alarm is muted. Visual alarm signalling remains active as the LED continues to blink.

An acknowledgement always affects the most serious alarm state first according to risk or priority of seriousness. Acknowledging a gas alarm will leave a previous or simultaneous pump or battery alarm as being unacknowledged. These can sequentially also be acknowledged through repeated pressing of the speaker button. If at this point only acknowledged alarms are active, this will be indicated by display of a crossed out speaker symbol.

Please note that some alarms cannot be acknowledged or can only be properly acknowledged under certain circumstances.

### 5.2.2 Battery Alarm

Description:	The battery alarm is triggered as soon as the residual capacity displayed is lower than 10%.
Alarm-LED:	yellow
Acknowledgement:	possible any time

### 5.2.3 Pump Alarm

Description:	The pump alarm is triggered if the measured gas flow rate falls below the set target flow of the application. The alarm is automatically deactivated when a sufficient flow is achieved.
Alarm-LED:	green
Acknowledgement:	possible any time

### 5.2.4 Gas Detection Alarm (GA)

Description:	The gas detector alarm is triggered when the gas alarm concentration threshold is exceeded. As an example, if an alarm threshold of 10 ppm CH <sub>4</sub> is exceeded. The alarm is automatically deactivated when the detected value drops below the alarm threshold.
Alarm-LED:	red
Acknowledgement:	possible at any time - The acknowledgement of the alarm remains active until the gas concentration falls 30% below the threshold value.

### 5.2.5 Localization Alarm (LA)

Description:	The localization alarm is triggered when the gas concentration exceeds the pre-adjusted alarm threshold of 100 ppm CH <sub>4</sub> , for example. With any further increase in gas concentration, the frequency rate of the alarm tone will also increase until a level of 2% by Volume results in a continuous tone. The alarm is automatically deactivated when the detected value is once again below the alarm threshold.
Alarm-LED:	red
Acknowledgement:	possible any time



### 5.2.6 Pre-Alarm (VA)

**Description:** The alarm is triggered when the gas concentration exceeds the alarm threshold of 0.44% Volume CH<sub>4</sub>, for example. The alarm is automatically deactivated the moment the detected value drops below the alarm threshold.

**Alarm-LED:** red

**Acknowledgement:** possible any time

### 5.2.7 Main Alarm (HA)

**Description:** The main alarm is triggered when the gas concentration level exceeds the alarm threshold of 2.2 Vol% CH<sub>4</sub>, for example. The alarm is deactivated if it the detected level falls below the alert threshold only if it has been acknowledged. The main alarm is distinguished by a slightly higher frequency of pre-alarm tone.

**Alarm-LED:** red

**Acknowledgement:** possible any time

### 5.2.8 Overview of Gas Alarms

The following table shows an overview of all possible gas alarms with the factory pre-sets for the various alarm thresholds:

Gas	DA	LA	PA	MA	EA	STA	LTA
CH <sub>4</sub>	10 ppm	100 ppm	0,44 Vol.%	2,2 Vol.%	-	-	-

### 5.3 Car charger

The car charger allows charging the GM 5 with the 12V electrical system of a motor vehicle. The green light emitting diode in the main switch is the voltage control of the charger.

If the green control LED is not lit, you need to turn on the main switch or check the fuse that protects the connecting wire.

Mounting and connecting the car charger is done by customer.

**Important:** Use a circuit that is connected to an ignition system. Do not use a circuit that gets disconnected upon turning on the engine.

If you use a circuit that is not protected, you should install a fuse (1 ampere).

The coloured core has to be connected with +12 V (fused circuit, see above).

### 5.4 Charger

Do only use the original provided charger to charge the accumulators.

## 6 Error descriptions and solutions

**Description:** **Constant pump alarm (green LED flashing)**

**Cause:** Pump performance is set to high, or pump can't supply the set performance

**Solution:** Reduce the pump performance in the menu for application settings (see section 3.1), check input filter (see section 4.1 and 4.2)

**Description:** **Pump is too loud**

**Cause:** If the input filter is plugged, the pump increases the flow automatically. This causes a higher pump noise

**Solution:** Check the input filter

**Description:** **Constant gas alarm**

**Cause:** Shift of zero point with ambient air

**Solution:** Set the zero point (  )

**Description:** **Accumulator runtime too short (instrument turns off too early)**

**Cause 1:** If you don't use the instrument for a long time, the displayed accumulator capacity is not consistent with the real accumulator capacity and the instrument automatically turns off after reaching the minimum voltage to prevent deep discharge (see also section 3.9).

