

## VARIOTEC® 460 Tracergas



15.05.2023 a – 106924 – en

# Operating instructions

# VARIOTEC® 460 Tracergas



Fig. 1: VARIOTEC 460 Tracergas device overview

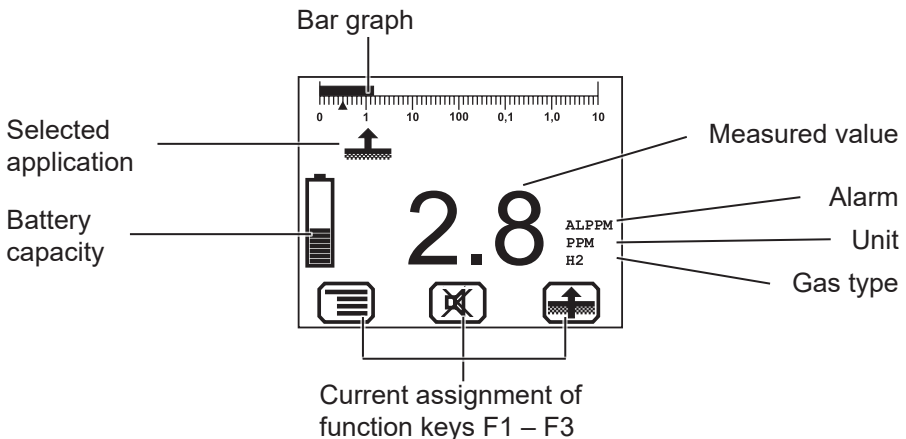


Fig. 2: VARIOTEC 460 Tracergas display

# Display symbols

## General



Menu



Fault



OK



Perform device inspection



Cancel



Tab (jump to next input field)



Buzzer off



Set zero point



Stop measurement



Information



Clear



Open stored comments  
Open stored inspectors



Battery capacity

## Applications



Inspection above ground



House



Measuring in bar holes



Gas measuring

## Information about this document

The symbols used in the document mean the following:



### **NOTICE!**

Indicates a hazardous situation for the product, which could result in functional disturbance, damage or destruction.

---



### **CAUTION!**

Indicates a hazardous situation for users, which could present health risks or result in bodily injury.

---



### **WARNING!**

Indicates a hazardous situation for users, which could result in serious injury or death.

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### **Note:**

Indicates tips and useful information.

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Instructions that must be followed in a specific sequence are numbered:

1. First action
2. Second action
  - a) Step one
  - b) Step two

Lists and instructions comprising only one action are indicated as follows:

- List point A
- List point B
  - Subordinated list point

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# 1 General

## 1.1 Warranty

The following instructions must be complied with in order for any warranty to be applicable regarding functionality and safe operation of this equipment. This product must only be commissioned by qualified professionals who are familiar with the legal requirements (Germany: DVGW).

- Read these operating instructions prior to operating the product.
- Use the product only as intended.
- Repairs and maintenance must only be carried out by specialist technicians or other suitably trained personnel. Only spare parts approved by Hermann Sewerin GmbH may be used when performing repairs.
- Use only suitable battery types, otherwise the device will not be explosion-proof.
- Changes or modifications to this product may only be carried out with the approval of Hermann Sewerin GmbH.
- Use only Hermann Sewerin GmbH accessories for the product.

Hermann Sewerin GmbH shall not be liable for damages resulting from the non-observance of this information. The warranty conditions of the General Terms and Conditions (AGB) of Hermann Sewerin GmbH are not affected by this information.

In addition to the warnings and other information in these Operating Instructions, always observe the generally applicable safety and accident prevention regulations.

The manufacturer reserves the right to make technical changes.



### 1.2 Purpose

The **VARIOTEC 460 Tracergas** is a portable measuring device for measuring the concentration of hydrogen in air or nitrogen.

The device is especially suitable for:

- Leak detection in pipes using hydrogen  
Both gas and water pipes can be inspected. Water pipes must not contain water at the time of inspection.
- Leak tests using the tracer gas method (e.g. in filling stations)
- Measuring the hydrogen content in air or nitrogen

All tasks that can be performed with the device are assigned to applications. For more detailed information please see section 1.5 on page 5.



#### **WARNING!**

The **VARIOTEC 460 Tracergas** is not a gas warning instrument.

- Do not use the device to warn against dangerous gas concentrations.
- 

#### **Note:**

These operating instructions describe the functions of firmware version 1.XXX. The manufacturer reserves the right to make changes.

All descriptions refer to the device as delivered (factory settings).

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### 1.3 Intended use

This device is intended for professional residential and commercial use, in small firms and commercial operations and in industry. The appropriate specialist knowledge is required to operate the device.

The device is intended for measuring hydrogen H<sub>2</sub>.

It should not be used for:

- Measuring toxic and corrosive gases
- Monitoring liquids
- Warning against explosive gas concentrations (operator protection)

The device can be used up to a temperature of 40 °C. However, high temperatures reduce the lifetime of the rechargeable batteries.

### 1.4 General safety information

- The device has been tested to ensure that it is explosion-proof in accordance with European standards (CENELEC).
- The device is explosion-proof for tracer gas only up to a maximum hydrogen content of 5% in air or nitrogen. If the hydrogen content in air or nitrogen exceeds 5%, the device must be used in carrying bag TG8.
- SEWERIN recommends always using the device in carrying bag TG8 in enclosed spaces.
- Do not use this device in oxygen-enriched atmospheres, otherwise it will not be explosion-proof.
- Only probe hoses with a hydrophobic filter may be used.

#### **Exception:**

If the probe has a built-in hydrophobic filter, the hose does not require any other filters.

- Devices may only be tested with test gases in well ventilated areas or outdoors. Test gases must be handled in a professional manner.
- Always carry out a device inspection (see section 5.1 on page 36) after the device has suffered an impact (for example, if dropped accidentally).
- The device complies with the limits of the EMC directive. Always observe the information in the manuals of (mobile) radio equipment when using the device close to (mobile) radio equipment.



#### **NOTICE!**

Follow the advice regarding explosion protection (see section 2.3 on page 9).

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## 1.5 Allocation of tasks to applications

The device is used in measuring mode in four applications:

- Inspection above ground
- Measuring in bar holes
- House
- Gas measuring

Owing to the high sensitivity in the ppm range, the **Inspection above ground** and **House** applications are particularly suitable for leak detection but less so for reproducible measurements.

The table is designed to help you decide which application to choose for which activity (in accordance with /1/).

Location	Task	Application
<ul style="list-style-type: none"> <li>● Poorly accessible gas pipes               <ul style="list-style-type: none"> <li>– underground</li> <li>– laid in floors</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Measuring very low gas concentrations:               <ul style="list-style-type: none"> <li>– above ground or above the floor</li> <li>– above possible leakage points</li> </ul> </li> </ul>	Inspection above ground 
<ul style="list-style-type: none"> <li>● In the ground</li> </ul>	<ul style="list-style-type: none"> <li>● Measuring the gas concentration for:               <ul style="list-style-type: none"> <li>– Determining gas dispersion (detection limit)</li> <li>– Locating a probable gas escape (repair point)</li> <li>– Preventing possible dangers</li> </ul> </li> </ul>	Measuring in bar holes 
<ul style="list-style-type: none"> <li>● In the house</li> <li>● Freely accessible pipes</li> <li>● Industrial plants</li> <li>● Test laboratories</li> </ul>	<ul style="list-style-type: none"> <li>● Measuring very low gas concentrations</li> <li>● Locating the source of gas</li> <li>● Finding leaks at internal connections</li> <li>● Leak testing of industrial components</li> </ul>	House 
<ul style="list-style-type: none"> <li>● Pipes</li> <li>● Gas systems</li> </ul>	<ul style="list-style-type: none"> <li>● Measuring the gas concentration</li> <li>● Purging (to demonstrate purity or absence of gas, e.g. when commissioning/decommissioning gas systems)</li> </ul>	Gas measuring 

## 1.6 Tracer gas method

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### NOTICE!

