

VARIOTEC® EGA



VARIOTEC® 410



Fig. 1: Overview of device **VARIOTEC EGA**

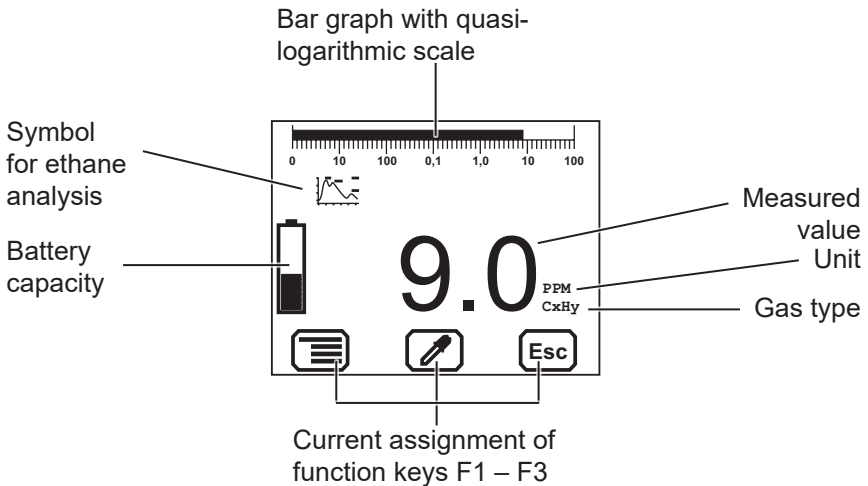


Fig. 2: Display, **VARIOTEC EGA**

Display symbols



Menu



OK



Cancel



Take sample



Perform device inspection



Tab (jump to next input field)



Battery capacity



Save



Information



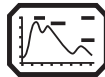
Delete



Fault



Purge



Ethane analysis



Opening stored comments
Opening stored inspectors

Information about this document

The warnings and notes in the document mean the following:



DANGER!

Risk of personal injury. Results include serious injury or death.



WARNING!

Risk of personal injury. Can result in serious injury or death.

CAUTION!

Risk of damage to property.

Note:

Tips and important information.

Enumerated lists (numbers, letters) are used for:

- Instructions that must be followed in a specific sequence

Bulleted lists (bullet points, dashes) are used for:

- Lists
- Instructions comprising only one action

Numbers enclosed by forward slashes /.../ refer to referenced documents.

1	General	1
1.1	Warranty.....	1
1.2	Purpose.....	2
1.3	Intended use	2
1.4	General safety information	3
2	Features	4
3	Operation	6
3.1	General information on operation.....	6
3.1.1	Keys and jog dial.....	6
3.1.2	Selecting/exiting menus and menu items.....	7
3.1.3	Switching the device on	7
3.1.4	Differences between measuring mode and settings mode	9
3.2	Measuring mode	9
3.2.1	Accessing the menu (measuring mode menu structure).....	9
3.2.2	Zero point.....	10
3.2.3	Ethane analysis.....	10
3.2.3.1	General information on ethane analysis.....	10
3.2.3.2	Purging the detector.....	12
3.2.3.3	Carrying out an ethane analysis.....	13
3.2.3.4	Evaluating an ethane analysis	15
3.2.4	Settings	18
3.2.5	Purge.....	18
3.2.6	Report	18
3.2.7	Device inspection	18
3.2.8	Device information	19
3.3	Settings	20
3.3.1	Opening Settings.....	20
3.3.2	Settings menu structure	21
3.3.3	Adjustment	22
3.3.4	System	22
3.3.5	Date/time.....	24
3.3.6	Memory	24
4	Power supply	25
4.1	Suitable disposable/rechargeable battery types	25
4.2	Operation with rechargeable batteries	26
4.2.1	Charging.....	26

4.2.2	Rechargeable battery maintenance	27
4.3	Battery alarm	28
4.4	Replacing disposable/rechargeable batteries	28
5	Maintenance	30
5.1	Device inspection	30
5.1.1	General information on the device inspection	30
5.1.1.1	Scope	30
5.1.1.2	Frequency	30
5.1.1.3	Documentation	30
5.1.1.4	Integrated device inspection	31
5.1.1.5	Order	32
5.1.2	Performing the device inspection	32
5.1.2.1	Accessing the device inspection	32
5.1.2.2	Concluding the device inspection	32
5.1.3	Testing the device status	34
5.1.3.1	Housing	34
5.1.3.2	Signals	34
5.1.3.3	Probe	35
5.1.3.4	Filter	35
5.1.3.5	Pump	35
5.1.4	Testing indication accuracy with supply of fresh air	36
5.1.5	Testing indication accuracy with supply of test gas	36
5.2	Adjustment	38
5.2.1	Scope	38
5.2.2	Suitable test gases	39
5.2.3	Preparation	39
5.2.4	Performing the adjustment	40
5.2.4.1	Adjusting the zero point	40
5.2.4.2	Adjusting the sensitivity	41
5.3	Servicing	42
6	Faults	43
7	Appendix	44
7.1	Specifications and permitted operating conditions	44
7.2	Limit values for the device inspection	46
7.3	Memory capacity	46
7.4	Technical information	47
7.4.1	Identification sticker (back of device)	47

7.4.2	Cleaning	47
7.4.3	Electrostatic charge.....	47
7.5	Accessories and consumables	48
7.6	EU declaration of conformity	49
7.7	Inspection report	50
7.8	Advice on disposal	51
7.9	Terminology and abbreviations	52
7.10	Referenced documents	52
8	Index	53

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 may only be commissioned by qualified professionals who are familiar with the legal requirements.

