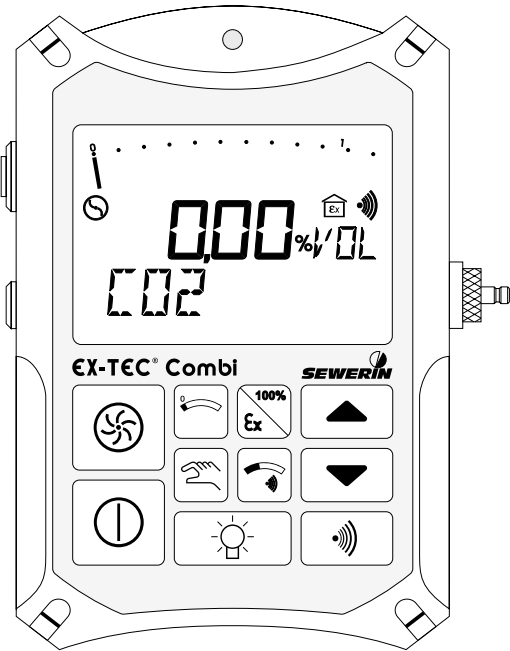


EX-TEC® Combi

Operating Instructions



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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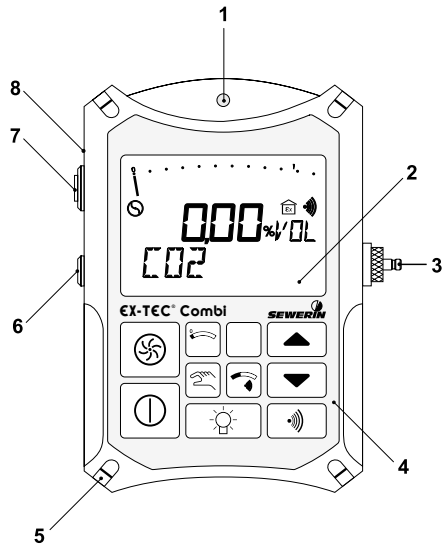
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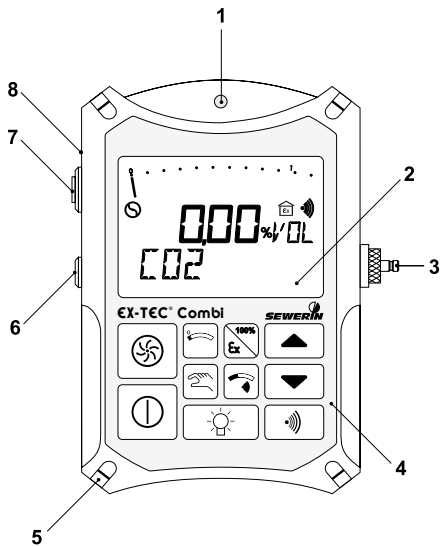
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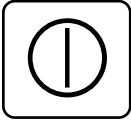
Device variation 1



Device variation 2



EX-TEC Combi: brief operating instructions



Switch on/off



Toggle between GAS WARNING/GAS MEASUREMENT operating modes (Device variation 2)



- Device variation 1: Toggle between GAS WARNING/GAS MEASUREMENT operating modes
- Switch pump on/off (in GAS MEASUREMENT mode)



Toggle between automatic/manual gas switching



Change the gas displayed (in manual operation)



Zero-point correction for the gas displayed



Display gas alarm thresholds AL1 and AL2



Acoustic clearance of the AL1 alarm



Switch LCD illumination on/off (switches off automatically after about 4

Operating Instructions

EX-TEC[®] Combi

15.06.2005 – V2.X – 103401 – en

For your safety

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 may damage or destroy the product.



Note:

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



This symbol will hereinafter identify all operating modes and measuring techniques not tested by DMT!

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1 EX-TEC Combi system

1.1 Excess-gas warning and measuring instrument



The **EX-TEC Combi** is a combined warning and measuring instrument for a number of different gases. It consists of:

- the basic instrument, incorporating a pump and a data memory for documentation purposes
- 4 sensor sockets for the measurement of up to 5 different gases

The following sensors are available:

- methane CH_4 or propane C_3H_8 or nonane C_9H_{20} (*)
- carbon dioxide CO_2
- oxygen O_2
- hydrogen sulphide H_2S
- carbon monoxide CO
- combined $\text{H}_2\text{S}/\text{CO}$ sensor

(*) This operating manual only describes methane measurement!

1.2 Fields of application

The **EX-TEC Combi** is suitable for use in the following fields:

WARNING mode

Workplace (atmospheric) monitoring in shafts and chambers in these fields:



- drinking-water supply (metering and transfer shafts)
- district-heating systems
- telecommunications shafts
- effluent-treatment systems (sewage works, pump sumps, digestion-tank areas, rain-overflow basins)
- traffic areas
- accessible culverts

● **Warning of explosive*) mixtures**

- due to leaking gas pipes near the shaft
- due to the proximity of oil, coal, natural-gas or LPG storage facilities
- due to the proximity of landfill sites, marshland, chemical works, filling stations or refineries
- due to cleaning or coating work with substances containing solvents
- due to the prohibited introduction of combustible substances into the canal network (e.g. petrol leaks)

*) the EC prototype test certificate DMT01ATEX G 002 includes measurement functions of the LEL methane/propane range

● **Warning of an oxygen defect /oxygen excess**

- due to an increase in other gas components
- due to the decomposition of organic waste in shafts (e.g. wet leaves)

- due to welding and heating processes with naked flames
- due to air depletion
- **Warning of toxic gases**
 - due to the formation of carbon dioxide by bacterial conversion processes
 - due to the formation of carbon dioxide in areas where there is mineral water
 - due to the formation of carbon dioxide in exhaled air
 - due to the formation of hydrogen sulphide in effluent
 - due to the formation of carbon monoxide from incomplete combustion (e.g. poorly-adjusted gas-heating systems)
 - due to the formation of carbon monoxide near highways or car-parks

GAS-MEASURING mode *)

Determining gas concentrations



- **Localisation**
 - measuring gas concentration in probe holes
 - determining which probe hole has the maximum concentration
- **Gas injection**
 - monitoring filling with natural gas and oxygen extraction
 - measuring the methane and oxygen concentration
- **Inertisation**
 - monitoring flushing with nitrogen and natural-gas extraction
 - measuring the methane and oxygen concentration

*) No measuring function for explosion protection in accordance with guideline 94/4/EG.

1.3 Test certificates

Passive explosion protection

The **EX-TEC Combi** has been tested for explosion protection in accordance with the European norm (CENELEC):

EC prototype test certificate:

PTB 96 ATEX 2166, supplements 1 and 3

Identification:  II 2 G EEx ib d IIB T3

Testing institution: Physikalisch-Technische Bundesanstalt, Braunschweig

Active explosion protection (measuring function)

The **EX-TEC Combi** has also been undergone a measurement-function test in **gas-warning** mode:

EG prototype test certificate:

DMT 01 ATEX G002, supplement 1 (measurement range 0 – 100 %LEL methane/propane)

Test report: PFG n° 41300401

- measurement range 0 – 25 vol.% oxygen, measurement of oxygen defect and excess,
- measurement range 0 – 5 vol.% of carbon dioxide,
- measurement range 0 – 500 ppm of carbon monoxide
- measurement range 0 – 100 ppm of hydrogen sulphide

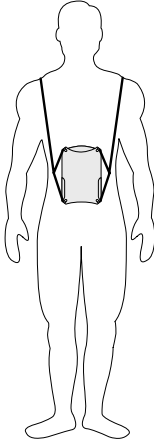
Testing institution: Deutsche Montan-Technologie GmbH (DMT), Essen

The test certificates can be found in the appendix.

