

EX-TEC[®] PM 4

Operating Instructions



EX-TEC® PM 4

Operating Instructions




SEWERIN
Technologies for leak detection.

Measurable success by Sewerin equipment

Congratulations. You have chosen a quality instrument manufactured by Hermann Sewerin GmbH.

Our equipment will provide you with the highest standards of performance, safety and efficiency. They correspond with the national and international guide-lines.

Please read and understand the following operating instructions before using the equipment; they will help you to use the instrument quickly and competently. If you have any queries we are available to offer advice and assistance at any time.

Yours

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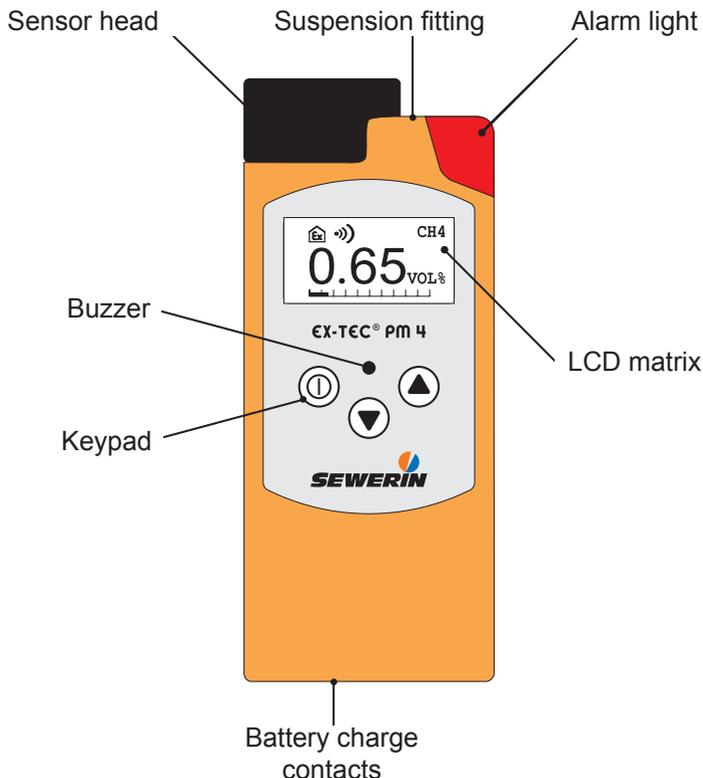
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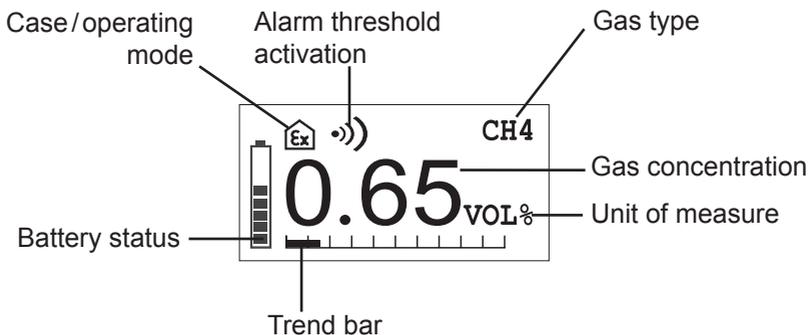
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Overview of device



Liquid Crystal Display



Control keys



Device On/Off
(press and hold for approx. 3 seconds)

Used to enter / confirm selection
(press briefly)



Used to switch between applications /
menu item selections

Press and hold one key for 2 seconds:
accesses user menu

Press and hold both keys for 2 seconds:
accesses advanced settings

Symbols on LCD



Display of available operating hours
(5 bars = 5 hours)



Alarm thresholds are activated



Device is in House application



Device is in Enclosed spaces application



Device is in Warning %LEL application



Device is in Measuring VOL% application



Device is in Automatic measuring range
changeover mode

Operating Instructions

EX-TEC[®] PM 4

20.04.2016 – V2.XXX – 105806 – en



CAUTION! Danger of injuries!

This symbol refers to important safety instructions. Adhere strictly to these instructions to avoid injuries!



CAUTION! Danger of damages!

This symbol refers to important safety instructions. Adhere strictly to these instructions to avoid material damages!



Note:

This symbol refers to information and useful tips which are exceeding the basic operating procedures.

Symbols for the applications:



House



Enclosed spaces



Warning %LEL



Measuring vol%

1	General	1
1.1	Warranty	1
1.2	Purpose	2
1.3	Intended use	2
1.4	General safety information	3
2	Features	5
2.1	Visual signals and audible signals	5
2.2	Measurement principles	6
2.3	Explosion protection	7
3	Operation	9
3.1	General information on operation.....	9
3.1.1	Operator guidance	9
3.1.2	Operating modes.....	10
3.2	Measuring mode	11
3.2.1	User menu.....	14
3.2.2	Setting the zero point	15
3.2.3	House application.....	16
3.2.4	Enclosed spaces application.....	18
3.2.5	Warning %LEL application	20
3.2.6	Measuring VOL% application.....	23
3.2.7	Function control.....	25
3.2.8	Changing gas types	26
3.3	Advanced settings.....	27
3.3.1	Access.....	27
3.3.2	Menu structure	29
3.3.3	Procedure.....	30
3.3.4	Info menu	32
3.3.4.1	Adjustment menu	32
3.3.4.2	System menu	33
3.3.4.3	Hardware menu.....	38
3.3.4.4	Memory menu	41
3.4	Connecting accessory devices.....	42

4	Charging and battery operation.....	43
4.1	General information on charging and battery operation.....	43
4.1.1	Suitable types of rechargeable and disposable batteries.....	43
4.1.1.1	Devices with serial numbers 060 0X and 061 0X.....	43
4.1.1.2	Devices with serial numbers 060 1X and 061 1X.....	44
4.1.2	Setting the rechargeable / disposable battery type.....	45
4.2	Battery alarm.....	45
4.3	Operation with nickel metal hydride rechargeable batteries (NiMH).....	46
4.4	Operation with alkaline non-rechargeable batteries.....	48
5	Maintenance	49
5.1	Function control.....	49
5.2	Testing indication accuracy with test gas	50
5.3	Adjustment	52
5.3.1	ppm range	53
5.3.2	LEL range and % vol. range.....	54
5.3.3	Confirming adjustment	55
5.4	Servicing	55
5.5	Pump.....	56
5.5.1	Function control of pump.....	56
5.5.2	Changing the pump filter	57
5.5.3	Changing the sensor filter	57
6	Faults.....	58
7	Technical data.....	59
7.1	Features	59
7.2	Alarm thresholds	60
7.2.1	Alarm thresholds for gas type methane CH ₄	60
7.2.2	Setting ranges of alarm thresholds for different gas types...	62
7.3	Response times	63
7.4	Sensors.....	64
7.5	Ranges of use	65
7.6	Pump capacity.....	65
7.7	Power supply.....	65
7.8	Dimensions and weight	65
7.9	Technical information	66
7.10	Advice on disposal	68

8	Available models and accessories	69
8.1	Available models	69
8.2	Accessories	70
Appendix .....	.....	75
Gas types .....	.....	75
Setting ranges for test gases.....	.....	79
Test certificates.....	.....	80
EU declaration of Conformity.....	.....	81
Entering a user name .....	.....	84
List of abbreviations.....	.....	86
Index.....	.....	87

1 General

1.1 Warranty

The following instructions must be complied with in order for any warranty to be applicable regarding functionality and safe operation of this equipment.

Hermann Sewerin GmbH cannot be held responsible for any damages resulting from non-compliance with these instructions. The warranty and liability provisions of the terms of sale and delivery of Hermann Sewerin GmbH are not affected by the information given below.

- This product must only be operated after the relevant operating instructions have been read and understood.
- This product may only be operated by qualified professionals who are familiar with the legal requirements (Germany: DVGW).
- This product must only be used for its intended purpose.
- This product is only suitable for use in industrial and commercial applications.
- Repairs must only be carried out by a specialist technician or by other suitably trained personnel.
- Changes or modifications to this product must not be carried out without approval from Hermann Sewerin GmbH. The manufacturer cannot be held responsible for damages if unapproved modifications have been made.
- Only accessories supplied by Hermann Sewerin GmbH may be used with this product.
- All repairs must be carried out using replacement parts that have been approved by Hermann Sewerin GmbH.
- Only approved battery types may be used, otherwise the device will not be explosion-proof.
- The manufacturer reserves the right to make technical modifications in the course of further development.

Generally applicable safety and accident-prevention regulations must be complied with, in addition to the information provided in this manual.

1.2 Purpose

The **EX-TEC PM 4** is an electronic handheld device for the detection and measurement of gas concentrations. Equipped with three sensors, it can be used for the ppm range, the % vol. range and the LEL range.

The **EX-TEC PM 4** is available as a diffusion device (without a pump) or pump device (with an integrated pump).

**Note:**

These operating instructions describe the functions of firmware version 2.XXX. The manufacturer reserves the right to make technical changes. The information provided here refers to a fully equipped **EX-TEC PM 4**, including pump (pump device). It also applies for diffusion devices.

1.3 Intended use

According to DVGW Note G 465-4 the device can be used for the following purposes:

- Testing in houses/buildings ,
e.g. measuring minute gas concentrations in buildings and locating the origin of the gas
- Testing in enclosed spaces ,
e.g. measuring the gas concentration in enclosed spaces or shafts with an increased potential of gas dispersal
- Warning against explosive gas concentrations ,
e.g. for monitoring work areas whilst carrying out work to gas pipes or gas systems
- Measurement of gas concentrations ,
e.g. when decommissioning gas systems

**WARNING!**

The **EX-TEC PM 4** is not suitable for the location or analysis of leaks in underground pressure lines.

1.4 General safety information

- The **EX-TEC PM 4** has been tested to ensure that it is explosion-proof in accordance with European standards (CENELEC).
- The functional safety of the **EX-TEC PM 4** has been tested in the LEL range, Warning (%LEL) application, for gas types methane (CH₄) and propane (C₃H₈).
- Use only original SEWERIN accessories with the **EX-TEC PM 4**. For **Flex handheld probe HG4 and Flex probe HG4**, use **only SEWERIN-approved filters with activated carbon**. Otherwise, the functional safety of the **EX-TEC PM 4** is not guaranteed.
- Always open the battery compartment of the **EX-TEC PM 4** and recharge the batteries outside the potentially explosive area.
- Always use the test gases in well ventilated areas.
- Always operate the pump device model of the **EX-TEC PM 4** with the pump switched on.
- Always carry out a function control (see Section 5.1) after the **EX-TEC PM 4** has suffered an impact (for example, if dropped accidentally). Readjust the zero point if necessary (see Section 5.3).
- The **EX-TEC PM 4** complies with the limits of the EMC Directive. Always observe the information in the manuals of (mobile) radio equipment when using the device close to (mobile) radio equipment.
- Use the **EX-TEC PM 4** with the following gases only:
 - Methane (CH₄)
 - Propane (C₃H₈)
 - Butane (C₄H₁₀)
 - Hexane (C₆H₁₄)
 - Nonane (C₉H₂₀)
 - Kerosene (JFUEL)
 - Hydrogen (H₂)
 - Acetylene (C₂H₂)



WARNING!