**Solution 1:** Fully charge the device (over the entire charging time) to synchronize the displayed accumulator capacity. We recommend to keep the unused device in the charger all the time or to charge the instrument once a week, in order to always have a fully functioning device.

**Cause 2:** The accumulators are subject to an ageing process, reducing their capacity.

**Solution 2:** Use new accumulators.

**Description:** **The instrument does not respond**

- Cause:** Accumulators completely discharged
- Solution 1:** Plug in the charger and then press the On/Off key
- Solution 2:** Plug in the charger, then press the Reset key (see section 6.1)

**Description:** **Jump of the measured value in application Ground-Air at low gas concentrations**

**Solution:** Press the zero key before every measurement (outside of the drill hole)

***If you don't find a solution:***

Please contact your distributor or the company Schütz Messtechnik GmbH.

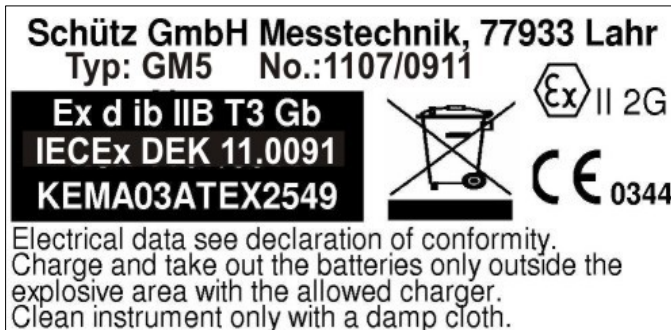
## 6.1 Reset

The current version of the device has a reset circuit, with which the device can be reset (e.g. when the instrument crashes). Therefore, there is a hole on the left side of the device. With a straightened paper clip you can press the reset-button.



## 7 Type plate

The device carries the following type plate:



**Note:**

- II 2 G: Equipment Group II, Category 2, Gas
- Ex d ib IIB T3 Gb
  - d ib: v used type of protection  
Intrinsically safe, category „ib“  
Flame-proof enclosure
  - IIB: Group of electrical equipment  
Electrical apparatus for potentially explosive areas except  
mines endangered by firedamp
  - T3: Temperature Class
  - Gb: Equipment Protection Level EPL
- 0344: Number of the designated testing laboratory (DEKRA)

## 8 Technical data

Applications: Symbols and designation according to G465-4 B1  
 Above ground  
 Ground-Air  
 Lying exposed  
 House  
 Cavity  
 Gas-Exchange

Measuring ranges: depending on application      Optional  
 – 10 ppm      - 100 Vol.% CO<sub>2</sub>  
 – 20 ppm  
 – 100 ppm  
 – 1000 ppm  
 – 1 Vol.%  
 – 10 Vol.%  
 – 100 Vol.%

Measuring principle: Semiconductor gas sensor (ppm range)  
 Thermal tone (~1-5 Vol.%)  
 Thermal conductivity (~100 Vol.%)  
 Infra-red sensor (CO<sub>2</sub> evidence)

EEX protection: Ex d ib IIB T3 Gb Category II 2 G  
 suited for Ex Zone 1

Test number: 03ATEX2549      IECExDEK 11.0091

Display: Graphic LCD display, automatic light  
 Digital and analogical display (bar graph)  
 Menu guidance

Range selection: Automatic or manual

Pump:: Working continuously, up to approx. 1,4 Litre/min  
 Flow regulation

Operating temp.: -20°C to +40°C

Storage temp.: -25°C to +70°C

Operating position: Upright (display at top)

Power Supply: Batteries NiMh

Operation time: 15 hours

Charge technique: Automatic charge

Charge time: 15 hours

Dimensions: 215 x 60 x 100 mm

Weight: approx. 1,9 kg

Storage time: Charger not connected, accumulators fully charged:  
approx. 30 days at a storage temperature of 20°C.

**Scope of supply:** GM 5, carrying case, charger, telescopic probe, batteries, manual, certificate.



## 9 Accessories

### 9.1 Carpet probe



**Reference: G10.167**

Intended use:

Survey of gas pipelines with the aspiration method.

