Operating Instructions

SEWERIN
Protecting Water, Gas and Life.

EX-TEC®
PM 580/550/500/400 CSA

01.09.2025 b – 107793 – en-us

Device

Fig. 1: Front view

Fig. 2: Rear view (left image) and underside of the device with battery pack (right image)

Display

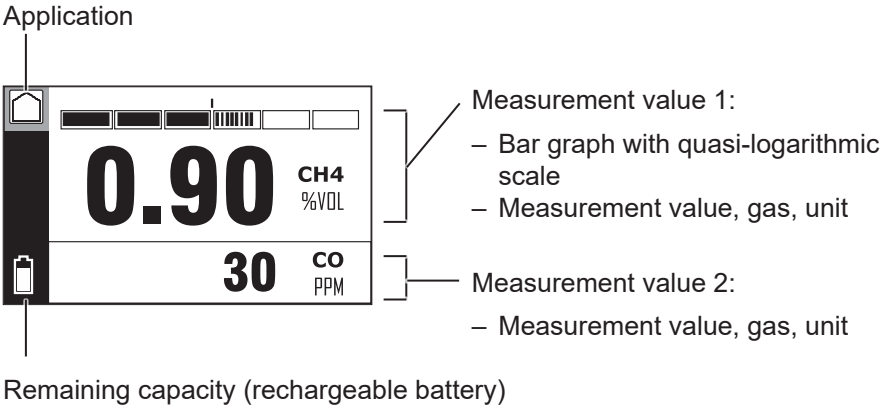

Fig. 3: Display in measuring mode - **Structure** application

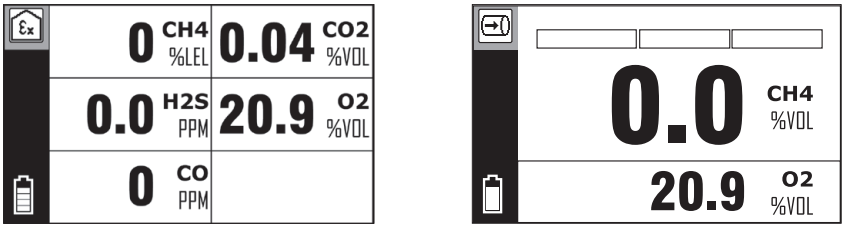

Fig. 4: Display in measuring mode
Left image: **Warning** application
Right image: **Measuring** application

Illustration of warnings in this document

⚠ DANGER Risk to persons. Results include serious injury or death.

⚠ WARNING Risk to persons. Could result in serious injury or death.

⚠ CAUTION Risk to persons. Could result in injury or health risk.

NOTICE Risk of damage to property.

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1 Introduction

1.1 Information about this document

This document is a component part of the product.

- Read the document before putting the product into operation.
- Keep the document within easy reach.
- Pass this document on to any subsequent owners.
- Unless otherwise specified, the information in this document refers to the product as delivered (factory settings) and applies to all product variants.
- The product is described with all device features. Not all of the functions described may be available on the product you are using. Please contact the SEWERIN sales department for further information.
- Differing national legal regulations take precedence over the information in this document.

Translations

Translations are produced to the best of our knowledge. The original German version is authoritative.

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1.2 Purpose

The device is a portable, ex-proof gas concentration measuring device for detection, measuring and warning.

The device can be used for:

- Pinpointing leaks in gas pipes that are not underground
- Assessment of the risk of explosion in work areas
- Identification of gas components

The device is suitable for the following applications:

- Warning
- Measuring
- Structure

1.3 Intended use

The product is suitable for the following uses:

- Professional
- Industrial
- Commercial

The product must only be used for the applications specified in section 1.2.

The gases that can be measured with the product depend on the product variant and the selected device features. For more detailed information please see section 2.

The product can be used at operating temperatures up to 40 °C (104 °F). However, high temperatures can reduce the lifetime of the sensors, disposable batteries and rechargeable batteries.

1.4 Improper use

The product must not be used for:

- Pinpointing leaks in underground gas pipes
- Gas analysis of technical processes
- Monitoring liquids

1.5 Warnings according to CSA

CSA approval requires a range of warnings. Because of lack of space on the device sticker, the following warnings are listed below:

⚠ WARNING Do not replace battery in a hazardous location.

⚠ WARNING Do not charge the battery in a hazardous location.

⚠ WARNING Do not use the electrical contact of the device in a hazardous location.

⚠ WARNING Potential electrostatic charging hazard – see instructions.

⚠ WARNING Substitution of components may impair intrinsic safety.

1.6 Safety information

This product was manufactured in accordance with all binding legal and safety regulations.

For compliance to /1/ and /4/ the equipment has only been tested for electrical safety. No evaluations of functional safety and performance characteristics have been performed.

Final acceptance of this equipment is subject to the jurisdiction of the local inspection authority.

The product is safe to operate when used in accordance with the instructions provided. However, when handling the product, there may be risks to persons and property. For this reason, always observe the following safety information.

- Observe all the applicable safety standards and accident prevention regulations.
- Use the product only as intended.
- Do not make any changes or modifications to the product unless these have been expressly approved by Hermann Sewerin GmbH.
- Only use accessories and consumables approved by Hermann Sewerin GmbH.

- Always observe the permitted operating and storage temperatures.
- Handle the product carefully and safely, both during transport and when working.
- Do not use the product if it is damaged or faulty.
- When the device has suffered an impact (such as being accidentally dropped):
  - Then perform a device inspection.[1]
- Protect the ports and sockets against dirt, and electrical ports in particular against moisture.

Explosion protection

- The device is explosion proof in normal atmospheric conditions (atmospheric pressure 800 – 1100 hPa, typical oxygen content 20.9% vol.).
- The device must not be stored or operated in explosive environments if there is a chance of strong electrostatic charges occurring (e.g. from fast moving particles, hydraulically propelled liquids, pneumatically extracted dust or materials, in electrostatic coating processes).

Certain activities with the device must be performed outside of an explosive environment. The corresponding warnings can be found in these operating instructions in the descriptions of actions.

Servicing

- Perform device inspection and adjustment only in well ventilated rooms or outdoors.
- Handle test gases in a professional manner.

Sensors

- Have sensors replaced by SEWERIN Service when their service life has expired.

[1] For the PM 400 SEWERIN also recommends: If the LEL sensitivity deviates by more than 20%, replace the CC sensor.

- SEWERIN recommends: Perform a device inspection when the device has been exposed to gas concentrations above the end of measuring range.

Special environments

- Substances containing silicone, and silicone vapours, can contaminate the sensors.
  - Do not allow the device to come into contact with substances containing silicone.
  - Use the device only in a silicone-free environment.
- The device complies with the requirements of Directive 2014/30/EU (EMC). When using the product close to devices with radio transmitters:
  - Comply with the information in the operating instructions for the devices regarding emission of interference.
- When used in mines:
  - Use the device only in environments where there is a low risk of mechanical impacts.

1.7 Qualification of users

Appropriate specialist knowledge is required for the use of this product. In addition, certain activities performed with the device or on it may be performed only by qualified persons.

A distinction is made between the following user groups:

Trained person

- Trained persons know the external structure, functions and operating instructions of the devices.
- Trained persons can detect defects or changes to the device.
- Trained persons may perform device inspections. They can evaluate the results.

Specialist (device inspector)

- Specialists have received professional training and thus have fundamental knowledge of the measuring principles used in gas concentration measuring devices.

- Specialists are experienced users and therefore have sufficient knowledge of the use of gas concentration measuring devices.
- Specialists are permitted to perform device inspections and adjustments. They can evaluate the results.

Competent person

SEWERIN service personnel and people trained by SEWERIN are competent persons.

- Competent persons have knowledge of the applicable regulations and guidelines as well as the tasks and functions of gas concentration measuring devices.
- Competent persons can evaluate whether the condition of devices renders them safe to operate and can perform the necessary operations without supervision.
- Competent persons are appointed by their company in writing. Their responsibilities are defined when they are appointed. They are authorised by the manufacturer.
- Competent persons must receive regular training.
- Competent persons are permitted to perform device inspections, adjustments and maintenance.

2 Product description

2.1 Product variants

The following product variants of the device are available:

- **EX-TEC PM 580** (for short: **PM 580**)
- **EX-TEC PM 550** (for short: **PM 550**)
- **EX-TEC PM 500** (for short: **PM 500**)
- **EX-TEC PM 400** (for short: **PM 400**)

Note:
The devices carry the CSA test mark on the rear of the device.

Each product variant has certain basic device features as standard. In addition, there are different device features for each product variant:

− The built-in sensors can be set up for various gas types.

− Other sensors can be installed as options.

Note:
The device features must be specified at the time of purchase.

- As a rule, optional sensors cannot generally be retrofitted.

2.2 Application options

2.2.1 Detectable gases

The device may be used to measure the following gases:

Gas	PM 580	PM 550	PM 500	PM 400
Methane CH_4	×	×	×	×
Propane C_3H_8	o	o	o	o
Nonane C_9H_{20}	–	–	–	o
Carbon dioxide CO_2	o	o	o	o
Oxygen O_2	o	o	o	o
Carbon monoxide CO	o	o	o	o
Hydrogen sulphide H_2S	o	o	o	–
Acetylene C_2H_2	–	–	–	o
Hydrogen H_2	–	–	–	o
JFuel	–	–	–	o

× as standard, o optional, – not possible

The gases that can actually be measured with a device depend on the device features with optional sensors and on the gas types for which the device is set up.

⚠ WARNING Risk to life from dangerous gas concentrations

Incorrect measurements may be obtained if nonane and JFuel are measured using unsuitable accessories.

If nonane and JFuel are to be measured, fit the necessary accessories:

- Use only the accessories approved for this purpose (section 9.7.2).

2.2.2 Applications

A distinction is made between the following applications for working with the device:

Application	Activities

Warning	– monitoring of work areas
	– Warning of:
	  – toxic gas concentrations
	  – lack of oxygen/excessive oxygen
	  – explosive gas concentrations

Measuring	– demonstrating gas purity / absence of gas in gas pipes

Structure	– measuring very small gas concentrations in structures
	– Locating the source of gas
	– Warning of:
	  – toxic CO concentrations
	  – explosive gas concentrations

The product variants are suitable for the following applications:

Application	PM 580	PM 550	PM 500	PM 400
Warning	×	×	×	×
Measuring	×	×	–	–
Structure	×	–	–	–

× as standard, – not possible

2.3 Features

2.3.1 Sensors

The sensors included as device features depend on the product variant. The following sensors are included as standard or as options:

Sensor	Gas/gas type	PM 580	PM 550	PM 500	PM 400
IR	CH_4 C_3H_8	×	×	×	–
	CO_2	o	o	o	o
SC	CH_4 C_3H_8	×	–	–	–
CC	CH_4 C_3H_8 C_9H_{20} C_2H_2 H_2 JFuel	–	–	–	×
EC	CO	o	o	o	o
	O_2	o	o	o	o
	H_2S	o	o	o	–
	CO and H_2S (COSH)	o	o	o	–

× as standard, o optional, – not possible

When charging, the device shows which optional sensors are included (Fig. 45).

Operating principles of the sensors

Sensor		Operating principle
IR	Infrared sensor	absorption by infrared-active gases
SC	Gas-sensitive semiconductor	reacts to changes in conductivity brought about by reducible gases
CC	Catalytic combustion sensor	catalytic combustion
EC	Electrochemical sensor	electrochemical cell

Technical information about the sensors, including their measurement ranges, can be found in section 9.2.

Information about electrochemical sensors

Very high gas concentrations can reduce the lifetime of electrochemical sensors.

Information about semiconductor sensors and catalytic combustion sensors

These sensors are sensitive to external influences.

- Oxygen-deficient atmospheres can reduce the sensitivity of the sensor (sensor suffocation).
- Gaseous components of silicones, oils and phosphate esters etc. can irreversibly damage the sensor.
- Contamination of the measuring environment with halogens, burnt neoprene, PVC, trichloroethylene etc. will also reduce the sensitivity of the sensor. However, the sensor can usually recover during further operation.

2.3.2 Gas types

By default, the device is set up for gas type methane CH_4.

However, the sensors fitted to a device as standard (section 2.3.1) can be set up for other or additional gas types.

The following gas types can be set up:

Gas type	PM 580	PM 550	PM 500	PM 400
CH_4	×	×	×	×
C_3H_8	o	o	o	o
C_9H_{20}	–	–	–	o
C_2H_2	–	–	–	o
H_2	–	–	–	o
JFuel	–	–	–	o

× as standard, o optional, – not possible

The gas types can be set up:

- when the device is purchased
- later on using **GasCom** software[1]

You can switch between all gas types for which a device is set up during operation (section 3.7).

2.3.3 Visual and audible signals

2.3.3.1 Overview

The device can emit the following signals:

- visual signal (via the signal light)
- audible signal (via the buzzer)

[1] The new gas type is not available in the device until an adjustment has been performed after setting up.

Visual and audible signal together:

- Alarm
- operating signal
- error (error message)
- device inspection or inspection due [2]
- warning, information
- switching the device on and off
- Concentration-dependent signal

Visual signal only:

- paused measurement

Audible signal only:

- keystroke[3]

Note:
In the event of an alarm or fault, the visual signal is emitted with full brightness; in the event of a paused measurement, it is emitted with reduced brightness.

2.3.3.2 Signal for paused measurement

When the device is in a state in which it cannot measure, a continuous visual signal is emitted.[4, 5] The signal light illuminates with reduced brightness.

The signal for paused measurement is emitted:

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[2] Signals when device inspections are due are emitted only if the guided device inspection has been enabled using the **GasCom** software.
[3] The audible signal can be disabled using the **GasCom** software.
[4] Does not apply if a fault occurs. The signal of the fault then supersedes the signal of the paused measurement.
[5] The signal of the paused measurement can be disabled using the **GasCom** software. For devices with a disabled signal, the functional safety test (type-examination certificate issued by DEKRA Testing and Certification GmbH) does not apply.

- when the device is switched on
- during the warm-up time of the sensors
- when the device is not measuring (e.g. **settings**, **adjustment**)

2.3.3.3 Operating signal

Note:
An operating signal is only available in the **Warning** and **Structure** applications.[6]

The operating signal indicates that the device is working properly. The signal is emitted regularly every 20 seconds.

The operating signal output is interrupted while there are faults.

2.3.3.4 Alarm signals

Warning alarms are emitted if the concentration of one or more gases exceeds certain limit values (alarm thresholds).

⚠ WARNING **Risk to life from dangerous gas concentrations**

An alarm always indicates danger.

- Immediately take all necessary measures for your own safety and the safety of others.

The specific measures depend on the situation.

- In the event of pre-alarm **AL1** it may be sufficient to ventilate thoroughly.
- In the event of main alarm **AL2** it may be necessary to leave the danger zone immediately.

---

[6] The operating signal of a device can be disabled using the **GasCom** software. For devices with a disabled operating signal, the functional safety test (type-examination certificate issued by DEKRA Testing and Certification GmbH) does not apply.

Acknowledgement

Under certain conditions, the audible signal can be muted during alarms. In some measurement situations, the visual signal and symbol can also be disabled. This process is referred to as acknowledgement.

Detailed information about the alarms, including the acknowledgement options, can be found in section 9.4.

2.3.3.5 Signals in the event of faults

In the event of error messages, the audible signal can be acknowledged/disabled, but not the visual signal.

The operating signal output or the signal during paused measurement is interrupted while there are faults.

2.3.4 Display illumination

The display has a backlight. When the device is switched on, the display will automatically switch on when any key is pressed.

The period of illumination can be changed using the **GasCom** software. The display illumination can also be disabled.

2.3.5 Gas input and filter

The test gas or ambient air is drawn in using the pump via the gas input.

In certain cases and in certain measuring situations, accessories are connected to the gas input, for example:

- test gas hose of the test set **SPE AutoFlow**
- Conditioner

  for humidifying the gas that is sucked in
- CO2 filter

The gas that is sucked in flows through two filters directly behind the gas input. The filters prevent contamination or moisture from entering the device and thus reaching the sensitive sensors.

- Dust filter

  traps solids, particularly dusts
- Hydrophobic filter

serves as a water barrier

Fig. 5: Hydrophobic filter (left) and dust filter (right)

The filters must be changed regularly. Information on the frequency and procedure for changing can be found in section 3.12.

2.3.6 Belt clip and short probe

The device comes with a belt clip and the **PM 5 short probe**. The short probe is placed in a recess in the belt clip.