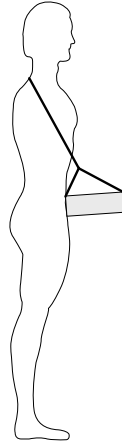
1.4 Carrying equipment

TRIANGEL carrying system

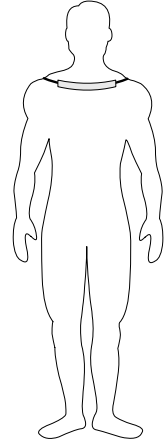
a quick and easy way of carrying the instrument, consisting of a carrying strap and neck-pad



front view



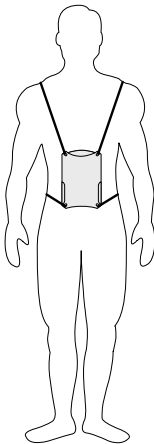
side view



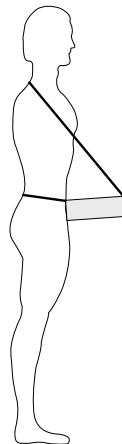
back view

CROSS-STRAP carrying system

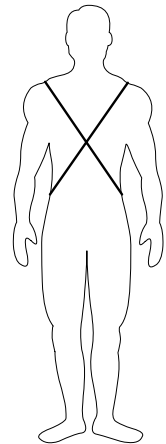
a comfortable way to carry the instrument for longer periods, consisting of 2 carrying straps crossed at the back



front view



side view



back view

2 Safety

2.1 Safety notes



CAUTION!

Always use original SEWERIN accessories with the **EX-TEC Combi**.



CAUTION!

Always use a probe hose with a hydrophobic filter.



CAUTION!

Do not use other than the original SEWERIN fine dust filters with the **EX-TEC Combi**. Never use activated carbon filters, as these will collect H₂S gas particles, thus causing the warning feature to stop working properly.



CAUTION!

Observe the permissible operating temperature of -10 °C to +40 °C.



CAUTION!

The **EX-TEC Combi** may only be recharged in an area not exposed to the danger of explosion.



CAUTION!

Use the test gases only in well-ventilated areas, as some concentrations exceed the pertinent MAK values.



CAUTION!

The **EX-TEC Combi** satisfies the limits of the EMV regulation. When using it near mobile radio equipment please also observe the instructions in their manuals.

3 Measuring operation

3.1 Instrument description

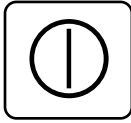


Note:

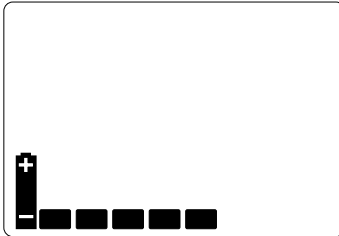
Fold out the illustration inside the front cover!

Item	description	function
1	alarm lamp	optical warning on: <ul style="list-style-type: none">● breaching alarm thresholds● display of error messages
2	LCD	display of: <ul style="list-style-type: none">● gas concentrations● menu items● operating conditions● error messages
3	probe connection	connection for: <ul style="list-style-type: none">● probe hose● test set
4	keypad	instrument operation
5	attachment	for carrying systems: <ul style="list-style-type: none">● Triangel● cross-strap
6	outlet	for the gas sample
7	buzzer	acoustic warning on: <ul style="list-style-type: none">● breaching alarm thresholds● display of error messages
8	interface	serial RS-232-interface for connection to a PC (⊗)

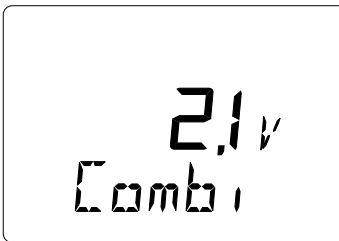
3.2 Switching on



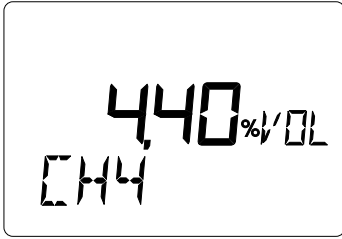
- always switch the instrument on in “fresh air”
- press the on/off key for about 3 seconds
- the optical and acoustic control signals (items 1 and 7) operate for about 3 seconds
- the LCD illumination automatically switches on for about 4 minutes
- available operating hours are displayed in the form of the battery symbol and bars (e.g.: 5 hours = 5 bars)
- the built-in pump runs at constant power



- the software version number (e.g. 2.1) and instrument type (Combi) are displayed

**Note:**

All the following instrument displays assume that the **EX-TEC Combi** is fully equipped for the measurement of 5 gases (CH₄ - CO₂ - O₂ - H₂S - CO).



CH₄ - methane

- the measurement range for methane is displayed:
0.00 – 4.40 %VOL
- depending on your last setting a display in the %UEG, %LEL, %LIE, %VOL, %GAZ quantities may also be possible (cf. section 7.6: Adjusting the CH₄ sensor)



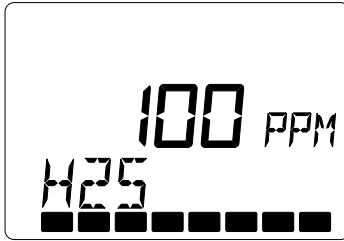
CO₂ - carbon dioxide

- the measurement range for carbon dioxide is displayed:
0.00 – 5.00 %VOL
- depending on your last setting a display in the %VOL, %GAZ quantities may be possible (cf. section 7.7: Setting the measurement quantity)



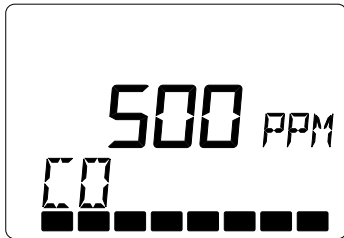
O₂ - oxygen

- the measurement range for oxygen is displayed:
0.0 – 25.0 %VOL
- depending on your last setting a display in the %VOL, %GAZ quantities may be possible (cf. section 7.7: Setting the measurement quantity)
- display of the sensor lifetime in the form of bars (cf. section 11.2: Technical data):
8 bars = 100 %



H₂S - hydrogen sulphide

- the measurement range for hydrogen sulphide is displayed:
0 – 100 PPM
- display of the sensor lifetime in the form of bars (cf. section 11.2: Technical data):
8 bars = 100 %



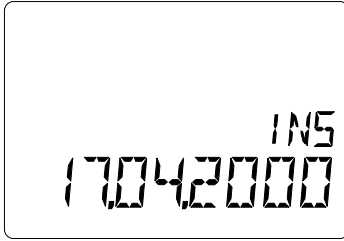
CO - carbon monoxide

- the measurement range for carbon monoxide is displayed:
0 – 500 PPM
- display of the sensor lifetime in the form of bars (cf. section 11.2: Technical data):
8 bars = 100 %



Time/date

- the current time (e.g. **17:49**) and date (e.g. **24.02.2000**) are displayed
- properly-set values are important for the documentation of your readings
- you can correct any variances (cf. section 9.2: Setting the date/time)



Next scheduled inspection (display optional)

- if you have set an inspection interval, the next scheduled inspection (e.g. **17.04.2000**) is displayed for about 3 seconds (cf. section 9.3: Setting the inspection interval)
- depending on the date and set schedule, the interval or continuous alarm may also be triggered (items 1 and 7)
- clearing the alarm with the **buzzer key** or waiting for 15 seconds switches to measuring operation



Note:

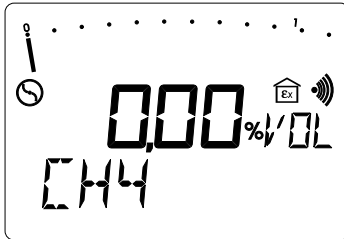
If the **EX-TEC Combi** now automatically switches off, the inspection date has passed with the inspection block switched on (cf. section 9.4: Setting the inspection block).