Follow the advice regarding explosion protection (see Section 2.3).

- When the **Warning %LEL** application is in use, a brief audible signal emitted every 5 seconds indicates that the device is working properly. If no operating signal sounds, there is no guarantee that the gas concentration is being monitored. You must leave the danger zone immediately.

2 Features

The **EX-TEC PM 4** is available in two models (see Section 8.1):

- Diffusion device: basic device without a pump
- Pump device: basic device with an integrated pump
(designation on back of device: **P**)

The **EX-TEC PM 4** is suitable for the following applications:

- House
- Enclosed spaces
- Warning %LEL
- Measuring vol%

2.1 Visual signals and audible signals

The device features two signalling mechanisms:

- Red alarm light on top of the device
- Buzzer on the front of the device



Note:

These signalling mechanisms cannot be switched off.

An audible signal is emitted each time a key is pressed:

- Very long signal On error message
- Long signal When switching device off,
When changing menus
- Short signal When switching device on,
When confirming a selection,
When navigating within a menu

2.2 Measurement principles

The device features three sensors:

Semiconductor sensor

Measuring range	0 to 10,000 ppm
Application	House Enclosed spaces

Catalytic combustion sensor

Measuring range	0 to 100 % LEL
Application	Warning %LEL

Thermal conductivity sensor

Measuring range	0 to 100 % vol.
Application	Measuring vol% House Enclosed spaces

2.3 Explosion protection

The **EX-TEC PM 4** features the following explosion-protection classifications:

 II2G Ex d e ib IIB T4 Gb

Basic device **without** leather bag for:

- Methane CH_4
- Propane C_3H_8
- Butane C_4H_{10}
- Hexane C_6H_{14}
- Nonane C_9H_{20}
- Kerosene (JFUEL)

 II2G Ex d e ib IIC T4 Gb

Basic device **with** leather bag for:

- **Hydrogen**
- **Acetylene (C_2H_2)**
- Methane CH_4
- Propane C_3H_8
- Butane C_4H_{10}
- Hexane C_6H_{14}
- Nonane C_9H_{20}
- Kerosene (JFUEL)

The respective test certificates are provided in the appendix.



WARNING!

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

- Always open the battery compartment outside the potentially explosive area.
- Always recharge the batteries outside the potentially explosive area.
- Use only approved battery types.
- Use of the leather bag is mandatory to achieve class **IIC** for gas types hydrogen (H_2) und acetylene (C_2H_2).

3 Operation

3.1 General information on operation

3.1.1 Operator guidance

There are two ways to operate the **EX-TEC PM 4**:

- Operator guidance by application
- Operator guidance by sensor

These operating instructions are based on operator guidance by application in accordance with DVGW Note G 465-4:

- Testing in houses/buildings (**House** application)
- Testing in enclosed spaces (**Enclosed spaces** application)
- Warning against explosive gas concentrations (**Warning %LEL** application)
- Measurement of gas concentrations (**Measuring VOL%** application)

**Note:**

The factory default operator guidance setting for the device is **Application**. This can be changed to **Sensor** in the advanced settings (see Section 3.3.4.2).

3.1.2 Operating modes

The device is operated in two modes:

- Measuring mode (Section 3.2)

Measurements are taken in measuring mode. The zero point can be set, the application can be changed and the gas type can be selected via the user menu.

- Advanced settings (Section 3.3)

The advanced settings allow you to change specifications for the measurements as well as other device settings (e.g. adjustment, system, hardware, etc.). You cannot perform measurements in the advanced settings.

3.2 Measuring mode

The device is switched off.



Note:

Always switch the device on in fresh air.

- Press the  key for approximately 3 seconds.

The device switches on. At this point, the two signalling mechanisms are always tested.



WARNING!

Do not use the device if you do not see the visual signal and hear the audible signal briefly when switching on the device.

The LCD switches on. The pump runs with constant output power.

The two start screens shown below are displayed:



Start screen

Display:

- Device type (EX TEC PM4)
- Firmware version (V2.000)
- Integrated sensors (PPM LEL VOL)

27.11.2008 12:37

City Council
Frank Smith
Leakage Delivery

Date/time

Display:

- Date (27/11/2008)
- Time (12:37)
- User data

The device accesses the preset application. Two additional screens are displayed automatically.

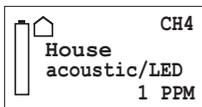


Note:

The start-up application can be changed in the advanced settings (see Section 3.3.4.3). The factory default setting for the device is the **Warning %LEL** application.

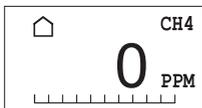
Display screens for the different applications:

● **House**



Measuring range

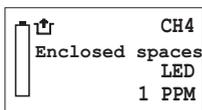
Name of application with specification of associated signals and measurement unit



Measurement data

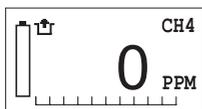
Measurement data display

● **Enclosed spaces**



Measuring range

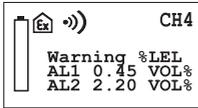
Name of application with specification of associated signals and measurement unit



Measurement data

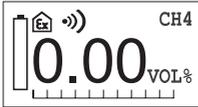
Measurement data display

● Warning %LEL



Measuring range

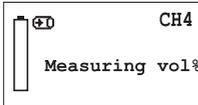
Name of application with specification of measurement unit



Measurement data

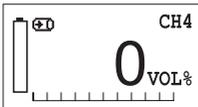
Measurement data display

● Measuring VOL%



Measuring range

Name of application with specification of measurement unit



Measurement data

Measurement data display

You cannot input any information until the device has stopped cycling through the displays. The device is not in measuring mode until the **Measurement data** screen is displayed.



Note:

When the device is switched on, the sensors must warm up. The duration of the warm-up time depends on the sensor type.

After switching on the device, changing the measuring range or setting the zero point, you may notice the reading flashing on the display. The device is only ready for use when the displayed reading stops flashing.

3.2.1 User menu

Measuring mode comprises the following functional scope:

- Zero point correction
- Application selection
- Confirmation of function control
- Gas type (optional)

The functions in the user menu are described in Sections 3.2.2 to 3.2.8.

To select functions, you must first access the **user menu**:

- Press the ▲ key or the ▼ key for approximately 2 seconds.

The **user menu** is displayed:

zero point
House
Enclosed spaces
Warning %LEL
Measuring vol%
inspection ok
type of gas

To move between menu items:

- Navigate up and down in the menu by briefly pressing the ▲ or ▼ key.
- Confirm your selection by briefly pressing the Ⓢ key.

If the selection is not confirmed, the display reverts back to measuring mode after approximately 10 seconds.

3.2.2 Setting the zero point

In general, the device sets the zero point automatically. However, in certain cases, values other than zero may be displayed when the device is switched on. This indicates a deviating zero point, meaning that the device must be adjusted manually to environmental conditions.

**Note:**

The zero point must be set separately for each application. The zero point setting must be carried out with fresh air.

To set the device to zero:

- Press the ▲ key or the ▼ key for approximately 2 seconds.
- Use the ▲ or ▼ key to select the **Zero point** menu item.
- Confirm your selection with the Ⓢ key.

The device returns to measuring mode.

The displayed value is **zero** (0).

**Note:**

If the displayed value is not zero (0), this means that the zero point of the device could not be set because the measured value was outside the specified limits (see appendix).

3.2.3 House application

The **House** application is used to measure minute gas concentrations in buildings and to locate the origin of the gas.

Measurement unit:

ppm (parts per million)
% vol.

Measuring range:

Semiconductor	0 to 10,000 ppm
Thermal conductivity	1 to 100 % vol.

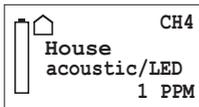
Signals (methane CH₄):

Audible	Intermittent tone increasing from 0 to 22,000 ppm (AL2)
	Continuous tone 2.2 % vol. and greater (AL2)
Visual	Flashing increasing from 4,400 ppm (AL1) to 22,000 ppm (AL2)
	Continuously On 2.2 % vol. and greater (AL2)

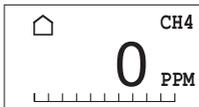
Procedure:

- Press the ▲ key or the ▼ key for approximately 2 seconds to access the user menu.
- Use the ▲ or ▼ key to select the **House** menu item.
- Confirm your selection with the Ⓞ key.

Following confirmation, the start screen for the **House** application is displayed initially.

**Measuring range**

Then the device returns to measuring mode. The measured values are displayed.

**Measurement data**

In number format:

e.g. 0 ppm

As a trend bar divided into 4 parts ranging from 0 ppm to 10,000 ppm:

0 ppm – 10 ppm

10 ppm – 100 ppm

100 ppm – 1,000 ppm

1,000 ppm – 10,000 ppm

A specific signal is emitted based on the reading, gas type and preset value.

3.2.4 Enclosed spaces application

The **Enclosed spaces** application is used to measure gas concentrations in enclosed spaces where there is increased potential of gas dispersal.

Measurement unit:

ppm (parts per million)
% vol.

Measuring range:

Semiconductor	0 to 10,000 ppm
Thermal conductivity	0.1 to 100 % vol.

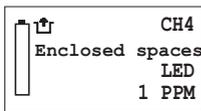
Signals (methane CH₄):

Audible	No signal
Visual	Flashing increasing from 4,400 ppm (AL1) to 22,000 ppm (AL2) Continuously On 2.2 % vol. and greater (AL2)

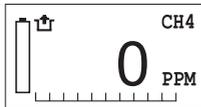
Procedure:

- Press the ▲ key or the ▼ key for approximately 2 seconds to access the user menu.
- Use the ▲ or ▼ key to select the **Enclosed spaces** menu item.
- Confirm your selection with the Ⓞ key.

Following confirmation, the start screen for the **Enclosed spaces** application is displayed initially.

**Measuring range**

Then the device returns to measuring mode. The measured values are displayed.

**Measurement data**

In number format:

e.g. 0 ppm

As a trend bar divided into 6 parts ranging from 0 ppm to 100 % vol.:

0 ppm – 10 ppm

10 ppm – 100 ppm

100 ppm – 1,000 ppm (0.1 % vol.)

0.1 % vol. - 1 % vol.

1 % vol. - 10 % vol.

10 % vol. - 100 % vol.