Belt clip

The user can wear the device on the belt clip attached to the belt or to the trouser waistband. Textile loops or the like can be passed through the D-ring of the belt clip.

PM 5 short probe

The short probe can facilitate the taking of the gas sample in certain situations, e. g. when searching for leaks. The short probe is connected to the gas input.

Fig. 6: PM 5 short probe

2.4 Additional probes

Various probes can be connected to the gas input of the device. The choice of a suitable probe depends on the application and the situation on site.

The **PM 5 short probe** is included in the scope of delivery (section 2.3.6). Other probes can be purchased as accessories. SEWERIN will be happy to advise you on selecting suitable probes.

Note:
Probes that are used must be visually inspected as part of the device inspection process. In addition, the leak-tightness of the gas path must be checked regularly (section 3.11).

2.5 Measuring mode and menu

When switched on the device is automatically in measuring mode. The current measurement values are displayed in measuring mode.

In the **Structure** and **Measuring** applications a maximum of two measurement values are displayed; in the **Warning** application up to five measurement values can be displayed. The display view in measuring mode therefore depends on the application (Fig. 3 and Fig. 4).

You can switch from measuring mode to the menu. Whether the top menu level or the measuring menu appears after the change depends on which key is pressed in measuring mode. The measuring menu is part of the menu.

In the menu the user can:

- Perform actions
- Perform settings
- View information

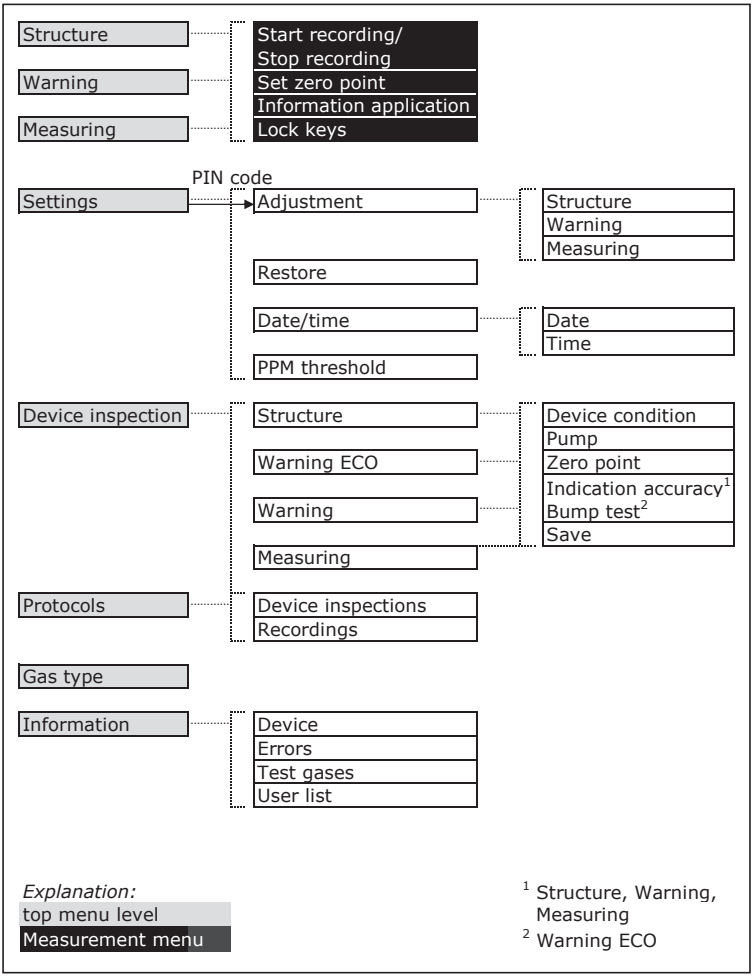

Fig. 7: Menu structure for the first three menu levels

2.6 Protocol memory

The device can store 500 device inspections as well as up to 500 recordings.

The device will notify the user if only a limited memory capacity remains.

If the memory is full, protocols will no longer be saved. Alternatively, you can set the **GasCom** software to delete the oldest device inspections or recordings when the memory is full to make space for new protocols. Deletion will then be automatic and without prior confirmation.

Note:
Protocols are important pieces of evidence. Depending on national legal stipulations, the protocols may be subject to retention obligations.

- Download the protocols regularly and in a timely manner to a computer using the **GasCom** software. Ideally, back up the protocols subsequently on another storage device.

The protocols in the protocol memory can only be viewed using the **GasCom** software. Exceptions include the 40 most recent protocols displayed in the protocol lists (section 5.1).

2.7 Concentration specification in the Warning application

In the **Warning** application, the measurement value for the flammable gases can be displayed in either % LEL or % vol..

The device is supplied set to the % LEL unit. The unit can be changed using the **GasCom** software.

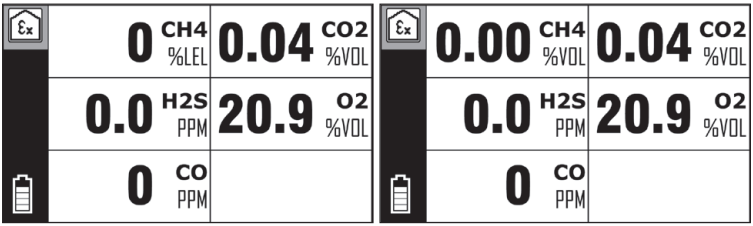

Fig. 8: **Warning** application - measurement value of flammable gas (*here:* CH_4) with different units
Left image: Unit % LEL
Right image: Unit % vol.

3 Operation

3.1 Switching on the device

⚠ WARNING Risk to life due to contaminated ambient air

If the device is switched on in a contaminated environment[1], incorrect measurement values may be displayed in measuring mode.

- Switch on the device only in clean air.

Each switch-on process is linked to activation of the buzzer, signal light and display. This allows the user to check the following device functions:

Buzzer:	Is the audible signal working?
Signal light:	Is the visual signal working?
Display:	Can incorrect pixels be seen in the inverse display?

⚠ WARNING Risk to life if device functions are faulty or missing

Checking the device functions at switch-on is necessary for the safety of the user.

- Monitor the device carefully during the switch-on process.
- Cancel the switch-on process if the check of any one of the device functions is unsuccessful.

Note:

The **Start sensors …** message means the sensors are still warming up. During this warm-up time, the signal will be emitted for the paused measurement. In addition, no action can be performed.

---

[1] E.g. contamination with flammable hydrocarbons.

1. Make sure the ambient air is clean.
2. Hold down the ON/OFF key until the device reports with a visual and audible signal. The device function self-test has started.

   a) A sequence of start images appears (Fig. 9). The signal for the paused measurement is emitted.

   b) If device inspections and checks are due, these will be displayed[2] (Fig. 10).

   c) For the preset application, the gas types including their measuring ranges and the alarm thresholds are displayed (Fig. 11). The information is generally spread over several display views.

   d) The sensors warm up.

      During the warm-up, the display view of the measuring mode is shown with animated squares.

      The **Start sensors …** message may also appear depending on the situation.
3. Wait until all measurement values are displayed.

   The signal for the paused measurement stops. The device is in measuring mode.
4. Perform all device inspections that are due.

   The device is now ready for use. The displayed measurement values correspond to the zero point when the device has been switched on in clean air and is not misaligned.

[2] The device inspections that are due will only be displayed if the guided device inspection has been enabled using the **GasCom** software.

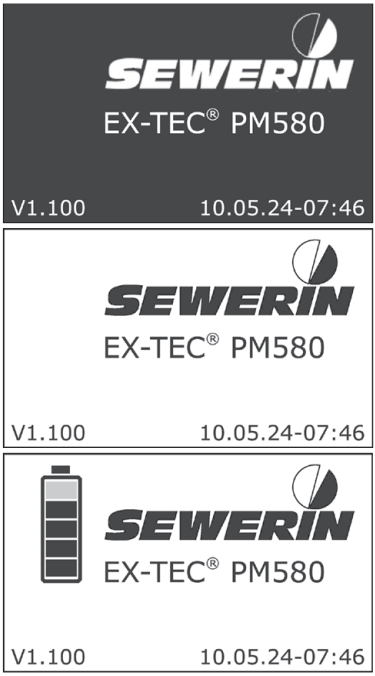

Fig. 9: Sequence of start images during switch-on process
The logo can be customised using the **GasCom** software.

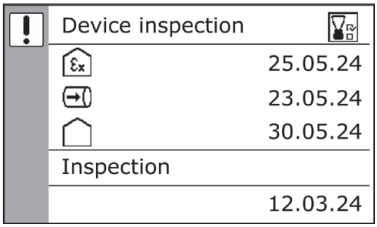

Fig. 10: Display of the device inspections that are due and the inspection that is due
(Only displayed if the guided device inspection is enabled and a device inspection or inspection is due.).

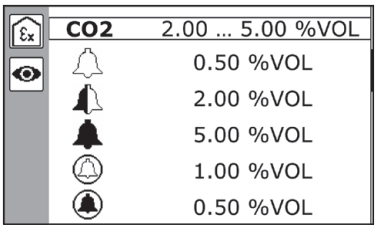

Fig. 11: Indication of gases, measuring ranges and alarm thresholds (*here:* **Warning** application, Gas CO_2)

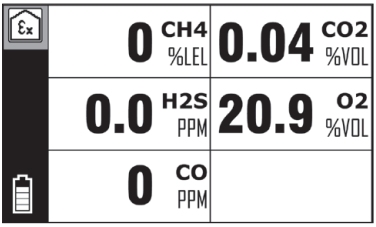

Fig. 12: Device ready for use with the preset application (*here:* **Warning** application)

Special features at initial start-up

The language must be set once at initial start-up.

This is done following the start images (Fig. 9).

Special features when changing the battery pack

After the battery pack has been changed it may be necessary to reset the date and time.

This is done before the start images appear (Fig. 9).

3.2 Switching off the device

The device takes approx. 3 seconds to switch off. During the switch-off process, the display shows:

- **Device switching off…** message
- Progress bar

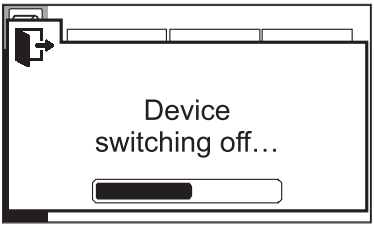

Fig. 13: Display during switch-off

- Hold down the ON/OFF key until the message has disappeared.

Cancelling switch-off

Whilst the **Device switching off …** message is displayed, the switch-off process can be cancelled.

- Release the ON/OFF key before the message disappears. The device returns to measuring mode.

3.3 Navigating

3.3.1 Orientation tools on the display

The user can use the orientation tools to identify the program status of the device or what action is required.

The display features the following orientation tools:

- Information area
- Status area
- Messages

Information area

The information area is at the left edge of the display.

The current application is displayed in measuring mode with symbols, otherwise the selected menu level is displayed.

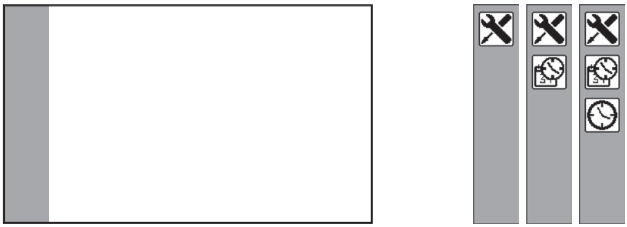

Fig. 14: Information area (grey)
Left image: Information area at the left edge
Alongside: Examples of orientation using symbols (*here:* **Settings** > **Date/time** > **Time**)

Status area (measuring mode only)

In measuring mode, the information area partly overlaps the status area.

The symbols in the status area give an indication of the current situation. The remaining battery capacity is always displayed.

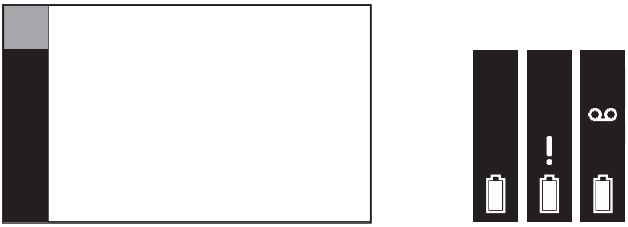

Fig. 15: Status area (black)
Left image: Status area above the information area
Alongside: Examples of information about the current situation (*here:* **Remaining capacity**, **Device inspection due**, **Recording**)

Messages

Messages largely cover the information beneath them.

Messages contain texts explaining a program status or asking for action.

The most important messages are:

- Warning
- Error
- Question
- Information

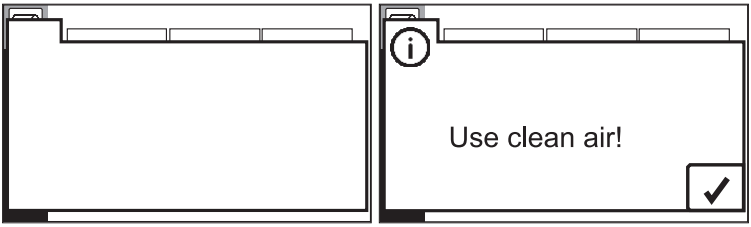

Fig. 16: Message
Left image: The message covers the information underneath it.
Right image: Example (*here:* Information **Use clean air!**)

3.3.2 Key functions

The following actions can be performed using the keys:

Key	Actions
	● switch – the device on and off
	● switch – from measuring mode to the top menu level – back a menu level ● cancel – an action, a process
	● switch – from measuring mode to the measuring menu – to a subordinate menu level ● confirm/apply – a selected menu item – a message – a value
	● select – a menu item – a value ● acknowledge – an alarm ● change – a default setting, e. g. for questions

Switching the display backlight on

The device must be switched on. The display automatically switches on when any key is pressed.

3.3.3 Switching between levels

3.3.3.1 Switching from measuring mode to the menu or measuring menu

⚠ WARNING Risk to life due to absence of alarms

The device emits alarms only when in measuring mode. As soon as you switch from measuring mode to the menu, no alarms are triggered.

- Switch from measuring mode to the menu only in environments that are not explosive and where there is no toxic or low-oxygen atmosphere.

Switching to the menu

The device is in measuring mode.

- Press the Menu key. The device switches to the top menu level.

Switching to the measuring menu

The device is in measuring mode.

- Press the Enter key. The device switches to the measuring menu.

3.3.3.2 Switching from the menu or the measuring menu to measuring mode

The display shows the top level menu or the measuring menu (Fig. 7).

- Wait 5 seconds without pressing any key. The device will automatically switch to measuring mode.

OR

1. Using the arrow keys, select an application.
2. Press the Enter key. The device switches to measuring mode.

3.3.3.3 Selecting a menu item in a menu

The device shows a menu.

1. Using the arrow keys, select the desired menu item.
2. Press the Enter key. The menu item appears.

3.3.4 Cancelling the action or process

An action is performed or a process is running.

- Press the Menu key. The action or process is cancelled. The device switches back one menu level.

3.3.5 Scrolling

If lists, information etc. are so large that they cannot be displayed on a display view, a narrow scroll bar appears at the right-hand edge.

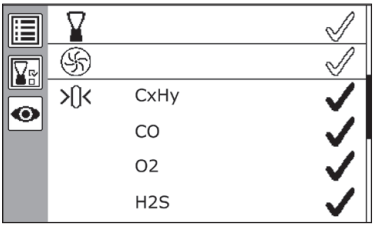

Fig. 17: Example of display view with scroll bar at the right edge (*here:* Protocol of a device inspection)

The display view has a scroll bar.

▲▼ • Press the arrow keys to scroll.

3.3.6 Selecting values

Values must be selected for certain settings. Entering the PIN code also works in this way.

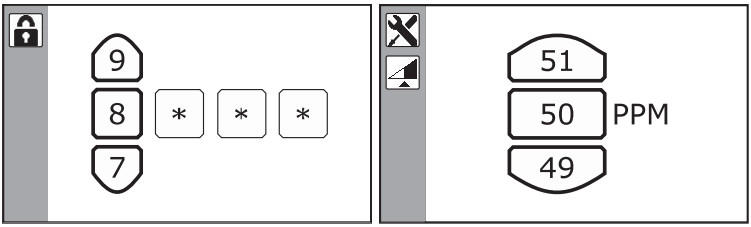

Fig. 18: Examples of selecting values
Left image: Entering the PIN code for the settings
Right image: PPM threshold

The program status requires values to be selected. The individual fields are changed from left to right.

▲▼ 1. Select the desired value in the first field using the arrow keys.