- 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 EGA** is a portable measuring device for ethane analysis to help you safely distinguish between natural gas and swamp gas.

Note:

All descriptions in these operating instructions refer to the device as delivered. The manufacturer reserves the right to make changes.

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 for working in gas pipelines is required to operate the device.

It may be used to measure the following gases:

- Methane CH_4 / Propane C_3H_8 / Butane C_4H_{10}

It may **not** be used for:

- Gas analysis of technical processes
- Monitoring liquids

The device can be used up to a temperature of 40°C (104°F). However, high temperatures reduce the service life of the sensors and 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).
- 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.

- The device must only be tested and adjusted with test gases in well ventilated rooms or in the open air. Test gases must be handled in a professional manner.
- Always carry out a device inspection 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.

Note:

Follow the advice regarding explosion protection (see Section 2 on page 4).

2 Features

Standard device equipment includes:

- Detector for ethane analysis
- Thermal conductivity sensor (TC)
- Gas-sensitive semiconductor (SC)

Thermal conductivity sensors measure the specific conductivity of gases. The gas-sensitive semiconductor reacts to changes in conductivity brought about by reducible gases.

The device features two alarms:

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

Signals are emitted when a fault occurs.

Explosion protection

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

Explosion-proof group	For the following atmospheres	When using...
II2G Ex de ib IIB T4 Gb	<ul style="list-style-type: none"> – Methane CH₄ – Propane C₃H₈ – Butane C₄H₁₀ – Carbon monoxide CO 	Device without carrying bag TG8
II2G Ex de ib IIC T4 Gb	<ul style="list-style-type: none"> – Methane CH₄ – Propane C₃H₈ – Butane C₄H₁₀ – Carbon monoxide CO – Hydrogen H₂ 	Device with carrying bag TG8

EC type-examination certificate: TÜV 07 ATEX 553353 X



DANGER! Risk of explosion due to sparks

- Only open the battery compartment outside of explosive areas.
 - Only charge the device outside of explosive areas.
 - Only use the USB port outside of explosive areas.
 - Use only suitable battery types.
 - When working with hydrogen, always use the carrying bag TG8 for the device.
-

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

3.1.2 Selecting/exiting menus and menu items

Functions 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 9 for information on accessing the main menu.

Selecting submenus / menu items

Submenus (menu items) are selected and opened using the jog dial and/or function keys.

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

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 **Back** from the menu

3.1.3 Switching the device on

Note:

Always switch the device on with fresh air.

- 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.

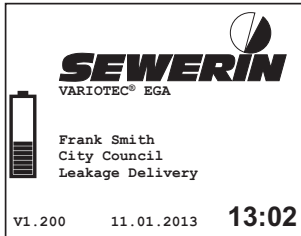


Fig. 3: Start screen

Display:

- Device type: **VARIOTEC EGA**
- User:
Frank Smith
Public services: Any town
Dep.: Fault clearing
- Firmware version: V1.200
- Date and time
- Battery capacity

An overview of the gases that can be detected will then appear briefly.

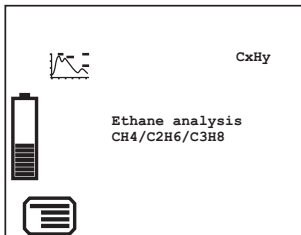


Fig. 4: Overview of detectable gases

Display:

- Symbol: Ethane analysis
- Detectable gases
- Battery capacity

The device switches to measuring mode.

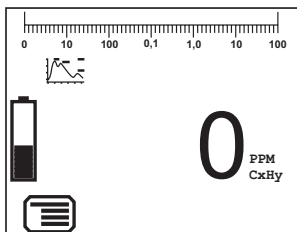


Fig. 5: Measuring mode – display of current readings

Display:

- Symbol: Ethane analysis
- Current measurement value
- Battery capacity

The device is ready for use.

3.1.4 Differences between measuring mode and settings mode

The device is operated in two modes:

- **Measuring mode** (see Section 3.2 on page 9)

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 20)

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.

3.2 Measuring mode

When switched on, the device is in measuring mode. In measuring mode, the current measurements are always displayed (see Fig. 5).

3.2.1 Accessing the menu (measuring mode menu structure)

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

Zero point
Ethane analysis
Settings
Report
Start purge
Device inspection
Device information
Exit

Fig. 6: Menu with submenus (menu items)

3.2.2 Zero point

The zero point can be set manually in the **Zero point** item. This is only required 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.