This section provides only a brief overview of the tracer gas method. Using the tracer gas method correctly requires extensive specialist knowledge.

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The tracer gas method can be used for leak detection and for leakage tests.

The method uses a nitrogen/hydrogen gas mixture (tracer gas) consisting typically of 5% hydrogen and 95% nitrogen. Gas mixtures containing 10% hydrogen and 90% nitrogen can also be used, however.

Owing to its physical properties, hydrogen has the ability to penetrate other materials (e.g. screed, concrete). This penetrating power is used to locate gas leaks in closed systems with a gas measuring device such as the **VARIOTEC 460 Tracergas**.

Such closed systems may either already exist (e.g. filling stations) or may have to be created. In the latter case the pipe sections to be inspected are closed off with blind flanges, for example.

Although pure hydrogen is extremely flammable, tracer gas is non-combustible, non-corrosive and non-toxic. Hydrogen is approved as a food additive (E949), making the tracer gas method suitable for inspecting water pipes.

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## 2 Features

### 2.1 Visual and audible signals

The device features two alarms:

- Signal light on top of device (visual signal)
- Buzzer on side of device (audible signal)



If this symbol appears on the display, the audible signal can be switched off.

When an audible signal has been switched off it cannot be switched back on while the concentration level remains above the alarm threshold.



This symbol appears at the top left of the display as soon as the audible signal has been switched off. It disappears automatically if the level falls below the alarm threshold.

#### Alarm

If the measured hydrogen gas concentration exceeds specified limit values (alarm thresholds) the device gives a warning. It emits both audible and visual signals.

The device has two alarms:

- **ALPPM** (adjustable alarm in the ppm range)
- **ALEOS** (alarm at the end of the measuring range)

---

#### Note:

Alarms are only emitted in the **Inspection above ground** and **House** applications.

There are no alarms in the **Measuring in bar holes** and **Gas measuring** applications.

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The **ALPPM** alarm signal cycles between on and off. The **ALEOS** alarm signal comprises a continuous tone and a steady light.

There is detailed information on alarms in section 7.2 on page 51.

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### Dynamic or constant signal for ALPPM

For the **ALPPM** alarm there are two options for cycling the audible and visual signals:

- dynamic (**dynamic signal**)
- constant

With the dynamic signal option the cycle speed is dependent on the measured gas concentration. The higher the concentration above the alarm threshold, the shorter the interval between two signals. This applies up to a concentration of 5 % vol. H<sub>2</sub>. Above a concentration of 5 % vol. H<sub>2</sub> the cycle speed remains constant.

With the constant signal option the cycle speed is always independent of the measured gas concentration. The interval between two signals is always constant.

The default setting at delivery is dynamic signal. If the dynamic signal option is switched off, the device automatically switches to a constant signal.

See section 3.3.5 on page 30 for information on how to switch off the dynamic signal.

## 2.2 Sensors

The device features two types of sensor:

- Gas-sensitive semiconductor (SC) for hydrogen
- Thermal conductivity sensor (TC)

Application	Measuring range (H <sub>2</sub> )	Sensors
Inspection above ground	0.0 ppm — 5 % vol.	SC, TC
Measuring in bar holes	0.0 % vol. – 100 % vol.	TC
House	0.0 ppm — 5 % vol.	SC, TC
Gas measuring	0.0 % vol. – 100 % vol.	TC

### 2.3 Explosion protection

The device is assigned to the following explosion-proof groups:

Explosion-proof group	For the following atmospheres	When using
<b>II2G Ex d e ib IIB T4 Gb</b>	<ul style="list-style-type: none"> <li>● Methane CH<sub>4</sub></li> <li>● Propane C<sub>3</sub>H<sub>8</sub></li> <li>● Butane C<sub>4</sub>H<sub>10</sub></li> <li>● Tracer gas with max. 5% H<sub>2</sub> in N<sub>2</sub></li> </ul>	Device <b>with-out</b> carrying bag TG8
<b>II2G Ex d e ib IIC T4 Gb</b>	<ul style="list-style-type: none"> <li>● Methane CH<sub>4</sub></li> <li>● Propane C<sub>3</sub>H<sub>8</sub></li> <li>● Butane C<sub>4</sub>H<sub>10</sub></li> <li>● Hydrogen H<sub>2</sub></li> <li>● Tracer gas</li> </ul>	Device <b>with</b> carrying bag TG8

EC type-examination certificate: TÜV 07 ATEX 553353 X



#### WARNING!

It is essential to observe the following points to ensure that the device is explosion-proof:

- Only ever open the battery compartment and recharge the batteries outside of explosive areas.
- Only use the USB port outside of explosive areas.
- Always use the appropriate type of disposable/rechargeable battery.
- To ensure that the device complies with explosion-proof group **IIC** with hydrogen H<sub>2</sub> and tracer gas containing more than 5% H<sub>2</sub> in N<sub>2</sub>, the device must be used in carrying bag TG8.



## 3 Operation

### 3.1 General information on operation

#### 3.1.1 Keys and jog dial

The ON/OFF key is the only control on the device that does not change its function.

When switched on, the device is operated using the jog dial and function keys to navigate the display.

Control	Action	Function
<b>ON/OFF key</b>	Press	<ul style="list-style-type: none"><li>● Switches the device on</li><li>● Switches the device off</li></ul>
<b>Function keys F1, F2, F3</b>	Press	<ul style="list-style-type: none"><li>● Variable</li><li>● As indicated on the display at the bottom of the screen</li><li>● Function keys may also have no function assigned in some cases</li></ul>
<b>Jog dial</b>	Turn	<ul style="list-style-type: none"><li>● Selects functions, settings, measurement data, etc.</li><li>● Modifies values</li></ul>
	Press	<ul style="list-style-type: none"><li>● Opens the next program level (e.g. menu item, function, measurement data, selectable values)</li><li>● Applies values</li></ul>

#### 3.1.2 Selecting/exiting menus and menu items

Functions, applications and settings etc. are selected via the main menu (for short: **Menu**). This **menu** has submenus and menu items. Refer to section 3.2.1 on page 15 for information on accessing the main menu.

### Selecting submenus/menu items

Submenus and menu items are selected and opened using the jog dial and/or the function keys (see section 3.1.1 on page 10).

The name of the selected menu or menu item is always shown at the top left of the display.

In measuring mode the name of the selected application is indicated by the symbol at the top left of the display. You can find detailed information on selecting and switching applications in section 3.1.4 on page 13.

### Exiting menus/menu items

There are generally two ways to exit open menus/menu items and return to the next level up:

- Press **Esc**
- Select **Exit** from the menu

### 3.1.3 Switching the device on

---

#### Note:

Always switch the device on with fresh air.

---

1. Press the ON/OFF key. The device switches on.

A visual and audible signal confirms that the device has been switched on. The display and the pump come on.

The start screen appears on the display.

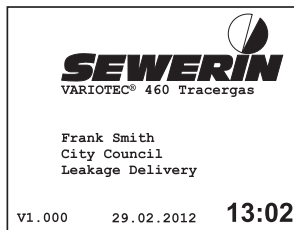


Fig. 3: Start screen

#### Display:

- Device type: VARIOTEC 460 Tracergas
- User: Frank Smith  
City Council  
Leakage Delivery
- Firmware version: V1.000
- Date and time

Then the opening screen for the selected application appears (see section 3.3.4 on page 29).

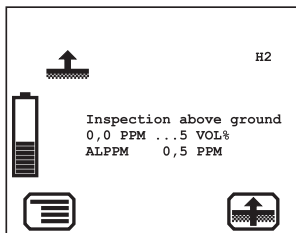


Fig. 4: Opening screen for Inspection above ground application

Display:

- Gas type: H<sub>2</sub>
- Application as symbol (top left) and text:  
Inspection above ground
- Measuring range:  
0.0 ppm – 5 % vol.
- Alarm threshold:  
ALPPM 0.5 ppm
- Symbol for next application that can be selected via function key F3: Measuring in bar holes

The device switches to measuring mode. The device warms up. The reading flashes.