↵ 2. Press the Enter key. The value is applied.

(▲▼) (↵) 3. Repeat the selection for all subsequent fields. Once the last value has been applied, the device switches back a level.

3.3.7 Answering questions

Questions appear in the program procedure if actions have further consequences and during the device inspection. The following responses are possible:

Note:
Questions have different default settings for the answer.

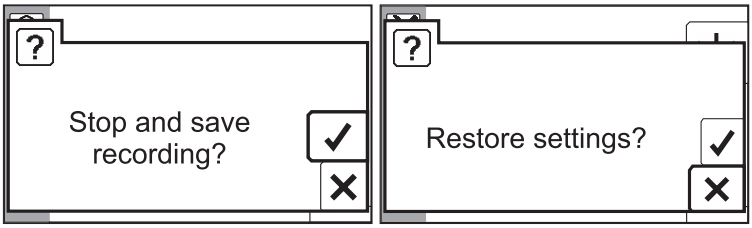

Fig. 19: Examples of questions
Left image: Question with the default answer **Yes**
Right image: Question with the default answer **No**

The display shows a question.

1. Check the default answer setting.
2. (▲▼) Select the other response if necessary using the arrow keys.
3. ↵ Press the Enter key. Depending on the response selected, the action is performed or not performed.

3.3.8 Lists – viewing detailed information

Protocols and information are stored in lists. The relevant detailed information can be displayed for each entry in a list.

The display shows a list (e. g. Fig. 36).

1. ▲▼ Use the arrow keys to select the relevant entry.
2. ↵ Press the Enter key. The detailed information about the entry will be displayed.

3.3.9 Writing a comment

Comments are information that can be saved together with the measurement values of a recording (e.g. information about the measurement location).

Comments can always be rewritten or selected from a list of the last 10 comments (Fig. 20).

If a comment is selected from the list, it can either be accepted as it is or modified.

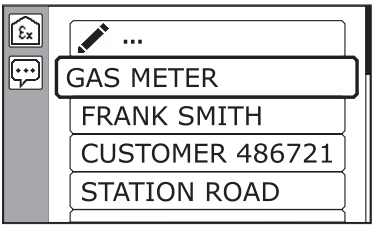

Fig. 20: List of comments
top line: write new comment (**Write** symbol)
below: existing comments

A comment can contain letters, spaces, numbers and special characters (dot, comma, dash). The entry can be a maximum of 20 characters long.

To write a comment, characters from a sequence of preset characters are selected.

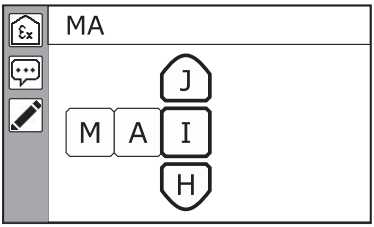

Fig. 21: Writing comments using character selection
horizontal:
string with 2 applied and 1 selected characters
vertical: character selection
at the top edge:
preview of string

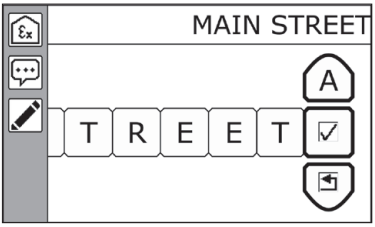

Fig. 22: Apply written comment using the **Confirm** symbol

Keys and symbols are used to navigate in the character selection. The symbols are integrated into the character selection.

The following keys and symbols can be written:

Key	Actions
▲ ▼	● select – a character or symbol
↵	● use – a character ● trigger – actions associated with the symbols ● move – to the right
≡	● move – to the left

Symbol	Actions
☑	● use – the entire comment The comment will be saved together with the recording.
☒	● cancel – the character entry The device returns to the list of comments.
	● insert – a character in front of an existing character
	● delete – a character

3.4 Recording measurements

In measuring mode, the device continuously displays the current measurement values. If these measurement values are to be saved, they must be recorded. This is done using:

- **Start recording**
- **Stop recording**

Each recording is automatically saved when it stops and is then listed in the protocols. A comment can be saved for each recording together with the measurement values.

As an alternative to manual saving and stopping, measurements can also be recorded automatically.

3.4.1 Start recording

The device is in measuring mode.

1. Press the Enter key. The device switches to the measuring menu.
2. Select **Start recording**.
3. Press the Enter key. The device returns to measuring mode. The recording is running.

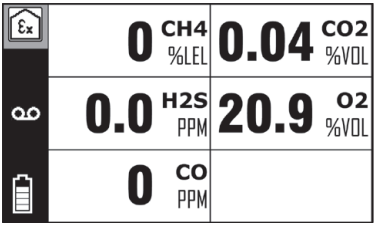

Fig. 23: Measuring mode (*here:* **Warning** application) On the left (status area): **Recording** symbol (while recording is running)

3.4.2 Stop recording and save without a comment

The device is in measuring mode. A recording is running.

1. Press the Enter key. The device switches to the measuring menu.
2. Select **Stop recording**.
3. Press the Enter key. The following question appears: **Stop and save recording?**

4. Confirm the question. The following question appears: **Add comment?**
5. Select **Cancel**.
6. Press the Enter key. The recording is saved without comment. The device returns to measuring mode.

3.4.3 Stop recording and save it with a comment

The device is in measuring mode. A recording is running.

1. Press the Enter key. The device switches to the measuring menu.
2. Select **Stop recording**.
3. Press the Enter key. The following question appears: **Stop and save recording?**
4. Confirm the question. The following question appears: **Add comment?**
5. Confirm the question. The list of comments will appear (Fig. 20).
6. Write a comment.

   Information about writing comments can be found in section 3.3.9.
7. Apply the comment.

   To do so, select the **Confirm** symbol in the character selection (Fig. 22).

   The recording is saved with a comment. The device returns to measuring mode.

3.4.4 Automatically recording a measurement

As an alternative to manual recording by starting and stopping, measurements can also be recorded automatically.

Automatic recordings will always start 5 seconds after switching to measuring mode. The sensors must be warmed up.

Automatic recording must be activated using the **GasCom** software.

Stopping automatic recording

As soon as the user presses the menu key, thus switching the device from measuring mode to the menu, the recording stops and is saved. The protocol of the recording will include the comment **auto recorded**.

Note:
If the device is switched back to measuring mode, a new recording will start after 5 seconds.
This device behaviour can only be stopped by deactivating automatic recording using the **GasCom** software.

3.5 Switching application

In measuring mode, the symbol in the top left corner of the display shows the current application.

Fig. 24: Measuring mode (*here:* **Measuring** application) top left (information area): Symbol for the current application

⚠ WARNING Risk to life from using misaligned or faulty devices

A device inspection must be performed regularly when the device is used as a gas warning instrument. This applies both when the **Warning** or **Structure** application is preset and when switching to one of these applications from another application.

- Perform the device inspections in accordance with the national specifications. For more information, refer to section 6.4.2.

⚠ CAUTION Risk due to delayed alarm

When switching application, the calculation of STEL and LTEL restarts.

Requirement for switching application

− The device is drawing in clean air.

The device is in measuring mode.

1. Press the Menu key.
2. Use the arrow keys to select the desired application.
3. Press the Enter key.

For the new application, the gas types including their measuring ranges and the alarm thresholds are displayed.

The device switches to measuring mode.

4. Wait until all measurement values are displayed. The device is now ready for use.

3.6 Setting the zero point

If the measured values deviate from the target values for clean air (table after Fig. 25), the zero point can be reset temporarily.

The zero point is set temporarily for each separate application. This means that only the gases used in the application are set to the target value.

In contrast to performing a zero point adjustment, the temporarily set zero point is not saved.

Note:
If the zero point deviates repeatedly from the target values, adjust the device.

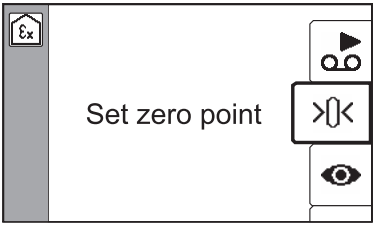

Fig. 25: Setting the zero point

Target values for the zero point

Gas	Content in clean air	Target value on the device
CH_4	0% LEL	0% LEL
CO_2	0.04% vol.	0.04% vol.
O_2	20.9% vol.	20.9% vol.
CO	0 ppm	0 ppm
H_2S	0.0 ppm	0.0 ppm

Requirements for setting the zero point

- The device is switched on in clean air.
- The device is drawing in clean air.
- The sensors are warmed up.

The device is in measuring mode. The measurement values deviate from the target values.

1. Press the Enter key.
2. Select **Set zero point**. A question appears.
3. Confirm the question. The zero point is set. The device returns to measuring mode. The measured values in clean air correspond to the target values.

If the zero point cannot be set successfully, you will find information in section 8.3.2 about how to solve the problem.

3.7 Changing gas type

The device always switches on set to the preset gas type. During operation you can temporarily switch between all gas types for which a device is set up.

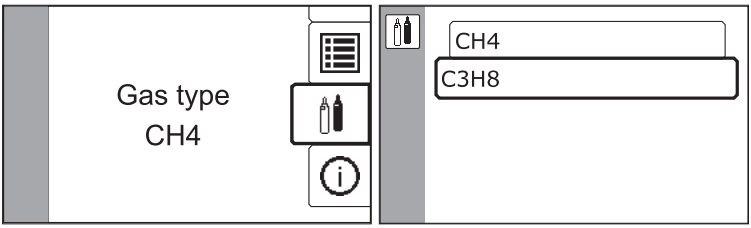

Fig. 26: changing gas type
Left image: Menu item **Gas type**
The current gas type is displayed in the 2nd line (*here:* CH_4).
Right image: List of the available gas types

Note:
If the **Device inspection due** symbol appears in the status area after the gas type has been changed, this must be performed immediately.

Requirement for changing the gas type

− The device is drawing in clean air.

The device is in measuring mode.

1. Press the Menu key.
2. Select **Gas type**.
3. Press the Enter key. The list of available gas types appears.
4. Select the relevant gas type.
5. Press the Enter key. The device first returns a menu level and then switches to measuring mode. The device uses the selected gas type.

3.8 Changing the settings on the device

Some settings can be changed directly on the device.

Fig. 27: Settings

Detailed information about the settings that can be changed on the device can be found in section 4.3.

⚠ WARNING Risk to life due to absence of alarms

The device emits alarms only when in measuring mode. As soon as you switch from measuring mode to the menu, no alarms are triggered.

- Adjust settings only in environments where there is no risk of explosion and where there is no toxic or low-oxygen atmosphere.

The device is in measuring mode.

1. Press the Menu key.
2. Select **Settings**. The PIN prompt appears.
3. Enter the PIN code. The settings will appear.
4. Select the desired menu item.
5. Change the settings.
6. Press the Enter key. The changed settings will be applied.
7. Press the Menu key to exit the **Settings**.

3.9 Concentration-dependent signal (structure)

In the **Structure** application, there is a concentration-dependent signal for the measurement of hydrocarbons. This signal can be used for audible evaluation of the measurement value.

The signal is triggered when a specified concentration value is exceeded.

- As the concentration increases, the signal becomes louder.
- If the concentration drops, the signal becomes quieter again.

The triggering concentration value is set below the **PPM threshold** (section 4.3.5).

When the **AL1** alarm threshold is exceeded, the concentration-dependent signal switches off.

Note:
The operating signal is interrupted during the concentration-dependent signal.

When the concentration-dependent signal is triggered, the device emits both a visual and an audible signal. The audible signal can be switched off.

Switching off the audible signal

The device is in measuring mode. The concentration-dependent signal was triggered.

- Press one of the arrow keys. The audible signal switches off. The **Audible signal off** symbol appears in the status area. The operating signal is emitted.

Switching on the audible signal

The device is in measuring mode. The concentration-dependent signal was triggered. The audible signal is switched off. The status area displays the **Audible signal off** symbol.

- Press one of the arrow keys. The audible signal switches on again. There is no operating signal.

3.10 Key lock

In order to protect the device from accidental operation during measuring mode, the keys can be locked.

The following options are available for locking:

- manual
- automatic

The keys are always unlocked manually.

As long as the keys are locked, the status area displays the **Key lock** symbol (Fig. 28).

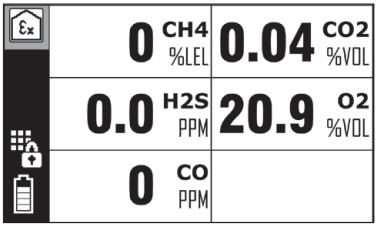

Fig. 28: Keys locked in measuring mode (**Key lock** symbol in the status area)

3.10.1 Locking keys manually

The user can lock the keys at any time.

Note:
In order to lock the keys manually, automatic key lock must be deactivated.

The device is in measuring mode.

1. Press the Enter key. The device switches to the measuring menu.
2. Select **Lock keys**. The keys will be locked.

To operate the device again, unlock the keys (section 3.10.3).

3.10.2 Locking keys automatically

When the automatic key lock has been activated, the keys will always lock after 15 seconds as soon as the device is in measuring mode and if no other key has been pressed in the meantime.

To operate the device again, unlock the keys (section 3.10.3).

Automatic key lock must be activated using the **GasCom** software.

3.10.3 Unlocking keys

Locked keys have to be unlocked manually, whether they were locked manually or automatically.

The device is in measuring mode. The keys are locked.

1. Press any key. The following question appears: **Unlock keys?**
2. Confirm the question. The keys will be unlocked.

3.11 Leak test when using probes

If the device is used with probes, the leak-tightness of the gas path and the probe or probe hoses must be checked regularly.

The gas path at the gas inlet is sealed off for the test. The device must respond to this with an error message.

Frequency

The leak test must be performed at least quarterly.

Special features

- **Flexible probe HG5, flexible hand probe**

  Before the test, the filter cap must be unscrewed and the filter removed.

  If the filter does not exhibit any visible contamination, it can be reinserted after the test. The original orientation must be maintained.

- **Floating probe**

  The test is not performed at the probe but at the end of the probe hose connected to the device.

Checking the leak-tightness

A probe or a probe hose is connected to the device. The device is in measuring mode.

1. Seal the probe or the probe hose at the open end, e. g. with a finger.

   The gas path is leak-tight if the following error message appears after a maximum of 10 seconds: **Pump error. Check suction path!**

2. Uncover the sealed opening again.

3.12 Replacing filters

The filter seal seals the filter opening. The dust filter is located in the filter seal, the hydrophobic filter is located in the filter opening (Fig. 29).

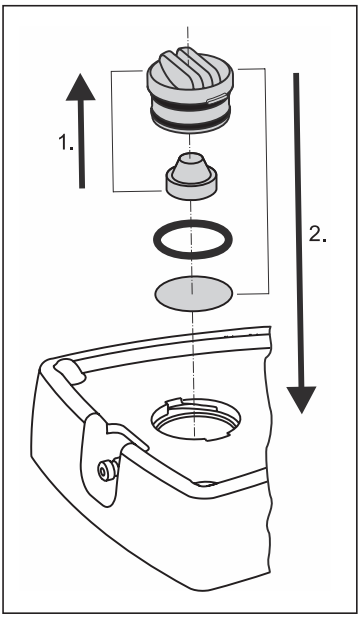

Fig. 29: Position of filters (diagram)

from top to bottom:
Filter seal with 2 O-rings
dust filter
O-ring
Hydrophobic filter

The filter seal has lugs of two different widths. It fits neatly into the filter opening.

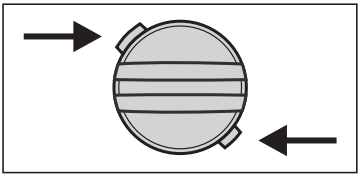

Fig. 30: Filter seal with lugs of two different widths (view from above)

Frequency

The frequency of the filter replacement is greatly dependent on the frequency of device usage and the ambient conditions during use.

The filters must be replaced if they exhibit:

- visible contamination
- mechanical damage
- contact with water

If none of the events occurs, the filters must be replaced after 12 months at the latest.

Checking the filters

The dust filter contamination can be tested from the outside by inspection through the transparent filter seal.

To check the condition of the filters more precisely, the filter seal must be unscrewed.

Note:
Once a hydrophobic filter has been taken out it must not be replaced.

Recommended tools

- Coin

  for turning the filter seal
- Tweezers

  for removing and inserting the hydrophobic filter and O-ring

Replacing filters

NOTICE **Risk of contamination**

New filters, i.e. filters not yet used, must be handled carefully to prevent mechanical damage.