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.

3.2.3 Ethane analysis

The overview of detectable gases can be accessed in the **Ethane analysis** menu item (Fig. 4). The device automatically returns to measuring mode.

Note:

The ethane analysis cannot be started with the **Ethane analysis** menu item.

Information about carrying out the ethane analysis can be found in Section 3.2.3.3 on page 13.

3.2.3.1 General information on ethane analysis

Ethane analysis is used to demonstrate the presence of natural gas and to distinguish between natural gas and swamp gas. This analysis utilizes the fact that natural gas contains ethane, but swamp gas does not. Thus, if ethane is detected, it can be concluded that natural gas is present.

Note:

Ask the network operator about the composition of natural gas. Request an analysis certificate.

Ethane can definitely be detected in natural gas at a minimum concentration of 1% vol. If the concentration of ethane in natural gas is less than 0.5% vol., the gas cannot be detected. If the concentration falls between these two values, the analysis can be carried out, but the result must then be evaluated.

During the ethane analysis, the gas sample is always analyzed for the presence of the following three gases:

- Methane CH_4
- Ethane C_2H_6
- Propane C_3H_8

Prerequisite

The ethane analysis only works if the gas sample exhibits a specific concentration.

The device checks the concentration at the start of the analysis and prevents the analysis being carried out if the concentration is too low.

Gas sample concentration	Analysis is ...	Device response
> 1% vol.	Definitely possible	Analysis can be carried out
1% vol. – 0.5% vol	Technically possible	Analysis can be carried out, but Ethane analysis critical message appears
< 0.5% vol.	Not possible	Analysis cannot be carried out because Take sample symbol is not displayed

Displayed measurement values

In **measuring mode**, the device displays the actual concentrations.

During the **analysis**, the device automatically dilutes the gas sample to 1% vol. to ensure optimal utilization of the semiconductor sensor. This means:

- The concentration ratios of all components of the gas sample are retained.
- The maximum concentration of a gas component is 1% vol., even if the actual concentration in the gas sample is higher. In the mode of curve, the maximum peak may be cut off as necessary (Fig. 10 right).

Number of measurements

Always carry out 2 – 3 measurements in the same location to obtain certain results. Observe the information on evaluation in Section 3.2.3.4 on page 15.

3.2.3.2 Purging the detector

The detector for ethane analysis must be kept clean at all times to prevent distortion of measurement results. When the device is in use, however, higher hydrocarbons (e.g. propane, butane) can accumulate in the detector and contaminate it.

The detector is automatically purged after every ethane analysis.

An additional purge of the detector is required in these situations:

- Canceled ethane analysis
If an ethane analysis is canceled, the message **Purging required** and the **Take sample** symbol appear automatically.
- Detector contamination suspected

Note:

The purge always takes 4 minutes. A new ethane analysis can only be started when the purge cycle has been completed.

The device is in measuring mode.

1. Only when detector contamination is suspected:
 - a) Press **Menu**.
 - b) Select the **Purging** menu item. The message **Purging required** and the **Take sample** symbol appear.
-

CAUTION! Risk of damaging the sensor

The ethane detector will be damaged if the air supply is contaminated or moist.

- Always add clean, dry fresh air.
-

2. Make sure the device is drawing in fresh air.
3. Press **Take sample**.

The purge cycle starts automatically as soon as the gas concentration drops below 50 ppm. The time remaining until the end of the purge cycle is displayed.

After the purge cycle is complete, the device will revert to measuring mode.

3.2.3.3 Carrying out an ethane analysis

The device is in measuring mode.

1. The ethane analysis is generally performed on a bar hole. Use the localization probe and a probe hose.
 - a) Insert the probe into the bar hole.
 - b) Connect the probe hose to the device.

As soon as the measurement value satisfies specific conditions (gas concentration > 1% vol., stable measurement value), the **Take sample** symbol appears.

2. Press **Take sample**. A message appears.

Note:

An ethane analysis takes approximately 4 minutes. After **Esc** is used to cancel the analysis, the detector must be purged (see Section 3.2.3.2 on page 12). This purge cycle also takes 4 minutes.

3. Confirm the **Take sample?** prompt by pressing **OK**. The gas sample is taken.

The **Add fresh air** message appears.

4. Add fresh air.

a) To do so, remove the probe hose from the device.

b) Move away from the bar hole. Note the direction of the wind.

As soon as the gas concentration drops below 50 ppm, the analysis of the gas sample taken starts automatically. The gas sample analysis is plotted on the display.

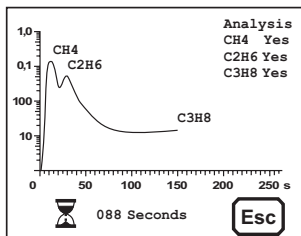


Fig. 7: Mode of curve of an analysis in progress

When the analysis is complete, the **Save** symbol appears.

5. Press **Save**.

6. If necessary enter a **Comment** on the analysis.

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.