3.2.5 Warning %LEL application

The **Warning %LEL** application is used to test working environments where explosion is possible, e.g. working on gas pipes or gas systems.

Measurement unit:

% LEL

Measuring range:

Catalytic combustion

1 % LEL to 100 % LEL

In the **Warning %LEL** application, a brief audible signal emitted every 5 seconds indicates that the device is working properly.



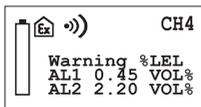
WARNING!

If no operating signal sounds, there is no guarantee that the gas concentration is being monitored. You must leave the danger zone immediately.

Procedure:

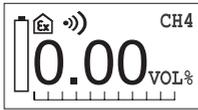
- Press the  key or the  key for approximately 2 seconds to access the user menu.
- Use the  or  key to select the **Warning %LEL** menu item.
- Confirm your selection with the  key.

Following confirmation, the start screen for the **Warning %LEL** application is displayed initially.



Measuring range

Then the device returns to measuring mode. The measured values are displayed.



Measurement data

In number format: e.g. 0.00 % vol.

As a trend bar divided into 10 parts ranging from 0 % LEL to 100 % LEL in increments of 10 %.

For the **Warning %LEL** application, the **EX-TEC PM 4** features three alarm thresholds.

Alarm thresholds

- Alarm threshold 1 (AL1 – pre-alarm):
 - When this alarm threshold is exceeded, an audible alarm and a visual alarm are triggered and **AL1** appears on the display.
 - The audible alarm (2-Hz intermittent tone) is distinctly different from the operating signal.
 - The audible alarm can be acknowledged by pressing the key. The visual alarm remains active.
 - When the level drops below this alarm threshold concentration, the alarms switch off.

- Alarm threshold 2 (AL2 – main alarm):
 - When this alarm threshold is exceeded, an audible alarm and a visual alarm are triggered and **AL2** appears on the display.
 - The audible alarm (5-Hz rapid intermittent tone) is distinctly different from the operating signal.
 - The AL2 alarm cannot be acknowledged.
 - When the level drops below this alarm threshold concentration, the alarm can be acknowledged.

- Alarm threshold 3 (AL3 – continuous alarm and end of measuring range):
 - When this alarm threshold is exceeded, a continuous audible alarm and a continuous visual alarm are triggered and **AL3** flashes on the display.
 - The continuous tone is distinctly different from the operating signal.
 - The AL3 alarm cannot be acknowledged.
 - There are two ways to terminate the AL3 alarm:
 - By switching to the **Measuring VOL%** application
 - By switching off the device

The alarm thresholds can be adjusted in the **System menu** (see Section 3.3.4.2).

The setting ranges of the alarm thresholds are specified under Technical data (see Section 7.2).

3.2.6 Measuring VOL% application

The **Measuring VOL%** application is used to demonstrate gas purity or the absence of gas in gas pipes.



WARNING!

The **Measuring VOL%** application is not suitable for use in hazardous areas. It does not comprise an alarm mechanism.

Measurement unit:

% vol.

Measuring range:

Thermal conductivity 1 % vol. to 100 % vol.

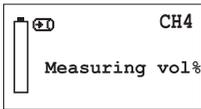
Signals (methane CH₄):

Audible	Intermittent tone At 100 % vol. (AL5)
Visual	Flashing At 100 % vol. (AL5)

Procedure:

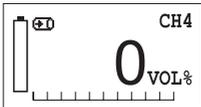
- Press the  key or the  key for approximately 2 seconds to access the user menu.
- Use the  or  key to select the **Measuring VOL%** menu item.
- Confirm your selection with the  key.

Following confirmation, the start screen for the **Measuring VOL%** application is displayed initially.



Measuring range

Then the device returns to measuring mode. The measured values are displayed.



Measurement data

In number format: e.g. 0 % vol.

As a trend bar divided into 10 parts from 0 % vol. to 100 % vol. in increments of 10 %.

3.2.7 Function control

Before starting work and when resuming work after an interruption, you must carry out a function control. The scope of the function control is described in Section 5.1.

Confirm the successful completion of the control on the device as follows:

- Press the ▲ key or the ▼ key for approximately 2 seconds.
- Use the ▲ or ▼ key to select the **Inspection OK** menu item.
- Confirm your selection with the Ⓢ key.

The function control is saved. The device returns to the application.

3.2.8 Changing gas types



Note:

Always change the gas type in fresh air.
Only calibrated gas types can be selected in the user menu.
The factory default setting for the device is methane CH₄ (or a special gas you have ordered).

- Press the ▲ key or the ▼ key for approximately 2 seconds.
- Use the ▲ or ▼ key to select the **Gas type** menu item.
- Confirm your selection with the Ⓜ key.
- Use the ▲ or ▼ key to select the required gas type.
- Confirm your selection with the Ⓜ key.

After you have selected the gas type, the device returns to the **Warning %LEL** application.

To perform measurements for another application, follow the instructions provided to select this application.



Note:

Gas type changes made in the user menu are only temporary. The preset gas will be selected again the next time the device is switched off and back on. To permanently change the gas type, use the advanced settings (see Section 3.3.4.3).

3.3 Advanced settings

Settings for the following areas of the device can be made in the advanced settings:

- Adjustment
- System
- Hardware
- Memory

You cannot perform measurements in the advanced settings.

3.3.1 Access

There are two ways to access the **Advanced settings** area:

The device is **switched off**:

- Simultaneously press the ,  and  keys for approximately 2 seconds.

The device is in **measuring mode**:

- Simultaneously press the  and  keys for approximately 2 seconds.

The following display appears:

PIN 0001

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

The device can be set so that only authorised users have access to the Info menu.

It is advisable to reset the PIN code after starting the device for the first time.

**Note:**

If the PIN code is set to 0000, you will not be asked to enter the PIN code. The advanced settings can then be accessed by anyone.

If you cannot access the Advanced settings area, for example, if you have lost the PIN code, you must contact SEWERIN Service.

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

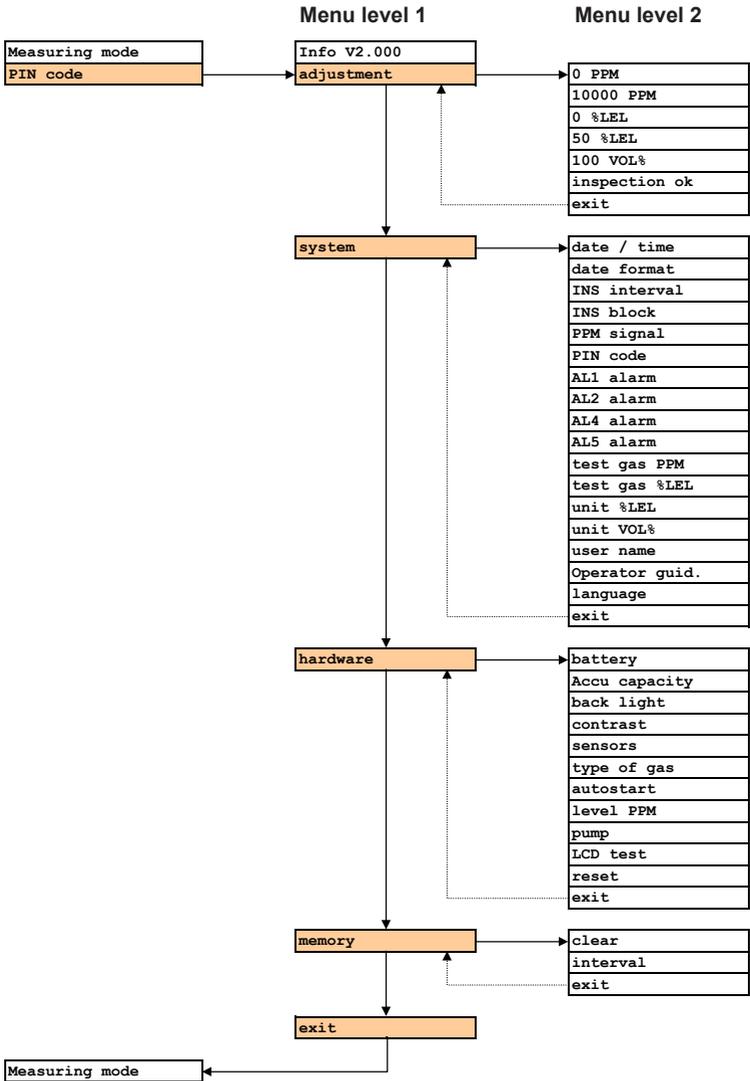
- Use the ▲ or ▼ key to select the first digit.
- Confirm your selection with the Ⓢ key. The device jumps to the second digit.
- Enter all digits of your code in sequence, confirming each entry.

If the PIN code has been entered correctly, the **Info menu** will appear once the last digit has been confirmed:

adjustment
system
hardware
memory
exit

Otherwise the device will return to measuring mode.

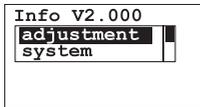
3.3.2 Menu structure



3.3.3 Procedure

The advanced settings are divided into three menu levels.

- The first two menu levels are used to organise and subdivide the settings options.
- A concrete selection or entry is made in the third menu level.



The name of the current menu (e.g. **Info**) is always shown at the top left of the display.

The items available for selection are displayed in the frame below (e.g. **Adjustment, System**).

The Info menu (menu level 1) also includes the firmware version (e.g. **V2.000**).

Use the ▲ and ▼ keys to navigate within a menu.

Press the Ⓢ key to confirm the selected menu item.

Menu level 1 and 2

The **Exit** menu item always appears at the end of a menu.

When you select this item, the display reverts back to the previous menu.

Exception: In menu level 1 the device returns to measuring mode.

Menu level 3

Menu level 3 is used to select settings or enter values:

- **Selecting settings**

Use the ▲ and ▼ keys to navigate within a selection.

Press the Ⓢ key to confirm the selected setting.

When you have confirmed your selection, the display reverts to the previous menu.

- **Entering values**

The configurable position is always displayed with a black background.

Use the ▲ or ▼ key to increase or decrease the value.

Press the Ⓢ key to confirm the selected value.



Note:

Always confirm each value. Values can only be specified going forward. Once you have started entering values, it is not possible to interrupt this process.

When you have confirmed the last value, the display reverts to the previous menu.

3.3.4 Info menu

The Info menu is located at the top of the Advanced settings:

adjustment
system
hardware
memory
exit

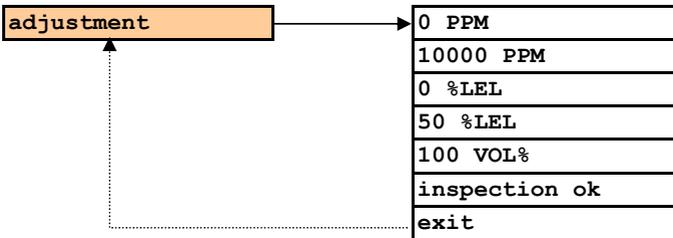


Note:

When you select **Exit** from the **Info menu**, the device returns to measuring mode.