While the device is warming up, the prompt **Add fresh air!** is displayed as a reminder.

2. Make sure the device is actually drawing in fresh air. Change its location if necessary.
3. Wait until the reading stops flashing.

The device is ready for use.

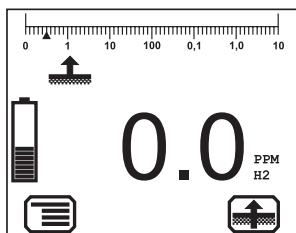


Fig. 5: Inspection above ground measuring mode

Display:

- Current reading: zero when device is switched on with fresh air

### 3.1.4 Selecting/switching applications

---

**Note:**

You may only switch applications when the device is drawing in fresh air.

---

The current application is indicated by the symbol at the top left of the display. The symbol at the bottom right shows the next application that can be selected via function key **F3**. You can specify which application is activated first when the device is switched on in the **Settings** under **System** (see section 3.3.4 on page 29).

- Press **Menu**. Select the menu item for the application you want to use.

OR

- a) Press function key **F3**. The device switches to the next application.
- b) Repeat until the symbol for the application you want to use appears at the top left.

### 3.1.5 Differences between measuring mode and settings mode

The device is operated in two modes:

- **Measuring mode** (see section 3.2 on page 14)

Measurements are taken in measuring mode. All functions needed to take readings can be accessed from one menu.

- **Settings** (see section 3.3 on page 25)

The device settings can be changed in settings mode. Information about the device can also be retrieved. Measurements cannot be taken in settings mode.

Settings are accessed via the menu in measuring mode. The settings are access-protected by a PIN code.



#### **CAUTION!**

The device only issues alarms in measuring mode. As soon you access the menu, alarms are no longer triggered.

---

## 3.2 Measuring mode

When switched on (see section 3.1.3 on page 11) the device is in measuring mode. In measuring mode, the current measurements are always displayed (see fig. 5). Depending on the application, the measurement will have to be saved or started and then stopped (see section 3.2.8 on page 21).

### 3.2.1 Accessing the menu (measuring mode menu structure)

In measuring mode **F1** can be used to access the **Menu**.

Zero point
Inspection above ground
Measuring in bar holes
House
Gas measuring
Settings
Start measurement
Protocol
Device inspection
Device information
Exit

Fig. 6: **Menu** with submenus (menu items)

Once you have started a measurement **Start measurement** in the menu becomes **Stop measurement**. In some applications this menu item is called **Save measurement**.

You can find detailed information on starting, stopping and saving measurements in section 3.2.8 on page 21.

### 3.2.2 Zero point

The zero point only has to be set manually if the displayed fresh air measurement is not zero after the end of the warm-up period.

The manual zero point setting is not saved. The zero point can be corrected by adjustment as often as zero point deviations occur (see section 5.2 on page 44).

#### Requirements for correct setting of the zero point

- Device was switched on with fresh air.
- Device continues to draw in fresh air.

#### **Setting zero point (manual zero point setting)**

1. Press **Menu**.
2. Select **Zero point** from the menu. The values are automatically adjusted. The device returns to measuring mode.

In the **Inspection above ground** and **House** applications the **Setting zero point** function can also be opened by means of the corresponding symbol.

### 3.2.3 Inspection above ground

#### Area of use

- Measuring very low gas concentrations in poorly accessible gas pipes (underground or laid in floors)
- Measurement above ground, above the floor or above possible leakage points

#### Symbol



#### Unit

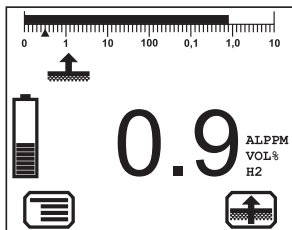
- ppm (parts per million)
- % vol.

#### Measuring range

Gas-sensitive semiconductor 0.0 to 10,000 ppm

Thermal conductivity sensor 0.1 to 5 % vol.

#### Measurement data display



- Digits, e.g. 0.9 % vol. H<sub>2</sub>
- Bar graph with quasi-logarithmic scale

Fig. 7: Inspection above ground measuring mode



### 3.2.4 Measuring in bar holes

#### Area of use

---

- Measuring the gas concentration in the ground for:
  - Determining gas dispersion (detection limit)
  - Locating a probable gas escape (repair point)
  - Preventing possible dangers

#### Symbol

---



#### Unit

---

- % vol.

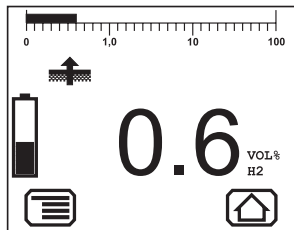
#### Measuring range

---

Thermal conductivity sensor 0.0 to 100 % vol.

#### Measurement data display

---



- Digits, e.g. 0.6 % vol. H<sub>2</sub>
- Bar graph with quasi-logarithmic scale

Fig. 8: Measuring in bar holes measuring mode

### 3.2.5 House

#### Area of use

---

- Freely accessible pipes in buildings, industrial plants, test laboratories
- Measuring very low gas concentrations
- Locating the source of gas
- Finding leaks at internal connections
- Leak testing of industrial components

#### Symbol

---



#### Unit

---

- ppm (parts per million)
- % vol.

#### Measuring range

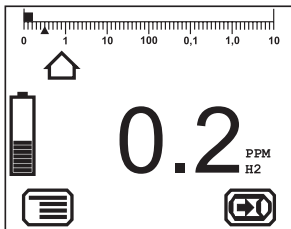
---

Gas-sensitive semiconductor                      0.0 to 10,000 ppm

Thermal conductivity sensor                      0.1 to 5 % vol.

#### Measurement data display

---



- Digits, e.g. 0.2 ppm H<sub>2</sub>
- Bar graph with quasi-logarithmic scale

Fig. 9: House measuring mode

#### 3.2.6 Gas measuring

##### Area of use

---

- Measuring the gas concentration in pipes and gas systems
- Purging (to demonstrate purity or absence of gas, e.g. when commissioning/decommissioning gas systems)

##### Symbol

---



##### Unit

---

- % vol.

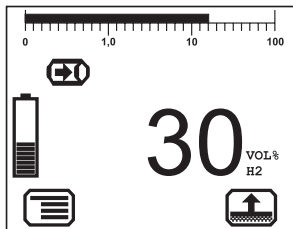
##### Measuring range

---

Thermal conductivity sensor                      0.0 to 100 % vol.

##### Measurement data display

---



- Digits, e.g. 30 % vol. H<sub>2</sub>
- Bar graph with quasi-logarithmic scale

Fig. 10: Gas measuring mode

### 3.2.7 Settings

You can change the device settings and access information about the device under **Settings** in the menu (see section 3.3 on page 25).

### 3.2.8 Starting/stopping/saving a measurement

Depending on the application, measurements will have to be saved or started and then stopped.

Application	Measurement	
	start/stop	save
Inspection above ground	×	
Measuring in bar holes		×
House		×
Gas measuring	×	

#### Difference between starting/stopping and saving

Selecting **Start measurement** followed by **Stop measurement** saves a measurement plot.

Selecting **Save measurement** saves an individual measurement, the current one.

---

#### Note:

Measurements cannot be cancelled. The only way to cancel a measurement is to stop it.

---

Up to 80 measurements can be saved.

The measured values can be saved with or without a comment. Comment entries are saved automatically (ring memory with max. 10 entries).



Once the first comment has been entered, the **Open stored comments** function will become available.

The stored measurements can be displayed on a computer using a **readout program**. The program is available at [www.sewerin.com](http://www.sewerin.com).

#### **Start measurement**

1. Press **Menu**.
2. Select **Start measurement** from the menu. This starts the measurement plot recording.

The measurement plot recording must always be concluded with **Stop measurement**.