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

3.3 Modes

GAS-WARNING mode

Monitoring the atmosphere in shafts and chambers (cf. section 1.2: Fields of application)



- immediately after being switched on the **EX-TEC Combi** is always in warning mode

Indication: 

- all alarm thresholds are activated

Indication: 

- each available gas is displayed for about 3 seconds before switching to the next

Sequence:

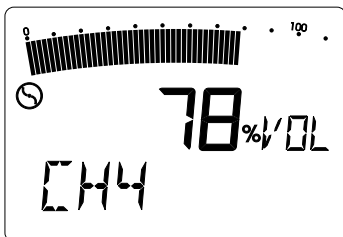
CH₄ - CO₂ - O₂ - H₂S - CO

- Every 5 seconds an operating signal is activated as a marker. It is both, acoustic (item 7) and optical (item 1). The optical signal acts as a control that the instrument is functioning in **gas-warning** mode.

If the operating signal is switched off, the monitoring of the gas concentration is no longer insured. The endangered area must be left immediately.

GAS-MEASURING mode (⊗)

Determining gas concentrations (cf. section 1.2: Fields of application)



- pressing the **operating-mode key** (instruments variant 2) for about 3 seconds switches between the two modes
- on instruments variant 1, the switching is carried out by pressing the **pump-key** for about 3 seconds
- in this mode all alarm thresholds and the operating signal are switched off
- the pump now runs at maximum power
NB: (no symbols)
- each available gas is displayed for about 3 seconds before switching to the next

Sequence:

CH₄ - CO₂ - O₂ - H₂S - CO

- in this mode, depending on the task at hand, you can also switch the instrument's pump on and off by briefly pressing the **pump-key**



Note:

If you wish to use the **EX-TEC Combi** purely as a warning device, you can deactivate **GAS-MEASURING** mode (cf. section 9.5: Setting the 100 vol.% range)!

3.4 Switching gases



- repeatedly pressing the hand key toggles between automatic and manual gas-type switching

Automatic switching

- each available gas is displayed for about 3 seconds before switching to the next:

Sequence:

CH₄ - CO₂ - O₂ - H₂S - CO



Manual switching

- each gas is displayed until a **arrow key** is pressed
- pressing a **arrow key** then switches to the next gas:

Sequence (cursor up):

CH₄ - CO₂ - O₂ - H₂S - CO



Note:

In **WARNING** mode automatic switching always has priority!

If the instrument is in manual switching mode and no key has been pressed for about 10 seconds, it shifts back to automatic switching!

3.5 Alarms

The „Technical Rules for Hazardous Substances (TRGS 402 and 900)“ require certain limit values to be monitored and adhered to in the air in the workplace.

In **WARNING mode** only the **EX-TEC Combi** thus has three different types of alarm: one optical (item 1), one acoustic (item 7) and one that takes the form of the LCD illumination (item 2) switching on:

AL1, AL2, AL3 The instantaneous value alarm appears with all gases:

CH₄ - CO₂ - O₂ - H₂S - CO

when the **measured** gas concentration exceeds or falls below a fixed **threshold value**.

KZW The short-term value alarm appears with toxic gases:

CO₂ - H₂S - CO

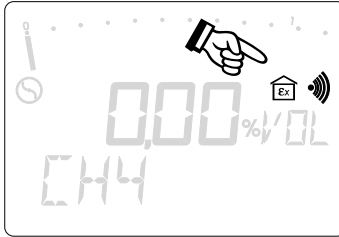
when the gas concentration **averaged** over an adjustable time period (e.g. 15 minutes) has exceeded an assessed **limit value**.

LZW The **long-term value alarm** appears with toxic gases:

CO₂ - H₂S - CO

when the gas concentration **averaged** over an 8-hour working shift has exceeded a fixed **limit value**.

3.6 Instantaneous value alarms (AL1, AL2, AL3)



- when in **gas-warning** mode the **EX-TEC Combi** is constantly in alarm readiness
- this is displayed in the LCD by two symbols: **Ex-area** and **alarm threshold**
- the alarm is triggered as soon as a threshold is breached

Display of alarm thresholds

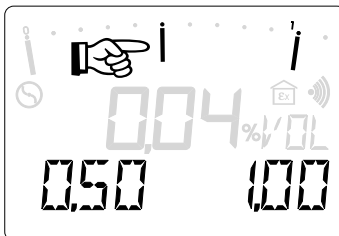


- holding down the **threshold value key** displays the set alarm thresholds for the pertinent gas



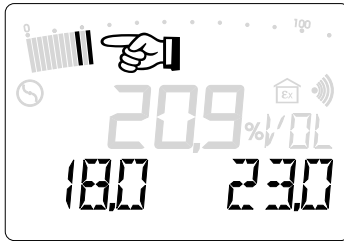
Methane CH₄

- alarm thresholds (factory settings):
AL1 = 0.90 %VOL = 20 %LEL
AL2 = 2.20 %VOL = 50 %LEL



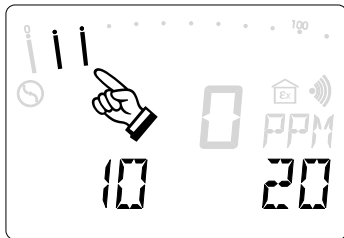
Carbon dioxide CO₂

- alarm thresholds (factory settings):
AL1 = 0.50 %VOL (MAK value)
AL2 = 1.00 %VOL



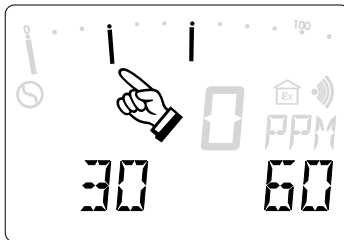
Oxygen O₂

- alarm thresholds (factory settings):
AL1 = 18.0 %VOL
AL2 = 23.0 %VOL
- the AL1 alarm threshold is triggered when the value falls below the threshold



Hydrogen sulphide H₂S

- alarm thresholds (factory settings):
AL1 = 10 PPM (MAK value)
AL2 = 20 PPM



Carbon monoxide CO

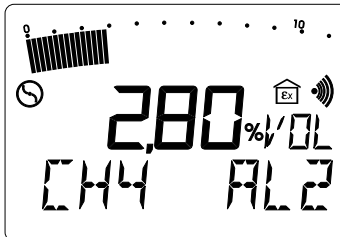
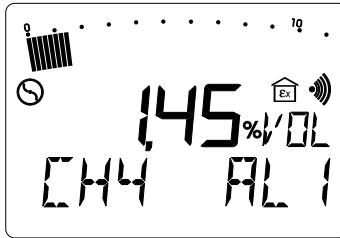
- alarm thresholds (factory settings):
AL1 = 30 PPM (MAK value)
AL2 = 60 PPM



Note:

You can alter the factory-set thresholds to your own individual limits (cf. section 9.7: Setting the alarm thresholds)!