7. Confirm your entry with **OK**. The comment is saved together with the report name (date, time).

3.2.3.4 Evaluating an ethane analysis

Fully completed ethane analyses are saved as reports. These can be accessed and deleted at any time.

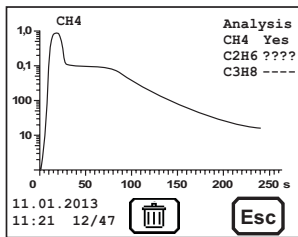


Fig. 8: Ethane analysis report

A report contains the following information about the gas sample:

– Analysis of the gas components:

CH_4 Yes

C_2H_6 ????

C_3H_8 ----

– Curve; peaks of the gas components definitely present in the sample are labeled: CH_4

– Date and time the report was saved

– Report number: 12/47, i.e. 12th report of 47 reports in total

The symbols next to the analyzed gas components are defined as follows:

Symbol	Gas component is ...
Yes	Definitely present
????	Possibly present
----	Not present

Ideally, the result of the ethane analysis is a curve with at least one clear, steep peak (Fig. 9 left). However, occasionally, the analysis does not provide a clear determination of the gas components present (Fig. 9 right). In such cases, you must decide whether the analysis quality is sufficient.

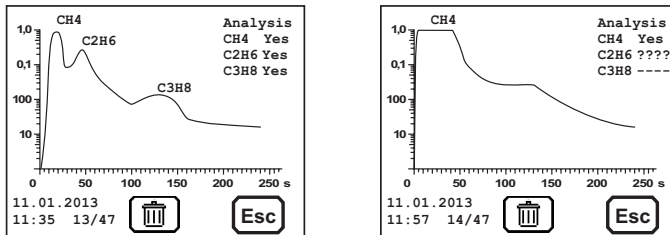


Fig. 9: Quality assessment of an ethane analysis; Left: good quality, Right: poor quality

Criteria for determining good analysis quality

- Methane is definitely present.
- Methane concentration is 1% vol.
- Peaks of the gas components present are clearly recognizable.

Criteria for determining the presence of natural gas

- Good analysis quality (see above)
- Ethane is definitely present.

Ethane analyses of insufficient quality

Note:

Never use poor-quality ethane analyses to demonstrate the presence of natural gas.

Poor-quality ethane analyses can exhibit the following features, for example:

- Curve does not contain any clear peaks (smooth concentration plot)

Reason: Residual gases from previous analyses have accumulated.

Corrective action: Purge with test gas, e.g.:

– 1% vol. CH₄ in synthetic air

OR

– 100 ppm C₂H₆, 1% vol. CH₄ in synthetic air

- Curve and symbols (**Analysis**) provide contradictory information about gas components

Reason: Extremely high or low temperatures (optimal working temperature: 20°C (68°F))

3.2.4 Settings

You can change the device settings and access information about the device under **Settings** in the menu.

Detailed information about the settings can be found in Section 3.3 on page 20.

3.2.5 Purge

The ethane detector purge is started with the **Purge** menu item.

Note:

The purge cycle starts immediately when the **Purge** menu item is selected. The purge always takes 4 minutes. A new ethane analysis can only be started when the purge cycle has been completed.

Detailed information about purging the detector can be found in Section 3.2.3.2 on page 12.

3.2.6 Report

You can retrieve or delete reports of saved data under **Report** in the menu. When saved, the reports are assigned to different report types.

The following report types are available:

- Ethane analysis
- Device inspection

Reports can only be deleted individually.

You can find information on how to delete all reports of one report type in Section 3.3.6 on page 24.

3.2.7 Device inspection

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

Note:

The integrated device inspection is switched off in the factory settings.

If the integrated device inspection is switched on, the device will remind you quarterly 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.

More detailed information about the device inspection can be found in Section 5.1 on page 30.

3.2.8 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** :

- Adjustment
- System
- Date/time
- Memory

You can find information on selecting and exiting menus and menu items in Section 3.1.2 on page 7.

3.3.1 Opening Settings

1. Press **Menu**.
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.

SEWERIN recommends setting a different PIN code after initial start-up, so only authorized 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	Press the jog dial
2nd digit		Press the jog dial
3rd digit		Press 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. 10). Otherwise, the device will revert to measuring mode.