Filters and O-rings must not come into contact with grease.

- Ensure your hands are clean when changing the filters.
- Use tweezers to insert the hydrophobic filter.

The device is switched off.

1. Turn the filter seal anti-clockwise until it reaches the stop.
2. Pull off the filter seal.
3. Inside the filter seal: change the dust filter
   a) Remove the used dust filter.
   b) Insert a new dust filter. Press the filter gently into the filter seal.
4. In the filter opening: Replace the hydrophobic filter
   a) Remove the O-ring above the filter, taking care not to damage it.
   b) Remove the used hydrophobic filter.
   c) Carefully insert a new hydrophobic filter.
   d) Replace the O-ring.
5. Replace the filter seal. Make sure the side lugs are facing the right way.
6. Turn the filter seal clockwise until it reaches the stop.

4 Settings

4.1 General information about the settings

A distinction is made between the following settings:

- Settings that can only be set using the **GasCom** software
- Settings that can be set either on the device or using the **GasCom** software

When a device is connected to a computer on which the **GasCom** software has been opened:

- The current settings of the device can be read out and edited in the software.
- Settings made using the software must be transferred to the device.

4.2 Settings using GasCom software

Most settings for the device are made on the computer using the **GasCom** software.

They include:

- specifying the application at switching on
- enabling/disabling guided device inspection
- Alarm thresholds
- signals
- measurement interval
- setting the units for measuring flammable gases in the **Warning** application
- changing gas type
- managing test gases
- managing protocols

More detailed information about the **GasCom** software can be found in the relevant Help section. It describes all settings as well as how to connect the devices to the computer, for example. To read the Help section, the **GasCom** software must be open.

⚠ WARNING **Risk from unchecked settings**

When using the device as a gas warning device, the settings set using **GasCom** software must be checked after they have been sent to the device.

- Check the settings on the device.

OR

- Check the settings in the **GasCom** software. To do so, read the device data again using the **GasCom** software.

The **GasCom** software can be downloaded free of charge from www.sewerin.com.

4.3 Settings on the device

The following settings and actions can be performed on the device:

- **Adjustment**
- **Restore**
- **Date/time**
- **PPM threshold** (only for the **Structure** application)

4.3.1 Access to the settings using PIN code

The settings on the device are protected by PIN code.

The device comes with the PIN code “0001”. The PIN code can be changed using the **GasCom** software.

SEWERIN recommends changing the PIN code after initial start-up, so that only authorised users have access to the settings.

With the digits “0000” the settings are not protected by PIN code.

4.3.2 Adjustment

Adjustment is a servicing activity.

Detailed information about carrying out the adjustment can be found in section 6.5.

4.3.3 Restore

The device can be restored to the status as at the time of the last maintenance.[1]

The following settings are saved at every maintenance and can therefore be restored:

- adjustment values of the sensors
- Alarm thresholds
- application and gas type after switching on
- PIN code

The settings to be restored cannot be reset individually. All of the above settings will be reset together.

When **Restore** is selected from the menu, a warning prompt appears to prevent accidental resetting.

⚠ WARNING **Danger when settings are changed or sensors age**

Every time settings are restored, the following steps are required:

- Perform a device inspection.
- Check the selected measuring ranges and alarm thresholds when switching on or when setting to the **Information application**.

4.3.4 Date/time

The date and time of the device are used to record the protocols, information and servicing activities.

Note:
Ensure that the date and time are set correctly at all times so that, for example, recordings from different devices can be compared with each other.

---

[1] Before its first maintenance, the device will be restored to the same settings as when delivered.

The date and time of the device are set in two separate menu items.

- **Date** (day, month, year)
- **Time** (time of day)

4.3.5 PPM threshold

The threshold value can be set for the concentration-dependent signal in the **Structure** application.

The options are:

- **–** | **10** | **20** | … | **100 ppm**

  If the concentration-dependent signal is to be disabled, "**–**" must be selected.

Information about the concentration-dependent signal can be found in section 3.9.

5 Protocols and information

5.1 Protocols

The device saves device inspections and recordings in the protocol memory as protocols. In addition, the most recent protocols are displayed in protocol lists.

Information about the protocol memory can be found in section 2.6.

The device can display the protocols. To delete them, the **GasCom** software or the **ATS** test set must be used.

The following protocols can be displayed:

- **Device inspections**

  Protocols of device inspections

- **Recordings**

  Protocols of recordings

Protocol lists

The protocol lists (Fig. 31) show the most recent protocols.

- For device inspections, a symbol indicates the associated overall result.
- If a comment has been saved for a recording, it will appear before the date on the first line.

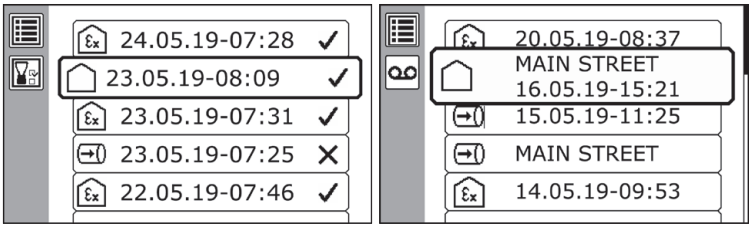

Fig. 31: Protocol list
Left image: Protocols of device inspections
Right image: Protocols of recordings

Protocol lists display a maximum of 40 protocols. When the lists are full, the oldest protocol will be overwritten with the most recent protocol. Protocols that are no longer displayed in the protocol lists still exist in the protocol memory.

Detailed information

You can access the relevant detailed information for each protocol (Fig. 32 and Fig. 33).

Note:
The detailed information about a protocol is generally spread over several display views.

- Scroll using the arrow keys to view the complete information.

5.1.1 Device inspections

Note:
The device not only saves the guided device inspections, but also all the device inspections performed using the **ATS** test set.

The protocol of a device inspection includes:

- application (symbol)
- overall result (symbol)
- save date
- Inspector
- results of the subtests (device condition, pump, zero point, tested gases)

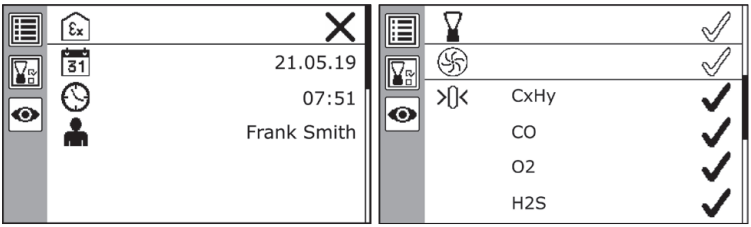

Fig. 32: Protocol of a device inspection (detailed information)
The information is spread over several display views.

The device is switched on. The top menu level is open.

1. Select **Protocols** > **device inspections**.

The protocol list appears.

2. Select a protocol.
3. Press the Enter key.

   The detailed information about the selected protocol will be displayed.

5.1.2 Recordings

The protocol of a recording includes:

- application (symbol)
- date, start and end of recording
- comment (optional)
- gases with their minimum and maximum measurement values

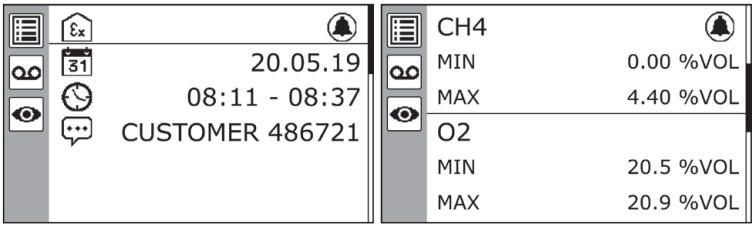

Fig. 33: Protocol of a recording (detailed information)
The information is spread over several display views.

The device is switched on. The top menu level is open.

1. Select **Protocols** > **Recordings**.

   The protocol list appears.

2. Select a protocol.
3. Press the Enter key.

   The detailed information about the selected protocol will be displayed.

5.2 Information

The following information can be displayed:

- **Device**

  Information about the device

- **Error**

  Error list
- **Test gases**

  Test gas list
- **User list**

  A list of users for the device
- **Application**

  Information about the measuring ranges and alarm thresholds of the applications

---

Note:
The information is generally spread over several display views.
- Scroll using the arrow keys to view the complete information.

5.2.1 Device

The following information will be displayed:

- Microcontroller firmware version
- Battery type
- Next maintenance
- built-in sensors with installation date and service life (2nd digit: expected lifetime)

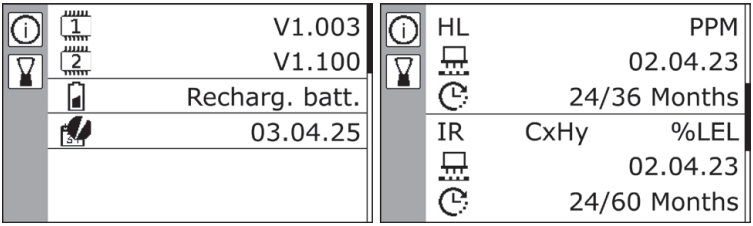

Fig. 34: Information – device
The information is spread over several display views.

The device is switched on. The top menu level is open.

- Select **Information** > **device**.

  Information about the device is displayed.

5.2.2 Errors

The last ten errors are displayed in the error list in descending chronological order. The following are displayed for each error:

- date and time
- error code
- description of the error and remedy

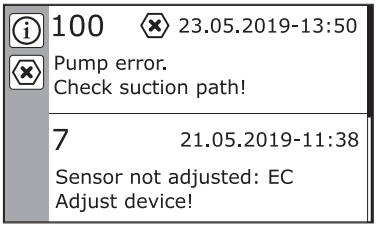

Fig. 35: Information – error list

The device is switched on. The top menu level is open.

- Select **Information** > **errors**.

  The error list is displayed.

5.2.3 Test gases

The test gas list displays the available test gases.

The detailed information about a test gas shows its composition.

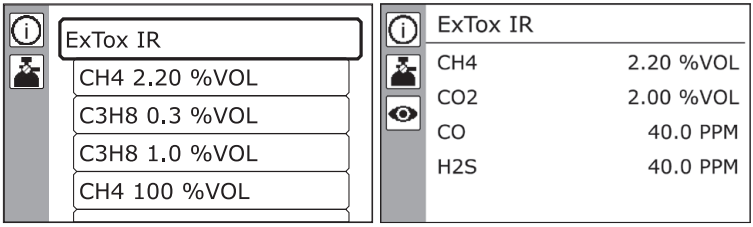

Fig. 36: Information – test gases
Left image: Test gas list
Right image: Detailed information (composition of a selected test gas)

The device is switched on. The top menu level is open.

- Select **Information** > **Test gases**.

  The test gas list is displayed.

5.2.4 User list

The user list displays the names of all users selected for the device and transferred to the device by the **GasCom** software.

Note:
Users can only be created and edited using the **GasCom** software.

Users included in the user list can save the result of device inspections together with their name.

The user list can include the user **Guest**. This user name can be used by any user. **Guest** is then listed as the name of the inspector in the protocol of the device inspection.

If no users are transferred to the device by **GasCom,** the user list will be empty.

The device is switched on. The top menu level is open.

− Select **Information** > **user list**.

The user list is displayed.

5.2.5 Application

The following information will be displayed:

− gas types

− Measurement ranges

− Alarm thresholds

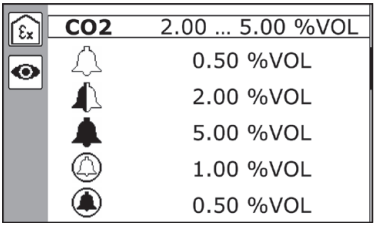

Fig. 37: Information – application
Display of gases, measuring ranges and alarm thresholds for a single application (here: **Warning** application, gas CO2)

The device is switched on. The top menu level is open.

1. Select an application.

2. Press the Enter key.
3. Select **Information application**.

   The information for the selected application will be displayed.

Note:
The information about the application is not only accessible manually, but it will also appear automatically every time the device is switched on for the configured application.

---

6 Servicing

6.1 Scope of servicing (overview)

Servicing of the device consists of the following activities:

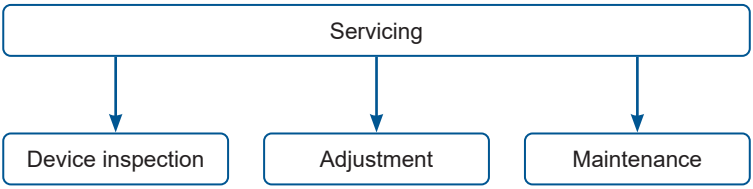

Fig. 38: Servicing activities

The frequency and performers of the individual activities vary. For detailed information, refer to the following sections.

All servicing activities must be documented.

Note:
In addition, these operating instructions only describe the device inspection and adjustment in more detail, since maintenance must only be carried out by specialists.

6.2 Test gases

6.2.1 Suitable test gases

Both gas mixtures and individual gases can be used for device inspection and adjustment. With some test gases, particularly gas mixtures, several gases can be tested or adjusted simultaneously.

Test gases can be both preset and self-set.

Preset test gases

Test gases are preset at delivery. These SEWERIN test gases can be used to perform all the required device inspections and adjustments.

Information about the preset test gases can be found in section 9.3.1.

Self-set test gases

Test gases other than preset test gases can be used provided they meet the listed specifications. The test gases that are not preset must be set up by the user by means of the **GasCom** software. The test gas specifications are available on request.

6.2.2 Available test gases

Available test gases can be both pre-set and self-set test gases.

The test gases available for servicing are always listed at the start of an activity. The device also shows which gases can be tested or adjusted with a test gas.

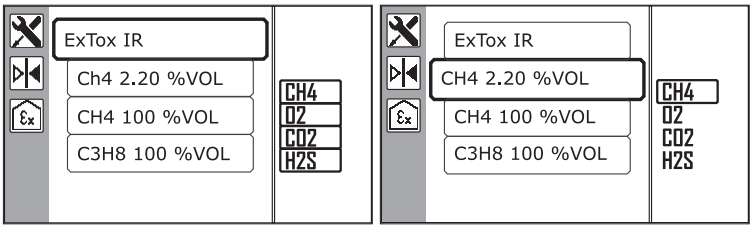

Fig. 39: Adjustment – selection of the test gas

Middle:	Test gas list
At the right edge:	List of gases to be adjusted The gases that can be tested and adjusted with a selected test gas are outlined.
Left image:	All gases can be adjusted using the selected test gas.
Right image:	One gas can be adjusted using the selected test gas.

6.2.3 Gas mixtures for adjusting devices with a COSH sensor

Note:
The COSH sensor can be used measure CO and H_2S at the same time.
The information below only applies to devices with a COSH sensor when it comes to adjusting CO with certain gas mixtures.

If the test gas used to adjust devices with a COSH sensor is a gas mixture containing 40 ppm H_2S, (e.g. ExTox IR), an adjustment deviation of up to -10 %, i.e. -4 ppm CO can occur with CO. If greater accuracy is required, a test gas free from H_2S must be used for subsequent readjustment (e.g. ExCOx IR).

Detecting a COSH sensor

Determine whether a device has a COSH sensor as follows:

- When the device is switched on, both CO and H_2S are displayed (Fig. 11).
- When the device is charging, both CO and H_2S are displayed as optional sensors (Fig. 45).

6.3 Suitable environment

Device inspection and adjustment must be performed in an environment with clean air. This means that the ambient air must be free of hydrocarbons and toxic gases.

During device inspection and adjustment the device will indicate whether the ambient air is clean (for example: **Use clean air!**).

6.4 Device inspection

Device inspections are carried out to ensure the functionality of the device.

The probes and probe hoses used with the device must also be visually inspected at each device inspection.

6.4.1 Options for carrying out the procedure

The following options are available for performing the device inspection:

- free
- guided

Alternatively, the device inspection can be performed using the **ATS 503/501** test set.

Free device inspection

The user performs the device inspection autonomously and on his own responsibility. The user logs the results (e. g. on paper).

Guided device inspection

The **PM 580/550/500/400** device guides the user interactively through all the necessary subtests. The subtests must be selected manually.

The results can be saved in the device and read out on a computer using the **GasCom** software.

The device reminds the user in good time when the device inspection is due.

Note:
These operating instructions only explain the guided device inspection.
The visual inspection of probes and probe hoses is not explicitly part of the guided device inspection. This visual inspection must therefore also be performed.

6.4.2 Frequency and due date

Frequency

The frequency of device inspections depends on the application.