Triggering the alarm thresholds

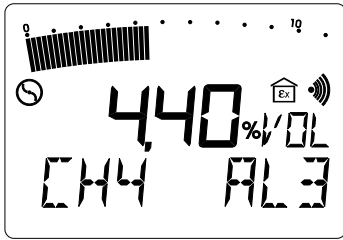


AL1 alarm (Example: CH₄)

- exceeding this alarm threshold triggers:
 - the optical alarm (item 1)
 - the acoustic alarm (item 7)
 - the appearance of **AL1** in the LCD
- the **interval tone** is clearly distinguishable from the operating signal
- the AL1 alarm can be cleared, the optical alarm (item 1) persists
- if the concentration falls below this alarm threshold, the optical and acoustic alarms (items 1 and 7) switch off

AL2 alarm (Example: CH₄)

- exceeding this alarm threshold triggers:
 - the optical alarm (item 1)
 - the acoustic alarm (item 7)
 - the appearance of **AL2** in the LCD
- the **continuous tone** is clearly distinguishable from the operating signal
- the AL2 alarm cannot be cleared
- if the concentration falls below this alarm threshold, the alarm that sounds (AL1) can be cleared



AL3 alarm (Example: CH₄)

- if the end of the measurement range is exceeded, the optical and acoustic alarms (items 1 and 7) are triggered and **AL3** appears in the LCD
- the continuous tone is clearly distinguishable from the operating signal
- the AL3 alarm cannot be cleared either
- if the gas concentration falls below the end of measurement range, the AL3 alarm is reset and the AL2 alarm activated



Note:

The AL3 alarm can be suppressed by switching to **GAS-MEASURING** mode or switching off the instrument!



Note:

In the **GAS-WARNING** mode, 0 – 100 %LEL methane concentrations exceeding the upper measuring range value can influence the accuracy of measurement.

After triggering the AL3 alarm in this measuring range, the instrument must be inspected before any further use (cf. section 5.1: Function testing, testing display accuracy, maintenance). It is necessary to repeat this operation the following days.



Note:

In the **GAS-WARNING** mode the following remarks should be observed during operation at degrees below zero, high temperatures and high humidity:

- Degrees below zero lead to a diminished display (up to 4 % LEL at -10 °C) at the zero-point of the methane and propane sensor. This can be compensated by a correspondingly lower adjustment of the alarm thresholds.
- When adjusting the methane sensor with dry gas, high temperatures and high relative humidity (> 90 %) could lead to a diminished display (up to 30 % of measuring value). This can be compensated by a correspondingly lower adjustment of the alarm thresholds.


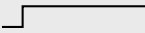
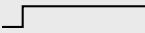





Note:

After triggering the AL3 alarm in the CO- or H₂S-measuring range, the instrument must be inspected before any further use (cf. section 5.1: Function testing, testing display accuracy, maintenance).

Summary

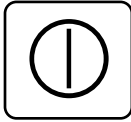
All alarm thresholds (factory settings) and clearance facilities in brief:

Alarm display	Pre-alarm AL1 	Main alarm AL2 	End of range AL3 
Confirmation			
CH ₄ C ₃ H ₈ C ₉ H ₂₀	0.90 %VOL 20 %LEL 0.34 %VOL 0.15 %VOL	2.20 %VOL 50 %LEL 0.86 %VOL 0.35 %VOL	4,40 %VOL 100 %LEL 1.7 %VOL 0.7 %VOL
CO ₂	0.50 %VOL	1.00 %VOL	5.00 %VOL
O ₂ *	18.0 %VOL	23.0 %VOL	25.0 %VOL
H ₂ S	10 PPM	20 PPM	100 PPM
CO	30 PPM	60 PPM	500 PPM
NH ₃	50 PPM	75 PPM	100 PPM

*** Exception:**

With oxygen O₂ both thresholds take the form of a main alarm. The **AL1 alarm** is triggered if the value falls below the threshold of 18.0 vol.%.

3.7 Short-term value alarm (KZW), long-term value alarm (LZW), minimum and maximum values (MIN/MAX)



- briefly press the on/off key in gas-warning mode

MIN/MAX - minimum and maximum values

Often it is only the display of the minimum or maximum concentrations encountered so far that is of interest. These can be displayed for **all gases** since the last time the instrument was switched on.

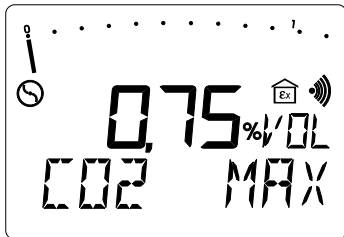


MIN value (Example: CO₂)

- the minimum concentration value (e.g. 0.25 %VOL) since the last time the instrument was switched on is displayed
- MIN appears in the LCD



- pressing the **arrow-up key** brings you to the next display



MAX value (Example: CO₂)

- the maximum concentration value (e.g. 0.75 %VOL) since the last time the instrument was switched on is displayed
- MAX appears in the LCD



- pressing the **arrow-up key** brings you to the next display

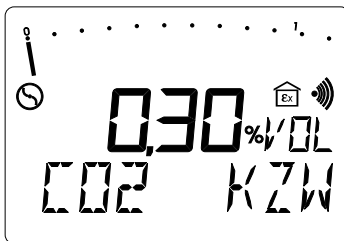
KZW - short-term value alarm

This monitoring mode is based on an **averaging period, usually 15 minutes** (cf. section 8.5: Setting the short-term value interval).

The total concentrations of the pertinent **toxic gas** over the averaging period must not exceed the product of the MAK value and the overshoot factor.

Gas	MAK value	Factor
carbon dioxide CO ₂	0.50 vol.%	4
hydrogen sulphide H ₂ S	10 ppm	1
carbon monoxide CO	30 ppm	2

Example: a constant reading > 2.00 vol.% (= 4 x 0.50 vol.%) over 15 minutes triggers the **KZW alarm (main alarm)**, which cannot be cleared.



KZW (Example: CO₂)

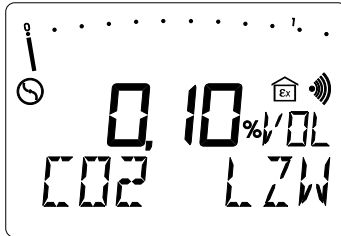
- the current short-term value (e.g. 0.30 %VOL) since the last time the instrument was switched on is displayed
- **KZW** appears in the LCD
- pressing the **arrow-up key** brings you to the next display

LZW - long-term value alarm

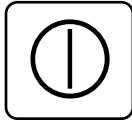
This monitoring mode is based on a **shift length of 8 hours**.

The total concentrations of the pertinent **toxic gas** over the length of the shift must not exceed the MAK value.

Example: a constant reading > 0.50 vol.% over 8 hours triggers the **LZW alarm (main alarm)**, which cannot be cleared

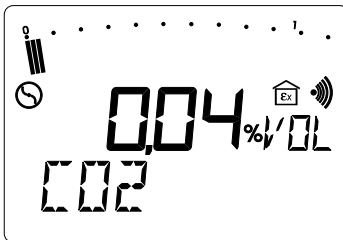
**LZW (Example: CO₂)**

- the current long-term value (e.g. 0.10 %VOL) since the last time the instrument was switched on is displayed
- **LZW** appears in the LCD (item 2)
- the display of these values disappears:
 - if the **on/off key** is briefly pressed
 - if no key is pressed for about 10 seconds

**Note:**

Both alarms (KZW and LZW) can be suppressed by switching to GAS-MEASURING mode or turning the instrument off.