#### **Stop measurement**

1. Press **Stop measurement**.  
OR
  - a) Press **Menu**.
  - b) Select **Stop measurement** from the menu.
2. Answer **Yes** to the warning prompt.
3. Enter a comment for the measurement.
  - a) Select the characters required using the jog dial. Confirm each character using the jog dial.  
OR
    - Press **Open stored comments**. A list of the stored comments will appear. Select the desired comment. Open the comment with **OK**.
  - b) Then confirm your entry/selection with **OK**.  
OR
    - Press **Esc** if you do not wish to enter a comment for the measurement.

The measurement is saved as a protocol. The protocol name is formed from the date, time and comment.

### Save measurement

1. Press **Menu**.
2. Select **Save measurement** from the menu.
3. Enter a **comment** for the measurement.
  - a) Select the characters required using the jog dial. Confirm each character using the jog dial.

OR

    - Press **Open stored comments**. A list of the stored comments will appear. Select the desired comment. Open the comment with **OK**.
  - b) Then confirm your entry/selection with **OK**.

OR

    - Press **Esc** if you do not wish to enter a comment for the measurement.

The measurement is saved as a protocol. The protocol name is formed from the date, time and comment.

### 3.2.9 Protocols

You can retrieve or clear protocols of saved data under **Protocol** in the menu. When saved, the protocols are assigned to different protocol types.

The following protocol types are available:

- Device inspection
- Measurements

Protocols can only be cleared individually.

You can find information on how to clear all protocols of one protocol type in section 3.3.7 on page 31.

### 3.2.10 Device inspection

The **device inspection** can be used to check the general status and the indication accuracies. **Device inspection** only appears in the menu when the integrated device inspection is switched on.

---

#### Note:

The integrated device inspection is switched off in the factory settings. More detailed information about the device inspection can be found in section 5.1.2 on page 38.

---

The frequency of the device inspection depends on the application (see section 5.1.1.2 on page 36).

If the integrated device inspection is switched on, the device will remind you to perform a device inspection.



The **Device inspection** symbol will appear when the inspection is due. It is visible in the display until the complete integrated device inspection has been carried out successfully.

### 3.2.11 Device information

The following device information is shown under **Device information** in the menu:

- Firmware:  
version, date
- Service:  
date of the last service, date of the next service

## 3.3 Settings

The following menus and menu items are included under Settings (see section 3.3.3 on page 28 to section 3.3.7 on page 31):

- Adjustment
- System
- Alarms
- Date/time
- Memory

You can find information on selecting and exiting menus and menu items in section 3.1.2 on page 10.

### 3.3.1 Opening settings

1. Press **Menu**.



#### **CAUTION!**

The device only issues alarms in measuring mode. As soon you access the menu, alarms are no longer triggered.

---

2. Select **Settings** from the menu.

Access is protected by a PIN code. The **default setting** is always **PIN code 0001**.




**Note:**

You can change the PIN code at any time (see section 3.3.4 on page 29).

SEWERIN recommends setting a different PIN code after initial start-up, so only authorised personnel have access to the settings.

---

3. Enter the PIN code from left to right. The active digit is always displayed with a black background.

Digit	To change	To confirm
1st digit	Turn the jog dial	Push the jog dial
2nd digit		Push the jog dial
3rd digit		Push the jog dial
4th digit		

If the PIN code has been entered correctly, the **Settings** menu will appear once the last digit has been confirmed (fig. 11). Otherwise the device will revert to measuring mode.

Adjustment
System
Alarms
Date/time
Memory
Exit

Fig. 11: **Settings** menu

### 3.3.2 Settings menu structure

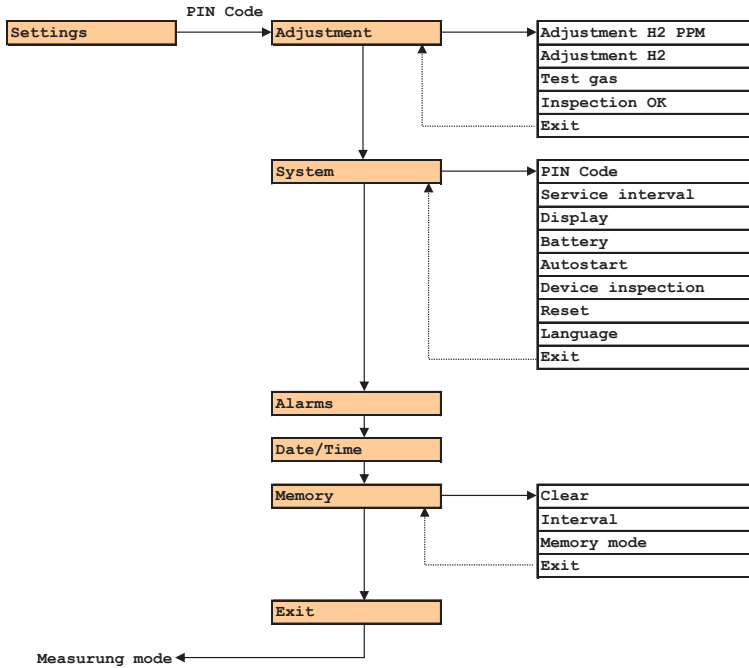


Fig. 12: Menu structure for the **VARIOTEC 460 Tracergas** settings

### 3.3.3 Adjustment

The Adjustment menu is used to set the sensors.



#### **NOTICE!**

The device may only be adjusted by specialist technicians in well ventilated rooms or in the open air. Incorrect adjustment can lead to incorrect measurement results.

---

#### **Note:**

A detailed description of adjustment along with important information is provided in section 5.2 on page 44.

---

#### **H2 PPM adjustment**

Used to set the gas-sensitive semiconductor for hydrogen H<sub>2</sub> in the ppm range.

Applications:           – Inspection above ground  
                                  – House

#### **H2 adjustment**

Used to set the thermal conductivity sensor for hydrogen H<sub>2</sub> in the % vol. range.

Applications:           – Inspection above ground  
                                  – Measuring in bar holes  
                                  – House  
                                  – Gas measuring

#### **Test gas**

Used to adjust the concentration of the test gases used.

#### **Inspection OK**

Confirms the device is in proper working order. This extends the service interval.

### 3.3.4 System

General information and specifications for operation are set in the System menu.

#### **PIN code**

Used to change or reset the PIN code.

---

#### **Note:**

If you lose the PIN code, you must contact SEWERIN Service. If the PIN code is set to **0000**, you will not be asked to enter it. The settings can then be accessed by anyone.

---

#### **Service interval**

Specifies the regular inspections/maintenance required for the device. You can also activate the automatic switch-off function once the set interval has passed.

#### **Display**

Used to set how long the display remains illuminated after any key is pressed as well as the display contrast.

#### **Battery**

Used to set the type of disposable/rechargeable battery used.



#### **NOTICE!**

The battery type setting must always be correct to prevent damage to the device.

---

#### **Autostart**

Sets the application that is automatically activated when the device is switched on.

### **Device inspection**

Used to switch the integrated device inspection on or off.

### **Reset**

Used to reset the device settings to the factory settings.

### **Language**

Sets the language.

### **3.3.5 Alarms**

Used to set the alarm threshold and the dynamic signal.

---

#### **Note:**

The **ALEOS** alarm cannot be adjusted. It always occurs at the end of the measuring range.

---

There is detailed information on alarms in section 7.2 on page 51.

### **ALPPM**

Sets the alarm threshold for exceeding significant gas concentrations in the ppm range, which indicate a gas leak.

Application:           – Inspection above ground  
                              – House

### **Dynamic signal**

Switches the dynamic signal off or on.

See section 2.1 on page 7 for detailed information on the dynamic signal.

### **3.3.6 Date/time**

Used to set the time, day, month and year. There are two formats available for the date.

### 3.3.7 Memory

The Memory menu is used to specify how measurement data and protocols are handled.

#### **Clear**

Used to clear protocols.

The different protocol types must each be cleared separately. All protocols in one protocol type are cleared at once.

You can find information on clearing individual protocols in section 3.2.9 on page 24.