SEWERIN recommends: Unless national or federal regulations stipulate otherwise, perform the device inspection as shown in the table below.

Frequency (time interval)	**Bump test** ECO device inspection	**Indication accuracy** Standard device inspection
before each work shift	Warning	
weekly		Structure
quarterly		Warning Measuring

⚠ WARNING **Risk to life from using misaligned or faulty devices**

For the Structure application, the functional safety test[1] applies only under the following conditions:

- Perform the **Warning ECO** or **Warning** device inspection daily before each work shift.
- Also carry out the **Structure** device inspection on a weekly basis.

Due date

Device inspections are marked as due when the specified intervals[2] have been exceeded.

When switching on, the device highlights any device inspections that are due (Fig. 10). The symbol appears in the status area in measuring mode (Fig. 40).

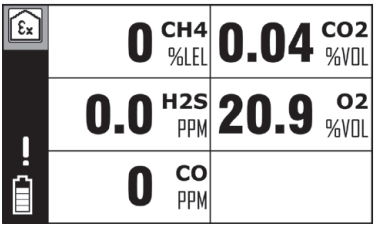

Fig. 40: Measuring mode
The **Device inspection due** symbol is displayed in the status area.

[1] Type-examination certificate issued by DEKRA Testing and Certification GmbH

[2] Setting using the **GasCom** software.

6.4.3 Variants of the guided device inspection (standard and ECO)

The guided device inspection can be performed in two variants. These options depend on whether the indication accuracy is tested and whether a bump test is performed.

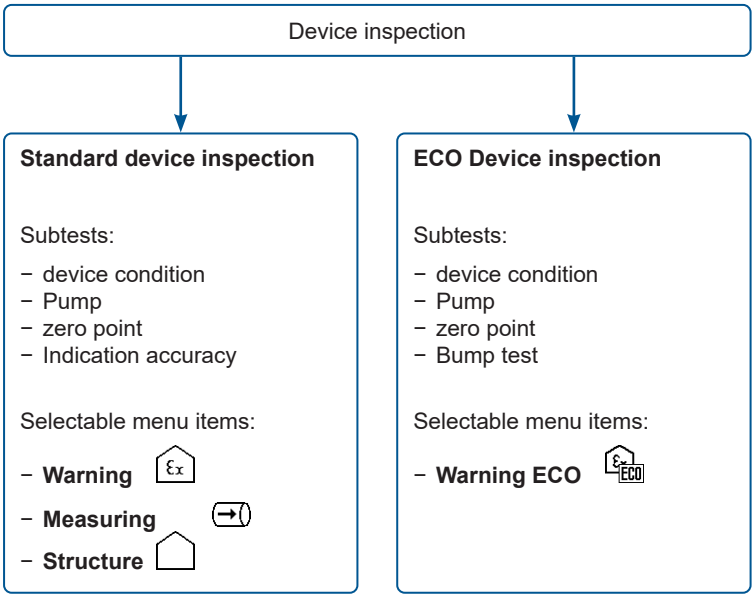

Fig. 41: Variants of device inspection with associated subtests and menu items

The **ECO** device inspection is only available in the **Warning** application.

6.4.4 Features

- The device inspection must be performed separately for each application.
- Device inspections can be saved.
- The device automatically remembers successful subtests for use in subsequent device inspections. The requirements for this are:
  - The device inspection was performed on the same day.
  - The device inspection has been saved.

Subtests

The following subtests are part of a device inspection:

- **Device condition**

  Evaluation of the external device condition (visual inspection)

  Test whether the signals work.

- **Pump**

  Check whether the device detects a pump error. To do this, the gas input is blocked.

- **Zero point**

  Check whether the zero point is within the permitted tolerances. Test gas is supplied for this purpose.

- **Indication accuracy** (for standard device inspections)

  Check whether the indication accuracy is within the permitted tolerances. Test gas is supplied for this purpose.

- **Bump test** (for **ECO** device inspection)

  Check whether the display is working and whether alarms are triggered. Test gas is supplied for this purpose.

6.4.5 Presentation of results

The results of subtests and the overall result of a device inspection are displayed using symbols. Please see section 9.9 for an explanation of the symbols.

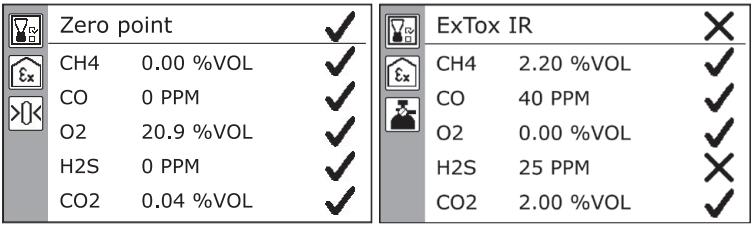

Fig. 42: Device inspection - overview of results (*here:* Device inspection with ExTox IR)
Left image: zero point
Right image: Indication accuracy (*here:* H_2S failed and the device inspection as a whole failed.)

6.4.6 Required accessories

The following accessories are required for testing the indication accuracy/bump test:

- Test gas

  Information about the suitable test gases can be found in section 6.2.

- **SPE AutoFlow** test set

6.4.7 Performing the device inspection

6.4.7.1 Requirements (summary)

The following requirements must be met for a device inspection:

- The device is switched on in clean air.
- The device continues to draw in clean air after it is switched on.
- The sensors are warmed up.
- The necessary accessories are available.
- The intended test gas is suitable for the gas to be tested.
- The intended test gas corresponds to the set concentrations.[3]

6.4.7.2 Starting the device inspection

The device is in measuring mode.

1. Press the Menu key.
2. Select **Device inspection**.
3. Select an application and thus also the variant of the device inspection (**Warning ECO**, **Warning**, **Measuring** or **Structure**).
4. Perform the subtests described below (section 6.4.7.3 to section 6.4.7.6).

[3] Setting using the **GasCom** software.

6.4.7.3 Testing the device condition

An application is selected for the device inspection.

1. Select **Device condition**.
2. A series of questions appears. Answer them.

   a) **Device condition: Display inverted?**

   Does the display show all pixels in reverse colour assignment[4]?

   b) **Device condition: Signal light and buzzer switched on?**

   Is the acoustic signal audible and can the visual signal be seen?

   c) **Device condition: Housing OK?**

   Is the housing free from external damage?

The device condition check is now complete. The device switches back one menu level.

6.4.7.4 Testing the pump

An application is selected for the device inspection.

1. Select **Pump**.
2. If the following message appears: **Disable gas input!**
   - Seal the gas input, e. g. with a finger.
3. If the following message appears: **Release gas input!**
   - Release the gas input again.

   The test of the pump is now complete. The device switches back one menu level.

6.4.7.5 Testing the zero point

An application is selected for the device inspection.

1. Select **Zero point**.

   The following message appears: **Use clean air!**

[4] White pixels are displayed in black, black pixels are displayed in white.

2. Wait while the following message is visible: **Use clean air! Process ongoing …**
3. When the zero point test is complete, the result will appear. The device switches back one menu level.

6.4.7.6 Testing the indication accuracy (standard device inspection)

The **Warning**, **Measuring** or **Structure** application is selected for the device inspection.

1. Select **Indication accuracy**.
2. Select a test gas from the list.
3. If the following message appears: **Add test gas!**
   - Add the test gas

     To do so, connect the test gas hose of the **SPE AutoFlow** to the device's gas input.
4. Wait while the following message is visible: **Add more test gas! Process ongoing …**
5. If the following message appears: **Stop test gas!**
   - Disconnect the test gas hose from the gas input.
6. When the indication accuracy test is complete, an overview of the gases tested will appear.

   The device returns to the test gas selection.
7. If necessary:
   - Repeat the indication accuracy test for other gases.
8. Press the Menu key.

   The device switches back one menu level. When all gases have been tested, the device switches back to the **Indication accuracy** menu item.

6.4.7.7 Performing a bump test (ECO device inspection)

The **Warning ECO** application is selected for the device inspection.

1. Select **Bump test**.
2. Select a test gas from the list.
3. If the following message appears: **Add test gas!**
   - Add the test gas

     To do so, connect the test gas hose of the **SPE AutoFlow** to the device's gas input.
4. Wait while the following message is visible: **Add more test gas! Process ongoing …**
5. If the following message appears: **Stop test gas!**
   - Disconnect the test gas hose from the gas input.
6. When the bump test is complete, an overview of the tested gases will appear.

   The device returns to the test gas selection.
7. If necessary:
   - Repeat the bump test for other gases.
8. Press the Menu key.

   The device switches back one menu level. When all gases have been tested, the device switches back to the **Bump test** menu item.

6.4.7.8 Saving the device inspection

Fully performed device inspections as well as subtests can be saved in the device.

Which steps need to be taken to save a device inspection will depend on whether the device’s user list contains user names or not. Information about the user list can be found in section 5.2.

Device with entries in the user list

A device inspection is saved with the name of the user (inspector).

If the user list contains the entry **Guest,** this user name can be used by any user. **Guest** is then listed as the name of the inspector in the protocol.

The entire device inspection or subtests were performed for a selected application.

1. Select **Save**. The user list appears.
2. Select your user name from the user list.
3. If necessary:
   - enter your PIN code.

   The device inspection will be saved with your name.

Device without entries in the user list

The device inspection will be saved without a name. The protocol is then missing the verification of which user performed the device inspection.

The entire device inspection or subtests were performed for a selected application.

- Select **Save**. The device inspection is saved.

6.4.8 Testing the response time

The response time provides an indication of how quickly a sensor reacts to a gas. Deviations between the theoretical and the actual response times of a sensor can have various causes. The sensor may be approaching the end of its service life, for example.

Usually, the response time is measured until 90% of the concentration of a test gas (t_{90}) or 50% has been reached (t_{50}).

The following accessories are required for testing the response time:

- Test gas
- **SPE AutoFlow** test set

Requirements

− The device must be correctly adjusted.

The device is in measuring mode.

1. Add the test gas.
2. Measure the time until the measurement value reaches the specified percentage of the test gas concentration, e. g. 90% or 50%.
3. Compare the time you have recorded against the theoretical response times in section 9.2.

6.5 Adjustment

The sensors and the corresponding gases are configured by adjustment. To this end, the zero point is adjusted successively and then the sensitivity to the reference values.

6.5.1 Frequency

An adjustment must be performed in the following cases:

- Measurement values outside the specified limit values (section 9.6)
- The device inspection failed

Only the gases concerned need to be adjusted, not the entire device.

6.5.2 Features

Note:
Only specialist technicians may perform adjustments.

- The adjustment of a gas must be performed separately for each application.
  - The ambient air is used to perform adjustment of the zero point.

    Exception:

    A test gas must be used for oxygen. The test gas must not contain oxygen.
  - Test gases must be used to perform adjustment of the sensitivity.

    Exception:

    The ambient air is used for oxygen. (Fresh air contains 20.9% vol. oxygen.)
- Failed adjustments are saved in the error list.

6.5.3 Presentation of results

The result of an adjustment is displayed with symbols. Please see section 9.9 for an explanation of the symbols.

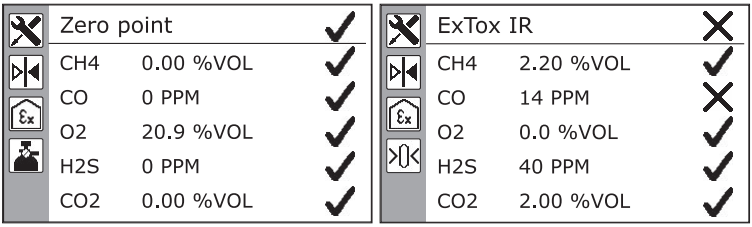

Fig. 43: Adjustment – overview of results
Left image: zero point
Right image: Gases (*here:* ExTox IR, CO adjustment failed)

6.5.4 Required accessories

The following accessories are required for an adjustment:

- Test gas

  Information about the suitable test gases can be found in section 6.2.1.

- **SPE AutoFlow** test set

  Alternatively, the adjustment can be performed using the **ATS** test set.

- CO2 filter (carbon dioxide filter)

  Only devices with a CO_2 sensor: To adjust the **Warning** application.

- Conditioner

  To adjust the **Structure** application.

6.5.5 Performing an adjustment

⚠ WARNING Risk to life due to incorrect adjustment

An incorrectly adjusted device may fail to warn users in time of dangerous gas concentrations.

- Always perform the adjustment in well ventilated rooms or in the open air.

Note:
When performing adjustment, the user is supported by the display of situation-dependent information and prompts.

6.5.5.1 Requirements (summary)

The following requirements must be met for an adjustment:

- The user is an authorised professional.
- The device is switched on in clean air.
- The device continues to draw in clean air after it is switched on.
- The sensors are warmed up.
- The necessary accessories are available.
- The intended test gas is suitable for the gas to be adjusted.
- The intended test gas corresponds to the set concentrations.[5]

[5] Setting using the **GasCom** software.

6.5.5.2 Warning application

The device is in measuring mode.

1. Press the Menu key.
2. Select **Settings**. The PIN prompt appears.
3. Enter the PIN code.
4. Select **Adjustment**.
5. Select **Warning**.
6. Select a suitable test gas.
7. Press the Enter key. Adjustment of the zero point begins.
8. If the following message appears: **Supply clean air via CO2 filter!**
   - Connect the CO2 filter to the gas input.
9. Wait while the following message is visible: **Use clean air! Process ongoing …**
10. When the zero point adjustment is complete, an overview will appear (Fig. 43, left image).

    The adjustment will continue automatically.
11. If the following message appears: **Remove CO2 filter! Add test gas!**

    a) Remove the CO2 filter from the gas input.

    b) Add the designated test gas.

    To do so, connect the test gas hose of the **SPE AutoFlow** to the device's gas input.
12. Wait while the following message is visible: **Add more test gas! Process ongoing …**
13. If the following message appears: **Stop test gas!**
    - Disconnect the test gas hose from the gas input.
14. When the adjustment is complete, an overview of the adjusted gases will appear (Fig. 43, right image).

    The device returns to the test gas selection.
15. If necessary:
    - Repeat the adjustment for further gases.

6.5.5.3 Measuring application

The device is in measuring mode.

1. Press the Menu key.
2. Select **Settings**. The PIN prompt appears.
3. Enter the PIN code.
4. Select **Adjustment**.
5. Select **Measuring**.
6. Select a suitable test gas.
7. Press the Enter key. Adjustment of the zero point begins.

   The following message appears: **Use clean air!**
8. Wait while the following message is visible: **Use clean air! Process ongoing …**
9. When the zero point adjustment is complete, an overview will appear (Fig. 43, left image).

   The adjustment will continue automatically.
10. If the following message appears: **Add test gas!**
    - Add the designated test gas.

      To do so, connect the test gas hose of the **SPE AutoFlow** to the device's gas input.
11. Wait while the following message is visible: **Add more test gas! Process ongoing …**
12. If the following message appears: **Stop test gas!**
    - Disconnect the test gas hose from the gas input.
13. When the adjustment is complete, an overview of the adjusted gases will appear (Fig. 43, right image).

    The device returns to the test gas selection.
14. If necessary:
    - Repeat the adjustment for further gases.

6.5.5.4 Structure application

The device is in measuring mode.

1. Press the Menu key.
2. Select **Settings**. The PIN prompt appears.
3. Enter the PIN code.
4. Select **Adjustment**.
5. Select **Structure**.
6. Select a suitable test gas.
7. Press the Enter key. Adjustment of the zero point begins.
8. If the following message appears: **Supply clean air via conditioner!**
   - Connect the conditioner to the gas input.
9. Wait while the following message is visible: **Use clean air! Process ongoing …**
10. When the zero point adjustment is complete, an overview will appear (Fig. 43, left image).
11. The adjustment will continue automatically. If the following message appears: **Add test gas via conditioner!**
    - Add the designated test gas.

      To do this, connect the test gas hose of the **SPE AutoFlow** to the conditioner.
12. Wait while the following message is visible: **Add more test gas! Process ongoing …**
13. If the following message appears: **Stop test gas!**

    a) Remove the test gas hose from the conditioner.

    b) Remove the conditioner from the gas input.
14. When the adjustment is complete, an overview of the adjusted gases will appear (Fig. 43, right image).

    The device returns to the test gas selection.
15. If necessary:
    - Repeat the adjustment for further gases.

6.6 Maintenance

Note:
Maintenance must be performed by specialists.

The device must undergo maintenance once a year.

- Send the device to SEWERIN Service for maintenance.
- If you have a service contract, the device can be serviced by the mobile service team.