3.8 Zero point adjustment



- if the **EX-TEC Combi** deviates from its zero point after flushing with „fresh air“ (observe tolerances), this can be corrected manually
- pressing the **zero point key** sets the zero point for the gas displayed (max. 5% from the end of the measurement range)
- if the zero point cannot be set, the sensor must be adjusted (cf. section 7: Adjustment menu)

CO₂ zero point

- the zero point for carbon dioxide is **0.04 %VOL**, as this is the concentration found in normal fresh air

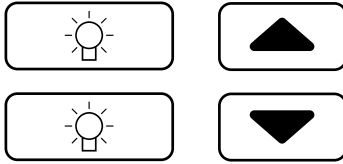
3.9 Illumination and contrast



Illumination

- repeatedly pressing the **light key** switches the LCD illumination on and off
- after about 4 minutes the illumination automatically switches off again

Contrast



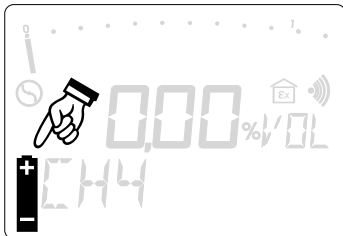
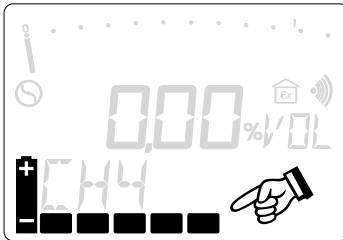
- simultaneously pressing the **light key** and a **arrow key** increases or reduces the contrast of the LCD
- your last setting is preserved even when the instrument is switched off

3.10 Operating hours display and battery alarm



Operating hours display

- simultaneously pressing **both arrow keys** during measuring operation displays the number of operating hours remaining (e.g. 5 hours)
- this display (battery symbol and bars) disappears automatically after about 10 seconds

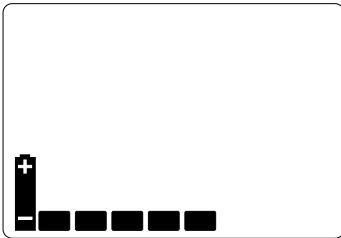
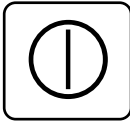


Battery alarm

- when the charge falls below a threshold value the battery symbol appears, the alarm lamp flashes and an acoustic signal sounds.
- the battery alarm can be cleared
- when the battery symbol is triggered, there is at least another 15 minutes' operating time remaining.

- this period of time is emphasized acoustically by a double beep tone
- after that the instrument must be recharged (cf. section 4: Charging)

3.11 Switching off



- press the **on/off key** for about 3 seconds
- the optical and acoustic control signals (items 1 and 7) operate 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

4.1 Charging and charge maintenance

Charging

When fully charged the instrument has a **maximum** of 9.5 hours' operating time with the pump running.

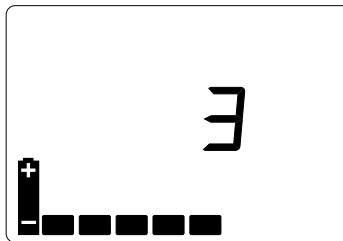
To charge the instrument you will need the **docking station HS 1.2 A** (see illustration), which can be used in the workshop or the emergency vehicle.



The following connection sockets can be found on the side of the docking station HS 1.2 A:

- AC/DC adapter M4 100 – 240 V~,
- Car cable M4 12 V= mounting,
- Car cable M4 12 V= mobile,
- Car cable M4 24 V= mounting.

Switch the **EX-TEC Combi** off and place it in the charger. A display on the following lines appears:



- the instrument still has 5 operating hours left (= 5 bars) and will take another 3 hours to be fully recharged
- if it is fully charged, all the bars appear and the numerical display disappears

Charge maintenance

As soon as the instrument is fully charged it automatically switches to charge maintenance. It can be left in the charging adapter until the next time it is needed.

4.2 Self-discharge

If the instrument is not placed in the charging adapter when it is switched off, this will cause the nickel-cadmium 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 co-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 Combi** regularly (e.g. once a month): leave it switched on until it switches itself off, then recharge it!

5 Testing/maintenance

**Note:**

Gas warning instruments must always be tested by the user before use or before each shift. But at a minimum all 4 month. The test must cover:

- the battery charge
- the display with environmental gas conditions and test gases

(Technical bulletin BGI 518)

**Note:**

DIN EN 50073 and EN 45544-4 provides that portable gas warning instruments (of which the **EX-TEC Combi** is one) must be tested as stipulated in their operating instructions and immediately before use. Items that the test is required to cover include the zero point and display sensitivity with a field calibration instrument and test gas.

**Note:**

In case of calibration data to multiple gas types are stored, tests of display accuracy must be carried out for all existing calibrations using corresponding test gases (see section 5.3).

5.1 Function testing, testing display accuracy, maintenance

Please consider the necessary and prescribed instruments control according to:

- EN 50073
- EN 45544-4
- BGI 518 (T023)
- BGI 836 (T021)/Applicable only in Germany
- DVGW worksheet G 465-4/Applicable only in Germany

Testing must also cover accessories used. Tests carried out and other activities must be documented and the documentation retained for at least one year. The instrument tests required and prescribed by DVGW G 465-4 (Technical Communications, reference) are divided into the following sections:

What ?	Who ?	When ?
function testing	user	prior to start working
testing display accuracy (adjustment)	specialist or specialist company	daily to half-yearly
servicing (maintenance, any repairs required)	SEWERIN, specialist or authorised company	annual; on defective instruments

Function testing

This is the simplest form of instrument test, which must be carried out by the **user** before starting work. It covers the following items:

- external condition including probe systems
- function-testing the controls
- battery charge
- inspecting the pump and suction inlet
- pump function
- zero point
- display of test gas feeding

Testing display accuracy (adjustment)

The frequency of the tests must be fixed depending on the sensors built-in and intensity of use.

The test must be carried out by a gas-supply company specialist, a specialist company or by SEWERIN itself.

The test gas described (see section 5.3: Test gases) must be used. The guidelines on the selection, installation, application and maintenance of appliances for the detection and measuring of flammable gases, oxygen or toxic gases (EN 50073 and EN 45544-4) need to be observed

Moreover, national regulations BGI 518 and BGI 836 must be complied with!

A full function test must also be carried out.

Servicing - maintenance and repair

Instruments must be serviced (and any necessary repairs carried out) at least once a year, by **SEWERIN Service**, a specialist company authorised by SEWERIN or an authorised specialist of the gas-supply company.

These activities must be documented in writing.



The test plaque on the instrument gives the date of the last service and the scheduled date of the next (e.g. 5/00 = May 2002).

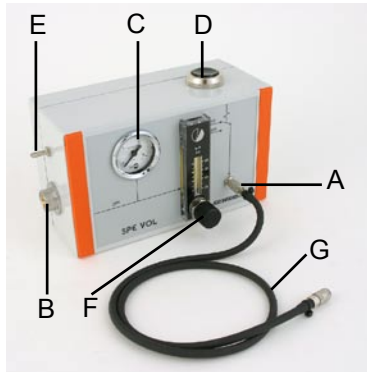
Annual maintenance and repair must include at least the specialist care of the instrument, its settings and the replacement of components with a limited lifetime.

