EX-TEC® OD 4 / GM 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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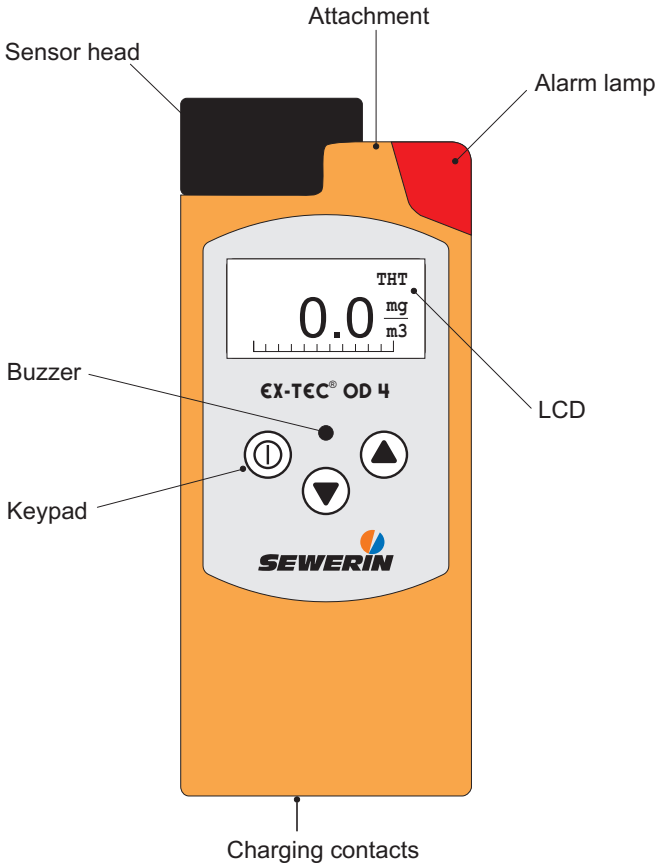
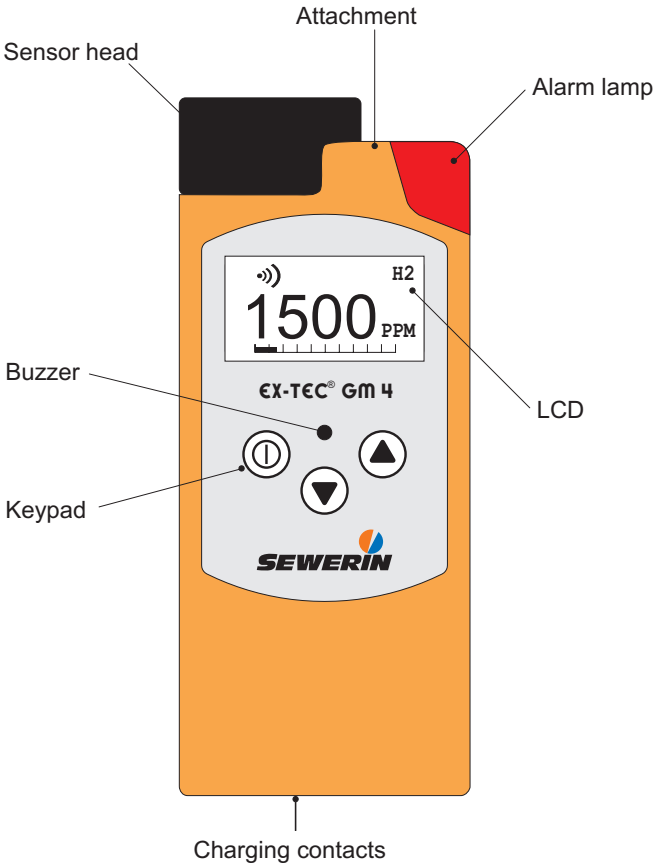
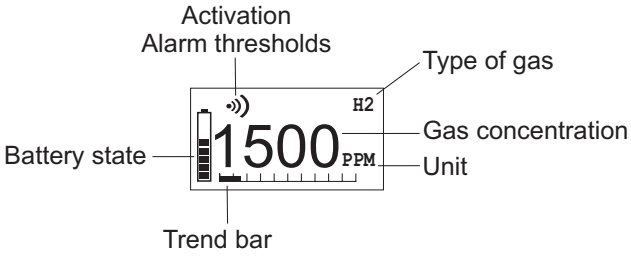

Attachment
Sensor head
Alarm lamp
THT
0.0
mg
m3
Buzzer
LCD
EX-TEC® OD 4
Keypad
SEWERIN
Charging contacts


Attachment
Sensor head
Alarm lamp
H2
1500
PPM
Buzzer
LCD
EX-TEC® GM 4
Keypad
SEWERIN
Charging contacts


Activation
Alarm thresholds
Type of gas
H2
Battery state
1500
PPM
Gas concentration
Unit
Trend bar

Operating Instructions

EX-TEC® OD 4/GM 4

20.04.2016 a – V1.XXX – 103955 – en

This product may only be operated by appropriately-trained persons who are familiar with the relevant operating manual.

It may only be used for its designated purpose, i.e. for industrial and commercial use.

Repair work may only be carried out by specialists or by persons who have undergone appropriate training.

Any alterations or modifications to the product require the prior approval of Hermann Sewerin GmbH. In the event of unauthorised alterations to the product the manufacturer accepts no liability for damage.

Only Hermann Sewerin GmbH accessories may be used with the product.

Only spare parts approved by us may be used for repairs.

Hermann Sewerin GmbH accepts no liability for damage resulting from non-compliance with the foregoing. The guarantee and liability provisions in the Hermann Sewerin GmbH terms of sale and supply are not extended by the foregoing.

We reserve the right to make changes in the context of continued technical development.

In addition to these instructions, please comply with generally applicable safety and accident-prevention regulations.

Symbols used:

CAUTION:
This symbol warns of dangers that may threaten the safety of the user or maty damage or destroy the product.

Note:
This symbol flags information and hints extending beyond the actual operation of the product .

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1 EX-TEC OD 4/EX-TEC GM 4 system

The **EX-TEC OD 4** is a combined warning and measuring instrument for determining **odorant** concentration. It is available with either a **THT** or a **TBM sensor**.

The **EX-TEC GM 4** is a warning and measuring instrument that detects **oxygen** and various **toxic gases**.

1.1 The EX-TEC OD 4 system

1.1.1 Before starting work

Adequate gas odorisation is an important criterion for safe network operation. Please take careful note of the following information.

1.1.2 The need for gas odorisation

Natural gas is odourless. So that even the smallest leaks in indoor installations or elsewhere in a gas-distribution network can be immediately detected, the gas is odorised: a strong-smelling substance is added to it. The substances used are organic sulphur compounds and acrylates. The most widespread currently being tetrahydrothiophene (THT) and tertiary butyl mercaptan (TBM).

DVGW worksheet G 280 sets the minimum values for odorant concentration at 10 mg of THT / m^3 and 3.8 mg of TBM / m^3. This worksheet also requires the operator of a distribution network to check and document the odorant concentration at least once a year.

1.1.3 Measurement principle

The **EX-TEC OD 4** contains an electrochemical sensor that reacts to the smallest traces of sulphur compounds. This produces electrical signals, which are then processed by the integral electronic system. The intensity of the signal varies directly with the strength of the concentration.

The sensor is filled with a liquid (electrolyte), which makes it very sensitive to high temperatures. The maximum storage temperature of 40 °C must therefore not be exceeded. Electrochemical processes constantly take place inside the measurement cell, requiring the **EX-TEC OD 4** to be permanently supplied with battery power at an adequate voltage. For this reason the integral batteries must not be permitted to reach a state of deep discharge. When the instrument is not in use it should therefore be stored in charge-maintenance operation (see section 4.1: Charging and charge maintenance when using NiMH batteries).

1.1.4 Boundary conditions for measurement and sampling

As well as all sulphur compounds, the electrochemical measurement cell also reacts very strongly to moisture. Even though this is rarely important when carrying out measurements in a gas-distribution network, operators should not blow through sampling hoses to clear them.

When sampling it is essential to ensure that there are no connecting pieces made of rubber or synthetic substances between the **EX-TEC OD 4** and the connection to the gas main unless these consist of inert materials (e.g. Viton or nylon).

A further factor that affects the measurement of sulphur compounds with the **EX-TEC OD 4** is the flow rate through the measurement chamber, which must always exceed 20 l/h. Only the connection hoses supplied with the instrument should therefore be used for sampling.

1.1.5 EX-TEC OD 4

The **EX-TEC OD 4** is a hand-held instrument for the measurement of tetrahydrothiophene (THT) or tertiary butyl mercaptan (TBM). It is available in pump and diffusion versions.

The following sensors are available:

Sensor	range	principle
THT	0 –100 mg/m^3	electrochemical
TBM	0 –100 mg/m^3	electrochemical

1.1.6 Test certificates

Passive explosion protection

The **EX-TEC OD 4** has been tested for explosion protection in accordance with European norms (CENELEC):

EC prototype test certificate:	TÜV 01 ATEX 1657
Identification:	Ⓔx II2G Ex e ib IIB T4 Gb
Testing institution:	TÜV NORD CERT GmbH, Hannover

1.2 EX-TEC GM 4 system

The **EX-TEC GM 4** is a gas-measurement and warning instrument. It is available in pump and diffusion versions. A different sensor is used for each gas.

The following electrochemical sensors are available:

Sensor	**range**
Carbon monoxide CO	0 – 500 ppm
Hydrogen H_2	0 – 1.0 vol.%
Hydrogen sulphide H_2S	0 – 100 ppm
Hydrogen sulphide H_2S	0 – 2000 ppm
Ammonia NH_3	0 – 100 ppm
Oxygen O_2	0 – 25 vol.%
Hydrogen chloride HCl	0 – 30 ppm

1.2.1 Test certificates

Passive explosion protection

The **EX-TEC GM 4** has been tested for explosion protection in accordance with European norms (CENELEC):

EC prototype test certificate:	TÜV 01 ATEX 1657
Identification 1:	Ⓔx II2G Ex e ib IIB T4 Gb basic instrument **without** leather case for all gases **except** hydrogen H_2
Identification 2:	Ⓔx II2G Ex e ib IIC T4 Gb basic instrument **with** leather case for all gases **including** hydrogen H_2
Testing institution:	TÜV NORD CERT GmbH, Hannover

2 Safety

2.1 Safety instructions

CAUTION!
Always use original SEWERIN accessories with the **EX-TEC OD 4/GM 4!**

CAUTION!
Observe the permissible operating temperature range of minus 10 °C to plus 40 °C!
(with some sensors the temperature range may be wider - see section 11.2: Technical data)!

CAUTION!
The **EX-TEC OD 4/GM 4** must not be recharged or its battery compartment opened in areas exposed to the danger of explosion!