3.3.4.1 Adjustment menu

The Adjustment menu is used to set the sensors.

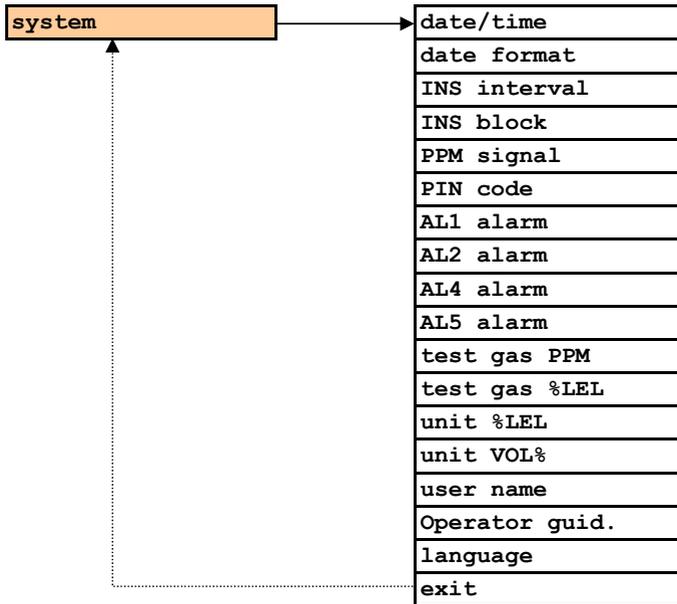


Note:

Refer to Section 5.3 for detailed information on carrying out an adjustment.

3.3.4.2 System menu

General information and specifications for operation, inspection and alarms are set on the System menu.



27.11.2008 12:37

Date/time

Used to enter the date and time. This is important for documenting the measurements.

DD.MM.YYYY

YYYY-MM-DD

Date format

There are two formats available for the date.

Weeks 00

INS interval

The inspection interval setting reminds you to inspect/adjust the device regularly.

Yes
No

acoustic /LED
acoustic
LED
No

PIN 0000

%LEL 10

%LEL 20

A 0.50 Vol%

INS block

When the inspection block is enabled, an inspection must be performed on the next due date. The device cannot be used in measuring mode until the inspection has been carried out and confirmed.

PPM signal

Used to switch visual/audible signals on and off in the ppm range.

PIN code

Used to enter your PIN code enabling access to the advanced settings.

AL1 alarm

First modifiable alarm threshold: e.g. 10 % LEL for **Warning %LEL** application

AL2 alarm

Second modifiable alarm threshold: e.g. 20 % LEL for **Warning %LEL** application

AL4 alarm

No function assigned for operator guidance by **application**. For operator guidance by **sensor**, this is the permanently assigned alarm threshold for **automatic** mode.

VOL% 100

AL5 alarm

Permanently assigned alarm threshold for the **Measuring VOL%** application.

Indicates the end of the measuring range.

1.00 Vol%

2.20 Vol%

Test gas PPM

Used to set the test gas concentration for the ppm range based on the gas type.

The setting range is provided in the appendix.

%LEL 50

Test gas %LEL

Used to set the test gas concentration for the LEL range based on the gas type.

The setting range is provided in the appendix.

%UEG

%LEL

%LIE

%DMV

%DGW

%SEM

%DGE

ARH%

VOL%

%VOL

%GAZ

%OBJ

tf. %

Unit %LEL

Used to set individual measured variables for the LEL range (**Warning %LEL** application).

VOL%
%VOL
%GAZ
%OBJ
tf.%

City Council
Frank Smith
Leakage Delivery

Intended use
sensors

Unit VOL%

Used to set individual measured variables for the VOL range (**Measuring VOL%** application).

User name

Used to enter the user name. This is important for documenting the measurements.

The procedure and characters that can be displayed are provided in the appendix.

Operator guidance

Used to select operator guidance by application (House, Enclosed spaces, Warning %LEL, Measuring VOL%) or by sensor (PPM, LEL, VOL).

When using operator guidance by sensor, the four applications for measuring mode are replaced by the following operating modes:

- GAS DETECTION
(0..10000 PPM)
- GAS WARNING
(0....100%LEL)
- GAS MEASURING
(0....100 VOL%)
- AUTOMATIC

Automatic measuring range changeover from 0 ppm to 100 % vol. according to gas concentration present.

For operator guidance by sensor, the user menu looks like this:

zero point
0..10000 PPM
0....100 %LEL
0....100 VOL%
automatic
inspection ok
type of gas

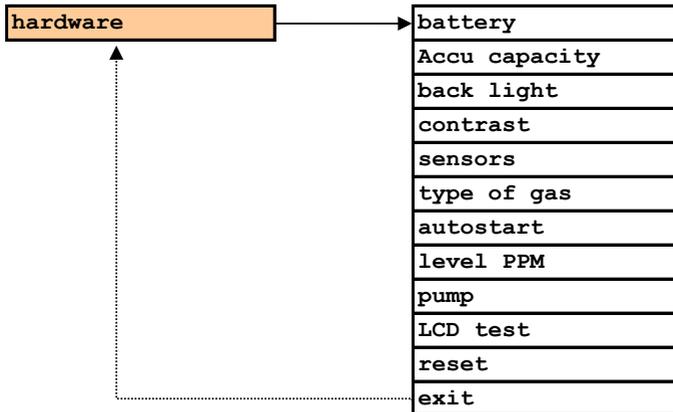
Deutsch
English
Français
Italiano
Dansk
Cesky
Polski
Chinese
Slovenia
Kroatian
Dutch
Español
Hungarian

Language

The device can be operated in 13 different languages.

3.3.4.3 Hardware menu

The Hardware menu comprises settings pertaining to device management.



Accu Ni-MH
Alcaline

Battery

Used to set the battery type in use. This is important for calculating the operating time.

mAh 1850

Accu capacity

Used to enter the rechargeable battery capacity. This is important for calculating the operating time.

Sec 010

Light

Used to specify how long the LCD will remain lit after a key is pressed.

0 - 100%

Contrast

Contrast settings to facilitate reading of the LCD (in approximately 30 increments).

PPM	LEL	VOL
PPM	LEL	
PPM		VOL
PPM		
	LEL	VOL
	LEL	
		VOL

Sensors



CAUTION!

Settings in the **Sensors** menu item may only be configured by SEWERIN Service!

CH4
C3H8
C4H10
C6H14
C9H20
JFUEL
H2
TGAS
C2H2

Gas type

Used to permanently change the measuring medium.



Note:

The new gas type is not activated until the device has been adjusted (and the adjustment has been confirmed) (see Section 5.3).

House
Enclosed spaces
Warning %LEL
Measuring vol%

Autostart

Use to set the test type that is activated when the device is switched on.

For operator guidance by sensor, the autostart menu looks like this:

0..10000 PPM
0....100 %LEL
0....100 VOL%
automatic

PPM 001

Level PPM

Used to set the response threshold for the House and Enclosed spaces applications, for example, to decrease the measuring sensitivity.

Yes
No

Pump

Used to switch the pump on and off.



WARNING!

When using a pump device, never switch the pump off for any reason other than maintenance.

LCD test

LCD test

Used to test the working condition of the LCD.

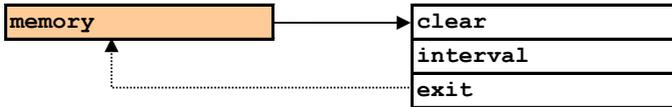
Yes
No

Reset

Used to reset all settings to the factory settings.

3.3.4.4 Memory menu

The Memory menu enables you to delete the recorded measurements, function controls and alarms. All other settings remain unchanged.



Yes
No

Clear

Used to clear the contents of the memory.

30 Sec

Interval

The frequency with which readings are to be saved can be set according to the table below.

Capacity of data memory:

Interval [s]	Typ. capacity [h]
1	7
2	15
5	39
10	78
20	156
30	234
60	470



Note:

Data stored in memory can be retrieved by means of a docking station with an interface.

3.4 Connecting accessory devices

The following accessory devices can be fitted to the sensor head:

- **Probes**

For detection and measurement in hard-to-reach places. Probes are fitted using two knurled thumb screws.

- **Test head**

For adjusting the device using a test set.



Note:

Certain probe types can only be used with devices having an integrated pump.

4 Charging and battery operation

4.1 General information on charging and battery operation



WARNING!

The device must not be used with leaking disposable / rechargeable batteries. Replace disposable / rechargeable batteries in a timely manner. Clean the battery compartment (and, if necessary, the device) before inserting the new disposable / rechargeable batteries.

4.1.1 Suitable types of rechargeable and disposable batteries



WARNING!

Use only approved rechargeable or disposable battery types; otherwise, the device will not be explosion-proof!

Compliance with indications based on the serial number of your device is strictly mandatory!

4.1.1.1 Devices with serial numbers 060 0X and 061 0X

Only the following rechargeable batteries and disposable batteries approved by the Physikalisch-Technische Bundesanstalt (German national metrology institute) or the TÜV (German technical inspection association) are permitted for use in these devices (Ⓔ II 2 G EEx ib d IIB T3):

Manufacturer	Designation
NiMH rechargeable cell batteries	
Panasonic:	HHR-150-AA Flat Top
Sanyo:	AA HR3U
Varta:	VH 1600AA, 55117 201 052
Alkaline disposable batteries	
Varta:	No. 4006, LR6-AA-AM3
Varta / Electric Power:	No. 8006, LR6-AA-AM3
Duracell:	MN 1500, size AA

4.1.1.2 Devices with serial numbers 060 1X and 061 1X



WARNING!

To ensure that the device remains explosion-proof as per Directive 94/9/EC, only the following disposable / rechargeable batteries may be used:

- Batteries supplied by SEWERIN
- Batteries other than those supplied by SEWERIN, provided they comply with standard EN 60079-7:2003 (in particular Section 5.7.2.1.17; explanation below)

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

Disposable battery requirements

- Type: size AA
- The creepage distance and air gap between the poles must not be less than 0.5 mm (EN 60079-7:2003; Section 5.7.2.1.17).
- Alkaline disposable batteries must comply with EN 60086-1 type LR6.

Rechargeable battery requirements

- Type: size AA
- The creepage distance and air gap between the poles must not be less than 0.5 mm (EN 60079-7:2003; Section 5.7.2.1.17).
- Rechargeable batteries must meet the requirements of IEC 61951-2 type HR6 and comply with the temperature range.



CAUTION!