Adjustment
System
Date/time
Memory
Exit

Fig. 10: Settings menu

3.3.2 Settings menu structure

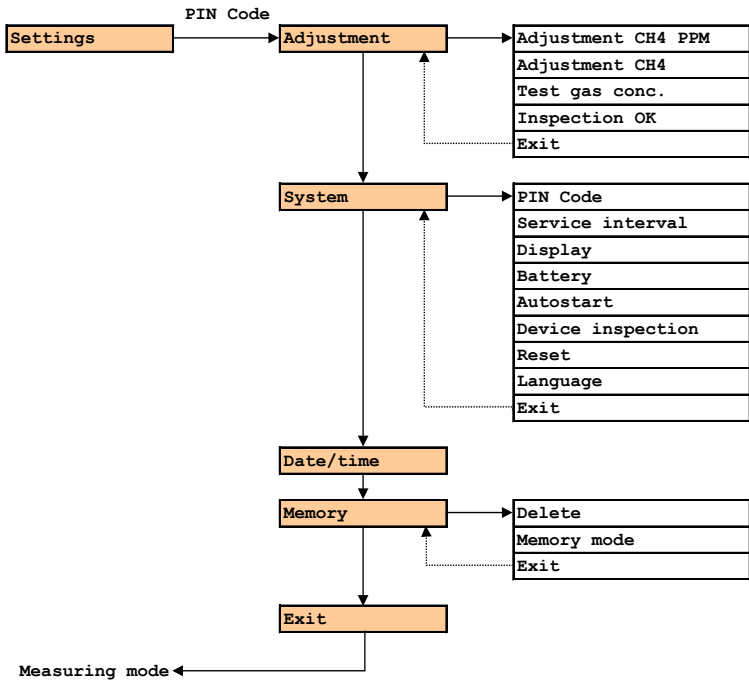


Fig. 11: Settings menu structure for the VARIOTEC EGA

3.3.3 Adjustment

The Adjustment menu is used to set the sensors.

A detailed description of adjustment along with important information is provided in Section 5.2 on page 38.

Adjustment CH4 PPM

Used to adjust the gas-sensitive semiconductor for methane CH₄ in the ppm range.

Adjustment CH4

Used to adjust the thermal conductivity sensor for methane CH₄ in the % vol. range.

Test gas conc.

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.

Note:

The inspection is used for regularly checking the device. It is not used as often for the device inspection (function control); more often it is carried out for maintenance purposes.

The inspection must be carried out by an authorized specialist (e.g. device inspector).

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.

CAUTION! Damage possible due to device overheating

If the battery type is not correctly set, the device can overheat.

- Always enter the correct battery type.
-

Autostart

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

Note:

For this device, no function is assigned for this menu item because only the ethane analysis is available.

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 Date/time

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

3.3.6 Memory

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

Delete

Used to delete reports.

The two different report types must each be cleared separately. All reports in one report type are cleared at once.

You can find information on clearing individual reports in Section 3.2.6 on page 18.

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.



WARNING! Risk of explosion due to leaking batteries

Leaking electrolytes can shorten the creepage distance and air gap between the poles. As a result, the requirements for the batteries may no longer be met.

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

4.1 Suitable disposable/rechargeable battery types



WARNING! Risk of explosion due to unsuitable batteries

To ensure that the device remains explosion-proof as per /4/, only certain disposable/rechargeable batteries may be used:

- Only use batteries supplied by SEWERIN. Other disposable/rechargeable batteries, which have not been supplied by SEWERIN, may only be used if they meet the specifications in accordance with /1/.
 - In each battery compartment, respectively, use only those batteries that are identical with respect to type (disposable or rechargeable), capacity and manufacturer.
-

Disposable battery requirements

- Alkaline disposable batteries
- Size: mignon (AA), type: LR6 as per /2/
- The creepage distance and air gap between the poles must not be less than 0.5 mm in accordance with /1/.

Rechargeable battery requirements

- NiMH rechargeable batteries
- Size: mignon (AA), type: HR6 as per /3/
- The creepage distance and air gap between the poles must not be less than 0.5 mm in accordance with /1/.
- The rechargeable batteries must be quick charging ($I > 1.25 \text{ A}$) and remain within the temperature range.

Note:

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



DANGER! Risk of explosion due to sparks

When batteries are charged in potentially explosive areas, high charging current occurs.

The power supply is not explosion-proof.

- Only charge the device 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.



DANGER! Risk of explosion due to sparks

When batteries are charged in potentially explosive areas, high charging current occurs.

The power supply is not explosion-proof.

- Only charge the device 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 (once)
 - 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



DANGER! Risk of explosion due to sparks

When the housing is open, the device is not explosion-proof.

- Only open the battery compartment 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 slightly in alternation; 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
- Maintenance

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 device status
- Test of the indication accuracy with supply of fresh air
- Test of the indication accuracy with supply of test gas

5.1.1.2 Frequency

The device inspection must be carried out quarterly.

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

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:

If the integrated device inspection is switched off, the device inspection must be documented on paper.

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 report. The device inspection reports can be opened at any time. The reports can also be displayed on a computer using a **readout program**. The program is available at 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.

If the device inspection was completed but the device failed on some points, 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 tests that make up the device inspection in any order you wish. You can repeat the tests as often as you wish provided you have not yet concluded the device inspection.

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.

2. Select the **Ethane analysis** menu item.

The **Dev. Test Ethane analysis** menu appears.

Device status
Fresh air
Test gas 50/100 PPM C2H6

Fig. 12: **Dev. Test Ethane analysis** menu

3. Select a test from the menu (**Device status**, **Fresh air**, **Test gas 50/100 PPM C2H6**).

4. Carry out the test.

For detailed information, refer to the following sections:

- Device status Section 5.1.3 on page 34
- Fresh air Section 5.1.4 on page 36
- Test gas ... Section 5.1.5 on page 36

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 report from being accessed by unauthorized 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. If necessary, 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 report. An overview with the device inspection results is displayed.