CAUTION!
Test gases may only be used in well-ventilated spaces!

CAUTION!
The **EX-TEC OD 4/GM 4** satisfies the limits of the EMV regulation. When using it near (mobile) radio equipment please also observe the instructions in the manuals for that equipment!

CAUTION!
Please note that when the **EX-TEC OD 4/GM 4** is in measuring operation the gas sample is released into the ambient air through its outlet.
Special care must be taken to ensure that this does not produce an explosive or toxic gas mixture, especially during use in confined spaces. It may therefore be necessary to use a gas-warning device to monitor the ambient air.

CAUTION!
The **EX-TEC GM 4** with the hydrogen sulphide H_2S sensor **(0 – 2000 ppm)** is a pure measuring instrument: the „warning“ operating mode is not available. Please note that the human sense of smell fails at concentrations of 100 ppm of H_2S and above. Concentrations of over 500 ppm of H_2S lead to very serious damage to health, uncoordinated movements, unconsciousness, respiratory failure and death. It is thus **essential** to ensure that the lower toxic limit of 10 ppm in the ambient air is not exceeded!

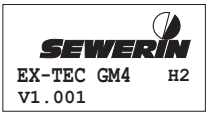
CAUTION!
When using the H_2 sensor the HG4 must be in its leather case (to provide explosion protection)!

3 Measuring operation

3.1 Switching on

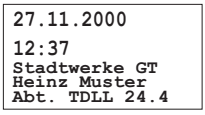
> **Note:**
> This operating manual describes the functions of software version 1.XXX. Other versions may involve changes.In this event please consult any page insertions.

- always switch the instrument on in **„fresh air“**
- hold the **on/off key** down for about 3 seconds
- the optical and acoustic control signals (items 1 and 7) operate for about 3 seconds
- the LC display illumination automatically switches on
- **pump instruments**: the integral pump runs at constant power



Opening screen

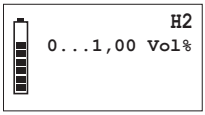
- display of:
  - version number **(V1.001)**
  - instrument type **(GM 4)**
  - sensor type **(H2)**



Date/time

- display of:
  - date **(27.11.2000)**
  - time **(12:37)**
  - user name
- properly-set values are important for the documentation of your readings

- you can correct any variances (cf. section 8.2: Setting the date/time)

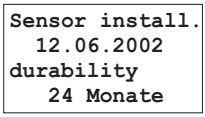


Instrument settings

The **EX-TEC OD 4/GM 4** defaults to a set operating mode at switch-on, which you can change (cf. section 9.4: Autostart). The operating mode is factory-set to **„Measurement“**:

- display of:
  - battery-charge level
  - gas (here: **H2**)
  - operating mode (here: measurement)
  - range (here: **0 – 1.00 vol.%**)

Other possible settings can be found in section 9.4: Autostart.



- display of the day the sensor was fitted
- display of expected sensor life

Symbols

- available operating hours are displayed (5 hours = **5 bars**)

symbol: battery

- measurement is under way **(symbol eggtimer)**

- all alarm thresholds are activated

symbol: alarm threshold

Next scheduled inspection
(display optional)

- if you have set an inspection interval, the next scheduled inspection date (e.g. **11.03.2004**) is displayed for about 3 seconds (cf. section 8.3: Setting the inspection interval))
- depending on the current and inspection dates, the intermittent or continuous alarm may also be triggered (items 1 and 7)

- clearing the alarm with the **on/off key** or waiting for 15 seconds switches to measuring operation

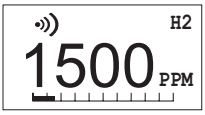
Note:
If the **EX-TEC OD 4/GM 4** now automatically switches off, the inspection date has passed with the inspection block switched on (cf. section 8.0: System menu).

The instrument does not revert to measuring operation until an inspection has been carried out **and** confirmed.

3.2 Operating modes

WARNING

- Warning of high gas concentration in buildings and the working environment
- Testing enclosed spaces



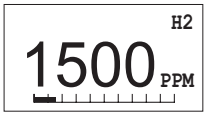
- all alarm thresholds are activated

  NB:
- the current gas concentration is displayed:
  - as a figure (e.g.: **1500 PPM H2**)
  - as a trend bar
- every 5 seconds an operating signal - both acoustic (item 7) and optical (item 1) - is emitted to confirm that the instrument in functioning in the **warning** operating mode. If this operating signal is not emitted, you cannot be sure that the gas concentration is being properly monitored and must leave the endangered area without delay.

MEASUREMENT

EX-TEC GM 4:

- Testing the gas concentration in buildings
- Measuring gas concentrations in pipes and elsewhere
- Searching for leaks in pipes in buildings
- Checking joints, e.g. weld seams
- Carrying out building tests
- Checking enclosed spaces



- the current gas concentration is displayed:
  - as a figure (e.g.: **1500 PPM H2**)
  - as a trend bar

EX-TEC OD 4:

- Determining the odorant concentration in natural gas
- Measuring the odorant concentration in the air in odorising plants
- Before sampling observe the sufficient flush of intake

Sampling hoses

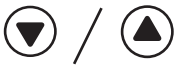
To ensure that the sample always passes through the **EX-TEC OD 4** at an adequate rate, there are different sampling hoses for each of the possible pressure ranges. These are colour-coded as follows:

Colour	Pressure range	Part-Nr.
black	20 – 50 mbar	OD04-Z0100
blue	50 – 125 mbar	OD04-Z0200
green	125 – 400 mbar	OD04-Z0300
yellow	400 – 1000 mbar	OD04-Z0400
red	1 – 2 bar	OD04-Z0500

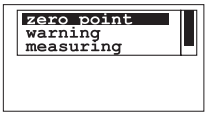
(further on request)

Measurements are only reliable if the original Sewerin-supplied hoses are used.

Switching operating modet

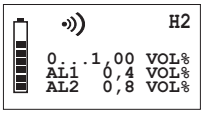


- holding down one of the cursor keys for about 2 seconds brings you to operating mode selection

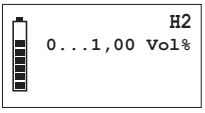


- use the **cursor keys** to select one of the items:

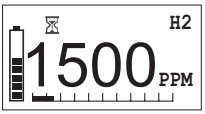
Zero point
in the currently selected measurement range zero-point correction can be carried out if necessary (temporary zero-point adjustment within certain limits)



Warning
selects the **WARNING** operating mode

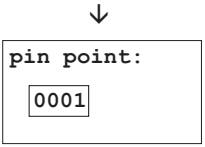


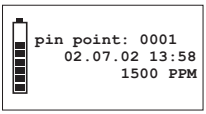
Measurement
selects the **MEASUREMENT** operating mode



Saving

The gas concentration measured can be saved and assigned to a measurement location. After the number of the measurement location has been entered, the measurement location, date, time and reading are displayed together once again. These data can subsequently be read out and analysed with the PC analysis software (available separately).



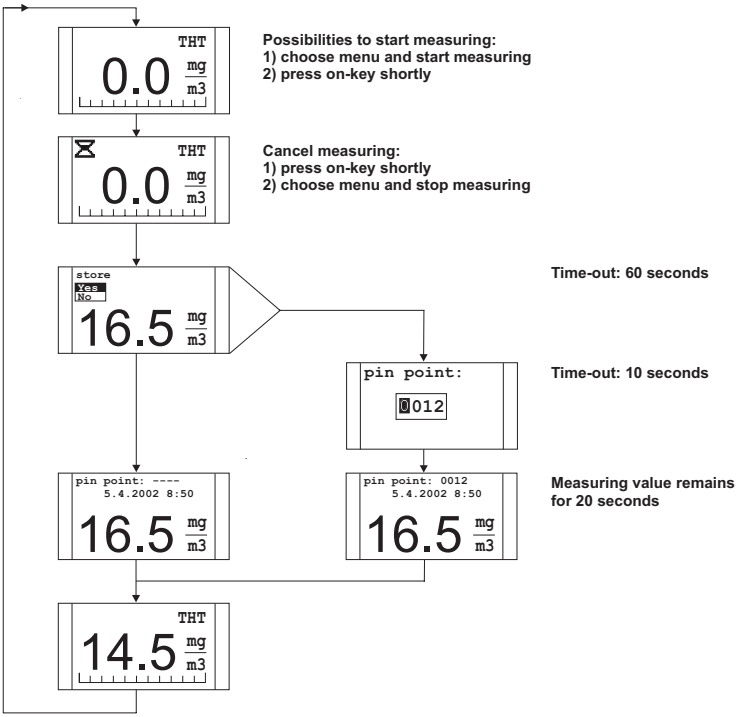


- then press the **on/off key** to confirm your selection

Note:
If the selection is not confirmed with the **on/off key**, the instrument reverts to its previous operating mode after about 10 seconds!

Starting measurement (only possible on the EX-TEC OD 4 in the „Measurement“ operating mode)

- A measurement can also be started by briefly pressing the **on/off key**.
- Indication when measurement is under way: eggtimer symbol.
- Measurement is halted on the expiry of the measurement duration (about 3.5 minutes) or when the reading has stabilised.
- When measurement is complete the reading can be assigned to a measurement location and saved.
- These data can subsequently be read out and analysed with the PC analysis software (available separately).
- If no measurement location is entered within 10 seconds, the measurement is lost.