A device operated with disposable alkaline batteries cannot be charged. A note will appear in the display accordingly.

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

4.1.2 Setting the rechargeable/disposable battery type

To ensure that the charging time and remaining battery life are properly displayed, you must specify the following in the advanced settings:

- Rechargeable battery type (Info menu – Hardware – Battery)
- Capacity of rechargeable types in use (Info menu – Hardware – Accu capacity)

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

This device can be operated using:

- Nickel metal hydride rechargeable batteries (see Section 4.3)
- Alkaline non-rechargeable batteries (see Section 4.4)

4.2 Battery alarm



When the power supply becomes low, a battery alarm is emitted:

- The battery symbol appears on the LCD.
- The operating signal sounds at double the normal frequency.

When the battery alarm is triggered, an operating time of at least 15 minutes remains. After this, the device must be recharged.

4.3 Operation with nickel metal hydride rechargeable batteries (NiMH)



The **docking station HG4** is required for charging.

The docking station can be used in the workshop or in the service vehicle.



CAUTION!

Compliance with the following guidelines is essential to ensure trouble-free operation:

- The docking station must not be directly connected to a 24-V on-board power supply in the vehicle. The voltage is too high for the charging process.
- The rechargeable battery should be charged at approximately room temperature.
- Short operating times and long periods out of use can reduce the available capacity of the rechargeable battery (memory effect).

Ways to connect the docking station to the power supply:

- AC/DC adapter for 100 – 240 V~
- Vehicle cable mounting for 12 V=
- Vehicle cable mobile for 12 V=
- Vehicle cable mounting for 24 V=



Note:

Up to three docking stations can be operated on an AC/DC adapter for 100 – 240 V~. For four or more docking stations, the charging voltage is too low. In this case, an error message is displayed.

Charging:

- Place the device (**switched off**) into the docking station.

The time required for complete charging is displayed.

Once the rechargeable batteries have been fully charged, the device automatically switches to charge maintenance mode. It can remain in the docking station until the next time it is used.

After at least 12 hours of charging time (depending on the capacity of the rechargeable battery), the device has an available operating time of at least 8 hours.



Note:

If the device is switched off and stored outside the docking station, the nickel metal hydride rechargeable battery will begin to self-discharge. The rechargeable batteries will lose their charge after 30 days at the latest.

To preserve the capacity of the rechargeable batteries, discharge the device completely and recharge it again fully on a regular basis (e.g. once a month).

Discharging:

- Place the device (**switched on**) into the docking station.
- The rechargeable batteries will be fully discharged. Once the device has been discharged, it will automatically switch to charging mode.

A full discharging and recharging cycle takes approximately 20 hours (8 hours discharging + 12 hours recharging). The duration depends on the capacity of the accumulator used.



Note:

When you switch from alkaline disposable batteries to nickel metal hydride rechargeable batteries, the operating hours indication on the display is incorrect. Switch the device on and place it into the docking station to allow it to discharge and recharge automatically. The operating hours will then be displayed correctly.

4.4 Operation with alkaline non-rechargeable batteries

**CAUTION!**

A device operated with alkaline disposable batteries cannot be charged in the docking station. A message to this effect appears on the display if the device is placed into the docking station.

When equipped with new disposable alkaline batteries, the **EX-TEC PM 4** has an available operating time of at least 12 hours (depending on the capacity of the accumulator used).

Follow the steps below to change the batteries:

- Using the supplied screwdriver, unscrew the bottom two screws on the back of the device.
- Open the battery compartment.
- Insert the new battery cells in the direction indicated.
- Close the battery compartment.
- Re-tighten the bottom two screws on the back of the device.

**Note:**

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

5 Maintenance

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

- Function control
- Indication accuracy test
- Adjustment
- Servicing



Note:

As specified in EN 60079-29-2/BGIT 023, portable gas warning devices must be tested by the user immediately prior to each use. The test scope comprises the function control and the indication accuracy test using test gas.

5.1 Function control

The function control must be carried out by the user **before commencing work**.

The following elements must be tested:

- External condition of device incl. probe systems
- Function of controls
- Battery charge status
- Airflow passages
- Pump function (Section 5.5)
- Zero point when switching device on (fresh air)
- Accessories

When switching the device on, if the zero point deviation is greater than is permissible for the respective gas type (see appendix: Gas types), you must readjust the zero point (see Section 5.3).

The following must also be tested:

- Indication accuracy with test gas (Section 5.2)

The frequency of the test depends on the application. For the **Warning %LEL** application, it must be carried out **before commencing each work session!**

When the function control is complete, it can be stored in the user menu (see Section 3.2.7).

5.2 Testing indication accuracy with test gas

The frequency of the test depends on the application.

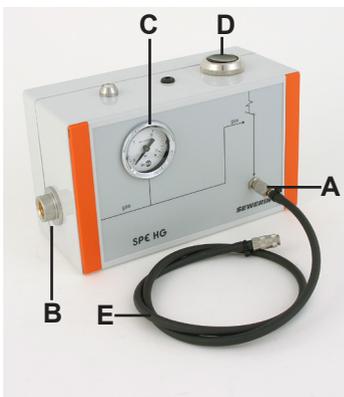
Application	When to test	Legal basis
Warning %LEL	Daily when commencing work	EN 60079-29-2 / BGI T 023
House	Weekly to every six months	DVGW G 465-4
Enclosed spaces		
Measuring VOL%		

The indication accuracy must be tested separately for each calibrated gas type.

All tests must be documented. The documentation must be kept for at least one year.

Connections and controls on the tester

(shown here: SPE HG)



- A Device connection
- B Test gas connection
- C Pressure gauge
- D Release button
- E Connecting hose

Carry out the indication accuracy test as follows:

- Insert connecting hose (E) into connection (A) and attach it to the **EX-TEC PM 4**.
- Screw the test gas canister onto connection (B). Pressure gauge (C) indicates the pressure inside the test gas canister.
- Switch on the **EX-TEC PM 4**.
- Wait until the **EX-TEC PM 4** has finished warming up.
- Press release button (D) to release the test gas. Keep the button depressed.
- Continue to keep release button (D) depressed until the value displayed on the **EX-TEC PM 4** has stabilized. Then release the button.

The value displayed on the **EX-TEC PM 4** must correspond to the specified concentration of the test gas or fall within the permissible tolerances (see appendix: Gas types).

If the display values fall outside the specified tolerances, the **EX-TEC PM 4** must be readjusted (see Section 5.3).

Enter the test results in the test protocol (see appendix).

5.3 Adjustment

Both the zero point and the indication accuracy must be adjusted for each of the three sensors.



WARNING!

The device be adjusted by specialist technicians only. Incorrect adjustment can result in incorrect analysis of the measurement results.

The Adjustment menu is shown in Section 3.3.4.1. The overview below shows the menu items and corresponding sensors. These these items in menu level 2 can be accessed via the advanced settings of the **Info** menu, under **Adjustment**.

Menu item	Sensor	Measuring range	Adjusts:
0 PPM	Semiconductor	ppm	Zero point
10000 PPM	Semiconductor	ppm	Indication accuracy
0%LEL	Catalytic combustion	LEL	Zero point
	Thermal conductivity	% vol.	
50%LEL	Catalytic combustion	LEL	Indication accuracy
100 VOL%	Thermal conductivity	% vol.	Indication accuracy



Note:

Each time you select **Reset** from the Hardware menu, you must subsequently carry out an adjustment.

5.3.1 ppm range

**CAUTION!**

Atmospheric humidity can cause interference in the semiconductor sensor. Therefore, never adjust the device without using conditioner fitted between the device and the test set!

Tools:

- Test head HG 4
- Test set **with** integrated conditioner (e.g. SPE ppm, SPE 2, SPE DUO)

OR

Test set **without** integrated conditioner (e.g. SPE HG, SPE VOL, SPE Y) and **additionally** a conditioner, which must be fitted between the device and the test set

Zero point test gas: Fresh air

Indication accuracy 1.00 % vol. CH₄

test gas:

Setting the zero point

- Connect the device to the test set.
To do so, follow the steps indicated in the operating instructions for the tester. Be sure to remember the conditioner if it is not already included in the test set.
- Add fresh air as the test gas.
- Wait until the value on the LCD no longer flashes.
- Press the On/Off key to confirm.

Setting the indication accuracy

- Connect the device to the test set.
To do so, follow the steps indicated in the operating instructions for the tester. Be sure to remember the conditioner if it is not already included in the test set.
- Place the test head on the device.

- Press and hold the release button on the test set until the concentration displayed on the device has reached a stable value.
- Press the On/Off key to confirm.

5.3.2 LEL range and % vol. range

- Tools:**
- Test head HG 4
 - Test set (see Accessories)

Zero point test gas: Fresh air

Indication accuracy test gas: 2.20 % vol. CH₄ for 50 % LEL adjustment
100 % vol. CH₄ for 100 % LEL adjustment

Setting the zero point

Tools are not required to set the zero point.

The zero points for the LEL range and the % vol. range are always set together in one step.

- Switch on the device.
- Add fresh air as the test gas.
- Wait until the value on the LCD no longer flashes.
- Press the On/Off key to confirm.

Setting the indication accuracy

- Connect the device to the test set.
To do so, follow the steps indicated in the operating instructions for the tester.
- Place the test head on the device.
- Press and hold the release button on the test set for **at least 1 minute**. Do not let go of the release button until the concentration displayed on the device has reached a stable value.
- Press the On/Off key to confirm.
- Remove the test head and wait until the zero point has reset itself.

5.3.3 Confirming adjustment

As part of the adjustment process, each completed test must be stored in memory. This is done via the **Inspection OK** menu item. As a result:

- The test date is saved.
- The next adjustment date is calculated based on the specified inspection interval.
- An inspection block (if set) is triggered.

Confirm the completed adjustment on the device as follows:

- Using the ▲ or ▼ key, select the **Inspection OK** menu item.
- Confirm your selection with the Ⓞ key.

5.4 Servicing

The device must only be serviced and repaired by SEWERIN Service or a qualified service technician/company authorised by SEWERIN.

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

**Note:**

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



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

5.5 Pump



Note:

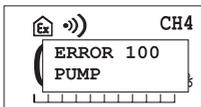
The descriptions in this section refer only to pump devices.

The integrated pump in pump devices accelerates the purging of the device with fresh air. The device pump has a capacity of approximately 10 l/h.

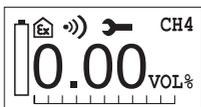
5.5.1 Function control of pump

The pump function in pump devices is tested by a simple leak tightness check:

- Switch on the device in fresh air.
- Make sure the pump is switched on.
- Seal off the sensor head for approximately 10 seconds, by holding the test cap closed, for example.



If the pump is functioning properly, a corresponding error message will be displayed.