**Note:**

- Where instruments feature explosion protection the applicable regulations must be observed!
- Servicing operatives must be SEWERIN-trained!

5.2 Test set

The **test set SPE VOL** is available to test the pump power, zero point and sensitivity:



(Fig. 1)

Item	description	function
A	device connection	connection with: <ul style="list-style-type: none"> ● probe connection ● test heads
B	test gas connection	connection for: <ul style="list-style-type: none"> ● test gas cans ● pressure hose adapter (in conjunction with pressure cylinder and pressure reducer)
C	manometer	Display of remaining pressure inside the test gas container
D	release button	release of test gas
E	fresh air supply	opening for: <ul style="list-style-type: none"> ● aspirating fresh air ● fresh air hose
F	needle valve with flowmeter	reading the pump power in litres per hour (l/h)
G	connection hose	connected to: <ul style="list-style-type: none"> ● device

5.3 Test gases

The following test gases are used in conjunction with the **test set SPE VOL** tester to test zero point and sensitivity:

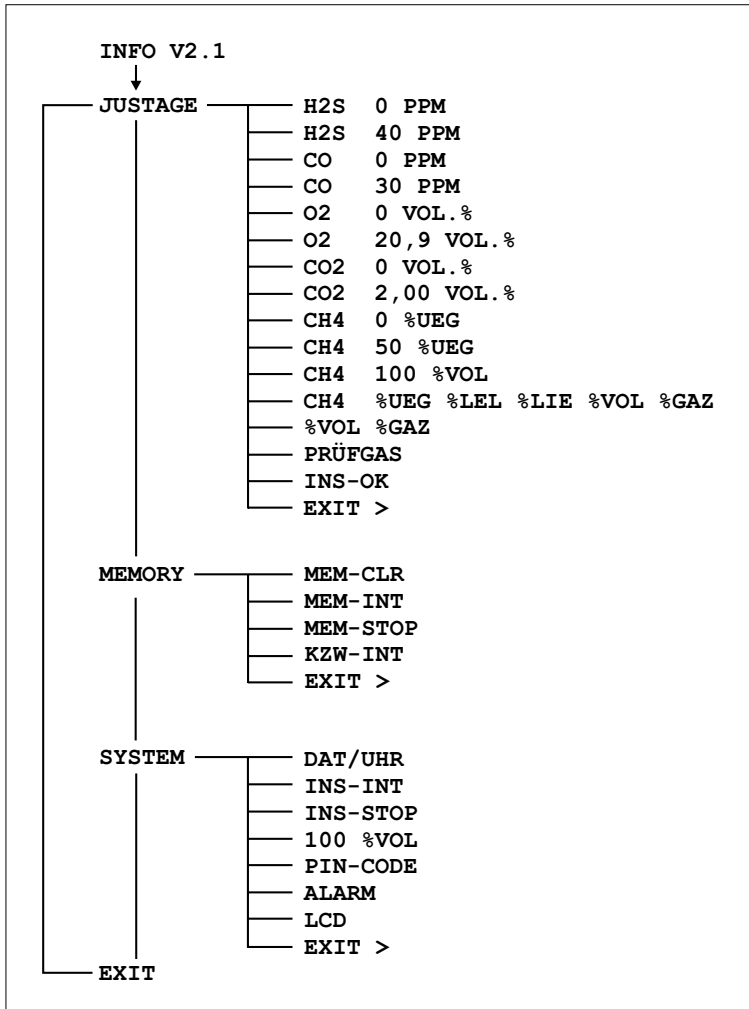
Gas	Test gas
Methane CH ₄	
- zero point:	fresh air
- sensitivity 1:	2.2 vol.% (50 %LEL) CH ₄ in synth. air
- sensitivity 2:	100 vol.% CH ₄
Propane C ₃ H ₈	
- zero point:	fresh air
- sensitivity	1.0 vol.% (59 %LEL) propane (C ₃ H ₈) in synth. air
Nonane C ₉ H ₂₀ (⊗)	
- zero point:	fresh air
- sensitivity	replacement test gas 0.30 vol.% propane (C ₃ H ₈) in synth. air (reading to be a returned when replacement test gas: 0.35 vol.%)
Carbon dioxide CO ₂	
- zero point:	fresh air
- sensitivity	2.0 vol.% (CO ₂) in synth. air
Oxygen O ₂	
- zero point:	100 vol.% methane (CH ₄)
- sensitivity	fresh air
Hydrogen sulphide H ₂ S	
- zero point:	fresh air
- sensitivity	40 ppm hydrogen sulphide (H ₂ S) in synth. air
Carbon monoxide CO	
- zero point:	fresh air
- sensitivity	40 ppm carbon monoxide (CO) in synth. air
Ammonia NH ₃ (⊗)	
- zero point:	fresh air
- sensitivity	50 ppm Ammonia (NH ₃) in Nitrogen

These gases are supplied in 6 test gas cans:

- 2.2 vol.% CH₄, 2.0 vol.% CO₂, 17.5 vol.% O₂, 40 ppm CO
- 1.0 vol.% C₃H₈
- 0.3 vol.% C₃H₈
- 40 ppm H₂S
- 50 ppm NH₃
- 100 vol.% CH₄

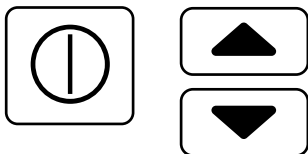
6 Info menu

6.1 Menu structure

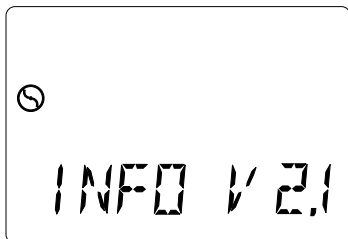


6.2 Overview

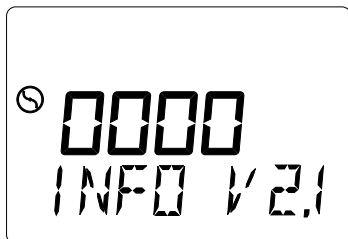
The info menu is accessible only when the **EX-TEC Combi** is switched off.



- now simultaneously press the following **3 keys**



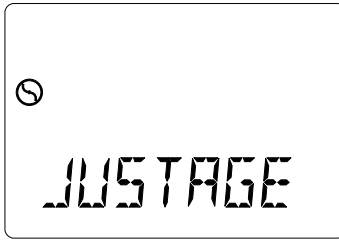
- you are now in the **INFO** menu item (cf. menu structure)
- the software version number (e.g. **V2.1**) is displayed and the LCD illumination automatically switches on for about 4 minutes



- you must now enter your **PIN code** (cf. section 9.6: Setting the PIN code)
- **0001** = factory settings
- only now do you have access to all menu items



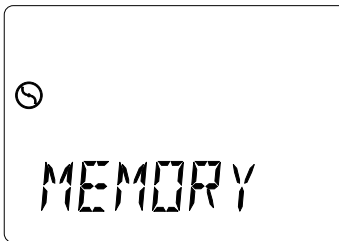
- the pump runs at constant power; it can be switched on or off with the pump key at any time
- the **arrow-up key** returns you to the menu structure



- you are now in the **ADJUSTMENT** menu item (cf. section 7: Adjustment menu)