3.3 Alarms

In the **WARNING operating mode** the **EX-TEC OD4/GM 4** has various alarm thresholds:

EX-TEC OD 4

Example: TBM

AL1 alarm threshold 1 = 10 mg/m³

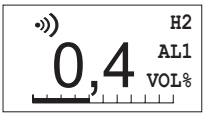
AL2 alarm threshold 2 = 20 mg/m³

EX-TEC GM 4

Example: H_2 (factory setting)

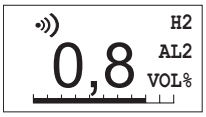
AL1 alarm threshold 1 = 4000 ppm

AL2 alarm threshold 2 = 8000 ppm



AL1 alarm (example: H2)

- if this alarm threshold is exceeded, the result is:
  - optical alarm (item 1)
  - acoustic alarm (item 7) at 2 Hz
  - LCD (item 2) lights up
  - **AL1** appears in the LCD
- the 2 Hz **intermittent tone** is quite different from the operating signal
- the acoustic AL1 alarm can be cleared by briefly pressing the **on/off key**, but the optical alarm (item 1) continues
- if the concentration falls below this alarm threshold, the optical and acoustic alarms (items 1 and 7) switch off

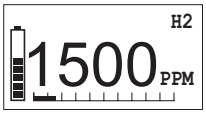


AL2-alarm (example: H2)

- if this alarm threshold is exceeded, the result is:
  - optical alarm (item 1)
  - acoustic alarm (item 7) at 5 Hz
  - LCD (item 2) lights up
  - AL2 appears in the LCD
- the **rapid intermittent tone** at 5 Hz is quite different from the operating signal
- the AL2 alarm **cannot** be cleared
- if the concentration falls below this alarm threshold, the alarm becomes an AL1 alarm, which can be cleared

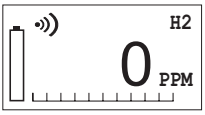
3.4 Illumination and operating-hours display

- pressing any **key** switches the LCD illumination on
- ou can also adjust the illumination time individually (cf. section 9: Hardware menu)



- when the illumination comes on the remaining operating hours (e.g. 5 hours) are displayed
- this display (battery symbol and bars) and the illumination switch off automatically after about 10 seconds

3.5 Battery alarm



- the battery symbol appears in the LC display and the operating signal sounds at twice its normal rate
- you now have **at least** another 15 minutes' operating time available
- after that the instrument must be charged (cf. section 4: Charging and battery operation)

3.6 Switching off

- hold down the **on/off key** for about 3 seconds
- the optical and acoustical control signals (items 1 and 7) are activated for about 3 seconds

- remaining operating hours are displayed in the form of the battery symbol and bars (e.g. 5 hours = 5 bars)

4 Charging and battery operation

CAUTION!
The **EX-TEC OD 4/GM 4** must not be recharged or its battery compartment opened in an area exposed to the danger of explosion

4.1 Charging and charge maintenance when using NiMH batteries

Batteries should be approximately at room temperature for charging.

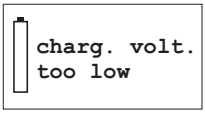
Charging

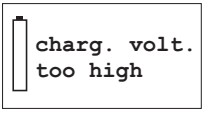
After 12 hours' charging the instrument has about **20 hours** of operation with the pump running or about **50 hours** of operation in diffusion operation.

The **docking station HG4** is required for charging. It can be used either in the workshop or in the emergency vehicle.

The docking station has the following connections on its side:

- AC/DC adapter M4 for 100 – 240 V~
- Vehicle cable M4 12 V= mounting
- Vehicle cable M4 12 V= mobile
- Vehicle cable M4 24 V= mounting
- You can operate up to 5 docking stations with one 100 – 240 V~ AC/DC adapter M4
- With more than 5 stations the charging voltage is insufficient. An error message is displayed to that effect
- if you connect the docking station directly to a 24-V network in the vehicle, the voltage will be too high for proper charging





Place the **EX-TEC OD 4/GM 4** in the docking station and a display on the following lines appears:

- the instrument now has 5 operating hours left (= 5 bars) and needs another 4 hours to reach full charge
- if it is fully charged, all the bars appear and the digital display disappears

Charge maintenance

Once the instrument is fully charged, it switches automatically to charge maintenance. It can be left in the docking station until the next time it is needed.

4.2 Self-dischargeand battery care

If the instrument is **not** placed in the charging adapter when it is switched off, this will cause the nickel/metal-hydride battery to self-discharge, reducing the remaining operating time.

After a maximum of 30 days the instrument indicates no remaining operating hours and it must be recharged.

Note:
Brief periods of use and protracted disuse may in the long term lead to the so-called „memory effect“, which means that the actual battery capacity available is less than what is shown in the display.

You can counteract this by fully discharging the **EX-TEC OD 4/GM 4** regularly (e.g. once a month) and then recharging it.

Switch the instrument **on** and place it in the docking station. When it is fully discharged, charging begins automatically. The entire process takes:

20	h	(typical discharge, pump instrument)
+ 12	h	(full charge)
= 32	h	

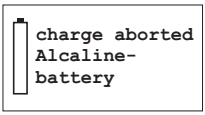
4.3 Battery operation

With new non-rechargeable alkaline batteries the **EX-TEC OD 4/ GM 4** will operate for 20 hours with the pump running or 50 hours in diffusion operation.

Changing the batteries

When the batteries need to be changed, the battery compartment can be opened with the screwdriver supplied (the two lower screws on the back of the instrument). Insert the new cells the right way round (as marked) and close the battery compartment again.

Once the old batteries are removed the date and time are preserved in the instrument for about **120 seconds**. If the battery change takes longer than this, you will have to re-enter both values next time it is switched on. No other data will be lost.



- An **EX-TEC OD 4/GM 4** fitted with non-rechargeable alkaline batteries cannot be charged. If you try to do so a warning message is displayed and the instrument must be removed from the docking station.

The value for the operating-hours display for nickel/metal-hydride batteries is lost if these are replaced by alkaline batteries, so if nickel/metal-hydride batteries are inserted again they must first be **fully discharged** and then recharged. This ensures that the available operating hours will be correctly displayed.

4.4 Instruments showing serial number 062 00

WARNING!
To ensure that the device remains explosion-proof as per ATEX 100a, only the following disposable/ rechargeable batteries may be used:
– Those supplied by SEWERIN,
– Others offered by SEWERIN, provided that compliance with standard EN 60079-7:2003 (especially chapter 5.7.2.1.17; explanation stated below) is guaranteed.

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

Disposable battery requirements

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

Rechargeable battery requirements

- Battery size: Mignon AA
- The creepage distance and air gap between the poles must not be less than 0.5 mm in accordance with (EN 60079-7:2003; Kap. 5.7.2.1.17).
- The accumulators must comply with DIN EN 61951-2 type HR6 and adhere to the temperature range.

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

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

5 Testing the instrument

5.1 Testing/upkeep

The required and prescribed instrument tests must be carried out in accordance with the following norms:

- EN 50073 (Guidelines for the selection, installation, operation and maintenance of instruments for the detection and measurement of combustible gases and oxygen)
- EN 45544-4 (Electrical workplace-atmosphere instruments for the direct detection and direct concentration measurement of toxic gases and vapours, part 4: Guidelines for selection, installation, operation and upkeep)
- BGI 518 (T023)
- DVGW worksheet G 465-4

The instrument tests prescribed by DVGW worksheet G 465-4 (Technical information, note) are divided into the following sections. Testing also covers accessories used with the instruments.

What ?	Who ?	When ?
function test	user	before use
display-accuracy test (adjustment)	expert or specialist firm	daily to half-yearly
upkeep (maintenance, repair if necessary)	SEWERIN, expert, authorised specialist firm	annually or whenever a defect occurs

Function test
This is the simplest form of instrument test. Carried out by the **user** before use, it comprises the following points:

- external condition including probe systems
- function of the operating controls
- function of the operating controls
- inspection of the pump and the intake channel
- pump function
- zero-point check

Checking display sensitivity (adjustment)

Testing frequency must be specified as a function of the sensors fitted and the use of the instrument. It can be anywhere between daily and half-yearly.

Testing must be carried out by an expert on the operator‘s own staff, by a specialist firm or by Sewerin itself.

The function test should be carried out at the same time.

Upkeep - maintenance and repair

The instrument must be maintained at least once a year by **SEWERIN Service**, a specialist firm authorised by SEWERIN or a SEWERIN-authorised **expert**.

Certificates must be issued accordingly.

The test disc on the instrument confirms when maintenance was last carried out and indicates the next scheduled date.

Annual maintenance and repair must cover at least the specialist care and adjustment of the instrument and the replacement of components with a limited useful life.

Note:
Where instruments have explosion protection the applicable regulations must be be observed!

Note:
Technicians responsible for upkeep must have been trained and instructed by Sewerin!

5.2 Test set

The **EX-TEC GM 4** and **EX-TEC OD 4** each have their own test sets.

5.2.1 EX-TEC GM 4

The test set **SPE HG** and **SPE-Y** check display accuracy:

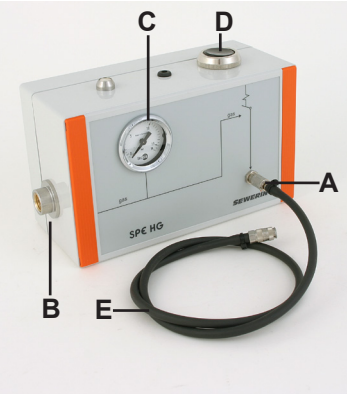


Fig.: Test set SPE HG

Item.	Description	Function
A	instrument hose	connection with: ● probe connection ● test heads
B	test gas connection	connection for: ● test gas cans ● pressure-hose adapter (in conjunction with pressure reducer
C	pressure indication	Display of actual pressure inside the test gas can
D	release key	release of test gas
E	connection hose	connection with: ● instrument hose

5.2.2 EX-TEC OD 4

The **test set SPE OD** checks display accuracy:

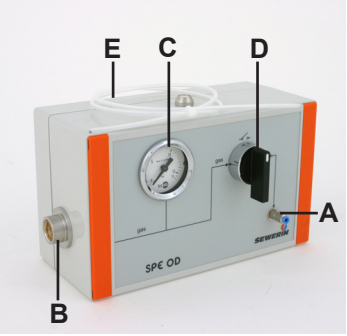


Fig.: Test set SPE OD

Item.	Description	Function
A	instrument hose	connection with: ● probe connection ● test heads
B	test gas connection	connection for: ● test gas cans ● pressure-hose adapter (in conjunction with pressure cylinder and pressure reducer reducer
C	pressure indication	Display of actual pressure inside the test gas can
D	release key	release of test gas
E	connection hose	connection with: ● instrument hose

5.3 Test gases

The following test gases are used in conjunction with the test set **SPE HG/SPE OD** to check the zero point and display accuracy **in the factory**. Test gas concentrations other than those listed here can also be used - see section 7.3: Setting the test gas concentration.

Gas	test gases
THT -zero point -sensitivity	 fresh air e. g. 15 mg/m^3 in synthetic air
TBM -zero point -sensitivity	 fresh air z. B. 10 mg/m^3 in synthetic air
Carbon monoxide CO -zero point -sensitivity	 fresh airt z. B. 30 ppm in synthetic air
Hydrogen H_2 -zero point -sensitivity	 fresh air 1 % vol. in synthetic air
Hydrogen sulphide H_2S -zero point -sensitivity	(0 – 100 ppm and 0 – 2000 ppm) fresh airt 40 ppm in N_2
Ammonia NH_3 -zero point -sensitivity	 fresh air 50 ppm in N_2
Oxygen O_2 -zero point -sensitivity	 100 % vol. CH_4 or CO_2 fresh air
Hydrogen chloride HCl -zero point -sensitivity	 fresh air 5 ppm in synthetic air

5.4 Testing the pump, zero point and display accuracy

Pump (pump instruments only)

The power of the instrument‘s integral pump is 5 – 15 l/h. You can function-test it by carrying out a simple impermeability test as follows:

- swith the instrument on in **fresh air**
- place the test head on the **EX-TEC OD 4/GM 4** and cover its nipple with a finger

  if the pump is working properly, error message **F100** (cf. section 11.3: Error messages) appears after about 10 seconds
  This error message is triggered if the volume flow falls below half its nominal level.
  The error message can be cleared by holding down any key.
- we recommend, replacing the pump filter of pump instruments on a regular basis (cf. section 11.4: Consumables).