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

5.1.3 Testing the device status

The device status test is part of the device inspection. The device status test 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.

1. Select **Device status** from the **Dev. Test Ethane analysis** menu.
2. Test all associated subitems as described in Section 5.1.3.1 to Section 5.1.3.5.
3. Confirm the prompt **Device status OK?** by pressing **Yes** if **all** subitems show no faults during testing. The device switches back to the **F-Inspection Ethane analysis** menu. A **Device status OK** message will appear.

This concludes the **Device status** test.

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. Make sure 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.

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.

The device inspection has been opened.

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

This concludes the **Fresh air** test.

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 7.2 on page 46). Move the device to another location and repeat the test.

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

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. The test is carried out in a manner similar to the ethane analysis.

The following resources are needed for the test:

- Test gas (gas mixture)
- Test set for the supply of test gas (e.g. **SPE VOL**)

Note:

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

As a test gas, SEWERIN recommends a gas mixture with 100 ppm C_2H_6 , 1.00% vol. CH_4 .

The device inspection has been opened.

1. Select **Test gas 50/100 PPM C2H6** from the **Dev. Test Ethane analysis** 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. As soon as the measurement value satisfies specific conditions (gas concentration > 1% vol., stable measurement value), the **Take sample** symbol appears.
5. Press **Take sample**. A message appears.
6. Confirm the **Take sample?** prompt by pressing **OK**. The gas sample is taken.

The **Add fresh air** message appears.

7. Add fresh air.
 - a) To do this, disconnect the test set from the device.
 - b) Make sure the device is drawing in fresh air.

As soon as the gas concentration drops below 50 ppm, the analysis of the gas sample taken starts automatically. The gas sample analysis is plotted on the display.

After the indication accuracy test is completed, the device switches back to the **F-Inspection Ethane analysis** menu. A **Test gas OK** message will appear. This concludes the **Test gas ...test**.

Test gas test unsuccessful

If the **Test gas ...** test was not carried out successfully, the message **Test gas not OK** appears.

A test may be unsuccessful for the following reasons:

Cause	Corrective action
Connections leaking	Repeat check, checking the seal on the connections
Measurement values outside the specified limit values (see Section 7.2 on page 46)	Adjustment required

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.

5.2 Adjustment

CAUTION! Damage possible due to incorrect adjustment

Incorrect adjustment can lead to incorrect measurement results.

- Only specialist technicians may perform adjustments
 - Adjustments must be made in well ventilated rooms or in the open air.
-

5.2.1 Scope

The following are adjusted:

- Zero point
 - Sensitivity
-

Note:

Always adjust the zero point first, followed by the sensitivity.

The adjustment only needs to be carried out if the measurement values of methane CH₄ are outside the specified limit values (see Section 7.2 on page 46).

5.2.2 Suitable test gases

The following test gases can be used for adjustment:

Gas	Suitable test gases for	
	Zero point	Sensitivity
CH ₄	<ul style="list-style-type: none"> • Fresh air 	<ul style="list-style-type: none"> • 10 ppm CH₄ • 100 ppm CH₄ • 1000 ppm CH₄ • 1.0% vol. CH₄ • 100% vol. CH₄

It is not necessary to perform the adjustment with all test gases. However, adjusting with more than one test gas increases the measurement quality.

The user cannot adjust ethane C₂H₆ or propane C₃H₈.

Note:

Use of test gases not provided by SEWERIN can cause interference.

The concentration of the test gas used must match the specified test gas concentration.

5.2.3 Preparation

An adjustment always requires 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 guarantee 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 test gases.



You can find detailed information on the adjustment of various gases (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

1. Make sure that only fresh air is being drawn in.
2. Open **Settings**.
3. Select **Adjustment** from the menu.
4. Select the desired adjustment (e.g. **Adjustment CH4 PPM**).
5. Wait at least 1 minute. The displayed reading must be stable.
6. Select **Zero point** from the menu.
7. Press **OK** to confirm.

This adjusts the zero point. The reading shows zero (0.0% vol. or 0 ppm).

5.2.4.2 Adjusting the sensitivity

The following resources are needed for adjusting the sensitivity:

- Test gas
- Test set for the supply of test gas (e.g. **SPE VOL**)

Note:

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

1. Connect the device to the test set.
2. Open **Settings**.
3. Select **Adjustment** from the menu.
4. Select the desired adjustment (e.g. **Adjustment CH4 PPM**).
5. Select the menu item that specifies the sensitivity to be tested.
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. 10 ppm CH₄).
9. Let go of the release button on the test set.