An inspection sticker on the device confirms the last maintenance and shows the next due date.

Fig. 44: Inspection sticker

7 Power supply

7.1 Overview

The device is powered by rechargeable batteries installed in a battery pack. The battery pack is rechargeable.

Only the original SEWERIN battery pack is approved for use with the device.

⚠ WARNING Risk of explosion due to leaking batteries

- If a battery pack is leaking or otherwise damaged, replace it immediately.
- Clean the device if necessary before inserting the new battery pack.

7.2 Charging mode

The battery pack can be charged in the device using accessories. Whilst being charged, the device is in charging mode.

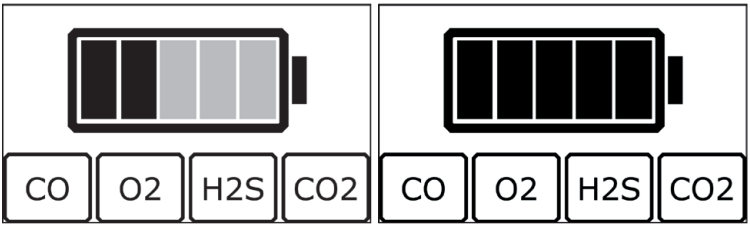

Fig. 45: Charging mode
at the bottom edge: Display of the device's optional sensors
Left image: Battery is charging
The black segments flash.
Right image: Battery is fully charged (charge maintenance)
The black segments do not flash.

Charging mode features intelligent charging management. The device detects the current charge level of the batteries and responds to this, for example:

− Once the rechargeable batteries are fully charged, the device switches to charge maintenance.

- The device recharges regularly for the purpose of charge maintenance.
- If the maximum battery temperature is exceeded, charging is interrupted until the temperature drops again.

7.2.1 Required accessories

The following accessories are required to charge the batteries:

- Docking station **PM 5** or **PM 5-T**

OR

- **ATS** test set

To connect the accessory to a power source you need:

- **M4** AC/DC adapter

⚠ DANGER **Risk of explosion from sparks**

High charging currents occur when batteries are being charged.

- Only ever charge the device outside of explosive areas.

7.2.2 Charging the battery pack

Note:

Observe the specified charging temperatures.

- At temperatures outside the specified charging temperatures, it may not be possible to charge the batteries.
- Temperatures from 10 to 25°C (50 to 77 °F) are ideal for charging.

The device is switched off or on.

1. Insert the device into the docking station or test set.
2. Connect the docking station or test set to a power source using a power cable. The device switches to charging mode.

7.3 Rechargeable battery maintenance

The actual daily operating time of the device depends on the battery capacity. Rechargeable batteries lose charge even when the device is not in use.

SEWERIN recommends: Charge the device regularly when not in use.

7.4 Alarm at undervoltage

If the remaining capacity of the batteries falls below a certain level, then the device will issue two levels of warnings.

First level

Message:	**Battery almost empty**
Warnings:	visual: – The **Remaining capacity** symbol flashes audible: – signal is emitted (simultaneously) – operating signal doubles
Remaining operating time:	approx. 15 min

Second level

Message:	**Battery empty**
Warnings:	visual: – no display except the **Remaining capacity** symbol audible: – a continuous signal is emitted
Remaining operating time:	none (the device switches itself off)

7.5 Replacing the battery pack

⚠ DANGER Risk of explosion from sparks

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

- Only ever open the battery compartment outside of explosive areas.

The battery compartment is on the underside of the device. To open the battery compartment, you will need a hexagon key wrench (size 2.5).

1. Undo the screw of the battery pack.
2. Remove the battery pack.
3. Insert the new battery pack and tighten the screw.
4. If the battery pack is disconnected for more than 120 seconds, the date and time will have to be reset the next time the device is switched on.

8 Faults and problems

8.1 Error messages

If a fault occurs during operation, an error message will appear on the display. Error messages are displayed in the order in which they occur. Up to 5 errors can be displayed.

The update rate for error messages is max. 1 second. Error messages continue to be displayed until the error is corrected.

Error messages with error code F7 - F59

Error code	Error	Corrective action
F7	Sensor not adjusted: EC	Adjust device!
F8	Sensor not adjusted: PX	Adjust device!
F9	Sensor not adjusted: IR	Adjust device!
F10	Adjustment error.	Check test gas! Otherwise sensor faulty.*
F11	Zero point not OK.	Adjust device!
F52	Memory error: XFlash	Contact SEWERIN Service!**
F59	Voltage error.	Contact SEWERIN Service!

* Check that the test gas selected in the device corresponds to the test gas actually used. If the test gas is correct, a faulty sensor may have caused the error message. In that case contact SEWERIN Service.
** First try to fix the error by **restoring** the device (section 4.3.3).

Error messages with error code F60 – F64

Error code	Error	Corrective action
F60	Sensor error: PX/CC	Contact SEWERIN Service!
F61	Sensor error: PX/TC	Contact SEWERIN Service!
F62	Sensor error: IR	Contact SEWERIN Service!
F63	Sensor error: PX	Contact SEWERIN Service!
F64	Sensor error: PX/SC	Contact SEWERIN Service!

Error messages with error code F80 – F200

Error code	Error	Corrective action
F80	Sensor error: Air pressure	Contact SEWERIN Service!
F81	Sensor error: Moisture	Contact SEWERIN Service!
F90	Battery voltage too low.	Check/replace battery!
F91	Battery voltage too high.	Check/replace battery!
F100	Pump error.	Check suction path!*
F200	System error: I2C slave	Contact SEWERIN Service!

* Check all filters, probes and hose connections for porosity and dirt.

8.2 Warning messages

Warnings include information for the user that refers to the operation of the device or device itself.

Warning	Corrective action
Battery almost flat.	Charge the batteries.
Battery flat.	1. Where applicable: Leave the danger area. 2. Charge the batteries.
Zero point not set.	1. Where applicable: Leave the danger area. 2. For corrective action see section 8.3.2.
Incorrect PIN.	Enter the correct PIN code.

8.3 Problem solving

8.3.1 Device has sucked water in

When using probes in particular, the device may accidentally draw in water. If the user does not notice this immediately, an error message (**Pump error**) will appear after a while.

The device is designed so that any water that is sucked in is collected in the filter opening. Care must be taken when removing the water to ensure no water enters the inside of the device.

NOTICE

Please observe the following instructions to prevent damage to the device:

- Remove the water as soon as possible.
- Please note all the information about changing the filter in section 3.12.
- Follow the sequence of operations described below.
- Replace both the old damp filters with new, dry filters.
- Dry the probe before re-use.

The device is switched off.

1. When a probe is connected:
   − Remove the probe from the gas input.
2. Turn the filter seal anti-clockwise until it reaches the stop.
3. Pull off the filter seal.
4. Tip the water out of the filter opening.
5. Thoroughly dry the filter opening with an absorbent cloth, lint-free if possible. Alternatively, you can also use a cleansing tissue or paper tissue.
6. Remove the O-ring and hydrophobic filter from the filter opening.
7. Carefully dry the filter opening once again.
8. Remove the dust filter from the filter seal.
9. Dry the filter seal.
10. Insert a new dust filter into the filter seal. Press the filter in gently.
11. Carefully insert a new hydrophobic filter into the filter opening.
12. Replace the O-ring.
13. Replace the filter seal. Make sure the side lugs are facing the right way.
14. Turn the filter seal clockwise until it reaches the stop.

8.3.2 Temporary zero point cannot be set

If the zero point cannot be set, the device emits a visual and an audible signal and one of the following messages appears:

- **Start sensors …**

  Cause: The sensors are not yet sufficiently warmed up.

  Corrective action:
  1. Wait until the sensors have warmed up.
  2. Then try again to set the zero point.

- **Zero point not set**

  Cause: The ambient air is not clean.

  Corrective action:
  - Move the device into an environment with clean air.

  Cause: A sensor is misaligned.

  Corrective action:
  - Adjust the device.

  Cause: A sensor is defective.

  Corrective action:
  - Contact SEWERIN Service.

9 Appendix

9.1 Technical data

Series

Type/model	CSA: • PM 400: 050 01 • PM 400 CO2: 050 02 • PM 500: 050 11 • PM 550: 050 21 • PM 580: 050 31

Certificates

Certificate	Explosion protection test • EU type examination certificate: TÜV 17 ATEX 171969 X • IECEx: IECEx TUN 17.0027 X • CSA: CSA19CA80006793X Functional safety test • for: ◦ Warning application; gas types CH_4, C_3H_8, C_9H_{20} (PM 400 only); gas CO_2, O_2, CO, H_2S ◦ Structure application; gas types CH_4, C_3H_8; gas CO • EU type-examination certificate/type-examination certificate (for firmware V1.100): DEKRA Testing and Certification GmbH: ◦ BVS 19 ATEX G 002 X ◦ PFG 19 G 004 X
Marking	PM 580/550/500 and PM 400 with IR for CO_2: • Ex ia db IIC T3 Gb • Class I, Zone 1, AEx ia db IIC T3 Gb • I.S. Class I, Div. 2, Group A,B,C,D,T3 PM 400: • Ex ia da IIC T3 Ga • Class I, Zone 0, AEx ia da IIC T3 Ga • I.S. Class I, Div. 1, Group A,B,C,D,T3

Device data

Dimensions (W x D x H)	• 93 × 47 × 165 mm (3.7 × 1.9 × 6.5 in) • 93 × 65 × 165 mm (3.7 × 2.6 × 6.5 in) incl. belt clip
Weight	depends on the built-in sensors • approx. 500 g (17.64 oz) • approx. 523 g (18.45 oz) incl. belt clip
Material	housing: polycarbonate, thermoplastic polyurethane

Features

Gas connections	Rectus NW 2.7 quick-release coupling
Display	TFT display, 380 × 224 pixels, size 56 x 33 mm (2.2 × 1.3 in)
Buzzer	• frequency: 2.4 kHz • volume: 80 dB (A) / 30 cm (11.8 in)
Signal light	red
Pump	diaphragm pump • vacuum: > 150 mbar • volume flow: > 10 l/h • pump error (F100): ≤ 5 l/h
Interface	USB 2.0 • docking station PM 5 or PM 5-T required
Memory	8 MB
Operation	membrane keypad
Sensors	PM 580/550/500: • IR for flammable gases (CH_4, C_3H_8) optional: • IR for CO_2 • EC for O_2, CO, H_2S PM 580 plus: • SC for flammable gases (CH_4, C_3H_8) PM 400: • CC for flammable gases (CH_4, C_3H_8, C_9H_{20}, C_2H_2, H_2, JFuel) optional: • IR for CO_2 • EC for O_2, CO
Filter	can be changed: • Hydrophobic filter • dust filter

Operating conditions*

Operating temperature	-20 – 40 ºC (-4 to 104 °F)
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Atmospheric pressure	700 – 1,200 hPa • pressure compensation for IR sensor
Pressure at gas input	max. 30 hPa
Protection rating	IP65

*Optional sensors can affect the operating conditions of the device.

Storage conditions

Storage temperature	• devices without an EC sensor: -25 – 60 ºC (-13 to 140 °F) • devices with an EC sensor: -25 – 40 ºC (-13 to 104 °F)
Humidity	5 – 95% r.h., non-condensing
Atmospheric pressure	700 – 1,200 hPa

Power supply

Power supply	PM 5 battery pack
Operating time, typical	at 25 °C (77 °F), depending on the product variant and application • PM 580/550/500, Warning application: 16 h • PM 580/550, Measuring application: 11 h • PM 580, Structure application: 8 h • PM 400, Warning application: 11 h • PM 400 with IR for CO_2, Warning application: 9 h the times apply only when no alarm is triggered during operation.
Battery voltage	NiMH: 3 × 1.2 V
Charging time	approx. 5 h (fully charged) at 2500 mAh
Charging temperature	0 – 35 °C (32 to 95 °F)
Charging voltage	12 V DC
Charging current	max. 300 mA
Charger	M4 AC/DC adapter

Data transmission

Communication	USB 2.0

Gas types

Standard	CH_4
Optional	PM 580/550/500: C_3H_8 PM 400: C_3H_8, C_9H_{20}, C_2H_2, H_2, JFuel

9.2 Sensors

Note:
When using probes, the specified response times are longer.

9.2.1 Infrared sensors

Methane CH_4, propane C_3H_8 (Warning application)

Type	infrared sensor (IR)
Use	PM 580/550/500
Measuring range	0 – 100% LEL • CH_4: 0 – 4.40% vol. (adjustable 4.00 – 5.00% vol.) • C_3H_8: 0 – 1.70% vol. (adjustable 1.50 – 2.10% vol.)
Resolution	• CH_4: 1% LEL or 0.05% vol. • C_3H_8: 1% LEL or 0.02% vol.
Response times	• CH_4: t_{50} < 13 s t_{90} < 25 s • C_3H_8: t_{50} < 15 s t_{90} < 28 s
Warm-up time	< 120 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	according to EN 60079-29-1 • CH_4: ±1% LEL (short-term stability) ±4% LEL (long-term stability) • C_3H_8: ±1% LEL (short-term stability) ±2% LEL (long-term stability)
Interference	all hydrocarbons
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Service life	24 months (60 months expected)
Test gases	• zero point: clean air • CH_4: 2.20% vol. • C_3H_8: 1.00% vol.
Humidity gas/test gas	5 – 95% r.h., non-condensing • short term: 0% r.h. • error: ±9% of end of measuring range
Pressure	700 – 1,200 hPa • error: ±2% of end of measuring range

Methane CH_4, propane C_3H_8 (Measuring application)

Type	infrared sensor (IR)
Use	PM 580/550
Measuring range	0 – 100% vol.
Resolution	• 0.0 – 9.9% vol.: 0.1% vol. • 10 – 100% vol.: 1% vol.
Response times	• CH_4: t_{50} < 13 s t_{90} < 23 s • C_3H_8: t_{50} < 15 s t_{90} < 28 s
Warm-up time	< 120 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	• CH_4: ◦ to 4.4% vol.: ±10% of measurement value (linearity), at least ±0.2% vol. ◦ 4.4% vol. – 9.9% vol.: ±10% of measurement value (linearity), at least ±0.5% vol. ◦ 10% vol. – 100% vol.: ±3% of measurement value (linearity), at least ±2% vol. • C_3H_8 ◦ to 1.7% vol.: ±10% of measurement value (linearity, at least ±0.2% vol. ◦ 1.7% vol. – 100% vol.: ±5% of measurement value (linearity), at least ±0.5% vol.
Interference	all hydrocarbons
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Service life	24 months (60 months expected)
Test gases	• zero point: clean air • CH_4: 100% vol. • C_3H_8: 100% vol. setting ranges: • CH_4: 50 – 100% vol. • C_3H_8: 50 – 100% vol.

Methane CH_4 (Structure application)

Type	infrared sensor (IR)
Use	PM 580
Measuring range	0 – 100% vol.
Resolution	• 0.00 – 4.40% vol.: 0.05% vol. • 4.5 – 9.9% vol.: 0.1% vol. • 10 – 100% vol.: 1% vol.
Response times	t_{50} < 13 s t_{90} < 23 s
Warm-up time	< 120 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	±3% of measurement value (linearity)
Interference	all hydrocarbons
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Service life	24 months (60 months expected)
Test gases	• zero point: clean air • CH_4: 100% vol. setting ranges: • CH_4: 50 – 100% vol.

Propane C_3H_8 (Structure application)

Type	infrared sensor (IR)
Use	PM 580
Measuring range	0 – 1.70% vol.
Resolution	0.02% vol.
Response times	t_{50} < 15 s t_{90} < 28 s
Warm-up time	< 120 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	±5% of measurement value (linearity)
Interference	all hydrocarbons
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Service life	24 months (60 months expected)
Test gases	• zero point: clean air • C_3H_8: 1.00% vol.

Carbon dioxide CO_2 (Warning application)

Type	infrared sensor (IR)
Use	PM 580/550/500/400
Measuring range	0 – 5.00% vol.
Indication range	-0.50 – 5.00% vol.
Resolution	0.02% vol.
Response times	t_{50} ≤ 15 s t_{90} ≤ 30 s
Decay times	t_{10} ≤ 23 s t_{50} ≤ 13 s
Warm-up time	< 120 s
Stabilisation time	≤ 80 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	• ±3% of measurement value (linearity), at least ±0.04% vol. • ±0.04% vol. (long-term stability) as per EN 45544
Drift	≤ 0.05% vol. per month
zero point deviation	0.04 % vol.
Interference	none
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h. • Error: ≤ 5% of measurement value, at least ±0.04% vol.
Service life	24 months (60 months expected)
Test gases	• zero point: clean air ◦ use a CO2 filter! • sensitivity: 2.00% vol. CO_2 setting ranges: • CO_2: 1.00 – 2.50% vol. humidity: short-term 0% r.h.
Pressure	700 – 1,200 hPa • Error: ≤ 5% of measurement value, at least ±0.04% vol.