Changing the pump filter with the EX-TEC OD 4/GM 4 switched off:

Undo and **remove the sensor cap** and extract the sensor from its holder. Now remove the pump filter (the white disc 4 mm in diameter) and replace it with a new one. The sensor (with rubber seal) and sensor cap can now be replaced. Do not overtighten the sensor cap screws.

For further testing proceed as follows:

- screw the selected test gas can by hand onto the test set you are using as far as it will go
- **EX-TEC GM 4:** connect the **test head HG4** to the hose of the **SPE HG** or **SPE-Y**
- **EX-TEC OD 4:** connect the **test and probe head OD4 (plug connection)** to the hose of the **SPE OD**
- enter your results in the test record (cf. appendix)

Zero point

wait for the instrument to warm up and reach a stable zero point:

Gas	tolerance
THT	-1.0 mg/m^3 – +1.0 mg/m^3
TBM	-1.0 mg/m^3 – +1.0 mg/m^3
Carbon monoxide CO	-3 ppm – +3 pppm
Hydrogen H_2	-40 ppm – +40 ppm
Hydrogen sulphide H_2S	(0 –100 ppm or. 0 – 2000 ppm) -3 ppm – +3 ppm or -20 ppm – +20 ppm
Ammonia NH_3	-3 ppm – +3 ppm
Oxygen O_2	-0.5 % vol. – +0.5 % vol.
Hydrogen chloride HCl	-1 ppm – +1 ppm

If display values are outside these tolerances the pertinent sensor must be readjusted (cf. section 7: Adjustment menu).

Display accuracy

- **EX-TEC GM 4:** place the **test head HG4** (without screws) on the instrument and hold down the release key of the SPE HG until the displayed concentration has reached a stable value.
- **EX-TEC OD 4:** place the **test and probe head OD4 (plug connection)** (without screws) on the instrument and turn the knob of the SPE OD. Now begin a measurement.

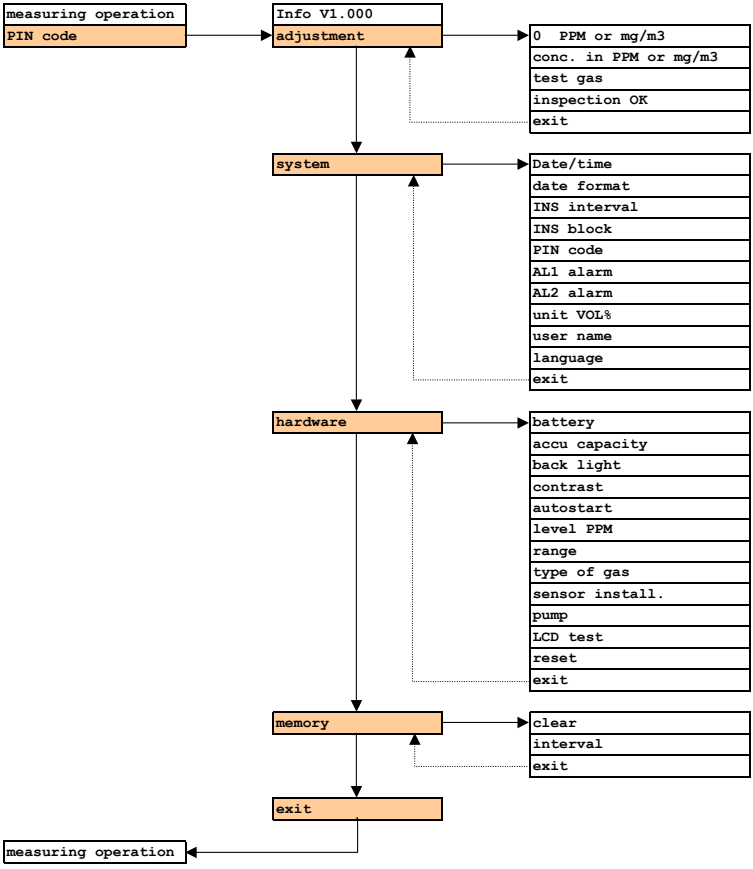
  The display values given in this table must be reached when the test gases listed in section 5.3 are administered.

Gas	Toleranz
THT	90 % – 110 % of the test gas
TBM	90 % – 110 % of the test gas
Carbon monoxide CO	27 – 33 ppm
Hydrogen H_2	0.9 – 1.1 % vol.
Hydrogen sulphide H_2S	(0 – 100 ppm or 0 – 2000 ppm) 36 ppm – 44 ppm or 20 – 60 ppm
Ammonia NH_3	45 – 55 ppm
Oxygen O_2	20.4 – 21.4 % vol.
Hydrogen chloride HCl	4.5 – 5.5 ppm

If display values are outside these tolerances the pertinent sensor must be readjusted (cf. section 7: Adjustment menu).

6 Info menu

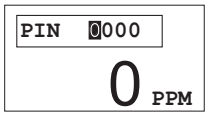
6.1 Menu structure



6.2 Overview

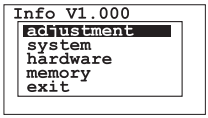
This is how to reach the Info menu during operation:

- simultaneously press both **cursor keys** for about 2 seconds
- **NB:** on **pump instruments** the integral pump continues to run at constant power
- you are now on the **INFO** menu item (cf. menu structure)



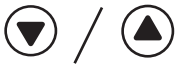
- you must now enter your **PIN** (cf. section 8.5: Setting the PIN):
  - factory setting = **0001**
  - pressing one of the **cursor keys** changes the value of the highlighted digit
  - pressing the **on/off key** saves this value

- only then do you have access to all menu items



- you are now on the **adjustment** menu item (cf. menu structure)

Adjustment



- press one of the **cursor keys** to navigate within the Info menu

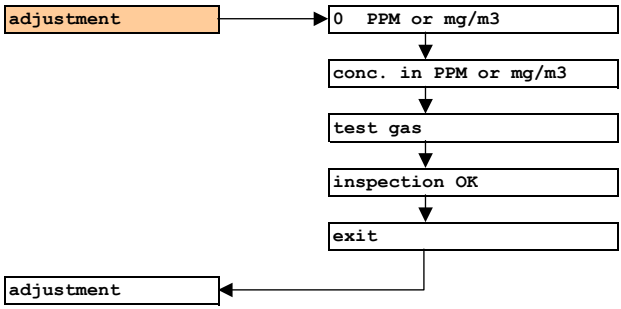
  This applies to all menu and submenu areas

- press the **on/off key** to select the highlighted submenu
- if you select the menu item **Back**, the instrument reverts to measuring operation

7 Adjustment menu

The adjustments described below relate to the **H_2 adjustment** on the **EX-TEC GM 4**. For other gases, use the test gases given in section 5.3.
The **O_2 adjustment** is covered explicitly in section 7.2.2. The **EX-TEC OD 4** is adjusted for **THT** or **TBM** as per the **H_2 adjustment**, but the test set **SPE OD** is used with the test and probe head OD4 (plug connection) and the connection hose supplied with the test set has to used as well.

7.1 Menu structure



7.2 Sensor adjustment

7.2.1 Setting the H_2-sensor

0 ppm

This function resets the **zero point**:

- carry out the adjustment in **fresh air**
- wait for the displayed concentration to reach a stable value
- press the **on/off key** to confirm ⏻.

100 ppm

This function resets the **display accuracy of the sensor**:

- use the test set SPE HG, the test head HG4 and 100 ppm H_2 test gas (cf. section 5: Testing the instrument)
- place (but do not screw) the test head on the **EX-TEC GM 4** and hold the release key down until the displayed concentration has reached a stable value.
- press the **on/off key** to confirm ⏻

7.2.2 Setting the O_2 sensor

0 % vol.

- use the test set SPE HG, the test head HG4 and 100 % vol. CH_4 or CO_2 test gas (cf. section 5: Testing the instrument)
- place (but do not screw) the test head on the **EX-TEC GM 4** and hold the release key down until the displayed concentration has reached a stable value.
- press the **on/off key** to confirm ⏻

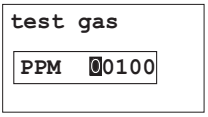
20.9 % vol.

- carry out the adjustment in **„fresh air“**
- wait for the displayed concentration to reach a stable value.
- press the **on/off key** to confirm ⏻.

7.3 Setting the test gas concentration

If you use test gases other than those supplied by SEWERIN (cf. section 5.3: Test gases), the concentration must be set accordingly.

Test gas



- briefly pressing the **on/off key** brings you to the test gas adjustment for the ppm-range
- the current concentration is displayed, e.g. the factory setting:
  100 PPM (... for hydrogen H_2)
- you can enter the required concentration digit by digit by pressing one of the **cursor keys** and pressing the **on/off key** to confirm

The adjustment ranges of the individual test gases are:

THT	
-adjustment range	10 – 50 mg/m^3
-increment	0.5 mg/m^3
TBM	
-adjustment range	5 – 50 mg/m^3
-increment	0.5 mg/m^3
Carbon monoxide CO	
-adjustment range	10 – 50 ppm
-increment	1 ppm
Hydrogen H_2	
-adjustment range	100 – 10,000 ppm
-increment	20 ppm
Hydrogen sulphide H_2S	(0 – 100 ppm)
-adjustment range	10 – 100 ppm
-increment	1 ppm
Hydrogen sulphide H_2S	(0 – 2,000 ppm)
-adjustment range	40 – 2,000 ppm
-increment	10 ppm
Ammonia NH_3	
-adjustment range	50 – 100 ppm
-increment	1 ppm
Oxygen O_2	
-adjustment range	17.0 – 22.0 % vol.
-increment	0.1 % vol.
Hydrogen chloride HCl	
-adjustment range	10 – 25 ppm
-increment	0.5 ppm

7.4 Inspection confirmation

Inspection OK

In this function you confirm the **inspection or adjustment** you have carried out by pressing the **on/off key**: ⏻

- this date is stored as a function of the set date (cf. section 8.2: Setting the date/time)
- the next inspection or adjustment date is calculated in accordance with the set inspection interval (cf. section 8.3: Setting the inspection interval)

7.5 Leaving the adjustment menu

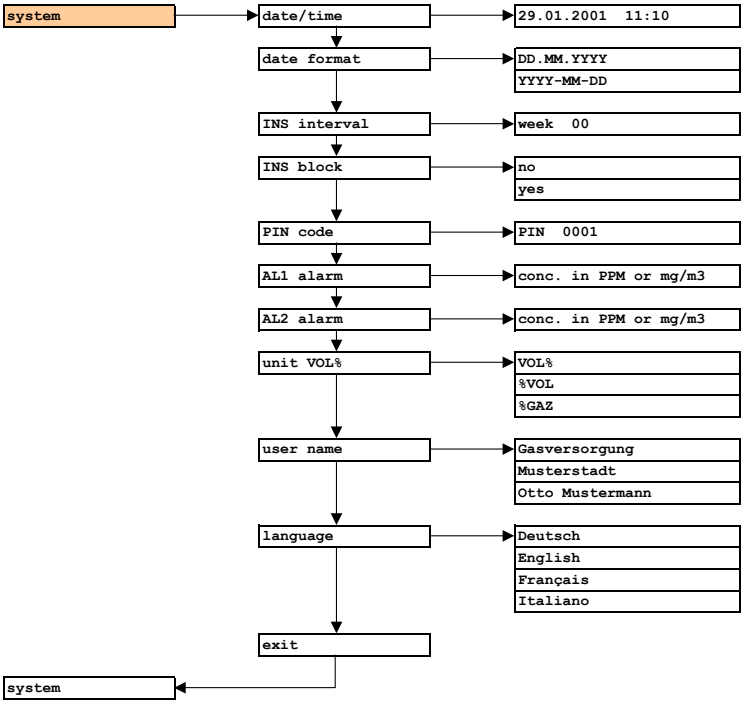
Back

This function switches you back to the Info menu**:**

- press the **on/off key** to confirm ⏻.