Press any key to acknowledge the error message.
If the error message does not appear, the pump may be faulty.
Have the device tested by SEWERIN Service.

5.5.2 Changing the pump filter



CAUTION!

Always switch off the device before changing the filter.

- Unscrew and remove the sensor cap.
- Take the sensor out of its holder.
- Remove the pump filter (white disk, 4 mm in diameter).
- Insert a new pump filter.
- Place the sensor with rubber seal back into the holder.
- Attach the sensor cap, making sure the screws are not too tight.

5.5.3 Changing the sensor filter



CAUTION!

Always switch off the device before changing the filter.

- Unscrew and remove the sensor cap.
- Remove the sensor filter from the sensor cap.
- Insert a new sensor filter.
- Attach the sensor cap, making sure the screws are not too tight.

6 Faults

If a fault occurs during operation, an error message will appear on the screen. The error number and error name will be shown.

If more than one error occurs, only the error that occurred first will be displayed. Each additional error message will be displayed only after the previous error has been corrected.

Overview of possible error messages

Error no.	Appearance on LCD (error name)	Cause	Error correction
9	NO ADJUSTMENT	No adjustment data available	Carry out adjustment
10	ADJUSTMENT ERROR	Zero point in ppm range (SC)	Check test gas or repeat adjustment
11	ADJUSTMENT ERROR	Zero point in LEL range (CC)	Check test gas or repeat adjustment
12	ADJUSTMENT ERROR	Zero point in vol. range (TC)	Check test gas or repeat adjustment
13	ADJUSTMENT ERROR	Sensitivity in ppm range (SC)	Check test gas or repeat adjustment
14	ADJUSTMENT ERROR	Sensitivity in LEL range (CC)	Check test gas or repeat adjustment
15	ADJUSTMENT ERROR	Sensitivity in vol. range (TC)	Check test gas or repeat adjustment
40	END OF RANGE	Measuring range violation in LEL range	Adjust LEL range
51-54	ERROR UNKNOWN	Component error	Switch device off and back on or consult SEWERIN-Service
59	VOLTAGE SUPPLY	Voltage outside permissible range	Error can only be corrected by SEWERIN Service
60	ERROR UNKNOWN	Semiconductor sensor break (SC)	Error can only be corrected by SEWERIN Service
61	ERROR UNKNOWN	Catalytic combustion sensor break (CC)	Error can only be corrected by SEWERIN Service
62	ERROR UNKNOWN	Thermal conductivity sensor break (TC)	Error can only be corrected by SEWERIN Service
100	PUMP CAPACITY	Insufficient pump capacity	Check filter in device and in probes

7 Technical data

7.1 Features

- Gas types
 - Standard: Methane (CH₄)
 - Optional: Propane (C₃H₈)
Butane (C₄H₁₀)
Hexane (C₆H₁₄)
Nonane (C₉H₂₀)
Kerosene (JFUEL)
Hydrogen (H₂)
Acetylene (C₂H₂)
- Liquid Crystal Display Graphic display, 65 × 132 pixels
- Membrane keypad 3 keys
- Buzzer Frequency 2.4 kHz
Volume = 75 dB (A) / 1m
- Alarm light Red
- PC interface via docking station HG4 with interface
- Memory Capacity: see Section 3.3.4.4
- Type of protection IP54

7.2 Alarm thresholds

7.2.1 Alarm thresholds for gas type methane CH₄



CAUTION!

AL1 must always be set to a lower value than AL2.

- House application

Alarm	Gas concentration		Signal	
	Setting range	Factory setting	Audible	Visual
	10 – 4,400 ppm	10	Concentration-dependent	Concentration-dependent
AL1	0.44 – 2.2 % vol.	0.44 % vol.	Concentration-dependent	Concentration-dependent
AL2	0.48 – 4.18 % vol.	2.2 % vol.	Continuously On	Continuously On

- Confined spaces application

Alarm	Gas concentration		Signal	
	Setting range	Factory setting	Audible	Visual
	1 – 4,400 ppm	1	–	–
AL1	0.44 – 2.2 % vol.	0.44 % vol.	–	Concentration-dependent
AL2	0.48 – 4.18 % vol.	2.2 % vol.	–	Continuously On

- Warning application (Warning %LEL)

Alarm	Gas concentration		Signal	
	Setting range	Factory setting	Audible	Visual
	0 – 10 % LEL		–	–
AL1	10 – 50 % LEL	10 % LEL	Pre-alarm 2 Hz	Pre-alarm 2 Hz
AL2	10 – 60 % LEL	50 % LEL	Main alarm 5 Hz	Main alarm 5 Hz
AL3	Invariable	100 % LEL	Continuous alarm	Continuous alarm

When the LEL unit in the system settings is set to % vol., the alarm thresholds are also set to % vol.

- Measuring application (Measuring VOL%)

Alarm	Gas concentration		Signal	
	Setting range	Factory setting	Audible	Visual
AL5	1 – 100 % vol.	100 % vol.	2 Hz flashing	2 Hz flashing

7.2.2 Setting ranges of alarm thresholds for different gas types

The factory settings are shown in bold.

Gas type		AL1	AL2
All (%LEL)	Threshold	10 % LEL	50 % LEL
Methane (CH ₄)	Threshold	0.45 % vol.	2.20 % vol.
	Setting range	0.45 – 2.20 % vol.	0.50 – 2.64 % vol.
	Increment	0.05 % vol.	0.05 % vol.
Propane (C ₃ H ₈)	Threshold	0.18 % vol.	0.86 % vol.
	Setting range	0.18 – 0.85 % vol.	0.18 – 1.02 % vol.
	Increment	0.02 % vol.	0.02 % vol.
Butane (C ₄ H ₁₀)	Threshold	0.14 % vol.	0.70 % vol.
	Setting range	0.14 – 0.70 % vol.	0.16 – 0.84 % vol.
	Increment	0.02 % vol.	0.02 % vol.
Hexane (C ₆ H ₁₄)	Threshold	0.10 % vol.	0.50 % vol.
	Setting range	0.10 – 0.50 % vol.	0.11 – 0.60 % vol.
	Increment	0.01 % vol.	0.01 % vol.
Nonane (C ₉ H ₂₀)	Threshold	0.08 % vol.	0.36 % vol.
	Setting range	0.08 – 0.35 % vol.	0.08 – 0.42 % vol.
	Increment	0.02 % vol.	0.02 % vol.
Kerosene (JFUEL)	Threshold	0.07 % vol.	0.35 % vol.
	Setting range	0.07 – 0.35 % vol.	0.07 – 0.42 % vol.
	Increment	0.01 % vol.	0.01 % vol.
Hydrogen (H ₂)	Threshold	0.40 % vol.	2.00 % vol.
	Setting range	0.40 – 2.00 % vol.	0.44 – 2.40 % vol.
	Increment	0.04 % vol.	0.04 % vol.
Acetylene (C ₂ H ₂)	Threshold	0.25 % vol.	1.15 % vol.
	Setting range	0.23 – 1.10 % vol.	0.25 – 1.38 % vol.
	Increment	0.01 % vol.	0.01 % vol.

- Alarm thresholds (as delivered, depending on fitted sensors)

Alarm	Gas concentration, factory setting	Operator guidance by	
		Application	Sensor (operating mode)
AL1	10 % LEL	House, Enclosed spaces, Warning	Gas detection, Gas warning
AL2	50 % LEL	House, Enclosed spaces, Warning	Gas detection, Gas warning
AL3	100 % LEL (end of measuring range)	Warning	Gas warning
AL4	0.5 % vol.		Automatic
AL5	100 % vol.	Measuring	Gas measuring

7.3 Response times

- Response times of **EX-TEC PM 4** (pump devices)

- ppm range:
 - $t_{90} < 7 \text{ s}$ for methane (CH_4)
 - $t_{90} < 7 \text{ s}$ for propane (C_3H_8)
 - $t_{90} < 7 \text{ s}$ for butane (C_4H_{10})
 - $t_{90} < 7 \text{ s}$ for hydrogen (H_2)
- LEL range:
 - $t_{50} < 5 \text{ s}$ for methane (CH_4)
 - $t_{50} < 6 \text{ s}$ for propane (C_3H_8)
 - $t_{90} < 12 \text{ s}$ for methane (CH_4)
 - $t_{90} < 16 \text{ s}$ for propane (C_3H_8)
 - $t_{90} < 3 \text{ min}$ for hexane (C_6H_{14})
 - $t_{90} < 3 \text{ min}$ for nonane (C_9H_{20})
 - $t_{90} < 3 \text{ min}$ for kerosene (JFUEL)
 - $t_{90} < 12 \text{ s}$ for acetylene (C_2H_2)
- % vol. range: $< 10 \text{ s}$

Probes increase the stated response times.

- Response times of **EX-TEC PM 4**

(diffusion device without probe)

- LEL range: $t_{50} < 8 \text{ s}$ for methane (CH_4)
 $t_{50} < 17 \text{ s}$ for propane (C_3H_8)
 $t_{90} < 36 \text{ s}$ for methane (CH_4)
 $t_{90} < 74 \text{ s}$ for propane (C_3H_8)
 $t_{90} < 3 \text{ min}$ for nonane (C_9H_{20})

- Warm-up time

- ppm range: Approx. 1 min
- LEL range: $\leq 22 \text{ s}$
- % vol. range: $\leq 22 \text{ s}$

7.4 Sensors

- Lifetime

Catalytic combustion sensor (CC)

- Warranted: 1 year
- Expected: 5 years

Semiconductor sensor (SC)

- Warranted: 1 year
- Expected: 5 years

Thermal conductivity sensor (TC)

- Warranted: 1 year
- Expected: 5 years

- Interference

- ppm / % LEL range: All flammable gases
- % vol. range: All gases with a different thermal conductivity than air

- Measuring error

- ppm range $\pm 30 \%$
- % LEL range $\pm 2 \%$ LEL (short-term stability)
 $\pm 4 \%$ LEL (long-term stability)
acc. to EN 60079-29-1
- % vol. range $\pm 5 \%$ vol.
acc. to EN 60079-29-1

7.5 Ranges of use

- Operating temperature: -20 °C to +40 °C
- Storage temperature: -25 °C to +55 °C
- Humidity: 5 % r.h. to 90 % r.h.
(non-condensing)
- Pressure: 800 hPa to 1,200 hPa

7.6 Pump capacity

- Vacuum: > 150 mbar
- Volume flow: 5 to 15 l/h, typical

7.7 Power supply

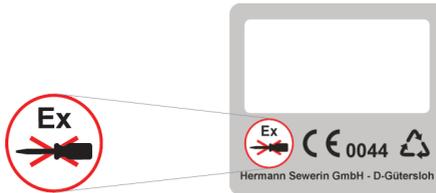
- Operated with: NiMH rechargeable batteries or alkaline disposable batteries
- Operating time: 8 h, minimum
- NiMH rechargeable batteries charged: Via docking station HG4 and plug-in adapter with 12-V interface
- Charging time: Approx. 12 h (fully charged) depending on capacity of accumulator

7.8 Dimensions and weight

- Dimensions (W × H × D) Approx. 60 × 144 × 35 mm
(without swan neck)
- Weight: Approx. 300 g
(depending on equipment)

7.9 Technical information

Identification sticker



The pictogramme on the identification sticker (back of device) signifies that the battery must only be opened outside the potentially explosive area!