#### **Interval**

Set the interval at which measurement data is saved.

#### **Memory mode**

Switches between ring memory and stack memory.

### 4 Power supply

This device can be operated using:

- Disposable (non-rechargeable) alkaline batteries
- Rechargeable NiMH batteries

The device comes with nickel metal hydride rechargeable batteries. The corresponding settings are stored.



#### **CAUTION!**

The device must not be used with leaking batteries.

- Replace leaking batteries.
  - Clean the battery compartment (and, if necessary, the device) before inserting the new disposable/rechargeable batteries.
- 

#### 4.1 Suitable disposable/rechargeable battery types

---



#### **WARNING!**

To ensure that the device remains explosion-proof as per /5/, only the following disposable/rechargeable batteries may be used:

- Batteries supplied by SEWERIN
- Batteries other than those supplied by SEWERIN, provided compliance with /2/ is guaranteed.

The batteries used in a battery compartment must always be identical in terms of type (disposable/rechargeable), capacity and manufacturer.

---

#### **Disposable battery requirements**

- Alkaline disposable batteries
- Battery size: AA, Type: LR6 as per /3/
- The creepage distance and air gap between the poles must not be less than 0.5 mm in accordance with /2/.

### Rechargeable battery requirements

- NiMH rechargeable batteries
- Battery size: AA, Type: HR6 as per /4/
- The creepage distance and air gap between the poles must not be less than 0.5 mm in accordance with /2/.
- The rechargeable batteries must be fast charging ( $I > 1.25 \text{ A}$ ) and remain within the temperature range.



#### **NOTICE!**

A device operated with disposable alkaline batteries cannot be charged. A note to this effect is shown on the display.

---

## 4.2 Operation with rechargeable batteries

The operating time of the device depends on the battery capacity.

If the device is not used or not kept in the docking station, the batteries will lose their charge due to self-discharge. The self-discharge intensity depends on the battery type.

### 4.2.1 Charging

The device can be charged via:

- Connection for power supply
- Docking station TG8



#### **WARNING!**

The device must only be charged outside of explosive areas.

---

For charging you will need either:

- M4 AC/DC adapter
- M4 vehicle cable

Please note the following points:



- The device or docking station must not be directly connected to a 24-V on-board power supply in the vehicle. The voltage is too high for the charging process.
- The battery should be charged at approximately room temperature.

### 4.2.2 Rechargeable battery maintenance

If the device is not used for a long period of time, it is advisable to fully discharge the battery before recharging it again.

A full discharging and recharging process takes approx. 11 hours (8 hours to discharge + 3 hours to recharge). The duration depends on the capacity of the rechargeable batteries used.



#### **WARNING!**

The device must only be charged outside of explosive areas.

---

- Connect the device (switched on) to the power supply via the side connection.

OR

- Place the device (switched on) into the docking station.

The rechargeable batteries will be fully discharged. Once the device has been discharged, it will automatically switch to charging mode.

### 4.3 Battery alarm

As soon as the remaining capacity of the batteries gets low, a battery alarm will go off:

Level 1: Battery almost empty

- **Battery capacity** symbol flashes
- Audible signal (one-off)
- Operating signal doubles
- Remaining operating time: approx. 15 min

Level 2: Battery empty

- Blank display apart from **Battery capacity** symbol
- Continuous audible signal
- Measuring mode unavailable
- Device shuts off

### 4.4 Replacing disposable/rechargeable batteries



#### **WARNING!**

The battery compartment must only be opened outside of explosive areas.

---

A 2.5 mm Allen key (supplied) is required to open the battery compartment on the back of the device.

1. Loosen the two screws securing the battery compartment. Remove the screws by repeatedly turning them alternately a short way; this ensures that the battery compartment does not twist.
2. Lift out the battery compartment.
3. Remove the disposable/rechargeable batteries and insert new ones. Ensure that the batteries are inserted with the correct polarity.
4. Replace the battery compartment so it fits neatly into place and secure firmly with the screws.
5. When you switch the device back on again, you will be asked which battery type is in use. Enter the correct battery type.

If it takes longer than 120 seconds to replace the batteries, the date and time will have to be reset the next time you switch the device on. All the other data will be saved.

### 5 Maintenance

In accordance with the legal regulations, device maintenance comprises the following elements:

- Device inspection including test of indication accuracy
- Adjustment
- Servicing

All inspections must be documented. The documentation must be retained for at least one year.

#### 5.1 Device inspection

##### 5.1.1 General information on the device inspection

###### 5.1.1.1 Scope

The device inspection includes the following tests:

- Analysis of the general status (see section 5.1.3 on page 41)
- Test of the indication accuracy with supply of fresh air (see section 5.1.4)
- Test of the indication accuracy with supply of test gas (see section 5.1.5)

###### 5.1.1.2 Frequency

The frequency of the device inspection depends on the application.

Application	When to test
Inspection above ground	weekly
Measuring in bar holes	every 3 months
House	weekly
Gas measuring	every 3 months



This symbol appears in the display when a device inspection is due for the selected application.

The applications are grouped together for the device inspection. The device inspection must be performed separately for each group.

### 5.1.1.3 Documentation

The device inspection procedure must be documented. There are two ways of doing this:

- On paper
- Saved electronically supported by the device (integrated device inspection)

Only the integrated device inspection is described in these operating instructions.

---

**Note:**

The device inspection must be documented on paper if the integrated device inspection is switched off.

---

### 5.1.1.4 Integrated device inspection

The integrated device inspection is accessed via the **menu** (fig. 6).

The results of the device inspection are stored in the device as a protocol.

The device inspection protocols can be opened in the device at any time (see section 3.2.9 on page 24). They can also be displayed on a computer using a **readout program**.

The program is available at [www.sewerin.com](http://www.sewerin.com).



The **Perform device inspection** symbol appears when a device inspection is due. It is visible in the display until the complete integrated device inspection has been carried out successfully for the selected application. If the device inspection was completed but the device failed on some points (not **OK**), the symbol will remain visible.

The integrated device inspection is switched off in the factory settings. The integrated device inspection has to be switched on (once only) before it can be performed.

### Switching on the integrated device inspection

1. Press **Menu**.
2. Select **Settings**.
3. Enter your **PIN code** .
4. Select **System**.
5. Select **Device inspection**.
6. Select **Yes**.
7. Apply the setting with **OK**.
8. Exit the **settings** with **Exit**.

#### 5.1.1.5 Order

You can carry out the device inspections and the associated tests for the applications (groups) that are due to be inspected in any order you wish. You can repeat the tests as often as you wish provided you have not yet concluded the device inspection for a group.

#### 5.1.2 Performing the device inspection

##### 5.1.2.1 Accessing the device inspection

The device is in measuring mode.

1. Press **Device inspection**.

OR

- a) Press **Menu**.
- b) Select **Device inspection** from the menu.

The **Device inspection** menu appears.

Inspection above ground/houses
Bar holes/measuring

Fig. 13: **Device inspection** menu

All the applications (groups) for which a device inspection is required are listed under **Required**.

2. Selecting an application (group).

The **Dev. Test ...** menu appears.

3. Select a test from the menu (**General status**, **Fresh air**, **Test gas H2**).
4. Carry out the test.

For detailed information, refer to the following sections:

- General status section 5.1.3
- Fresh air section 5.1.4
- Test gas ... section 5.1.5

### 5.1.2.2 Concluding the device inspection

After all the tests have been carried out as described in section 5.1.3 to section 5.1.5, the **Save** symbol will appear in the display.

An integrated device inspection is concluded by saving it. Up to 40 device inspections can be saved. The following information can be stored along with the device inspection:

- Inspector (e.g. inspector's name or initials)
- Password to protect the protocol from being accessed by unauthorised people

Inspector entries are saved automatically (ring memory with max. 10 entries).



Once the first inspector has been entered, the **Open stored inspectors** function will become available.

1. Press **Save**.
2. Enter the name of the **inspector**.
  - a) Select the characters required using the jog dial. Confirm each character using the jog dial.