8 System menu

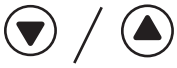
8.1 Menu structure



8.2 Setting the date and time

This function sets the current **date** and the current **time**:

- the date and time are displayed

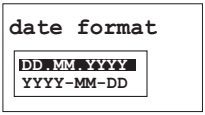


- press one of the **cursor key**s to change the value of the highlighted digit to the current value

- press the **on/off key** to save the value of the highlighted digit

Date format

This function sets the **date display format**:



DD.MM.YYYY
(e.g.: 31.01.2001)

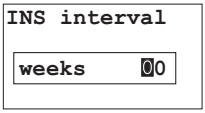
YYYY-MM-DD
(e.g.: 2001-01-31)

- press one of the **cursor keys** to select one of the settings:

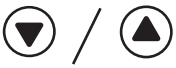
- press the **on/off key** to save the selected setting

8.3 Setting the inspection intervall

The **EX-TEC OD 4/GM 4** can remind you of scheduled inspection and adjustment dates. This reminder is based on the inspection interval:



- the last interval to be set is displayed



- press one of the **cursor keys** to change the interval in weekly increments (range: 0 – 52 weeks)

- press the **on/off key** to save the set interval

Example: inspection interval

February 2004						
Mo	Tu	We	Th	Fr	Sa	Su
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

March 2004						
Mo	Tu	We	Th	Fr	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

selected inspection interval:
04 weeks

inspection routine started
(i.e. inspection confirmed, see chapter 7.4):
10.02.2004

from these settings follows:
the next inspection has to be effected between **09. - 15.03.2004**.

How does the instrument indicate an inspection date?

1 week before (02. 03. 2004 - 08. 03. 2004)

```
Inspection
next week
```

LCD:
When switched-on a hint on the **approaching inspection** appears (as 4. picture) for approx. 3 secs.

lamp/buzzer:
inactive

instrument:
the instrument then automatically switches to measuring operation

During inspection period (09. 03. 2004 - 15. 03. 2004)

```
Inspection
necessary
```

LCD:
When switched-on a hint on the **due** inspection appears (as 4. picture) for approx. 10 secs.

lamp/buzzer:
interval light/sound

instrument:
the instrument then automatically switches to measuring operation

- by pressing **ON/OFF key**

OR

- automatically after 10 seconds

after exceeding inspection period (ab 16. 03. 2004)

```
Inspection
overtime
```

LCD:
When switched-on a hint on the **overdue inspection** appears (as 4. picture) for approx. 10 secs.

lamp/buzzer:
permanent light/sound

instrument:
type of reaction depends on function setting **INS lock** (see chapter 8.4)

Lock active (INS lock = yes)

instrument switches off
- by pressing the **ON/OFF key** or one of the **cursor keys**

OR
- automatically after 10 seconds

Lock deactivated (INS lock = no)

instrument switches to measuring operation
- by pressing **ON/OFF key**

OR
- automatically after 10 seconds

How does the instrument deteremine the next inspection date?

After an inspection has been effected, it has to be confirmed (see chapter 7.4). Thereby the internal inspection routine is started again.

Example:

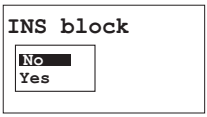
Inspection effected	11. 03.2004
Inspection confirmed	11. 03.2004
Inspection interval	4 weeks (see previous page)
Next inspection period	08. 04. 2004 – 14. 04. 2004

8.4 Setting the inspection block

You can activate an inspection block to make sure your **EX-TEC OD 4/GM 4** is regularly checked. This block does not become active until the next inspection date has passed (cf. section 8.3: Setting the inspection interval)..

After that the instrument cannot be operated until the inspection has been **carried out and confirmed** (cf. section 7.4: Inspection confirmation):

- briefly pressing the **on/off key** brings you to the inspection-block routine



- the last setting is displayed, e.g.:

  No = block inactive
  Yes = block active

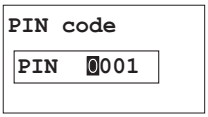
- you can set the desired condition by pressing one of the **cursor keys** and confirming with the **on/off key**

8.5 Setting the PIN

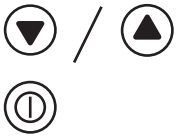
You can set up your **EX-TEC OD 4/GM 4** so that only authorised persons, e.g. instrument technicians and experts, have access to the information menu with all its subfunctions. This involves setting a PIN that must be entered every time the information menu is called.

When an incorrect PIN is entered the instrument reverts to its switch-on routine:

- briefly pressing the **on/off key** brings you to the PIN-setting routine



- the last PIN to be set (**0001** = factory setting) appears in the LC display
- we recommend you to use a different PIN



- by pressing or holding down one of the **cursor keys** and and confirming with the **on/off key** you can set each of the 4 digits from left to right to the desired PIN

PIN = 0000

the function is inactive, every user has access to the Info menu

PIN = 0001 – 9999

the function is active, only persons who know the set PIN have access to the Info menu

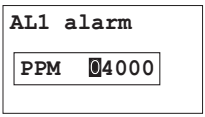
Note:
Make a note of your PIN and only give it to authorised persons!
If you forget your PIN, please contact SEWERIN service!

8.6 Setting the alarm thresholds

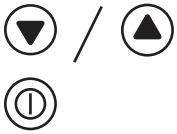
Alarm thresholds other than those pre-set by SEWERIN can be set as follows.

AL1-alarm

- briefly pressing the **on/off key** brings you to the AL1 alarm threshold routine



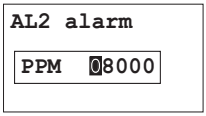
- the current alarm threshold is displayed, e.g. the factory setting for H_2: **4000 PPM**



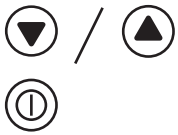
- press one of the **cursor keys** to set the desired threshold and the **on/off key** to confirm

AL2-alarm

- briefly pressing the **on/off key** brings you to the AL2 alarm threshold routine



- the current alarm threshold is displayed, e.g. the factory setting for H_2: **8000 PPM**



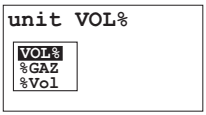
- press one of the **cursor keys** to set the desired threshold and the **on/off key** to confirm

The AL1 threshold is always lower than the AL2 threshold. The adjustment ranges of the individual alarm thresholds **(factory settings in bold)** are as follows:

Gas	AL1 threshold	AL2 threshold
THT/TBM - adjustment range - increment	 0.1 – 20.0 mg/m^3 0.1 mg/m^3	 20.1 – 100.0 mg/m^3 0,1 mg/m^3
CO - adjustment range - increment	**30 ppm** 5 – 199 ppm 1 ppm	**60 ppm** 6 – 200 ppm 1 ppm
H_2 - adjustment range - increment	**0.4 % vol.** 40 – 9.980 ppm 1 ppm	**0.8 % vol.** 60 – 10.000 ppm 1 ppm
H_2S (0 – 100 ppm) - adjustment range - increment	**10 ppm** 5 – 99 ppm 1 ppm	**20 ppm** 6 – 100 ppm 1 ppm
NH_3 - adjustment range - increment	**20 ppm** 1 – 99 ppm 1 ppm	**150 ppm** 2 – 100 ppm 1 ppm
O_2 - adjustment range - increment	**18.0 % vol.** 15.0 – 24.9 % vol. 0.1% vol.	**23.0 % vol.** 15.1 – 25.0 % vol. 0,1 % vol.
HCl - adjustment range - increment	**5 ppm** 9.5 ppm 0.5 ppm	**10 ppm** 1.0 – 10 ppm 0.5 ppm

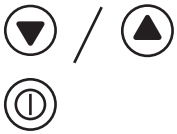
% vol. unit

- briefly pressing the **on/off key** brings you to the volume-unit setting routine



- he current setting is displayed, e.g.:

  VOL% - display in **VOL%** (D/GB)
  %VOL - display in **VOL%** (I)
  %GAZ- display in **%GAZ** (F)



- press one of the **cursor keys** to set the required unit and the **on/off key** to confirm

8.7 Setting the user name

You can also enter your name, your department or other personal information in the **EX-TEC OD 4/GM 4**. These will then be displayed every time the instrument is switched on to avoid doubt about who it is assigned to.

Three lines of 16 characters each are available for entries, e.g.:

Gassupply	-	line 1
Anytown	-	line 2
Otto Mustermann	-	line 3

User name

The user name is entered with buttons ▲ and ▼ . All existing signs must be confirmed.

There are two possibilities of entering:

1. possibility: new entry, no existing sign to be overwritten.

Entry starts with a blanc „ „.

Letters A - Z can be chosen in alphabetical order with button ▲.

After reaching letter Z the menu starts again with letter A.

Letters Z - A can be chosen downwards with button ▼.

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

> **Note:**
> The additional characters can only be chosen with button ▼.

The chosen letter is confirmed with button ⓘ.

The instrument automatically goes to the next letter.

After confirming the last letter of the user name, the instrument returns to the system menu.

2. possibility: an existing letter has to be overwritten.

When switching to the letter, the already existing letter is displayed.

The blanc appears when pressing button ⓐ, thereafter letters A - Z can be chosen as described on the previous page.

After reaching letter Z the menu starts again with letter A.