Gas application / inerting

Gas application (increasing concentration to 100 % vol.) and inerting (decreasing concentration to 0 % vol.) must be carried out in the **Measuring VOL%** application.

Unambiguous monitoring of the measurement is possible only in this application.

Sensitivity of the catalytic combustion sensor

The sensitivity of the catalytic combustion sensor can be distorted under the following conditions:

- Oxygen-deficient atmospheres lead to indication of lower values (sensor suffocation).
- Operation of the device in oxygen-enriched atmospheres is impermissible to ensure explosion protection.

Gaseous components of silicones, oils and phosphate esters, for example, are harmful to the sensor. They cause an irreversible decrease in sensitivity.

Impurities in the measuring environment, for example, due to halogens, burned neoprene, PVC or trichlorethylene, also decrease the sensitivity of the sensors; in this case, however, the sensitivity can be restored.

Cleaning

The device must only be cleaned with a damp cloth.

**CAUTION!**

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

Static charging

Electrostatic charging must generally be avoided. Electrostatically unearthed objects (e.g. including metallic housing without an earth connection) are not protected against applied charges (e.g. through dust or dispersed flows).

**CAUTION!**

When working with the gas types hydrogen (H_2) and acetylene (C_2H_2), the leather bag is mandatory because it is a component of the explosion protection of the device!

7.10 Advice on disposal

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

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

End-of-life equipment

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

8 Available models and accessories

8.1 Available models



EX-TEC PM 4 – W

Art. no.: PM04-20001

- Diffusion device for Warning application
- Includes catalytic combustion sensor

EX-TEC PM 4 – W/H/H/M

Art. no.: PM04-20201

- Pump device for Warning, Enclosed spaces, House and Measuring applications
- Includes semiconductor, catalytic combustion and thermal conductivity sensors

Addition models available upon request.

8.2 Accessories



Docking station HG 4

Art. no.:LP10-10001

Docking station HG 4 with interface

Art. no.:LP10-10101



AC/DC adapter M4

Art. no.:LD10-10001



Vehicle cable 12 V= mounting

Art. no.:ZL07-10000

- For connecting docking station HG 4 to 12 V= vehicle electrical system
- Includes built-in fuse and female spade connectors



Vehicle cable 12 V= mobile

Art. no.: ZL07-10100

- For connecting docking station HG 4 to 12 V= vehicle electrical system
- Includes built-in fuse and cigarette lighter adapter



Vehicle cable 24 V= mounting

Art. no.: ZL09-10000

- For connecting docking station HG 4 to 24 V= vehicle electrical system
- Includes voltage converter and female spade connectors for permanent connection



Carrying bag HG 4

Art. no.: 3204-0034

- Leather bag with viewing panel and D-rings for carrying strap
- Loop with snap for securing the device
- Clip for carrying the device on a belt
- Can be used in potentially explosive areas (conductive film on front panel)
- Required for use in hydrogen areas



Carrying strap

Art. no.: 3209-0003

- Leather strap for carrying the device
- Adjustable from 0.5 m to 1.0 m



Handheld probe with ball

Art. no.: ZS42-10000

- For diffusion devices only
- For measurement of hard-to-reach areas in 2-handed operation



Flex handheld probe HG4

Art. no.: ZS40-10100

- For pump devices only
- For detection and measurement of hard-to-reach areas in 2-handed operation



Flex handheld probe HG4 with filter

Art. no.: ZS40-10200

- For pump devices only
- For detection and measurement of hard-to-reach areas in 1-handed operation



Note:

These probes are suitable for gas types methane CH_4 , propane C_3H_8 , hydrogen H_2 and acetylene C_2H_2 . Probes for other gas types are available upon request. For **Flex handheld probe HG4** and **Flex probe HG4**, use only **SEWERIN-approved filters with activated carbon**.



Test set SPE HG

Art. no.: PP01-10201

- For mobile use, including use in vehicles
- Includes connection for SEWERIN test gas cans, flow regulation, release button and connecting hose in conjunction with test head HG 4, as well as conditioner for the semiconductor



Test set SPE Y

Art. no.: PP01-20001

- For mobile use, including use in vehicles
- Includes connection for SEWERIN test gas cans, flow restrictor and connecting hose for test head PM 4



Test head HG4

Art. no.: PP01-B1000

- Used to connect the sensor head to the test set



Test gas cans

- For indication accuracy testing and adjustment
- Various test gas concentrations in 1-litre cans pressurised to approx. 12 bar

Pressurised gas canisters

- For testing and adjustment of indication accuracy
- Various test can concentrations in 0.4- / 2.0- / 10.0-litre steel canisters pressurised to 100 – 150 bar



Case HG4

Art. no.: ZD18-10000

- Holds:
 - Device and charging equipment
 - Probe equipment
 - Test gas can and test set SPE-Y
- Contents not included



Filters for pump HG4

Art. no.: 2498-0003

- Protects pump from dirt contamination
- Bag contains 30 filters

Filters for sensor HG4

Art. no.: 2498-0010

- For pump devices
- Protects sensor from dirt contamination
- Bag contains 10 filters

Appendix

Gas types

LEL values are specified in accordance with IEC 60079-20.

Methane CH₄ (100 % LEL = 4.40 % vol.)

Area of application	Test gas	Tolerances /fresh air zero point	Tolerances /test gas indication accuracy
ppm range	1.0 % vol. CH ₄ in synth. air	0 ppm	0.8 to 1.4 % vol.
% LEL range	2.2 % vol. (50 % LEL) CH ₄ in synth. air	-0.15 to +0.15 % vol. (-3 to +3 % LEL)	2.00 to 2.40 % vol. (45 to 55 % LEL)
% vol. range	100 % vol. CH ₄	-2 to +2 % vol.	98 to 102 % vol.

Propane C₃H₈ (100 % LEL = 1.70 % vol.)

Area of application	Test gas	Tolerances /fresh air zero point	Tolerances /test gas indication accuracy
ppm range	1.0 % vol. C ₃ H ₈ in synth. air	0 ppm	0.8 to 1.4 % vol.
% LEL range	1.0 % vol. (59 % LEL) C ₃ H ₈ in synth. air	-0.06 to +0.06 % vol. (-3 to +3 % LEL)	0.90 to 1.10 % vol. (53 to 65 % LEL)
% vol. range	99.5 % vol. C ₃ H ₈	-2 to +2 % vol.	98 to 102 % vol.

Butane C₄H₁₀ (100 % LEL = 1.40 % vol.)

Area of application	Test gas	Tolerances / fresh air zero point	Tolerances / test gas indication accuracy
ppm range	Replacement test gas 1.0 % vol. C ₃ H ₈ in synth. air (display setpoint when adding replacement gas: 0.88 % vol.)	0 ppm	0.8 to 1.4 % vol.
% LEL range		-0.05 to +0.05 % vol. (-3 to +3 % LEL)	0.80 to 0.98 % vol. (57 to 69 % LEL)
% vol. range	Adjustment not possible	–	–

Hexane C₆H₁₄ (100 % LEL = 1.00 % vol.)

Area of application	Test gas	Tolerances / fresh air zero point	Tolerances / test gas indication accuracy
ppm range	Replacement test gas 1.0 % vol. C ₃ H ₈ in synth. air (display setpoint when adding replacement gas: 0.72 % vol.)	0 ppm	0.5 to 0.7 % vol.
% LEL range		-0.03 to +0.03 % vol. (-3 to +3 % LEL)	0.64 to 0.78 % vol. (65 to 79 % LEL)
% vol. range	Adjustment not possible	–	–

Nonane C₉H₂₀ (100 % LEL = 0.70 % vol.)

Area of application	Test gas	Tolerances / fresh air zero point	Tolerances / test gas indication accuracy
ppm range	Replacement test gas 0.30 % vol. C ₃ H ₈ in synth. air (display setpoint when adding replacement gas: 0.21 % vol.)	0 ppm	0.14 to 0.28 % vol.
% LEL range		-0.05 to +0.05 % vol. (-3 to +3 % LEL)	0.14 to 0.28 % vol. (20 to 40 % LEL)
% vol. range	Adjustment not possible	–	–

Kerosene JFUEL (100 % LEL = 0.70 % vol.)

Area of application	Test gas	Tolerances /fresh air zero point	Tolerances /test gas indication accuracy
ppm range	Replacement test gas	0 ppm	0.3 to 0.4 % vol.
% LEL range	0.30 % vol. C ₃ H ₈ in synth. air (display setpoint when adding replacement gas: 0.32 % vol.)	-0.04 to +0.04 % vol. (-4 to +4 % LEL)	0.28 to 0.36 % vol. (44 to 52 % LEL)
% vol. range	Adjustment not possible	–	–

Hydrogen H₂ (100 % LEL = 4.00 % vol.)

Area of application	Test gas	Tolerances /fresh air zero point	Tolerances /test gas indication accuracy
ppm range	1.0 % vol. H ₂ in synth. air	0 ppm	0.8 to 1.2 % vol.
% LEL range	2.0 % vol. (50 % LEL) H ₂ in synth. air	-0.12 to +0.12 % vol. (-3 to +3 % LEL)	1.80 to 2.20 % vol. (45 to 55 % LEL)
% vol. range	Adjustment not possible	–	–

Acetylene C₂H₂ (100 % LEL = 2.30 % vol.)

Area of application	Test gas	Tolerances /fresh air zero point	Tolerances /test gas indication accuracy
ppm range	Adjustment not possible	–	–
% LEL range	1.00 % vol. (43 % LEL) C ₂ H ₂ in synth. air	-0.07 to +0.07 % vol. (-3 to +3 % LEL)	0.88 to 1.12 % vol. (38 to 48 % LEL)
% vol. range	Adjustment not possible	–	–

Determining replacement test gas concentration using hexane adjustment as an example:

- Replacement test gas (specified): 1.0 % vol. propane
According to the table above, the display setpoint is 0.72 % vol.
The test gas concentration must be set to 0.72 % vol.
- Replacement test gas (alternative): 0.85 % vol. propane
When using another replacement test gas (example: 0.85 % vol. propane), this gas must be set proportionally to the specified replacement test gas. The following formula is given:
$$(0.85 / 1.0) \times 0.72 = 0.612$$

The hexane test gas must be set on the device to the rounded value of 0.61 % vol.