OR

    - Press **Open stored inspectors**. A list of the stored inspectors will appear. Select the desired inspector. Open the inspector with **OK**.
  - b) Then confirm your entry/selection with **OK**.

OR

- Press **Esc** if you do not wish to enter an inspector for the device inspection.

3. Enter a **password**.

- a) Select the characters required using the jog dial. Confirm each character using the jog dial.
- b) Then confirm your entry with **OK**.

OR

- Press **Esc** if you do not wish to enter a password for the device inspection.

The device inspection is saved as a protocol. An overview with the device inspection results is displayed.

This overview includes a list of all gas types for which the device is configured. Gas types for which the indication accuracy was successfully tested in the device inspection are flagged with OK. Gas types that are available but have not been tested are flagged with ----.

4. Confirm the overview by pressing **OK**. The device returns to measuring mode.

### 5.1.3 Testing the general status

The general status test is part of the device inspection (see section 5.1.1.1). It is based on estimations by the user. The following must be tested:

- Housing
- Signals
- Probe
- Filter
- Pump

The battery charge status and the working condition of the controls are automatically tested during the integrated device inspection.

The device inspection has been opened (see section 5.1.2.1).

1. Select **General status** from the **Dev. Test ...** menu.
2. Test all associated subitems as described in section 5.1.3.1 to section 5.1.3.5.
3. Confirm the prompt **General status OK?** by pressing **Yes** if **all** subitems show no faults during testing. **General status OK** appears on the display.

#### 5.1.3.1 Housing

- Is the housing free from external damage?

#### 5.1.3.2 Signals

During the integrated device inspection the signals are emitted at short intervals.

- Can the audible signal be heard?
- Is the visual signal visible?



### 5.1.3.3 Probe

Probes are accessories. They only need to be tested if they are likely to be used in the course of the working day.

- Are the probes free from external damage?

Probe hoses are tested with a simple leak check.

1. Connect the probe hose to the gas input.
2. Seal the free end of the probe hose.

An error message should appear after approx. 10 seconds. This indicates that the probe hose is in good condition.

### 5.1.3.4 Filter

The fine dust filter is located behind the gas input. It is tested by means of a visual inspection.

1. Unscrew the gas input.
2. Remove the fine dust filter.
3. Check that there is no dirt in the fine dust filter.

As soon as there are any signs of deposits, the filter must be replaced. If you do not replace the filter, you must reinsert it exactly as you found it.

### 5.1.3.5 Pump

The pump function is tested with a simple leak check.

1. Seal the gas input.

After a maximum of 10 seconds an error message should appear. This indicates that the pump is working correctly.

If the error message does not appear, the pump may be faulty. The device must be tested by SEWERIN Service.

2. Release the gas input again.

After approximately 5 seconds, the error message should disappear again. Otherwise there is a fault (see section 6).

#### 5.1.4 Testing indication accuracy with supply of fresh air

The indication accuracy with supply of fresh air test is part of the device inspection (see section 5.1.1.1).

The device inspection has been opened (see section 5.1.2.1).

1. Make sure that only fresh air is being drawn in.
2. Select **Fresh air** from the **Dev. Test ...** menu.
3. Wait until the displayed reading is stable. A **Status: OK** message will appear.
4. Press **OK** to confirm. **Fresh air OK** will appear on the display.

If the **Status: OK** message does not appear within a reasonable amount of time, the air inflow does not correspond to the limit values stored in the device (see section 7.3 on page 52). Move the device somewhere else and repeat the test.

If the **Status: OK** message still does not appear when the test is repeated, the device must be re-adjusted (see section 5.2).

#### 5.1.5 Testing indication accuracy with supply of test gas

The indication accuracy with supply of test gas test is part of the device inspection (see section 5.1.1.1).

The following resources are needed for the test:

- Test gas containing hydrogen (e.g. 5% H<sub>2</sub> in 95% N<sub>2</sub>)
- Test set for the supply of test gas

---

**Note:**

Details of how to use the test set can be found in the accompanying operating instructions.

---

The device inspection has been opened (see section 5.1.2.1).

1. Select **Test gas H2** from the **Dev. Test ...** menu.
2. Check whether the test gas concentration specified by the device matches the test gas you intend to use. To do this press **Information**.
3. Add the test gas

4. Wait until the displayed reading is stable. A **Status: OK** message will appear.
5. Press **OK** to confirm.
6. Stop the test gas supply.

If the **Status: OK** message does not appear within a reasonable amount of time, this may be due to the following:

Cause	Corrective action
Connections leaking	Repeat check, checking the seal on the connections
Measurement values outside the specified limit values (see section 7.3)	Adjustment required (see section 5.2)

### Changing the test gas concentration

If no test gas with the specified concentrations is available for the test, the values can be changed according to the test gas used under **Test gas** in the adjustment menu (see section section 3.3.3 on page 28).

## 5.2 Adjustment

---



### **NOTICE!**

The device may only be adjusted by specialist technicians in well ventilated rooms or in the open air. Incorrect adjustment can lead to incorrect measurement results.

---

### 5.2.1 Scope

Adjustments must be made separately for each measuring range.

- Zero point
- Sensitivity



#### NOTICE!

For each measuring range always adjust the zero point first, followed by the sensitivity.

### 5.2.2 Suitable test gas concentrations

The following test gas concentrations can be used for adjustment:

Zero point	Measuring range sensitivity	
	H <sub>2</sub> PPM adjustment	H <sub>2</sub> adjustment
Fresh air	H <sub>2</sub> in synthetic air <ul style="list-style-type: none"> <li>• 1 ppm</li> <li>• 10 ppm</li> <li>• 100 ppm</li> <li>• 1000 ppm</li> <li>• 1.00 % vol.</li> </ul>	H <sub>2</sub> in N <sub>2</sub> <ul style="list-style-type: none"> <li>• 5 – 100 % vol.</li> </ul>

It is not necessary to use all test gas concentrations to adjust a measuring range. However, adjusting with more than one test gas concentration increases the measurement quality.

SEWERIN recommends the following test gas concentrations for adjusting the sensitivity:

- **H<sub>2</sub> PPM adjustment:** 100 ppm H<sub>2</sub> in synthetic air
- **H<sub>2</sub> adjustment:** 5 % vol. H<sub>2</sub> in N<sub>2</sub>

### 5.2.3 Preparation

Carrying out an adjustment always takes some time. Leave yourself plenty of time to prepare the necessary steps of the procedure. Have all necessary tools available. Let the device run for several minutes to ensure that the temperature is correct, for example.

### 5.2.4 Performing the adjustment

The zero point and sensitivity are adjusted following the same procedure for all gas concentrations (see section 5.2.4.1 on page 46 / section 5.2.4.2 on page 47).



You can find detailed information on adjustment (for example, test gas concentration, installation date of the sensor, date of last adjustment) under **Information**.

The symbol appears after the corresponding **Adjustment...** menu item has been selected.

#### 5.2.4.1 Adjusting the zero point

The zero point is adjusted following the same procedure for all gas concentrations.

1. Make sure that only fresh air is being drawn in.
2. Open the **settings** (see section 3.3.1 on page 25).
3. Select **Adjustment** from the menu.
4. Select the desired adjustment (e.g. **H2 PPM adjustment**).
5. Wait at least 1 minute. The displayed reading must be stable.
6. Select **Zero point** from the menu (select and confirm with **OK**).  
This adjusts the zero point. The reading shows zero (0.0 % vol. or 0.0 ppm).

#### 5.2.4.2 Adjusting the sensitivity

The sensitivity is adjusted following the same procedure for all gas concentrations.

The following resources are needed for adjusting the sensitivity:

- Test gas (see section 5.2.2 on page 45)
- Test set for the supply of test gas

---

**Note:**

Details of how to use the test set can be found in the accompanying operating instructions.