9.2.2 Semiconductor sensor

Methane CH_4, propane C_3H_8 (Structure application)

Type	gas-sensitive semiconductor (SC)
Use	PM 580
Measuring range	• CH_4: 0 – 4000 ppm for LEL 4.40% vol. • C_3H_8: 0 – 1500 ppm for LEL 1.70% vol.
Resolution	1/2/20/200 ppm
Response times	• CH_4: 100 ppm: t_{50} < 7 s t_{90} < 10 s 1,000 ppm: t_{50} < 5 s t_{90} < 8 s • C_3H_8: 3,000 ppm: t_{50} < 8 s t_{90} < 11 s When using the **SPE AutoFlow**: the response times can be extended by up to 4 s as additional volume must be passed through (test gas hose, conditioner).
Warm-up time	< 120 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	for measurement values > 100 ppm under the same ambient conditions: • CH_4: ±20% of measurement value (linearity) • C_3H_8: ±20% of measurement value (linearity)
Interference	• all hydrocarbons • H_2 • water vapour
Service life	12 months (60 months expected)
Test gases	use the conditioner for all test gases! • zero point: clean air • CH_4: 1,000 ppm in synth. air • C_3H_8: 0.3% vol. in synth. air setting ranges: • CH_4: 100 – 1000 ppm • C_3H_8: 100 – 3000 ppm

9.2.3 Catalytic combustion sensor

Methane CH_4, propane C_3H_8, nonane C_9H_{20}, acetylene C_2H_2, hydrogen H_2, JFuel (kerosine)

Type	catalytic combustion sensor (CC)
Use	PM 400
Measuring range	0 – 100% LEL • CH_4: 0 – 4.40% vol. (adjustable 4.00 – 5.00% vol.) • C_3H_8: 0 – 1.70% vol. (adjustable 1.50 – 2.10% vol.) • C_9H_{20}: 0 – 0.70% vol. • C_2H_2: 0 – 2.30% vol. • H_2: 0 – 4.00% vol. • JFuel: 0 – 0.70% vol.
Resolution	• CH_4: 1% LEL or 0.05% vol. • C_3H_8: 1% LEL or 0.02% vol. • C_9H_{20}: 2% LEL or 0.02% vol. • C_2H_2: 2% LEL or 0.05% vol. • H_2: 1% LEL or 0.05% vol. • JFuel: 2% LEL or 0.02% vol.
Response times	• CH_4: t_{50} < 7 s t_{90} < 13 s • C_3H_8: t_{50} < 7 s t_{90} < 13 s • C_9H_{20}: t_{50} < 23 s t_{90} < 3 min • C_2H_2: t_{50} < 6 s t_{90} < 10 s • H_2: t_{50} < 6 s t_{90} < 11 s • JFuel: t_{50} < 15 s t_{90} < 60 s
Warm-up time	< 120 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	according to EN 60079-29-1 • CH_4: ±1% LEL (short-term stability) ±4% LEL (long-term stability) • C_3H_8: ±2% LEL (short-term stability) ±2% LEL (long-term stability) • C_9H_{20}: ±2% LEL (short-term stability) ±8% LEL (long-term stability) • C_2H_2: ±1% LEL (short-term stability) ±4% LEL (long-term stability) • H_2: ±1% LEL (short-term stability) ±2% LEL (long-term stability) • JFuel: ±2% LEL (short-term stability) ±8% LEL (long-term stability) when using a substitute test gas: • C_9H_{20}: ±30% of measurement value • JFuel: ±30% of measurement value

Interference	all flammable gases
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Service life	24 months (60 months expected)
Test gases	• zero point: clean air • CH_4: 2.20% vol. in synth. air • C_3H_8: 1.00% vol. in synth. air • C_9H_{20}: 0.28% vol. in synth. air (substitute test gas 0.30% vol. C_3H_8 in synth. air) • C_2H_2: 1.00% vol. in synth. air • H_2: 2.00% vol. in synth. air • JFuel: 0.32% vol. in synth. air (substitute test gas 0.30% vol. C_3H_8 in synth. air) setting ranges: • CH_4: 1.00 – 3.50% vol. • C_3H_8: 0.50 – 1.30% vol. • C_9H_{20}: 0.20 – 0.50% vol. • C_2H_2: 0.50 – 1.80% vol. • H_2: 1.00 – 3.20% vol. • JFuel: 0.20 – 0.50% vol.
Humidity gas/test gas	5 – 95% r.h., non-condensing • short term: 0% r.h. • error: ±5 % of the EMR
Pressure	700 – 1,200 hPa error: • CH_4: 800 – 1200 hPa ±3% of the EMR 700 – 1200 hPa ±4% of the EMR • C_3H_8: 800 – 1200 hPa ±2% of the EMR 700 – 1200 hPa ±2% of the EMR

9.2.4 Electrochemical sensors

Note:
At temperatures below 0 °C (32 °F) the specified response times and decay times may be longer.

Oxygen O_2

Type	electrochemical sensor (EC)
Use	PM 580/550/500/400
Measuring range	0 – 25.0% vol.
Indication range	-3 – 25.0% vol.
Resolution	0.1% vol.
Response times	t_{20} < 10 s t_{90} < 32 s
Warm-up time	< 2 min
Stabilisation time	< 90 s
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	• ±2% of measurement value (linearity), at least ±0.2% vol. (±2 digits) • ±0.2% vol. (long-term stability) as per EN 50104
Drift	≤ 3% within 3 months
Interference	none
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Service life	24 months (60 months expected)
Test gases	• zero point: clean air • O_2: 0.0% vol. setting ranges: • O_2: 0.0 – 1.0% vol.
Humidity gas/test gas	5 – 95% r.h., non-condensing • short term: 0% r.h. • error: ±3% of end of measuring range
Pressure	700 – 1,200 hPa • error: ±3% of end of measuring range

Carbon monoxide CO

Type	electrochemical sensor (EC)
Use	PM 580/550/500/400
Measuring range	0 – 300 ppm
Indication range	-30 – 300 ppm
Resolution	1 ppm
Response times	t_{50} ≤ 12 s t_{90} ≤ 26 s
Decay times	t_{10} ≤ 27 s t_{50} ≤ 14 s
Warm-up time	2 min
Stabilisation time	≤ 2 min
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	• ±3% of measurement value (linearity), at least ±3 ppm (±3 digits) additional influences: ◦ humidity: ≤ 5% of measurement value, at least ±3 ppm ◦ pressure: ≤ 6% of measurement value, at least ±3 ppm • ±5 ppm (long-term stability) as per EN 45544
Drift	< 10% within 6 months
zero point deviation	±3 ppm
Interference	at 20 ºC (68 °F) • 400 ppm H_2: < 70 ppm • 20 ppm H_2S: < 0.1 ppm • 100 ppm C_2H_2: < 200 ppm • 400 ppm C_2H_4: < 100 ppm • 100 ppm NO: < 50 ppm
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h.
Service life	24 months (36 months expected)
Test gases	• zero point: clean air • sensitivity: 40 ppm CO setting ranges: • CO: 10 – 50 ppm humidity: short-term 0% r.h.
Pressure	700 – 1,200 hPa

Hydrogen sulphide H_2S

Type	electrochemical sensor (EC)
Use	PM 580/550/500
Measuring range	0 – 50.0 ppm
Indication range	-10 – 100 ppm
Resolution	0.5 ppm
Response times	t_{50} ≤ 12 s t_{90} ≤ 29 s
Decay times	t_{10} ≤ 28 s t_{50} ≤ 14 s
Warm-up time	< 120 s
Stabilisation time	≤ 2 min
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	• ±3% of measurement value (linearity), at least ±3 ppm (±6 digits) • ±2 ppm (long-term stability) as per EN 45544
Drift	≤ 15% within 6 months
zero point deviation	±2 ppm
Interference	at 25 °C (77 °F) • 400 ppm H_2: < 1 ppm H_2S • 400 ppm CO: < 1.5 ppm H_2S • 100 ppm C_2H_2: < 2 ppm H_2S • 400 ppm C_2H_4: < 0.1 ppm H_2S • 50 ppm NO: < 12 ppm H_2S • 10 ppm NO_2: < -25 ppm H_2S
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h. • Error: ≤ 5% of measurement value, at least ±2 ppm (±4 digits)
Service life	24 months (36 months expected)
Test gases	• zero point: clean air • sensitivity: 40 ppm H_2S setting ranges: • H_2S: 10.0 – 50.0 ppm humidity: short-term 0% r.h.
Pressure	700 – 1,200 hPa • Error: ≤ 4% of measurement value, at least ±2 ppm (±4 digits)

COSH: Carbon monoxide CO and hydrogen sulphide H_2S

Type	electrochemical sensor (EC)
Use	PM 580/550/500
Measuring range	• CO: 0 – 300 ppm • H_2S: 0 – 50.0 ppm

Indication range	• CO: -30 – 300 ppm • H_2S: -10 – 100 ppm
Resolution	• CO: 1 ppm • H_2S: 0.5 ppm
Response times	• CO: t_{50} ≤ 11 s t_{90} ≤ 28 s • H_2S: t_{50} ≤ 11 s t_{90} ≤ 27 s
Decay times	• CO: t_{10} ≤ 28 s t_{50} ≤ 14 s • H_2S: t_{10} ≤ 27 s t_{50} ≤ 13 s
Warm-up time	< 120 s
Stabilisation time	≤ 2 min
Temperature range	-20 – 40 ºC (-4 to 104 °F)
Measuring error	• ±3% of measurement value (linearity), at least ±6 ppm (±6 digits) • ±5 ppm (long-term stability) as per EN 45544
Drift	≤ 10% within 6 months
zero point deviation	• CO: ±2 ppm • H_2S: ±2 ppm
Interference	at 20 ºC (68 °F) • 400 ppm H_2: < 55 ppm CO, < 1 ppm H_2S • 400 ppm CO: < 2 ppm H_2S • 40 ppm H_2S: ≤ 4 ppm CO • 100 ppm C_2H_2: < 200 ppm CO, < 2 ppm H_2S • 50 ppm NO: < 50 ppm CO, < 10 ppm H_2S
Humidity	5 – 95% r.h., non-condensing • short term: 0% r.h. • error: ◦ CO: ≤ 5% of measurement value, at least ±7 ppm (±7 digits) ◦ H_2S: ≤ 5% of measured value, at least ±2 ppm (±4 digits)
Service life	24 months (36 months expected)
Test gases	• zero point: clean air • sensitivity: 40 ppm CO 40 ppm H_2S setting ranges: • CO: 10 – 50 ppm • H_2S: 10.0 – 50.0 ppm humidity: short-term 0% r.h.
Pressure	700 – 1,200 hPa error: ◦ CO: ≤ 5% of measurement value, at least ±3 ppm (±3 digits) ◦ H_2S: ≤ 5% of measurement value, at least ±2 ppm (±4 digits)

9.2.5 Measuring ranges in the applications (overview)

PM 580

Sensor	Gas/gas type	Warning	Measuring	Structure
IR	CH_4	0 – 100% LEL	0 – 100% vol.	0 – 4.40% vol.*
	C_3H_8	0 – 100% LEL	0 – 100% vol.	0 – 1.70% vol.**
	CO_2	0 – 5.00% vol.	–	–
SC	CH_4 C_3H_8	–	–	0 – 4000 ppm
EC	CO	0 – 300 ppm	–	0 – 300 ppm
	O_2	0 – 25.0% vol.	0 – 25.0% vol.	–
	H_2S	0 – 50.0 ppm	–	–

* Display up to 100% vol.
** As delivered. Other settings possible (section 9.5).

PM 550

Sensor	Gas/gas type	Warning	Measuring	Structure
IR	CH_4 C_3H_8	0 – 100% LEL	0 – 100% vol.	–
	CO_2	0 – 5.00% vol.	–	–
EC	CO	0 – 300 ppm	–	–
	O_2	0 – 25.0% vol.	0 – 25.0% vol.	–
	H_2S	0 – 50.0 ppm	–	–

PM 500

Sensor	Gas/gas type	Warning	Measuring	Structure
IR	CH_4 C_3H_8	0 – 100% LEL	–	–
	CO_2	0 – 5.00% vol.	–	–
EC	CO	0 – 300 ppm	–	–
	O_2	0 – 25.0% vol.	–	–
	H_2S	0 – 50.0 ppm	–	–

PM 400

Sensor	Gas/gas type	Warning	Measuring	Structure
IR	CO_2	0 – 5.00% vol.	–	–
CC	CH_4 C_3H_8 C_9H_{20} C_2H_2 H_2 JFuel	0 – 100% LEL	–	–
EC	CO	0 – 300 ppm	–	–
	O_2	0 – 25.0% vol.	–	–

9.3 Test gases

9.3.1 Preset test gases

PM 580

Test gas	Gas									
	CH_4	C_3H_8	C_9H_{20}	CO_2	O_2	CO	H_2S	C_2H_2	H_2	JFuel
CH_4 100% vol.	×				×					
CH_4 1,000 ppm	×									
C_3H_8 100% vol.		×								
C_3H_8 0.30% vol.		×								
ExTox IR*	×			×	×	×	×			
ExCOx IR	×			×	×	×				

* Devices that are set up for gas type CH_4 alone show the test gas CH_4 2.20% vol. instead of the test gas ExTox IR.
Devices with COSH sensor: please refer to section 6.2.3!

PM 550

Test gas	Gas									
	CH_4	C_3H_8	C_9H_{20}	CO_2	O_2	CO	H_2S	C_2H_2	H_2	JFuel
CH_4 100% vol.	×				×					
C_3H_8 100% vol.		×								
C_3H_8 0.30% vol.		×								
ExTox IR*	×			×	×	×	×			
ExCOx IR	×			×	×	×				

* Devices that are set up for gas type CH_4 alone show the test gas CH_4 2.20% vol. instead of the test gas ExTox IR.
Devices with COSH sensor: please refer to section 6.2.3!

PM 500

Test gas	Gas									
	CH_4	C_3H_8	C_9H_{20}	CO_2	O_2	CO	H_2S	C_2H_2	H_2	JFuel
C_3H_8 0.30% vol.		×								
ExTox IR*	×			×	×	×	×			
ExCOx IR	×			×	×	×				

* Devices that are set up for gas type CH_4 alone show the test gas CH_4 2.20% vol. instead of the test gas ExTox IR.
Devices with COSH sensor: please refer to section 6.2.3!

PM 400

Test gas	Gas									
	CH_4	C_3H_8	C_9H_{20}	CO_2	O_2	CO	H_2S	C_2H_2	H_2	JFuel
CH_4 100% vol.					×					
C_3H_8 0.30% vol.		×	×							×
C_2H_2 1.00% vol.								×		
H_2 2.00% vol.									×	
ExTox CAT*	×			×	×	×				

* Devices that are set up for gas type CH_4 alone show the test gas CH_4 2.20% vol. instead of the test gas ExTox CAT.

9.3.2 Setting ranges

Note:
Test gas concentrations can be changed only using the **GasCom** software and only for test gases set up by the user himself.

Warning application

Gas	Unit	LEL*	Min	Max	As delivered	Resolution
CH_4	% vol.	4.40	1.00	3.50	2.20	0.01
C_3H_8	% vol.	1.70	0.5	1.30	0.30	0.01
C_9H_{20}**	% vol.	0.70	0.20	0.50	0.28	0.01
C_2H_2	% vol.	2.30	0.50	1.80	1.00	0.01
H_2	% vol.	4.00	1.00	3.20	2.00	0.01
JFuel***	% vol.	0.70	0.20	0.50	0.32	0.01

* As delivered. Other settings possible (section 9.5).
Substitute test gas:
** 0.28% vol. C_9H_{20} is equivalent to 0.3% vol. C_3H_8
*** 0.32% vol. JFuel is equivalent to 0.3% vol. C_3H_8

Gas	Unit	EMR	Min	Max	As delivered	Resolution
CO_2	% vol.	5.00	1.00	2.50	2.00	0.01
O_2	% vol.	25.0	0.0	1.0	0.0	0.1
CO	ppm	300	10	50	40	1
H_2S	ppm	100	10.0	50.0	40.0	0.1

Measuring application

Gas	Unit	EMR	Min	Max	As delivered	Resolution
CH_4	% vol.	100	50	100	100	1
C_3H_8	% vol.	100	50	100	100	1

Structure application

Gas	Unit		Min	Max	As delivered	Resolution
CH_4	ppm		100	1,000	1,000	10
C_3H_8	ppm		100	3,000	3,000	10

9.4 Alarms

Note:
Always observe the warning in section 2.3.3.4.