Setting ranges for test gases

Gas type		Test gas ppm	Test gas% LEL
Methane (CH₄)	Setting range	1.00 % vol. or 2.20 % vol.	1.75 to 3.50 % vol (40 to 80 % LEL)
	Increment	–	0.05 % vol. (1 % LEL)
Propane (C₃H₈)	Setting range	0.20 to 1.00 % vol.	0.34 to 1.36 % vol (40 to 80 % LEL)
	Increment	0.01 % vol.	0.02 % vol. (1 % LEL)
Butane (C₄H₁₀) Important: replacement test gas propane (C₃H₈)	Setting range	0.20 to 1.00 % vol.	0.56 to 1.12 % vol (40 to 80 % LEL)
	Increment	0.01 % vol.	0.02 % vol.
Hexane (C₆H₁₄) Important: replacement test gas propane (C₃H₈)	Setting range	0.12 to 0.60 % vol.	0.40 to 0.80 % vol (40 to 80 % LEL)
	Increment	0.01 % vol.	0.01 % vol.
Nonane (C₉H₂₀) Important: replacement test gas propane (C₃H₈)	Setting range	0.07 to 0.35 % vol.	0.14 to 0.56 % vol (20 to 80 % LEL)
	Increment	0.01 % vol.	0.02 % vol.
Kerosene (JFUEL) Important: replacement test gas propane (C₃H₈)	Setting range	0.07 to 0.35 % vol.	0.07 to 0.56 % vol (10 to 80 % LEL)
	Increment	0.01 % vol.	0.02 % vol.
Hydrogen (H₂)	Setting range	0.20 to 1.00 % vol.	1.60 to 3.20 % vol (40 to 80 % LEL)
	Increment	0.01 % vol.	0.04 % vol.
Acetylene (C₂H₂)	Setting range	–	0.92 to 1.84 % vol (40 to 80 % LEL)
	Increment	–	0.01 % vol.

Test certificates

Passive explosion protection

The **EX-TEC PM 4** has been tested to ensure that it is explosion-proof in accordance with European standards (CENELEC):

EC type-examination certificate: TÜV 09 ATEX 555077 X

Designation 1: I I2G Ex d e ib IIB T4 Gb
Basic device **without** leather bag for:
Methane CH₄
Propane C₃H₈
Butane C₄H₁₀
Hexane C₆H₁₄
Nonane C₉H₂₀
JFUEL

Designation 2: I I2G Ex d e ib IIC T4 Gb
Basic device **with** leather bag for:
Gases specified above
Hydrogen H₂
Acetylene C₂H₂

Testing institute: TÜV NORD CERT GmbH, Hannover

Measuring function for explosion protection

The **EX-TEC PM 4** has been tested in the LEL range, **GAS WARNING** mode, for methane (CH₄), propane (C₃H₈) and nonane (C₉H₂₀):

Test report (PFG no.) Testing institute:

413 007 02P	DMT – Deutsche Montan Technologie GmbH
413 007 02P N1	EXAM BBG Prüf- und Zertifizier GmbH
413 007 02P NII	DEKRA EXAM GmbH
413 007 02P NIII	DEKRA EXAM GmbH

Certificate BVS 09 ATEX G 002 X

EU declaration of conformity

Hermann Sewerin GmbH hereby declares that the **EX-TEC® PM 4** fulfils the requirements of the following guidelines:

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

Gütersloh, 2016-04-20



Dr. S. Sewerin
(General Manager)

The complete declaration of conformity can be found online.

Appendix

Inspection protocol
 Sensor
 Serial no. (e.g. 060 10 0001)

EX-TEC® PM 4 (methane CH₄)

PPM — LEL — VOL



16.07.2007

1.0	Device status																		
1.1	- status correct (e.g.: Y / N)																		
1.2	- remaining operating hours (e.g.: 5 h)																		

2.0	Pump test																		
2.1	- fault F100 when sealing																		
2.2	- pump filter changed (e.g.: Y / N)																		

3.0	PPM measuring range																		
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3.1	zero point (fresh air) - display 0 ppm																		
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3.2	test gas (1.00 % vol. CH ₄) - display 0.8 – 1.5 % vol.																		
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4.0	LEL measuring range																		
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4.1	zero point (fresh air) - display -0.15 – +0.15 % vol. or - display -3 – +3 % LEL																		
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4.2	test gas (2.2 % vol. CH ₄ / 50 % LEL) - display 2.0 – 2.4 % vol. or - display 45 – 55 % LEL																		
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5.0	VOL measuring range																		
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5.1	zero point (fresh air) - display -2 – +2 % vol.																		
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5.2	test gas (100 % vol. CH ₄ or natural gas) - display 98 – 102 % vol.																		
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6.0	AL1 alarm triggering																		
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6.1	optical alarm (e.g.: Y / N)																		
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6.2	audible alarm (e.g.: Y / N)																		
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7.0	Observations																		
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- housing broken
- adjustment, repair
- factory inspection
- or the like

8.0	Test																		
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- day
- month
- year
- signature

Inspection protocol Sensor Serial no. (e.g. 060 10 0001)	EX-TEC® PM 4 (propane C₃H₈) PPM — LEL — VOL	
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16.07.2007

1.0 Device status										
1.1 - status correct (e.g.: Y / N)										
1.2 - remaining operating hours (e.g.: 5 h)										

2.0 Pump test										
2.1 - fault F100 when sealing										
2.2 - pump filter changed (e.g.: Y / N)										

3.0 PPM measuring range										
3.1 zero point (fresh air) - display 0 ppm										
3.2 test gas (1.00 % vol. C ₃ H ₈) - display 0.8 – 1.4 % vol.										

4.0 LEL measuring range										
4.1 zero point (fresh air) - display -0.06 – +0.06 % vol. - display -3 – +3 % LEL										
4.2 test gas (1.0 % vol. C ₃ H ₈ / 59 % LEL) - display 0.9 – 1.1 % vol. - display 55 – 64 % LEL										

5.0 VOL measuring range										
5.1 zero point (fresh air) - display -2 – +2 % vol.										
5.2 test gas (100 % vol. C ₃ H ₈) - display 98 – 102 % vol.										

6.0 AL1 alarm triggering										
6.1 optical alarm (e.g.: Y / N)										
6.2 audible alarm (e.g.: Y / N)										

7.0 Observations										
- housing broken										
- adjustment, repair										
- factory inspection										
- or the like										

8.0 Test										
- day										
- month										
- year										
- signature										

Entering a user name

The user name is stored in the advanced settings (System menu). The advanced settings are explained in Section 3.3. The procedure for accessing the advanced settings is provided in Section 3.3.1.

Use the ▲ and the ▼ key to enter the characters. **All characters must be confirmed.**

Case 1: New entry; no existing characters to be overwritten.

Entry starts with a space (black block).

Use the ▲ key to select the letters A – Z in ascending order.

After the letter Z, the selection starts over with A.

Use the ▼ key to select the letters Z – A in descending order.

After the letter A, the following special characters are displayed:
@<=>=<;:9876543210/./.,+*)('&%\$#“!



Note:

Special characters can only be selected using the ▼ key.

Use the Ⓢ key to confirm a selected letter.

The device moves to the next position.

When you have confirmed the last character in the user name, the device returns to the System menu selection.

Case 2: An existing character is overwritten.

When you move the cursor to this position, the existing character is highlighted with a black block.

Press the  key to display a space, then select the letters A – Z in ascending order.

After the letter Z, the selection starts over with A.

Press the  key to display the previous letter of the alphabet and so on in descending order.

After the letter A, the following special characters are displayed:
`@≤>=<;:9876543210/./,+*)(,%$#!`

Use the  key to confirm a selected letter.

The device moves to the next position.

When you have confirmed the last character in the user name, the device returns to the System menu selection.

**Note:**

When entering the user name, you may notice that unassigned positions are displayed with a black box. This happens only in entry mode. The actual display shows the spaces correctly.

List of abbreviations

CENELEC	European Committee for Electrotechnical Standardization
DVGW	Deutsche Vereinigung des Gas- und Wasserfaches e. V. (German Technical and Scientific Association for Gas and Water)
LCD	Liquid Crystal Display
NiMH	Nickel metal hydride
ppm	Parts per million
TRGI	Technical regulations for gas installations
LEL	Lower Explosion Level
VOL	Volume

Index

A

Accessories 70
Accessory devices 42
Accu capacity 38, 45
Adjustment 52
 confirming 55
 indication accuracy 53, 54
 zero point 53, 54
Adjustment menu 32
Advanced settings 27
AL1 alarm 34
AL2 alarm 34
AL4 alarm 34
AL5 alarm 35
Alarm light *see* Cover
Alarm thresholds 60
Autostart 40
Available models 69

B

Battery
 battery operation 43
 battery types 43
 changing 47
 charging 43
 setting 38
Battery alarm 45
Battery charge contacts *see* Cover
Battery, disposable
 requirements 44
Battery, rechargeable 44
 requirements 44
Buzzer *see* Cover

C

Catalytic combustion sensor 6
Changing the operator guidance 36
Charging time 47
Contrast 39
Control keys *see* Cover

D

Data memory 41
Date format 33
Date/time 33

Device

 charging 46
 features 5
 maintenance 49
 on/off *see* Cover
 operation 9
Disposal 68
Docking station 46

E

Enclosed spaces application 18
Error message 58
Explosion protection 7, 80

F

Faults 58
Features 59
Function control 25, 49

G

Gas type 26, 39, 75

H

Hardware menu 38
House application 16

I

Indication accuracy 50
Indication accuracy test 50
Info menu 32
INS block 34
INS interval 33

K

Keypad *see* Cover

L

Language 37
LCD
 test 40
LCD matrix *see* Cover
Leather bag 7
Level PPM 40

Light 38

M

Maintenance 49

Measurement principles 6

Measuring mode 11

Measuring VOL% application 23

Memory menu 41

Menu structure 29

O

Operating modes 10

Operator guidance 9, 36

P

PIN code 27, 34

Power supply 43

PPM signal 34

Probes 42

Pump 40

 changing the pump filter 57

 changing the sensor filter 57

 function control 56

 pump capacity 65

Pump filter 57

R

Ranges of use 65

Reset 40, 41

Response times 63

S

Semiconductor sensor 6

Sensor filter 57

Sensor head *see* Cover

Sensors 39, 64

Servicing 55

Signal

 audible 34

 visual 34

Suspension fitting *see* Cover

System menu 33

T

Tester 50

Test gas %LEL 35

Test gas PPM 35

Test head 42

Thermal conductivity sensor 6

U

Unit %LEL 35

Unit VOL% 36

User menu 14

User name 36

W

Warning %LEL application 20

Z

Zero point 15

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