When pressing button ⓥ the previous letter of the alphabet appears, all others appear in descending order.

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

The chosen letter is confirmed with the ⓘ button.

The instrument automatically goes to the next letter.

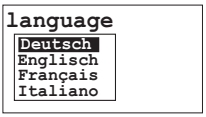
After confirming the last letter of the user name, the instrument returns to the system menu.

Note:
It could occur that during entry blancs a displayed by a black block. This only happens in entry mode. The actual display shows the correct blancs.

8.8 Setting the language

You can set the language of the individual menu items:

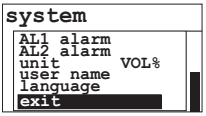
- briefly pressing the **on/off key** brings you to the language-setting routine



- the available settings are displayed

- press one of the **cursor keys** to set the required language and the **on/off key** to confirm

8.9 Leaving the system menu



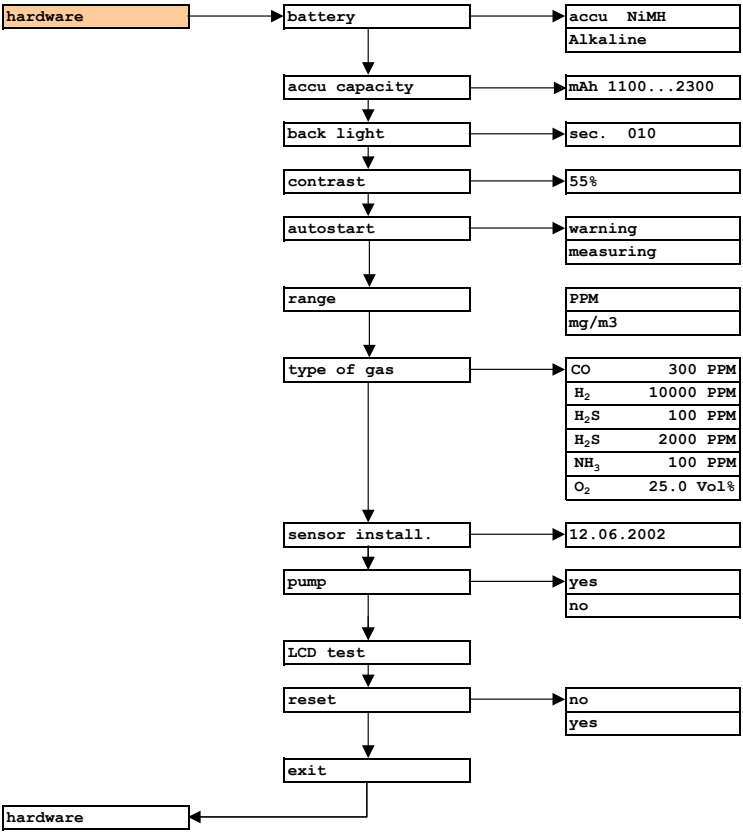
- this function switches back to the Info menu

- press the **on/off key** to confirm

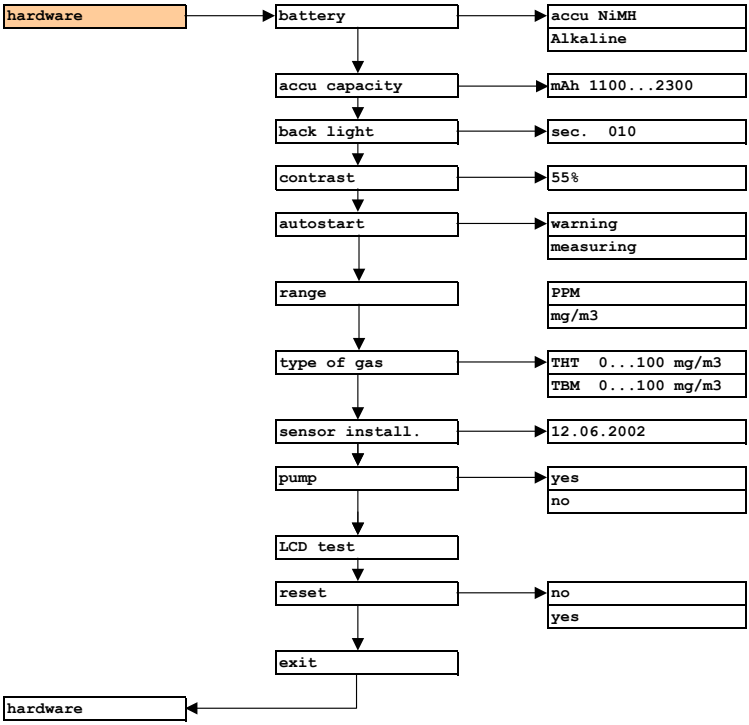
9 Hardware menu

9.1 Menu structure

9.1.1 EX-TEC GM 4



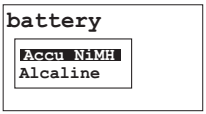
9.1.2 EX-TEC OD 4



9.2 Setting the battery type

The **EX-TEC OD 4/GM 4** can be operated with both rechargeable and non-rechargeable batteries (primary cells).

For the correct display of operating hours it is important for the current battery type to be properly set:

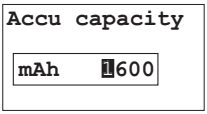


- the last battery type set is displayed

- press one of the **cursor keys** to select between settings:
  NiMH batteries
  (rechargeable)
  alkaline batteries
  (non-rechargeable)

- press the **on/off key** to save the battery type set

If you have selected NiMH as the battery type, you can enter the capacity (see the information on the battery itself):



- the last value set is displayed

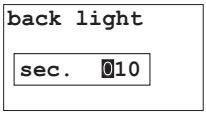
- press the **cursor keys** to change the value
  (range: 1100 – 2300 mAh)

- press the **on/off key** to save the set value

9.3 Setting the illumination time and contrast

During measuring operation the LCD illumination can be switched on by pressing any key (cf. section 3.4: Illumination and operating-hours display).

The period for which the illumination stays on can be set individually:



- the last period set is displayed

- press the **cursor keys** to change the value in seconds (range: 10 – 240 seconds)

- press the **on/off key** to save the set value

The contrast of the LCD can be set individually:

- the last contrast set is displayed

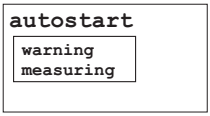
- press one of the **cursor keys** to change the value in percent (range: 0 – 100 %); 55 % is a good working value

- press the **on/off key** to save the set value

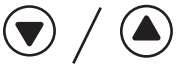
9.4 Autostart

The **EX-TEC OD 4/GM 4** enables you to set the default operating mode after switch-on. This function is preserved even when the instrument is switched off.

- briefly pressing the **on/off key** brings you to the Autostart routine



- the last set operating mode is highlighted, e.g. the factory setting „Measurement“



- press one of the cursor keys to select one of the Autostart functions

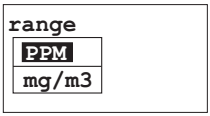
- briefly press the **on/off key** to confirm the selected Autostart function

9.5 Range

The **EX-TEC OD 4/GM 4** enables you to define the measurement units for some gases.

With THT/TBM sensors, for example, you can switch between a display in **ppm** and **mg/m3**.

- briefly pressing the **on/off key** brings you to the Autostart routine



- the last set unit is highlighted

- press one of the **cursor keys** to select one of the measurement units

9.6 Changing the sensor

The sensor in the **EX-TEC GM 4** can be changed. The following sensors are available: CO, H_2, H_2S (100 ppm), H_2S (2000 ppm), NH_3, O_2 and HCl.
Sensors not in use have to be stored in a special storage box.

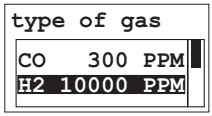
Note:
The sensor in the **EX-TEC OD 4** cannot be changed, and if an **EX-TEC GM 4** is fitted with an HCl sensor that cannot be changed either.

When you have changed the sensor you must enter the gas type and then the date on which the sensor was fitted.

CAUTION!
Whenever you change a sensor, you must readjust the instrument following a suitable test routine (see section 7).

9.6.1 Gas

- briefly pressing the **on/off key** brings you to the gas-setting routine



- the possible sensors are displayed

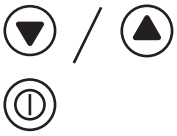
- press one of the cursor keys to select one of the sensors

9.6.2 Sensor installation

The sensor installation date can be entered.

- briefly pressing the **on/off key** brings you to the sensor installation-date routine

- the date when the sensor was installed is displayed

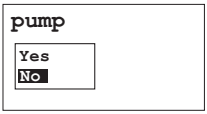


- press one of the **cursor keys** to enter the date and the **on/off key** to confirm

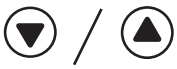
9.7 Setting pump operation

This function only applies to pump instruments. Pump instruments have the **letter P** on the identification sticker on the back.

If the pump of an **EX-TEC OD 4/GM 4 (pump)** fails, you can switch it off and continue to use it as a diffusion instrument **(though the probes cannot be used)**:



- the last set condition is displayed



- press one of the **cursor keys** to select one of the conditions:
  Yes (pump active)
  No (pump inactive)

- press the **on/off key** to save the set condition

9.8 Carrying out an LCD test

The LCD of your **EX-TEC OD 4/GM 4** has a matrix display. This test checks whether it is fully functional.

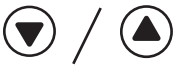
The test pattern that it generates enables the failure of individual pixels to be rapidly detected.

- briefly pressing the **on/off key** starts the LCD test

9.9 Restoring the factory settings

If all instrument settings (e.g. gas, sensor type, pump condition, contrast, illumination time etc.) have become totally disordered, the **EX-TEC OD 4/GM 4** can be restored to a defined initial state (factory setting):

- the date of the last restoration to factory settings is displayed



- press one of the **cursor keys** to select one of the options:
  - **No** leave settings as they are
  - **Yes** restore factory settings

- press the **on/off key** to confirm the selected option

CAUTION!
„After the instrument has been restored to its original settings, the adjustment must be checked!“

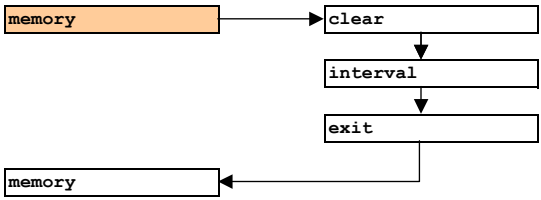
9.10 Leaving the hardware menu

This function switches back to the Info menu:

- press the **on/off key** to confirm

10 Memory menu

10.1 Menu structure



10.2 Clearing memory

- this function clears all saved readings

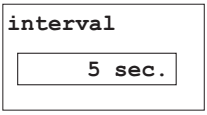
- press one of the **cursor keys** to select one of the options:

  No leave the memory content as it is

  Yes clear all saved readings

- press the **on/off key** to confirm the selected option.