Aspiration hose, fast coupling, surface filter, dust filter

Total length: approx. 140 cm

Carpet: 25 cm x 35 cm

### 9.2 Bore hole probe with water separator



**Reference: G10.147**

Intended use:

Measurement in bore holes

Water separator, dust filter, hose, fast coupling

Depth of bore hole: min. 25 cm

Total length: approx. 120 cm



### 9.3 Cup probe



**Reference: G10.137**

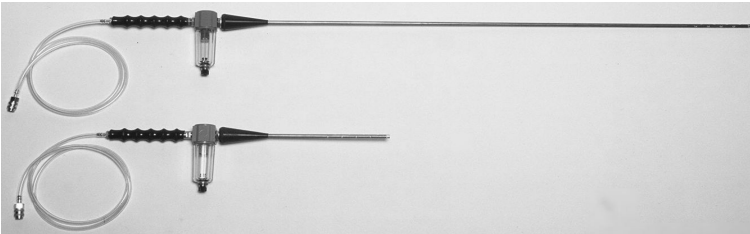
Intended use:

Surface measurements in  
difficult or rough terrain

Dust filter, hose, fast coupling

Total length: approx. 90 cm

### 9.4 Trench probe



**Reference:**

**000.025 – Point 300mm**

**000.026 – Point 1000mm**

Intended use:

Measurement in open pits

Probe tip (long or short), water separator, dust filter, fast coupling

Total length: approx. 50 cm added length when using long probe tip

## 9.5 Telescopic bore hole probe



**Reference: G10.149**

Intended use:

Measurement in deep bore holes

Depth of bore hole: from min. 30 cm up to over 55 cm

Total length: approx. 1,30 m

Water separator, dust filter, hose, fast coupling

## 9.6 Telescopic aerial probe in different versions



**Reference:**

**G10.152 – rigid point**

**G10.150 – moveable point**

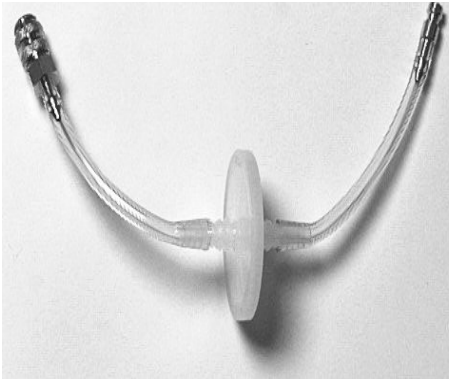
Intended use:

Measurement on exposed lines, fittings or other places of difficult access

Aspiration hose, fast coupling

Total length: from 30 cm to 1m

## 9.7 Water stop filter



**Reference: G10.190**

Intended use:

Protect the gas detection instrument from water and dust.

Hose nozzles on both sides

Outer diameter: approx. 58 mm

Packing unit: 1 unit

## 9.8 Car charger wire 12V



**Reference: 232.005**

Intended use:

To charge the gas detection instrument in a car (12V)

## 10 Testing and Accessories

Model-Number	Description
<b>Probes</b>	
000.071	Point probe, powder-coated
G10.160	Carpet probe complete, CFRP tube
G10.162	Carpet probe hinged complete CFRP tube
G10.169	Carpet probe completely foldable, steel pipe
G10.168	Carpet probe unicycle complete, steel pipe
G10.130	Bell probe, complete CFRP tube
G10.133	Bell probe folding, complete CFRP tube
G10.135	Bell probe mini, complete CFRP tube
G10.140	Borehole probe complete, FCK pipe
G10.143	Borehole probe folding, complete, FCK pipe
G10.170	Rigid spacecraft
G10.300	Industrial probe length 2.1 to 7.5 m
000.055	Punch/Mandrel, 400mm
000.056	Punch/Mandrel, 600mm
<b>Testing Equipment</b>	
202.780	PS 203 Test station complete, 2 gases
201.887	PS 203 Test station complete, 2 gases with probe test board
204.936	PS 203F Test station complete, 2 gases with humidifier
202.779	PS 403 Test station complete, 4 gases
201.862	PS 403 Test station complete, 4 gases with probe test board
204.308	PS 403-U Test station complete, 4 gases, negative pressure measurement
204.450	PS 403-US Test station complete, 4 gases, negative pressure measurement
G01.800	TS 3008 Inspection and test station, 8 gases