5.3 Servicing

The device may 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. 13: 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	Adjustment CH4 PPM required
9	No calibration IR/PX sensor adjustment	CH4 adjustment required
10	Adjustment failed Test gas	Check test gas concentration
52	XFLASH SEWERIN Service	Error can only be corrected by SEWERIN Service
59	System error SEWERIN Service	Error can only be corrected by SEWERIN Service
60	PX sensor SEWERIN Service	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

Device data

Dimensions (W x D x H)	Approx. 148 x 57 x 205 mm Approx. 148 x 57 x 253 mm with supporting bracket
Weight	Approx. 1000 g, depending on equipment

Certificates

Certificate	TÜV 07 ATEX 553353 X II2G Ex d e ib IIB T4 Gb Basic device without leather bag for: CH ₄ , C ₃ H ₈ , C ₄ H ₁₀ , C ₉ H ₂₀ , CO II2G Ex d e ib IIC T4 Gb Basic device with leather bag for: CH ₄ , C ₃ H ₈ , C ₄ H ₁₀ , C ₉ H ₂₀ , CO, H ₂
-------------	---

Features

Display	Monochromatic graphic display, 320 x 240 pixels
Buzzer	Frequency 2.4 kHz, volume 80 db (A) / 1 m
Signal light	Red
Pump capacity	vacuum > 250 mbar, volume flow approx. 50l/h
Interface	USB
Memory	8 MB
Operation	ON/OFF key, 3 function keys, jog dial

Operating conditions

Operating temperature	-20°C – +40°C (-4°F - +104°F)
Storage temperature	-25°C – +60°C (-13°F - +140°F) (temperatures above 40°C (104°F) reduce the service life of the sensors)
Humidity	5 – 90% r.h., non-condensing
Atmospheric pressure	800 – 1100 hPa
Protection rating	IP54

Power supply

Power supply	NiMH rechargeable or disposable alkaline batteries, type Mignon (AA)
Operating time, typical	At least 8 h
Charging time	Approx. 3 h (complete charge) depending on capacity
Charging voltage	12 V DC, max. 1 A

Data transmission

Communication	USB
---------------	-----

Gas types

Standard	Methane CH ₄
----------	-------------------------

Thermal conductivity sensor CxHy % vol. range

Measuring range	0 – 100% vol. (CH ₄)
Resolution	1% vol.
Response times	t ₅₀ < 9 s t ₉₀ < 17 s (CH ₄)
Measuring error	3% (as per EN 60079-29-1)
Interference	All gases with a different thermal conductivity
Expected service life	5 years

Semiconductor sensor ppm range

Measuring range	0 – 10000 ppm (CH ₄)
Resolution	1 ppm / 2 ppm / 20 ppm / 200 ppm
Response times	t ₉₀ < 7 s
Warm-up time	Approx. 1 min
Measuring error	30%
Interference	All flammable gases
Expected service life	5 years

Gas chromatograph CH₄, C₂H₆, C₃H₈

Measuring range	0 – 12000 ppm
Resolution	1 ppm
Warm-up time	Approx. 1 min
Measuring error	±30%
Separating capacity	25 ppm
Measurement time	4 min
Expected service life	5 years

Note:

Probes increase the stated response times.

7.2 Limit values for the device inspection

Gas	Zero point	
	Specification	Deviation
CH ₄	0 ppm	±3 ppm

7.3 Memory capacity

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

Report type	Maximum number of storable reports
Device inspection	40
Ethane analysis	40

There is a choice of two memory modes (see Section 3.3.6 on page 24). The selected memory mode applies for all report types.

7.4 Technical information

7.4.1 Identification sticker (back of device)

The symbols on the sticker mean the following:



Only open the battery compartment outside of explosive areas.



Read the operating instructions.

7.4.2 Cleaning

Use only a damp cloth to clean the device.

CAUTION! Damage possible due to unsuitable cleaning agents

Unsuitable cleaning agents can cause chemical corrosion on the housing surface. Vapors from solvents and substances containing silicone can penetrate the device and damage the sensors.

- Never clean the device with solvents, gasoline or cockpit spray containing silicone or similar substances!
-

7.4.3 Electrostatic charge

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



DANGER! Risk of explosion due to sparks

When working with hydrogen, electrostatic charging can occur.

- When working with hydrogen, always use the carrying bag TG8 for the device.
-

7.5 Accessories and consumables

Accessories

Part	Order number
Docking station TG8	LP11-10001
M4 AC/DC adapter	LD10-10001
M4 vehicle cable, 12 V= installed	ZL07-10100
M4 vehicle cable, 12 V= portable	ZL07-10000
M4 vehicle cable, 24 V= installed	ZL09-10000
"Vario" carrying system	3209-0012
Carrying bag TG8	3204-0040
Case TG8-RÜ	ZD29-10000
Compact case TG8	ZD31-10000
Localization probe	ZS03-10300
1 m probe hose	ZS25-10000
Test set SPE VOL	PP01-90101
Test set SPE ppm	PP01-40101
Test set SPE DUO	PP01-60001
Test case kit PPM	ZP03-12001

Consumables

Part	Order number
Fine dust filter	2499-0020
Hydrophobic filter	2491-0050
Rechargeable NiMH battery	1354-0009
Disposable alkaline battery	1353-0001
Test gas 100 ppm C ₂ H ₆ , 1% vol. CH ₄ in synthetic air	ZT43-10000
Test gas can 1 l, non-returnable	

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

7.6 EU declaration of conformity

Hermann Sewerin GmbH hereby declares that the **VARIOTEC® EGA** meets the requirements of the following guidelines:

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


Gütersloh, 2016-04-20



Dr. S. Sewerin (CEO)

The complete declaration of conformity can be found online.