10.3 Setting the memory interval



- you can set the frequency at which readings are saved, e.g.:
  5 sec **(factory setting)**
  readings are saved every 5 seconds

- press one of the **cursor keys** to change the value

- press the **on/off key** to save the new value

Data-memory capacity

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

10.4 Leaving the memory menu

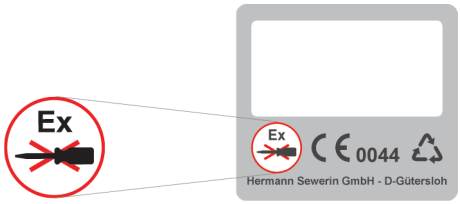
This function switches back to the Info menu:

- press the **on/off key** to confirm

11 Technical aspects

11.1 Technical notes

Identification sticker



The identification sticker on the back of the instrument includes a pictogram of a crossed-out screwdriver. This means that the battery compartment may not be opened in an area exposed to the danger of explosion.

Notes

If the **EX-TEX OD 4** is not left in the docking station after charging, it will have to be fully recharged again after 4 weeks at the most.

If the instrument will not switch on because of lack of power, charge it up and recalibrate it after a 3-day recovery period.

Accessories

The instrument accessories fall into three main groups: charging equipment, test equipment and sampling hoses (see section 12.2 „Accessories“).

Cleaning

The instrument should only be cleaned with a damp cloth: use no solvents, benzene, silcon-containing Cockpit-Spray or similar substances.

Static charge

Electrostatic charges should generally be avoided. Electrostatically floating objects (like metallic housings with no earth connection, for example) are unprotected against charges transferred from dust, aerosols and the like.

Battery change

After a change of batteries the **EX-TEC OD 4** and the **EX-TEC GM 4** with an **HCl sensor** require a minimum warm-up period of 15 minutes for a stable zero point to be reached.

11.2 Technical data

Instrument data

- Dimensions (W x H x D) 60 x 144 x 35 mm
- Weight: about 300 g

EX-TEC GM 4 (Serial number)

- diffusion instrument: 062 00 (type - version - number)
- pump instrument: 062 01 (type - version - number)

EX-TEC OD 4 (Serial number THT)

- diffusion instrument: 062 02 (type - version - number)
- pump instrument: 062 03 (type - version - number)

EX-TEC OD 4 (Serial number TBM)

- diffusion instrument: 062 04 (type - version - number)
- pump instrument: 062 05 ((type - version - number)

Explosion protection (CENELEC)

- Testing institution: TÜV NORD CERT GmbH, Hannover
- Test number: TÜV 01 ATEX 1657
- Identification 1: Ex II2G Ex e ib IIB T4 Gb
  basic instrument **without** leather case
  for all gases **except** hydrogen H_2
- Identification 2: Ex II2G Ex e ib IIC T4 Gb
  basic instrument **with** leather case for
  all gases **including** hydrogen H_2

Pump power

- negative pressure: > 150 mbar
- volume flow: typically 5 – 15 l/h

Power supply	
- Batteries:	3 rechargeable NiMH batteries or 3 alkaline primary cells (cf. section 4.3: Battery operation)
- Charging voltage:	12 V=
- Charging current:	360 mA (pulsed)
- Charging period:	about 12 hours (depending on battery capacity)
Measurement principle:	electrochemical measurement cell, temperature compensation, zero-point correction
Sensor life:	see sensor data!
Operating time:	20 h (pump operation) 50 h (diffusion operation) alarms and illumination reduce the operating time
Connection pressure (EX-TEC OD 4)	20 mbar - 2 bar (through different hoses: see page 12)
Operating and storage temperature:	see sensor data!

THT sensor data

Measurement principle: electrochemical

Range: 0 – 100 mg/m^3

Response times (pump instruments):

t_{90}< 210 sec

The use of probes increases response times!

Warm-up period: about 1 minute

Lifetime (depending on the ambient temperature):

- expected 18 months

Cross-sensitivity at 20 °C:

Gas	Concentration	Display
Carbon Dioxide CO2	5,000 ppm	0 mg/m3
Carbon Monoxide CO	100 ppm	2 mg/m3
Carbon Oxide Sulfide (COS)	1 % vol.	10 mg/m3
Ethylene C2H4	1 % vol.	yes, not defined
Hydrocarbons	100 % vol.	0 mg/m3
Hydrogen H2	1 % vol.	> 200 mg/m3
Hydrogen Sulfide H2S	20 ppm	0 mg/3
Isopropanol C3H8O	200 ppm	400 mg/m3
Methane CH4	100 % vol.	0 mg/m3
Nitrogen N2	100 % vol.	0 mg/m3
Tert.-Butylmercaptane	10 mg/m3	10 mg/m3
Triethyleneglycol C6H14O4	ppm scale	yes, not defined

Operating temperature: -10 °C – +40 °C

Humidity: 10 – 95 % r.h., non-condensing

TBM sensor data

Measurement principle: electrochemical

Range: 0 – 100 mg/m^3

Response times (pump instruments):

t_{90}< 270 sec

The use of probes increases response times:

Warm-up period: about 1 minute

Lifetime:

expected 12 months

Cross-sensitivity at 20 °C:

Gas	Concentration	Display
Alcohols	1,000 ppm	0 ppm
Carbon Dioxide CO2	5,000 ppm	0 ppm
Carbon Monoxide CO	300 ppm	0 ppm
Hydrocarbons	100 % vol.	0 ppm
unsat. Hydrocarbons	1,000 ppm	0 ppm
Hydrochloric Acid HCl	10 ppm	0 ppm
Hydrogen H2	1,000 ppm	0 ppm
Hydrogen Sulfide H2S	1 ppm	0 ppm
Nitrogen N2	100 % vol.	0 ppm
Nitrogen Dioxide NO2	1 ppm	yes, not defined
Nitrogen Monoxide NO	10 ppm	0 ppm

Operating temperature: -10 °C – +40 °C

Humidity: 10 – 95 % r.h., non-condensing

Carbon monoxide CO sensor data

Measurement principle: electrochemical

Range: 0 – 500 ppm

Response times (pump instruments):

t_{50}< 10 sec

t_{90}< 30 sec

The use of probes increases response times!

Warm-up period: about 1 minute

Lifetime (depending on ambient temperature):

- garanteed 24 months
- expected 36 months

Cross-sensitivity at 20 °C:

Gas	Concentration	Display
Alcohol	1,025 ppm	0 ppm
Ammonia	100 ppm	0 ppm
Carbon dioxide	10 % vol.	0 ppm
Chlorine or bromine	5 ppm	0 ppm
Benzene vapour	1 % vol.	0 ppm
Hydrogen	1,000 ppm	250 ppm
Hydrogen sulphide	20 ppm	0 ppm
Nitrogen dioxide	10 ppm	0 ppm
Nitrogen oxide	100 ppm	25 ppm
Sulphur dioxide	10 ppm	0 ppm

Operating temperature: -10 °C – +40 °C

Humidity range: 10 – 95 % r.h., non-condensing

Hydrogen H_2 sensor data

Measurement principle: electrochemical

Range: 0 – 1.0 % vol.

Response times (pump instruments):

t_{50} < 40 sec

t_{90} < 70 sec

The use of probes increases response times!

Warm-up period: about 1 minute

Lifetime:

- garanteed 12 months
- expected 24 months

Cross-sensitivity at 20 °C:

Gas	Concentration	Display
Ammonia	100 ppm	0 ppm
Carbon dioxide	1,000 ppm	0 ppm
Carbon monoxide	50 ppm	6 ppm
Chlorine	5 ppm	40 ppm
Ethylene	500 ppm	yes (not defined)
Hydrocyanic acid	10 ppm	0 ppm
Hydrogen sulphide	10 ppm	0 ppm
Isopropanol	1,100 ppm	0 ppm
Methane	1 % vol.	0 ppm
Nitrogen dioxide	10 ppm	0 ppm

Operating temperature: -10 °C – +40 °C

Humidity range: 10 – 95 % r.h., non-condensing

CAUTION!
The HG4 leather case is required for explosion protection when using the H_2 sensor.

Hydrogen sulphide H_2S sensor data (0 – 100 ppm)

Measurement principle: electrochemical

Range: 0 – 100 ppm

Response times (pump instruments):

t_{50}< 15 sec

t_{90}< 30 sec

The use of probes increases response times!

Warm-up period: about 1 minute

Lifetime:

- garanteed 24 months
- expected 36 months

Cross-sensitivity at 20 °C:

Gas	Concentration	Display
Ammonia	100 ppm	0 ppm
Carbon dioxide	5,000 ppm	0 ppm
Carbon monoxide	100 ppm	6 ppm
Chlorine	20 ppm	-1 ppm
Ethylene	500 ppm	2 ppm
Hydrogen	1 % vol.	200 ppm
Hydrocyanic acid	10 ppm	1 ppm
Methane	1 % vol.	0 ppm
Nitrogen dioxide	10 ppm	0 ppm
Sulphur dioxide	10 ppm	yes (not defined)

Operating temperature: -20 °C – +40 °C

Humidity range: 15 – 90 % r.h., non-condensing

Hydrogen sulphide H_2S sensor data (0 – 2000 ppm)

Measurement principle: electrochemical

Range: 0 – 2,000 ppm

Response times (pump instruments):

t_{50}< 30 sec

t_{90}< 90 sec

The use of probes increases response times!

Warm-up period: about 1 minute

Lifetime:

- garanteed 24 months
- expected 36 months

Cross-sensitivity at 20 °C:

Gas	Concentration	Display
Ammonia	100 ppm	0 ppm
Carbon dioxide	5,000 ppm	0 ppm
Carbon monoxide	100 ppm	6 ppm
Chlorine	20 ppm	-1 ppm
Ethylene	500 ppm	2 ppm
Hydrogen	1 % vol.	200 ppm
Hydrocyanic acid	10 ppm	1 ppm
Methane	1 % vol.	0 ppm
Nitrogen dioxide	10 ppm	0 ppm
Sulphur dioxide	10 ppm	yes (not defined)

Operating temperature: -20 °C – +40 °C

Humidity range: 15 – 90 % r.h., non-condensing

Ammonia NH_3 sensor data

Measurement principle: electrochemical

Range: 0 – 100 ppm

Response times (pump instruments):

t_{50}< 20 sec

t_{90}< 60 sec

The use of probes increases response times!