---

1. Connect the device to the test set.
2. Open the **settings** (see section 3.3.1 on page 25).
3. Select **Adjustment** from the menu.
4. Select the desired adjustment (e.g. **H2 PPM adjustment**).
5. Select the menu item that specifies the sensitivity to be tested (for example **100 PPM H2**). **Do not confirm with OK yet.**
6. Press and hold the release button on the test set. The test gas is added. **Do not let go of the release button.**
7. Wait at least 1 minute. The displayed reading must be stable.
8. Press **OK** to confirm. The device is adjusted. The reading shows the specified value (e.g. 100 ppm H<sub>2</sub>).
9. Let go of the release button on the test set.

### 5.3 Servicing

The device must only be serviced and repaired by SEWERIN Service.

- Send the device to SEWERIN for repairs and for annual maintenance.

---

#### Note:

If there is a service agreement in place, the device can be serviced by the mobile maintenance service.

---



The inspection plate on the device shows confirmation of the last maintenance and the next scheduled maintenance.

Fig. 14: Inspection plate

## 6 Faults

If a fault occurs during operation, an error message will appear on the screen.

Error messages are displayed in the order in which they occur. Up to five errors can be displayed. Error messages continue to be displayed until the error is corrected.

### Overview of possible error messages

Error code	Error message on the display	Error correction
8	No calibration PPM sensor adjustment	H2 ppm adjustment required (see section 5.2 on page 44)
10	Adjustment failed Test gas	Check test gas (see section 5.2 on page 44)
52	XFLASH SEWERIN Service	Error can only be corrected by SEWERIN Service
59	Error unknown SEWERIN Service	Error can only be corrected by SEWERIN Service
60	PX sensor	Error can only be corrected by SEWERIN Service
100	Pump error Probe/filter	Check all filters, probes and hose connections for porosity and dirt
202	I2C HOST – EX SEWERIN Service	Error can only be corrected by SEWERIN Service



## 7 Appendix

### 7.1 Specifications and permitted operating conditions

<b>Device data</b>	
Dimensions (W x D x H)	approx. 148 × 57 × 205 mm approx. 148 × 57 × 253 mm with supporting bracket
Weight	approx. 1000 g, depending on equipment

<b>Device elements</b>	
Display	monochromatic graphic display, 320 × 240 pixels
Buzzer	frequency 2.4 kHz, volume 80 db (A) / 1 m
Signal light	red
Pump capacity	vacuum > 250 mbar volume flow approx. 50 l/h
Interface	USB
Memory	8 MB
Operation	ON/OFF key, 3 function keys, jog dial

<b>Operating conditions</b>	
Operating temperature	-20 – 40 °C
Storage temperature	-25 – 60 °C (temperatures above 40 °C reduce the lifetime of the rechargeable batteries)
Humidity	5–90 % r.h., non-condensing
Atmospheric pressure	800 – 1100 hPa
Protection rating	IP54

<b>Power supply</b>	
Power supply	4 Mignon (AA) cells, either: <ul style="list-style-type: none"> <li>• NiMH rechargeable</li> <li>• disposable alkaline batteries</li> </ul>
Operating time, typical	at least 8 h
Charging time	approx. 3h (complete charge) depending on capacity
Charging voltage	12 V DC
Charging current	max. 1 A

## 7.2 Alarms

### Note:

Alarms are only emitted in the **Inspection above ground** and **House** applications.

There are no alarms in the **Measuring in bar holes** and **Gas measuring** applications.

### 7.2.1 Features

#### ALEOS

Type:	End of measuring range
Adjustable:	No
Latching:	No
Trigger:	ALEOS alarm threshold exceeded
Indicator:	<ul style="list-style-type: none"> <li>– Audible signal</li> <li>– Visual signal</li> <li>– <b>ALEOS</b> notification on display</li> <li>– Reading flashes</li> </ul>
Acknowledgement:	– Not possible
Reset:	<ul style="list-style-type: none"> <li>– Automatic when level falls below ALEOS alarm threshold</li> <li>– By switching device off</li> </ul>

#### ALPPM

Type:	Warning of gas concentration in ppm range
Adjustable:	Yes
Latching:	No
Trigger:	ALPPM alarm threshold exceeded
Indicator:	<ul style="list-style-type: none"> <li>– Audible signal</li> <li>– Visual signal</li> <li>– <b>ALPPM</b> notification on display</li> </ul>
Acknowledgement:	– Possible for audible signal when ALPPM alarm threshold is exceeded
Reset:	– Automatic when level falls below ALPPM alarm threshold

**7.2.2 Alarm thresholds (factory settings)**

Application	ALEOS	ALPPM
Inspection above ground	5 % vol.	0.5 ppm
Measuring in bar holes	100 % vol.	—
House	5 % vol.	0.5 ppm
Gas measuring	100 % vol.	—

**7.3 Limit values for the device inspection**

Application	Gas	Zero point		Sensitivity	
		Specifica- tion	Deviation	Specifica- tion	Deviation
Inspection above ground/House	H <sub>2</sub>	0.0 ppm	±0.5 ppm	100 ppm	+100 ppm -90 ppm
Gas measuring/ Measuring in bar holes	H <sub>2</sub>	0.0 % vol.	±1 % vol.	5 % vol.	±1 % vol.

## 7.4 Memory capacity

The total memory capacity of the device is divided up as follows:

Protocol type	Maximum number of storable protocols
Device inspection	40
Measurement	80

There is a choice of two memory modes (see section 3.3.7 on page 31). The selected memory mode applies for all protocol types.

### Measurements

#### Note:

A file is saved after each **Start measurement – Stop measurement** cycle, regardless of whether the memory capacity is exhausted.

Each file has a maximum memory capacity of 1800 data records. This means that a file can record data for 30 min (0.5 h) at a save interval of 1 second. After this, data recording continues automatically in the next file.

Save interval	Save time for 1 file (1800 data records)	Save time for 80 files (max. memory capacity)
1 s	0.5 h	40 h
2 s	1 h	80 h
<b>5 s</b>	2.5 h	200 h
10 s	5 h	400 h
20 s	10 h	800 h

Factory settings in **bold**

## 7.5 Sensors

---

**Note:**

Probes increase the stated response times.

---

### 7.5.1 Gas-sensitive semiconductor (SC) for H<sub>2</sub>

Measuring range	0.0 – 10000 ppm (1 % vol.)
Resolution	<ul style="list-style-type: none"> <li>• 0.1 ppm (0.0 – 9.9 ppm)</li> <li>• 2 ppm (10 – 100 ppm)</li> <li>• 20 ppm (100 – 990 ppm)</li> <li>• 0.05 % vol. (0.1 – 0.95 % vol.)</li> <li>• 0.1 % vol. (1.0 – 5.0 % vol.)</li> </ul>
Response times	10 ppm H <sub>2</sub> : <ul style="list-style-type: none"> <li>• t<sub>R</sub> &lt; 1.2 s      t<sub>50</sub> &lt; 6 s      t<sub>90</sub> &lt; 18 s</li> </ul> 100 ppm H <sub>2</sub> : <ul style="list-style-type: none"> <li>• t<sub>R</sub> &lt; 1.0 s      t<sub>50</sub> &lt; 7 s      t<sub>90</sub> &lt; 15 s</li> </ul> t <sub>R</sub> ... Time until device's first response following delivery of gas
Warm-up times	up to 5 min
Measuring error	30 % (short time)
Interference	at 20 °C: <ul style="list-style-type: none"> <li>• 1 % vol. CH<sub>4</sub>                      50 ppm maximum</li> <li>• 1 % vol. C<sub>3</sub>H<sub>8</sub>                      10 ppm maximum</li> <li>• 40 ppm CO                          2 ppm maximum</li> <li>• 1 % vol. C<sub>2</sub>H<sub>6</sub>O (ethanol)      2 ppm maximum</li> <li>• 3500 ppm benzene                10 ppm maximum</li> <li>• water vapour, &lt; 80% r.h.      &lt; 1 ppm typical</li> </ul>
Lifetime, expected	5 years

## 7.5.2 Thermal conductivity sensor (TC) for H<sub>2</sub>

Measuring range	0 – 100 % vol.
Resolution	0.1 % vol.
Response times	t <sub>50</sub> < 3.1 s    t <sub>90</sub> < 6.5 s
Warm-up time	< 30 s
Measuring error	3 % of measuring range end value
Interference	<ul style="list-style-type: none"> <li>• to all gases with a different thermal conductivity at 20 °C:</li> <li>• 100 % vol. CH<sub>4</sub>                      16 % vol. typical</li> <li>• 100 % vol. C<sub>3</sub>H<sub>8</sub>                      -2 % vol. typical</li> </ul>
Lifetime, expected	5 years

## 7.6 Technical information

### 7.6.1 Sensitivity of the gas-sensitive semiconductor (SC)

Low-oxygen atmospheres can reduce the sensitivity of the gas-sensitive semiconductor (sensor suffocation).