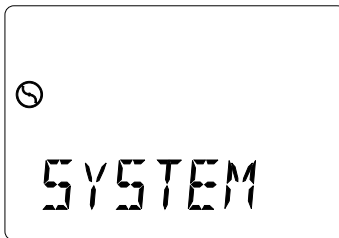
- the **arrow-up key** brings you to the next display



- you are now in the **MEMORY** menu item (cf. section 8: Memory menu)



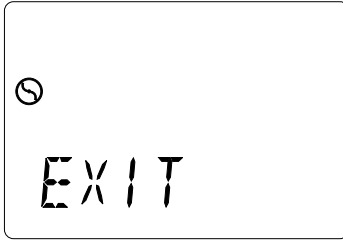
- the **arrow-up key** brings you to the next display



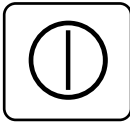
- you are now in the menu item **SYSTEM** (cf. section 9: System menu)



- the **arrow-up key** brings you to the next display



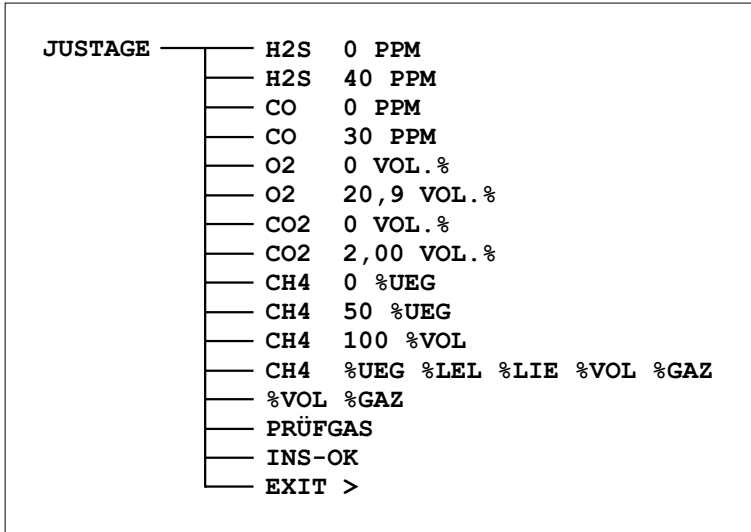
... or



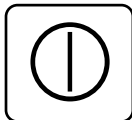
- you are now in the **EXIT** menu item
- there are now 2 ways of continuing to navigate through the menu structure
- pressing the **arrow-up key** returns you to the **ADJUSTMENT** menu item (cf. menu structure)
- briefly pressing the **on/off key** leaves the menu structure and the instrument switches to **measuring** operation

7 Adjustment menu

7.1 Menu structure

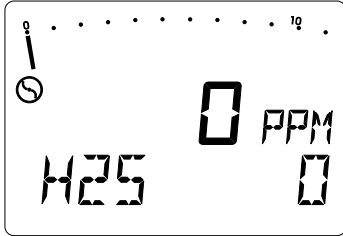


- you are in the **ADJUSTMENT** menu item



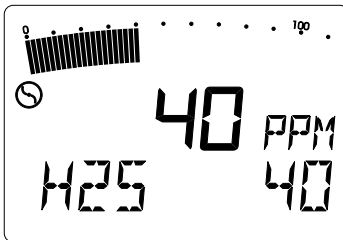
- briefly pressing the **on/off key** brings you to the adjustment menu

7.2 Setting the H₂S sensor



H₂S - zero point 0 PPM

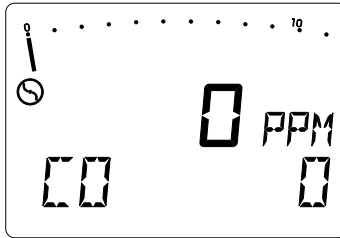
- release **fresh air** from the SPE VOL
- wait for the display to settle at a stable value and confirm the adjustment with the on/off key (**OK** appears in the LCD)
- pressing the **arrow-up key** brings you to the next display



H₂S - sensitivity 40 PPM

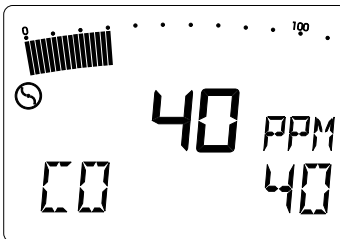
- now release test gas **40 PPM H₂S** from the SPE VOL (cf. section 7.8: Setting the test gas concentration)
- wait for the display to settle at a stable value and confirm the adjustment with the on/off key (**OK** appears in the LCD)
- once this has happened, turn off the test gas feed
- pressing the **arrow-up key** brings you to the CO-sensor setting facility

7.3 Setting the CO sensor



CO - zero point 0 PPM

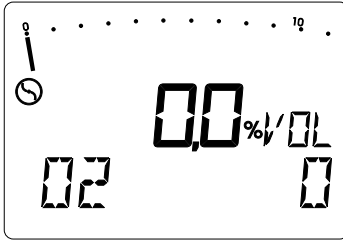
- now release **fresh air** from the SPE VOL
- wait for the display to settle at a stable value and confirm the adjustment with the on/off key (OK appears in the LCD)
- pressing the **arrow-up key** brings you to the next display



CO - sensitivity 40 PPM

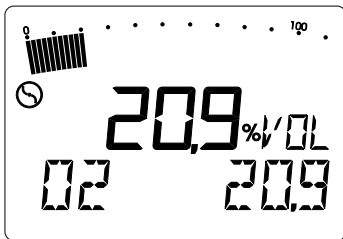
- now release **test gas 40 PPM** CO from the SPE VOL (cf. section 7.8: Setting the test gas concentration)
- wait for the display to settle at a stable value and confirm the adjustment with the on/off key (OK appears in the LCD)
- once this has happened, turn off the test gas feed
- pressing the **arrow-up key** brings you to the O₂-sensor setting facility

7.4 Setting the O₂ sensor



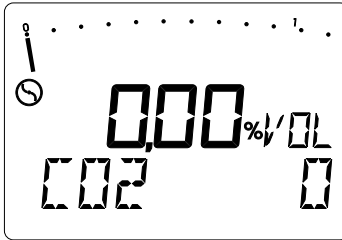
O₂ - zero point 0 %VOL

- now release test gas **100 vol.% CH₄** from the SPE VOL
- wait for the display to settle at a stable value and confirm the adjustment with the on/off key (**OK** appears in the LCD)
- once this has happened, turn off the test gas feed
- pressing the **arrow-up key** brings you to the next display

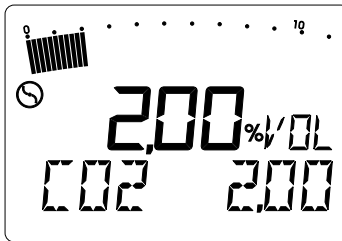


O₂ - sensitivity 20.9 %VOL

- now release **fresh air** from the SPE VOL (cf. section 7.8: Setting the test gas concentration)
- wait for the display to settle at a stable value and confirm the adjustment with the on/off key (**OK** appears in the LCD)
- pressing the **arrow-up key** brings you to the CO₂-sensor setting facility

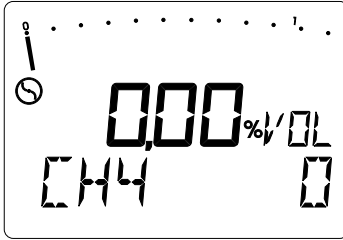
7.5 Setting the CO₂ sensorCO₂ - zero point 0 %VOL