Warm-up period: about 1 minute

Lifetime:

- garanteed 12 months
- expected 24 months

Cross-sensitivity at 20 °C:

Gas	Concentration	Display
Alcohol	1,000 ppm	0 ppm
Carbon monoxide	1,000 ppm	0 ppm
Carbon dioxide	5,000 ppm	0 ppm
Chlorine	1 ppm	0 ppm
Carbon hydride	1 % vol.	0 ppm
Hydrochloric acid	5 ppm	0 ppm
Hydrogen	1 % vol.	0 ppm
Hydrocyanic acid	10 ppm	0 ppm
Hydrofluoric acid	4 ppm	0 ppm
Hydrogen sulphide	10 ppm	0 ppm
Nitrogen	100 % vol.	0 ppm
Phosphine	300 ppm	0 ppm

Operating temperature: -20 °C – +40 °C

Humidity range: 10 – 95 % r.h., non-condensing

Oxygen O_2 sensor data

Measurement principle: electrochemical

Range: 0 – 25 % vol.

Response times (pump instruments):

t_{90}< 30 sec

The use of probes increases response times!

Warm-up period: about 1 minute

Lifetimer:

- garanteed 24 months
- expected 24 months

Operating temperature: -20 °C – +40 °C

Humidity range: 5 – 95 % r.h., non-condensing

Hydrogen chloride HCl sensor data

Measurement principle: electrochemical

Range: 0 – 30 ppm

Response times (pump instruments):

t_{50} < 30 sec

t_{90} < 70 sec

The use of probes increases response times!

Warm-up period: about 1 minute

Lifetime:

- garanteed 12 months
- expected 24 months

Cross-sensitivity at 20 °C:

Gas	Concentration	Display
Alcohol	1,000 ppm	0 ppm
Carbon dioxide	5,000 ppm	0 ppm
Carbon monoxide	1,000 ppm	11 ppm
Chlorine	5 ppm	1 ppm
Hydrobromic acid	1 ppm	1 ppm
Carbon hydride	1 % vol.	0 ppm
Hydrogen	1 % vol.	0 ppm
Hydrogen sulphide	10 ppm	2.75 ppm
Hydrocyanic acid	15 ppm	1 ppm
Hydrofluoric acid	3 ppm	0 ppm
Nitrogen	100 % vol.	0 ppm
Phosgene	0.1 ppm	0 ppm
Phosphine	0.1 ppm	0.3 ppm
Sulphur dioxide	5 ppm	expected (not defined)

Operating temperature: -20 °C – +40 °C

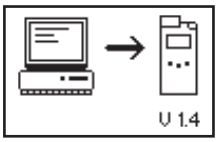
Humidity range: 10 – 95 % r.h., non-condensing

11.3 Error messages

An error message is displayed in case of any failure during operation. The error No. and error description will be indicated.

Error code	LCD (error description)	Cause	Remedy
F09	no adjustment:	no adjustment data present	carry out an adjustment
F10	adjustment error:	zero point in the ppm range	check test gas or repeat adjustment
F13	adjustment error:	sensitivity in the ppm range	check test gas or repeat adjustment
F51 – F54	system error	component error	witch instrument off and on again or contact SEWERIN service
F 59	voltage supply	voltage outside the permitted range	contact Sewerin service only
F100	pump power	pump power too low	check filters in the instrument and probes. Please observe the instructions in section 9.9: Adjusting pump operation

Note:
If any other error codes appear, please contact SEWERIN service!



Cause: Programm defect

Remedy: SEWERIN service

F09 – F15	temporary errors
F40, F100	clearable errors
F51 – 54, F59 – F62	system errors; switch instrument off

11.4 Consumables

Pump filter	built into the instrument to protect the pump (to replace it, the sensor cap must be removed with the screwdriver supplied with the instrument and the sensor removed)
H_2S filtre inside the senor head (EX-TEC OD 4)	Change in SEWERIN service
Test gas cans	various concentrations for monitoring and adjustment purposes

Note:
Test gas cans are under pressure: do not store above 50 °C!

11.5 Hints on Disposal

The disposal of instruments and accessories is governed by the European Waste Catalogue (EWC).

Type of Waste	Corresponding EWC Code
Instrument	16 02 13
Test gas can	16 05 05
Battery, accu	16 06 05

Old Instruments

Old instruments can be returned to Hermann Sewerin GmbH. We will arrange the qualified disposal free of charge through certified specialists.

12 Delivery variants and accessories

12.1 Delivery variants

EX-TEC OD 4
(diffusion device)

THT:

Part no.: OD04-10001

Serial number:
062 **02** ....
(Type - Model - Number)

TBM:

Part no.: OD04-11001

Serial number:
062 **04** ....
(Type - Model - Number)

EX-TEC OD 4
(pump-device)

THT:

Part no.:OD04-10101

Serial number:
062 **03** ....
(Type - Model - Number)

TBM:

Part no.: OD04-11101

Serial number:
062 **05** ....
(Type - Model - Number)

- All devices are equipped with an integral memory to store measuring data
- Suitable for connecting accessories

EX-TEC GM 4
(diffusion device)

Part no.: GM04-10001

Serial number:
062 **00** ....
(Type - Model - Number)

EX-TEC GM 4
(pump device)

Part no.: GM04-10101

Serial number:
062 **01** ....
(Type - Model - Number)

- All devices are equipped with an integral memory to store measuring data
- Suitable for connecting accessories
- For available sensors please note chapter 11.2

12.2 Accessories

Docking station HG4

Part-No.: LP10-10001

Docking station HG4 with interface

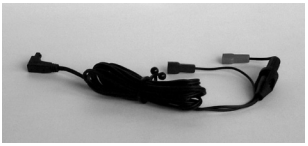
Part-No.: LP10-10101

- to hold the instrument
- with a connection socket for the AC/DC adapter or a vehicle cable
- with apertures for mounting in the vehicle or elsewhere

AC/DC adapter M4

Part-No.: LD10-10001

- to connect the docking station HG4 to a 100 – 240-volt~ mains supply



Vehicle cable M4 12 V= mounting

Part-No.: ZL07-10000

- to connect the docking station HG4 to a 12-volt= vehicle supply
- with built-in fuse and blade receptacles

Vehicle cable M4 12 V= mobile

Part-No.: ZL07-10100

- to connect the docking station HG4 to a 12-volt= vehicle supply
- with built-in fuse and connector for cigarette lighter

Vehicle cable M4 24 V= mounting

Part-No.: ZL09-10000

- to connect the docking station HG4 to a 24-volt= vehicle supply
- with voltage transformer and blade receptacles for a fix connection

Carrying bag HG4

Part-No.: 3204-0034

- leather case with viewing window and eyelets for the strap
- tab with press-stud to secure the instrument
- clip to wear device at the belt
- can be used in areas exposed to the danger of explosion (conducting front foil)
- must be used in areas where there is hydrogen and with the H_2-sensor

Carrying strap

Part-No.: 3209-0003

- Leather strap to carry the instrument
- adjustable between 0.5 – 1.0 m

Storage box for electrochemical sensors

Part-No.: GM04-Z0100

- designed for the safe storage of electrochemical sensors

EX-TEC GM 4 probe equipment

Diffusion device

Flexible hand probe HG4 with ball

Part-No.: ZS42-10000

- for two-handed operation in relatively inaccessible locations: probe tip with suction globe, fine dust filter, probe hose and probe head with attachment screws

Pump device

Flex Probe HG4_

Part-No.: ZS40-10200

- for one-handed detection and measurement in relatively inaccessible locations: flexible swan-neck, filter insert in the head and adapter head with attachment screws

Flexible hand probe HG4

Part-No.: ZS40-10100

- for two-handed detection and measurement in relatively inaccessible locations: hand grip with a flexible probe tip, filter insert in the head, probe hose and probe head with attachment screws

Note:
The probes for the pump instrument cannot be used in diffusion operation.
Probes for other gases are available on request.

Adapter EX-TEC OD 4

Test and probe head OD4

Part-No.: PP01-B1300

- the **EX-TEC OD 4** is operated in conjunction with the test and probe head, which has a plug connection for the sampling hoses

Adapter hoses

- Please note that different hoses must be used for different pressure ranges

  A detailed listing can be found on page 12

Mini measuring adapter

Part-No.: ZZ20-10000

- for connecting adapter hose and gas pipe

Prüftechnik

EX-TEC OD 4

Test set SPE OD

Part-No.: PP01-50100

- for mobile and in-vehicle use
- with a connection for SEWERIN test gas cans, flow-rate control, release key and connecting hose, in conjunction with the Test set and probe head OD4

EX-TEC GM 4

Test set SPE HG

Part-No.: PP01-10201

- for mobile and in-vehicle use
- with a connection for SEWERIN test gas cans, flow-rate control, release key and connecting hose, in conjunction with the probe head HG4

Test set SPE-Y

Part-No.: PP01-20001

- for mobile and in-vehicle use
- with a connection for SEWERIN test gas cans, flow-rate control, release key and connecting hose, for the probe head HG4

Test gas cans

- for testing display accuracy and adjustment
- various test gas concentrations in 1-litre cans under pressure of approx. 12 bar

Pressure cylinders

- for testing and adjusting display sensitivity
- various test gas concentrations in 0.4/2.0/10.0-litre steel cylinders under pressure of 100 – 150 bar

Case HG4

Part-No.: ZD18-10000

- to hold:
  - instrument and charging equipment
  - probe equipment
  - Test gas can and test set SPE-Y
- delivery does not include contents shown in the picture

13 Appendix

13.1 EU-declaration of conformity

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

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

Gütersloh, 2016-04-20

Dr. S. Sewerin
(General Manager)

The complete declaration of conformity can be found online.

13.2 Inspection protocol

Inspection protocol	**EX-TEC® GM 4 / OD 4**
Sensor (e.g. CO):	
test gas conc. (e.g. 40 ppm CO):	
display tolerance zero point (e.g. -3 – +3 ppm)	(Display tolerances according to
display tolerance test gas (e.g. 27 – 33 ppm)	chapter 5.4 of operating instruction)
Serial no. (e.g. 062 01 0001):	

SEWERIN

22.07.2008

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 F 100 when sealing										
2.2	- pump filter changed (e.g.: Y / N)										

3.0	**Display accuracy**										
3.1	- display (zero point)										
	- within tolerance (e.g.: Y / N)										
3.2	- display (test gas)										
	- within tolerance (e.g.: Y / N)										

4.0	**AL 1 alarm triggering**										
4.1	optical alarm (e.g.: Y / N)										
4.2	audible alarm (e.g.: Y / N)										

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

6.0	**Test**										
	- day										
	- month										
	- year										
	- signature										

13.3 EX-TEC OD 4/GM 4 operating instructions in brief

	switch on (press for about 3 seconds)
	switch off (press for about 3 seconds)
	clear AL1 alarm (press briefly)
	witch between operating modes/gases: - set zero point - warning - measurement - save or start measurement (OD 4 only)
(any key)	switch on LCD illumination and operating-hours dispplay (...these switch off automatically after about 10 seconds)

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