7.7 Inspection report

INSPECTION REPORT	VARIOTEC® EGA																				
Serial no. (e.g.: 065 12 00230)	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 15px;"></td> <td style="width: 20px; height: 15px;"></td> <td style="width: 20px; height: 15px;"></td> <td style="width: 20px; height: 15px;"></td> </tr> </table>																				
February 1, 2013																					
1.0 Device status																					
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)																					
2.0 Pump check																					
2.1 – Pump error F100 in seal																					
3.0 Ethane analysis																					
3.1 Test gas 100 ppm C ₂ H ₆ , 1 % vol. CH ₄																					
– CH ₄ : Yes, C ₂ H ₆ : Yes, C ₃ H ₈ : No																					
4.0 Comment																					
– Housing damaged																					
– Adjustment, repair																					
– Inspection at factory																					
– Or similar																					
5.0 Inspection																					
– Day																					
– Month																					
– Year																					
– Signature																					

7.8 Advice on disposal

The European Waste Catalog (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.

7.9 Terminology and abbreviations

CENELEC	<ul style="list-style-type: none">• European Committee for Electrotechnical Standardization
Gas type	<ul style="list-style-type: none">• Hydrocarbon C_xH_y, which can be measured with the TC
NiMH	<ul style="list-style-type: none">• Nickel metal hydride
ppm	<ul style="list-style-type: none">• Parts per million
Ring memory	<ul style="list-style-type: none">• Type of data storage in the device• If the available storage space is full, the oldest file is automatically overwritten by the current file.
SC	<ul style="list-style-type: none">• Gas-sensitive semiconductor
Stack memory	<ul style="list-style-type: none">• Type of data storage in the device• If the available storage space is full, you are prompted to confirm whether the oldest file should be overwritten by the current file.
TC	<ul style="list-style-type: none">• Thermal conductivity sensor
% vol.	<ul style="list-style-type: none">• Percent concentration of a gas in a gas mixture with respect to the volume

7.10 Referenced documents

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

- /1/ EN 60079-7:2007
- /2/ EN 60086-1
- /3/ EN 61951-2
- /4/ 94/9/EG ATEX 100a

8 Index

A

- Accessories 48
- Adjustment 22, 38
 - CH4 22
 - CH4 ppm 22
 - Performing 40
 - Preparation 39
 - Scope 38
 - Sensitivity 41
 - Zero point 40
- Adjustment menu 22
- Alarms 4
- Autostart 23

B

- Battery alarm 28

C

- Cleaning 47
- Consumables 48

D

- Date 24
- Delete 24
- Device
 - Switching on 7
- Device elements 4
- Device information 19
- Device inspection 18, 24, 30
 - Concluding 32
 - Documentation 30
 - Frequency 30
 - Integrated 31
 - Limits 46
 - Opening 32
 - Order 32
 - Performing 32
 - Scope 30
- Device status 34
- Display 23
- Display contrast 23
- Display illumination 23
- Disposable battery 23
 - Replacing 28

- Requirements 26
- Setting the type 23
- Disposal 51

E

- Electrostatic charge 47
- Error message 43
- Ethane analysis 10
- Explosion protection 4

F

- Faults 43
- Filter 35
- Fine dust filter 35
- Function key 6

G

- Gas-sensitive semiconductor *see* Sensor

H

- Housing 34

I

- Identification plate 47
- Indication accuracy
 - With fresh air 36
 - With test gas 36
- Inspection OK 22

J

- Jog dial 6

K

- Keys 6

L

- Language 24

M

Maintenance 42
Measuring mode 9
 Menu structure 9
Memory 24, 46
Memory mode 24
Menu 7, 9
 Exiting 7
 Opening 9
 Selecting 7
Menu item
 Exiting 7
 Selecting 7
Menu structure 9, 21

O

Operation 6

P

PIN code 20, 22
Power supply 25
Probe 35
Pump 35
Purge 12, 18
Purging the detector 12

R

Rechargeable battery 26
 Charging 26
 Maintenance 27
 Replacing 28
 Requirements 26
 Self-discharge 26
 Setting the type 23
Reports 18
Reset 24
Ring memory 24

S

Sensitivity
 Adjusting 41
Sensor
 Gas-sensitive semiconductor 4, 45
 Thermal conductivity 4, 45
Service interval 23
Servicing 30

Settings 9, 18, 20
 Menu structure 21
 Opening 20
Signals 34
 Audible 4
 Visual 4
Stack memory 24
System 22

T

Test gas conc. 22
 Changing 38
Thermal conductivity sensor *see* Sensor
Time 24

U

Use
 Intended 2

Z

Zero point 10
 Adjusting 40



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