## 11 Spare Parts

Model-Number	Description
<b>Accessories</b>	
203.385	Bluetooth RS232 Adapter complete
201.395	Equipment bag GM 5, GM 3100
G01.756	Car holder,GM 5,GM 3100
232.005	Car cable 15pole, GM 5, GM 3100
203.315	Carrying frame for gas sensing equipment
203.313	Carrying frame for tablet-PC and gas sensing equipment
203.378	Headphones for GM 5, GM 3100
<b>Spare Parts</b>	
205.877	Dust filter GM5/GM3100/GMS4000
203.394	Battery pack NiMh (consisting of 3 batteries)
206.182	Filter housing GMS400,GM5/3100
201.314	Battery cover
205.738	Filter housing
205.876	Intake socket type 21, G1/4a
204.972	Sintered filter with plugs

## 12 EC Declaration of Conformity

Manufacturer: **Schütz GmbH Messtechnik**  
Address: Im Dornschlag 6  
77633 Lahr

Designation: GM 5

Intended use: Gas detection and measurement instrument

The product described above complies with:

### EC Directive on Electromagnetic Compatibility

DIN EN 61000-6-3  
Resistance to interference in residential and commercial areas, small businesses

DIN EN 61000-6-2  
Interference resistance for industrial environment

### Electrical apparatus for explosive gas atmospheres

EN 60079-0 : 2009	General requirements
EN 60079-1 : 2007	Flameproof enclosure "d"
EN 60079-11 : 2007	Intrinsic safety "I"
IEC 60079-0 : 2011	General requirements
IEC 60079-1 : 2007-04	Flameproof enclosure "d"
IEC 60079-11 : 2006	Intrinsic safety "i"

Marking: II 2 G Ex d ib IIB T3 Gb, suitable for Ex Zone 1

Testing laboratory: DEKRA Certification B.V. (0344)  
Utrechtseweg 310  
6812 AR Arnhem  
The Netherlands

Test number: KEMA 03ATEX2549  
IECEx DEK 11.0091

Lahr 15.11.2011

A handwritten signature in black ink, appearing to be "Volker Heimburger", is written over a faint, light-colored circular stamp or watermark.

SCHÜTZ GMBH  
MESSTECHNIK  
Dipl.-Ing. (FH) Volker Heimburger  
Manager

# 13 Test report



TEST REPORT FOR GM 5 / GM 3100 (Methane / carbon dioxide)				Number:			
Cycle	Device condition	Target	actual				
<b>1.</b>	<b>Device condition</b>	<b>Target</b>	<b>actual</b>				
1.1	Visual device condition	ok					
1.2	Sintered filter clean	ok					
<b>2.</b>	<b>Pump control</b>	<b>Target</b>	<b>actual</b>				
2.1	Pump adjustment	ok					
2.2	Maximum flow	> 1.2 l/min					
<b>3.</b>	<b>Application above ground</b>	<b>Target</b>	<b>actual</b>				
3.1	Zero point at zero gas	0 ppm					
3.2	Test gas 10 ppm CH4	> 10 ppm					
3.3	Test gas 100 ppm CH4	70...140 ppm					
3.4	Test gas 1000 ppm CH4	800...1200 ppm					
3.5	Test gas 1 Vol.% CH4	0.8...1.2 Vol.%					
3.6	Test gas 2.2 Vol.% CH4	2.0...2.4 Vol.%					
3.7	Test gas 100 Vol.% CH4	95...100 Vol.%					
<b>4.</b>	<b>Application Ground-air</b>	<b>Target</b>	<b>actual</b>				
4.1	Zero point at zero gas	0.0 Vol%					
4.2	Test gas 1 Vol.% CH4	0.8...1.5 Vol.%					
4.3	Test gas 2.2 Vol.% CH4	2.0...2.4 Vol.%					
4.4	Test gas 100 Vol.% CH4	95...100 Vol.%					
4.5	Test gas 5 Vol.% CO2	4...6 Vol.%					
<b>5.</b>	<b>Documentation</b>						
5.1	Date						
5.2	Signature						

\* = 2.2 vol% every day before starting work when used in gas pressure regulation and measurement systems, 10 ppm before starting work if used for regular periodic review.

## **Schütz GmbH Messtechnik**

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D-77933 Lahr

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