Gaseous constituents of silicones, oils and phosphate esters for example have a damaging effect on the sensor. They permanently reduce the sensitivity.

Contamination of the measurement environment with halogens, burnt neoprene, PVC or trichloroethene for example also lowers the sensitivity of the sensors, but they can be regenerated.

### 7.6.2 Electrostatic charge

Avoid electrostatically charging the device. Electrostatically un-earthed objects (e.g. including metallic housing without an earth connection) are not protected against applied charges (e.g. through dust or dispersed flows).



#### **NOTICE!**

To prevent electrostatic charging when working with hydrogen H<sub>2</sub>, always use the carrying bag TG8.

---

### 7.6.3 Identification sticker (back of device)

The symbols on the sticker mean the following:



Only ever open the battery compartment outside of explosive areas.



Read the operating instructions.

### 7.6.4 Cleaning

The device must only be cleaned with a damp cloth.



#### **NOTICE!**

Do not use solvents, petrol or cockpit spray containing silicone or similar substances to clean the device!

---

## 7.7 Accessories and consumables

### Accessories

Part	Order number
Docking station TG8	LP11-10001
M4 AC/DC adapter	LD10-10001
M4 vehicle cable, 12 V= mobile	ZL07-10100
M4 vehicle cable, 12 V= mounting	ZL07-10000
M4 vehicle cable, 24 V= mobile	ZL09-10000
Carrying system "Vario"	3209-0012
Carrying bag TG8	3204-0040
Case TG8-RÜ	ZD29-10000
Compact case TG8	ZD31-10000
Carpet probe PRO	ZS01-12000
Bell probe D125	ZS05-10300
Localisation probe 345 mm	ZS03-10300
Flexible hand probe	ZS32-10000
Probe hose	ZS25-10000 (e.g.)
Test gas generator PGG H2	VT10-Z1000
Test set SPE VOL	PP01-90101
Test set SPE ppm	PP01-40101
Test set SPE DUO	PP01-60001
Test plate	ZP06-10000

### Consumables

Part	Order number
Fine dust filter	2499-0020
Hydrophobic filter	2491-0050
Special filter element	2499-0005
Rechargeable NiMH battery	1354-0009
Disposable alkaline battery	1353-0001
Test gas 100 ppm H <sub>2</sub> in synthetic air, test gas can 1 l, pressure approx. 12 bar	ZT18-10000
Test gas 5.0 % vol. H <sub>2</sub> in N <sub>2</sub> , test gas can 1 l, pressure approx. 12 bar	ZT37-10001

Other accessories and consumables are available for the product. Please contact our SEWERIN sales department for further information.



**7.8 Declaration of conformity**

Hermann Sewerin GmbH hereby declares that the **VARIOTEC® 460 Tracergas** fulfils the requirements of the following guidelines:

- 2014/30/EU
- 2014/34/EU


Gütersloh, 2016-04-20



Dr S. Sewerin (General Manager)

The complete declaration of conformity can be found online.

## 7.9 Inspection protocol

INSPECTION PROTOCOL	<b>Variotec® 460 Tracergas</b>											
Serial no. (e.g.: 065 15 00480)	<input style="width: 100px; height: 20px;" type="text"/>											
<small>02.05.2012</small>												
<b>1.0 General status</b>												
1.1	– Perfect condition (e.g.: Y / N)											
1.2	– Fine dust filter correct (e.g.: Y / N)											
1.3	– Disposable/rechargeable battery capacity (e.g.: ¼)											
<b>2.0 Pump check</b>												
2.1	– Pump error F100 in seal											
<b>3.0 Gas-sensitive semiconductor</b> (Inspection above ground/House)												
3.1	Zero point											
	– Display with fresh air											
3.2	Test gas 100 ppm H <sub>2</sub> (in synthetic air)											
	– Display 70 – 150 ppm											
<b>4.0 Thermal conductivity sensor</b> (Measuring in bar holes/Gas measuring)												
4.1	Zero point											
	– Display -1.0 – +1.0 % vol.											
4.2	Test gas 5 % vol. H <sub>2</sub> (in N <sub>2</sub> )											
	– Display 3.0 – 7.0 % vol.											
<b>5.0 Rapid test with PGG H2</b> (Inspection above ground/House)												
5.1	Zero point											
	– Display with fresh air											
5.2	Test gas H <sub>2</sub> (from PGG H2)											
	– Display >1.5 ppm; 8.0 ppm typical											
<b>6.0 Comments</b>												
	– Housing damaged											
	– Adjustment, repair											
	– Inspection at factory											
	– or similar											
<b>7.0 Inspection</b>												
	– Day											
	– Month											
	– Year											
	– Signature											

**7.10 Advice on disposal**

The European Waste Catalogue (EWC) governs the disposal of appliances and accessories.

Description of waste	Allocated EWC waste code
Device	16 02 13
Test gas can	16 05 05
Disposable battery, rechargeable battery	16 06 05

**End-of-life equipment**

Used equipment can be returned to Hermann Sewerin GmbH. We will arrange for the equipment to be disposed of appropriately by certified specialist contractors free of charge.

## 7.11 Terminology and abbreviations

<b>ALEOS</b>	<ul style="list-style-type: none"> <li>● Alarm at end of measuring range (end of scale)</li> </ul>
<b>ALPPM</b>	<ul style="list-style-type: none"> <li>● Adjustable alarm in ppm range</li> </ul>
<b>CENELEC</b>	<ul style="list-style-type: none"> <li>● European Committee for Electrotechnical Standardization</li> </ul>
<b>NiMH</b>	<ul style="list-style-type: none"> <li>● Nickel metal hydride</li> </ul>
<b>ppm</b>	<ul style="list-style-type: none"> <li>● Parts per million</li> </ul>
<b>Ring memory</b>	<ul style="list-style-type: none"> <li>● Type of data storage in the device</li> <li>● If the available storage space is full, the oldest file is automatically overwritten by the current file.</li> </ul>
<b>SC</b>	<ul style="list-style-type: none"> <li>● Gas-sensitive semiconductor</li> </ul>
<b>Stack memory</b>	<ul style="list-style-type: none"> <li>● Type of data storage in the device</li> <li>● If the available storage space is full, you are prompted to confirm whether the oldest file should be overwritten by the current file.</li> </ul>
<b>TC</b>	<ul style="list-style-type: none"> <li>● Thermal conductivity sensor</li> </ul>
<b>VOL</b>	<ul style="list-style-type: none"> <li>● Volume</li> </ul>

## 7.12 Referenced documents

The following standards, guidelines and regulations are referred to in these operating instructions:

- /1/ DVGW G 465-4  
Deutsche Vereinigung des Gas- und Wasserfaches e. V. (German Association of Gas and Water Specialists); Regulation G 465-4: Gasspür- und Gaskonzentrationsmessgeräte für die Überprüfung von Gasanlagen (Gas-Detection and Gas-Concentration Measurement Devices for Inspection of Gas Systems)  
Available for download at: [www.dvgw.de](http://www.dvgw.de)
- /2/ EN 60079-7:2007
- /3/ EN 60086-1
- /4/ EN 61951-2
- /5/ 94/9/EC (ATEX 100a)

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