9.4.1 Features

The alarms are prioritised as follows:

- **AL1** < **AL2** < **AL3** < **STEL** < **LTEL**

  with **AL1** lowest priority, **LTEL** highest priority

A higher priority alarm takes precedence over a lower priority alarm. If different alarms occur simultaneously, only the alarm with the highest priority is signalled.

The update rate for alarms is max. 1 second.

AL1: Pre-alarm	
Adjustable:	yes
Latching:	no Exception: For oxygen, **AL1** is self-latching.
Trigger:	When the alarm threshold **AL1** is reached Exception: In the case of oxygen, the alarm is triggered after level falls below alarm threshold **AL1**.
Indicators:	• audible signal • visual signal • **AL1** symbol
Acknowledgement:	audible signal • after the alarm has been triggered
Reset:	automatic when level falls below alarm threshold **AL1**

AL2: Main alarm	
Adjustable:	yes
Latching:	yes
Trigger:	When the alarm threshold **AL2** is reached
Indicators:	• audible signal • visual signal • **AL2** symbol
Acknowledgement:	audible signal • after the alarm has been triggered Overall alarm • after the level has fallen below the alarm threshold **AL2**
Reset:	• after the level has fallen below the alarm threshold **AL2** the alarm must also be acknowledged or have already been acknowledged. • by switching off the device

AL3: End of measuring range	
Adjustable:	no
Latching:	yes
Trigger:	When the alarm threshold **AL3** is reached
Indicators:	• audible signal • visual signal • **AL3** symbol
Acknowledgement:	Overall alarm • after the level has fallen below the alarm threshold **AL1** Exception: On **PM 400** devices the alarm can only be acknowledged for CO_2, O_2 and CO, but not for flammable gases.
Reset:	• after the level has fallen below the alarm threshold **AL1** the alarm must also be acknowledged or have already been acknowledged. • by switching off the device

STEL: Main alarm (Short Time Exposure Limit)	
Adjustable:	yes
Latching:	yes
Trigger:	The sum of the concentrations of a gas is greater than the product of the Occupational Exposure Limit and the excess factor over the averaging time
Indicators:	• audible signal • visual signal • **STEL** symbol
Acknowledgement:	not possible
Reset:	• by changing the application • by switching off the device

LTEL: Main alarm (Long Time Exposure Limit)	
Adjustable:	yes
Latching:	yes
Trigger:	The sum of the concentrations of a gas is greater than the Occupational Exposure Limit over the averaging time
Indicators:	• audible signal • visual signal • **LTEL** symbol
Acknowledgement:	not possible
Reset:	• by changing the application • by switching off the device

9.4.2 Setting ranges

Note:
Alarms can be changed using the **GasCom** software.
- In the **GasCom** software, the flammable gases are set in % LEL and displayed in % vol.

Specifications

When setting alarms you must comply with the following specifications:

- CO_2, O_2, CO: **AL1** < **AL2** ≤ **AL3**
- all other gases: **AL1** < **AL2** < **AL3**
- flammable gases, also:
  – **AL2** at least 3% LEL greater than **AL1**
  – **AL3** equals LEL

Gas	Unit	Increment	AL1	AL2	STEL	LTEL
CH_4*	% LEL	1	5 – 57	8 – 60	–	–
C_3H_8*	% LEL	1	5 – 57	8 – 60	–	–
C_9H_{20}*	% LEL	1	5 – 57	8 – 60	–	–
CO_2	% vol.	0.02	0.10 – 1.00	0.50 – 5.00	0.1 – 1.0	0.1 – 1.0
CO	ppm	1	5 – 30	16 – 300	10 – 100	10 – 50
H_2S	ppm	0.5	5 – 19	6 – 49	4 – 10	4 – 10
C_2H_2*	% LEL	1	5 – 57	8 – 60	–	–
H_2*	% LEL	1	5 – 57	8 – 60	–	–
JFuel*	% LEL	1	5 – 57	8 – 60	–	–

* LEL see section 9.5.

9.4.3 Alarm thresholds (as delivered)

Gas	Unit	AL1	AL2	AL3	STEL	LTEL
CH_4*	% LEL	10	50	100	–	–
C_3H_8*	% LEL	10	50	100	–	–
C_9H_{20}	% vol.	0.07	0.35	0.70	–	–
CO_2	% vol.	0.50	2.00	5.00	1.00	0.50
O_2	% vol.	18.0	23.0	25	–	–
CO	ppm	20	60	300	60	20
H_2S	ppm	5	10	50	10	5
C_2H_2	% vol.	0.23	1.15	2.30	–	–
H_2	% vol.	0.40	2.00	4.00	–	–
JFuel	% vol.	0.07	0.35	0.70	–	–

* LEL see section 9.5.

9.5 LEL

Note:
The LEL can be changed using the **GasCom** software.

- For gases with an adjustable LEL, the LEL must always be in accordance with the legal specifications in the area of use.

Gases with adjustable LEL

Gas	Unit	Increment	LEL	As delivered
CH_4	% vol.	0.01	4.00 – 5.00	5.00
C_3H_8	% vol.	0.01	1.50 – 2.10	2.10

Gases with non-modifiable LEL

Gas	Unit	LEL
C_9H_{20}	% vol.	0.70
C_2H_2	% vol.	2.30
H_2	% vol.	4.00
JFuel	% vol.	0.70

9.6 Device inspection limits

Gas	Zero point		Sensitivity	
	Specification	Deviation	Specification	Deviation
CH_4	0.00% vol.	±0.15% vol.	2.20% vol.	±0.20% vol.
C_3H_8	0.00% vol.	±0.10% vol.	1.00% vol.	±0.10% vol.
C_9H_{20}	0.00% vol.	±0.05% vol.	0.28% vol.	±0.06% vol.
CO_2	0.04 % vol.	±0.06% vol.	2.00% vol.	±0.20% vol.
O_2	0% vol.	±1.0% vol.	20.9 % vol.	±1.0% vol.
CO	0 ppm	±3 ppm	40 ppm	±5 ppm
H_2S	0 ppm	±3 ppm	40 ppm	±6 ppm
C_2H_2	0.00% vol.	±0.15% vol.	1.00% vol.	±0.10% vol.
H_2	0.00% vol.	±0.15% vol.	2.00% vol.	±0.20% vol.
JFuel	0.00% vol.	±0.05% vol.	0.32% vol.	±0.06% vol.

9.7 Type examinations

9.7.1 Explosion protection test

Ex marking	PM 580	PM 550	PM 500	PM 400	PM 400 with IR for CO2
Ex ia db IIC T3	×	×	×		×
Ex ia da IIC T3				×	
Class I, Zone 1, AEx ia db IIC T3	×	×	×		×
Class I, Zone 0, AEx ia da IIC T3				×	
I.S. Class I, Div. 2, Group A,B,C,D,T3	×	×	×		×
I.S. Class I, Div. 1, Group A,B,C,D,T3				×	

Certificates

– CSA: CSA19CA80006793X

– TÜV Nord (IECEx): IECEx TUN 17.0027 X

The certificates can be found online.

9.7.2 Functional safety test

Scope of the examination

Applications:
- Warning
- Structure

Gas types (as per /3/):

	Measuring range:
– Methane CH_4	0 – 100% LEL (PM 580/550/500/400)
– Propane C_3H_8	0 – 100% LEL (PM 580/550/500/400)
– Nonane C_9H_{20}	0 – 100% LEL (PM 400)

Gases (as per /2/):

	Measuring range:
– Carbon dioxide CO_2	0 – 5.00% vol.
– Oxygen O_2	0 – 25.0% vol.
– Carbon monoxide CO	0 – 300 ppm
– Hydrogen sulphide H_2S	0 – 50 ppm

Accessories (general):
- SPE AutoFlow test set
- PM 5 short probe

Accessories for methane CH_4, propane C_3H_8, carbon dioxide CO_2, oxygen O_2, carbon monoxide CO, hydrogen sulphide H_2S:
- Flexible hand probe with probe hose HG 1 m
- Floating probe with probe hose 6 m
- Flexible probe HG5

Accessories for nonane C_9H_{20}:
- Floating probe
- Probe hose HG 1 m nonane

Testing institute

DEKRA Testing and Certification GmbH

Certificates

- EU type examination certificate: BVS 19 ATEX G 002 X
- Type-examination certificate: PFG 19 G 004 X

The certificates can be found online.

Tested to:

– EN 45544-1, EN 45544-3, EN 50104, EN 50271, EN 60079-29-1

Not tested

– Functions: Storage of recordings and device inspections as well as the corresponding protocols
– Test set: ATS 503/501
– Gases: Acetylene C_2H_2, hydrogen H_2, JFuel
– Software: GasCom

9.8 Device identification

Fig. 46: Label on the back of the device (*here:* **PM 580**)

The device is marked in accordance with the statutory regulations. The label on the back of the device contains the following information:

- Serial number
- Date of manufacture (month/year)
- IECEx approval
- CSA approval for Canada and the USA
- Operating temperature, voltage, current
- Protection rating
- Manufacturer
- Notified body (CE mark)

Symbols

CE mark

Only ever open the battery compartment outside of explosive areas.

Explosion protection logos

Follow the operating instructions.

Do not dispose of device in domestic waste.

9.9 Symbols on the display

Applications

Structure

Warning

Warning ECO

Measuring

Alarms

AL1: pre-alarm

AL2: main alarm

AL3: end of measuring range

STEL (Short Time Exposure Limit)

LTEL (Long Time Exposure Limit)

Audible signal off

Actions/responses to questions

 Confirm or Yes

 Cancel or No

---

Actions when writing comments

 Confirm (apply)

 Cancel

 Insert

 Delete

---

Messages

 Warning

 Error

 Question

 Information

 Wait

 Device switches off

---

Measuring mode


key lock


recording


Start recording


Stop recording


zero point


Information about the application


Comment


Write


Remaining capacity (disposable/rechargeable battery)

Settings


Language


PIN code


Settings


Adjustment


Restore


Date/time


Date


Time


PPM threshold

Device inspection

	Warning ECO	
	Device condition	
	Pump	
	zero point	
	Indication accuracy/Bump test	
	Save	
	Not due	*before a device inspection (all gases)*
	Passed	*after a device inspection (in the protocol list: applies to the current gas type at the time of the inspection)*
	Not due	*current gas type*
	Failed	
	Due	*before a device inspection (current gas type) after a device inspection (in the protocol list only)*
	Not tested	*after a device inspection*

Adjustment

	Successful
	Failed
	Not adjusted

---

Gas type

	Gas type

---

Protocols


Protocols


Recordings


Device inspections


Inspector

Information


Information


Device


Error


Test gases

Microcontroller: Firmware version


Battery type


Next maintenance


Sensor: Installation date


Sensor: Service life

Charging mode and data exchange


Data exchange


Battery is charging


Battery fully charged


Battery too hot


Battery too cold


Battery exhausted


Battery is preparing to charge

9.10 Accessories and consumables

Accessories

Part	Order number
Docking station PM 5	LP12-10000
Docking station PM 5-T	LP12-20000
M4 AC/DC adapter	LD10-10001
Flexible probe HG5	ZS44-10000
Flexible hand probe	ZS32-10000
Probe hose HG 1 m	ZZ27-10000
Probe hose HG 1 m nonane	ZZ27-10100
Probe hose 6 m	ZS18-10100
Floating probe	ZS21-10100
Case HG5 L-BOXX	ZD64-10000
Test set ATS 503	PP05-10101
Test set ATS 501	PP05-10001
SPE AutoFlow test set	PP05-20000
Conditioner SC	PP05-Z3000
CO2 filter	ZG06-10000

Consumables

Part	Order number
Filter PM 5 dust (5 pcs.)	2498-0023
Filter PM 5 hydrophobic (10 pcs.)	2498-0021
Hydrophobic filter D28	2491-0020
Battery pack	PM05-B0400
Test gas 1,000 ppm CH_4*	ZT29-10001
Test gas 2.2% vol. CH_4*	ZT03-10001
Test gas 100% vol. CH_4*	ZT20-10000
Test gas 0.3% vol. C_3H_8*	ZT35-10001
Test gas 1.0% vol. C_3H_8*	ZT11-10001
Test gas 100% vol. C_3H_8**	ZT22-10001
Test gas ExTox IR*	ZT47-10000
Test gas ExTox CAT*	ZT32-10000
Test gas ExTox IR*	ZT52-10000

* Test gas can 1 ltr, pressure approx. 12 bar
** Test gas can 1 ltr, pressure approx. 7 bar

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

Apart from the following exceptions, the same storage conditions apply to accessories and consumables as to the device.

- Test gas cans: max. 50 °C (122 °F), no exposure to sunlight
- rechargeable batteries: max. 20 °C (68 °F), max. 1 year

9.11 Care

All that is necessary to care for the device is to wipe it down with a damp cloth.

NOTICE **Possible damage to property from 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!

9.12 Legal basis

/1/ APPROX./CSA C22.2 No. 61010-1-12
/2/ EN 50104:2010
/3/ EN 60079-29-1
/4/ UL 61010-1 (3rd Edition)

9.13 Declaration of conformity

Hermann Sewerin GmbH hereby declares that the **EX-TEC® PM 580/550/500/400** system fulfils the requirements of the following directives:

- 2011/65/EU
- 2014/30/EU
- 2014/34/EU

Gütersloh, 2025-09-01

Benjamin Sewerin (General Manager)

The complete declaration of conformity can be found online.

9.14 Contact with sales and service partners

The manufacturer's contact details as well as selected sales and service partners are listed on the back of this document.

Contact details of other sales and service partners can be found online at www.sewerin.com.

9.15 Abbreviations

% vol.	Percentage of a gas in a gas mixture based on the volume
AL	Alarm (**AL1**, **AL2**, **AL3**)
CC	Catalytic combustion sensor
CENELEC	European Committee for Electrotechnical Standardization
COSH	Name of a sensor that can measure CO and H_2S at the same time
EC	Electrochemical sensor
EMR	end of measuring range
IR	Infrared sensor
LEL	Lower Explosion Limit
LTEL	Long Time Exposure Limit
NiMh	Nickel metal hydride
ppm	parts per million
SC	Gas-sensitive semiconductor
STEL	Short Time Exposure Limit
TC	Thermal conductivity sensor

9.16 Technical terms

Acknowledgement

Noting an error message or an alarm and responding. Depending on the measurement situation, either only the audible alarm signal can be muted or in addition the visual signal and symbol can also be disabled.

Clean air

Air that is free from hydrocarbons and toxic gases.

Gas type

Gaseous hydrocarbon with the sum formula C_xH_y, e.g. methane CH_4, propane C_3H_8, nonane C_9H_{20}.

Inspection

Event for which the user can be reminded by the device. The user decides individually the event with which the reminder is associated (e.g. handing over the device to the device inspector). An inspection that is due will be displayed on a start screen.

The reminder date is set in the **GasCom** software.

Long Time Exposure Limit (LTEL)

Occupational exposure limit value over an averaging period of 8 hours.

Occupational exposure limit value

Time weighted average concentration of a substance in the air at the workplace. (Source: Wikipedia)

Recording

Contains the saved measurement values for a certain period of time.

Response time

The time a sensor needs from the start of a measurement until the measurement value has reached a certain percentage of the final value. Usually, the response time is measured until 90% of the measurement value (t_{90}) or 50% has been reached (t_{50}).

In some sources, the response time is also referred to as increase time.

Short Time Exposure Limit (STEL)

Product of the occupational exposure limit value and the excess factor over an averaging period of 15 minutes.

Stabilisation time

Time required by a sensor to produce no major deviations of more than ±1% of the measuring range across 3 consecutive measurement values read at intervals of 2 minutes.

User

General name for the user of the device, regardless of membership of a user group.

Warm-up time

Time taken by a sensor to become operational.

9.17 Conversion of concentration data

Gas concentrations are specified in the unit ppm (parts per million) or % vol. (volume percent).

Conversion:

1 % vol. = 10,000 ppm

0.1 % vol. = 1,000 ppm

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