- now release **fresh air** from the SPE VOL through a carbon dioxide filter (Sewerin accessory, see section 13.2)
- wait for the display to settle at a stable value and confirm the adjustment with the on/off key (**OK** appears in the LCD)
- pressing the **arrow-up key** brings you to the next display

CO₂ - sensitivity 2.00 %VOL

- now release **test gas 2.00 %VOL CO₂** from the SPE VOL (cf. section 7.8: Setting the test gas concentration)
- wait for the display to settle at a stable value and confirm the adjustment with the on/off key (**OK** appears in the LCD)
- once this has happened, turn off the test gas feed
- pressing the **arrow-up key** brings you to the CH₄-sensor setting facility

7.6 Setting the CH₄ sensor



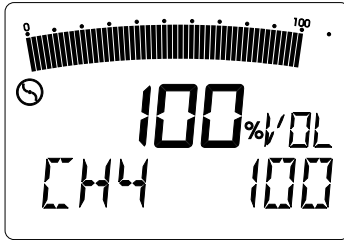
CH₄ - zero point 0 %VOL

- now release **fresh air** from the SPE VOL
- wait for the display to settle at a stable value and confirm the adjustment with the on/off key (**OK** appears in the LCD)
- pressing the **arrow-up key** brings you to the next display



CH₄ - sensitivity 2.20 %VOL

- now release **test gas 2.20%VOL (50 %UEG) CH₄** from the SPE VOL (cf. section 7.8: Setting the test gas concentration)
- wait for the display to settle at a stable value and confirm the adjustment with the on/off key (**OK** appears in the LCD)
- once this has happened, turn off the test gas feed
- pressing the **arrow-up key** brings you to the next display



CH₄ - sensitivity 100 %VOL

- now release **test gas 100 %VOL CH₄** from the SPE VOL
- alternatively you can dispense with the SPE VOL and use **natural gas from the local supply** instead
- wait for the display to settle at a stable value and confirm the adjustment with the on/off key (**OK** appears in the LCD)
- once this has happened, turn off the test gas feed

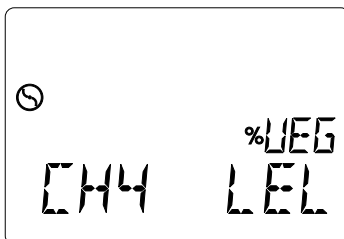


Note:

Before switching to the next step, please wait until the displayed concentration has reached the value of 0 vol. %!



- pressing the **arrow-up key** brings you to the next display



CH₄ - %UEG-range language

- repeatedly pressing the on/off key switches between the following displays in the %UEG range:

%UEG - display in Untere Explosionsgrenze (D)

%LEL - display in Lower Explosive Limit (GB)

%LIE - display in Limite Inférieure d'Explosion (F)

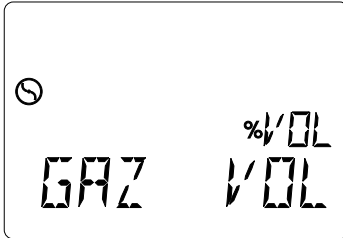
%VOL - display in **%VOL** (D/GB)

%GAZ - display in **%GAZ** (F)



- confirm the display, e.g. **%VOL**, with the on/off key (**OK** appears in the LCD)
- this setting is preserved even when the instrument is switched off
- pressing the **arrow-up key** brings you to the measurement-quantity setting facility

7.7 Setting the measurement quantity



CH₄, CO₂, O₂ - %VOL-range language

- repeatedly pressing the on/off key switches between the following displays in the vol.% range:

%VOL - display in **%VOL** (D/GB)

%GAZ - display in **%GAZ** (F)

- confirm the display, e.g. **%VOL**, with the on/off key (**OK** appears in the LCD)
- this setting is preserved even when the instrument is switched off
- pressing the **arrow-up key** brings you to the test gas concentration setting facility

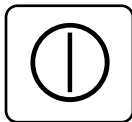


7.8 Setting the test gas concentration

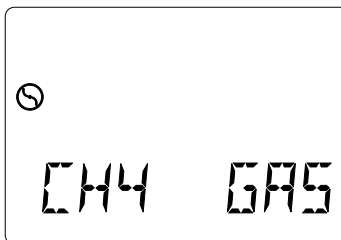
PRÜFGAS	CH4	GAS
	CO2	GAS
	O2	GAS
	H2S	GAS
	CO	GAS
	EXIT	>>



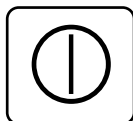
- if you use use test gases other than those supplied by SEWERIN, the concentration must be set accordingly
- you are in the **TEST GAS** menu item



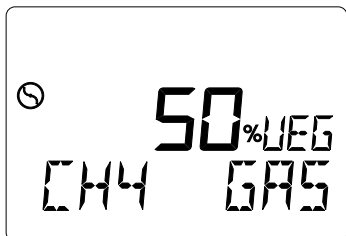
- briefly pressing the **on/off key** brings you to the test gas menu

**Example: CH₄**

- you are now in the **CH4 GAS** menu item



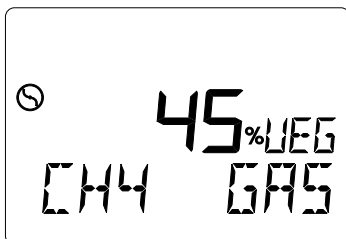
- briefly pressing the **on/off key** brings you to the CH₄ test gas concentration setting facility



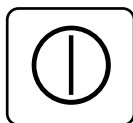
- the current concentration is displayed (e.g.: **50 %UEG = 2.20 %VOL**)



- you can set the desired concentration by repeatedly pressing or holding down a **arrow key**



- the selected concentration is displayed (e.g.: **45 %UEG = 2.00 %VOL**)

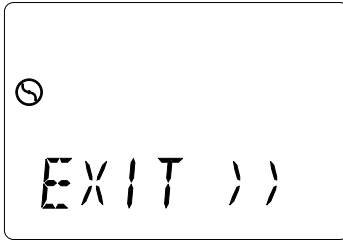


- confirm the concentration with the **on/off key**
- this setting is preserved even when the instrument is switched off
- the adjustment ranges of the individual test gas concentrations are:

test gas	2.20 vol.% (50%LEL) methane CH₄
- adjustment range:	1.75 – 3.50 vol.% (40 – 80 %LEL)
- step size	0.05 vol.% (1 %LEL)
test gas	1.0 vol.% (59 %LEL) propane C₃H₈
- adjustment range	0.68 – 1.36 vol.% (40 – 88 %LEL)
- step size	0.02 vol.% (1 %LEL)
test gas	for nonane C₉H₂₀ (⊗) replacement test gas 0.3 vol.% propane (C₃H₈)
- adjustment range	0.30 – 0.50 vol.% (40 – 80 %LEL)
- step size	0.05 vol.% (1 %LEL)
test gas	2.00 vol.% carbon dioxide CO₂
- adjustment range	0.90 – 4.10 vol.%
- tep size	0.02 vol.%
test gas	20.9 vol.% oxygen O₂
- adjustment range	17.0 – 22.0 vol.%
- tep size	0.1 vol.%
test gas	40 ppm hydrogen sulphide H₂S
- adjustment range	10 – 100 ppm
- step size	1 ppm
test gas	40 ppm carbon monoxide CO
- adjustment range	10 – 150 ppm
- step size	1 ppm
test gas	50 ppm Ammoniak NH₃ (⊗)
- adjustment range	10 – 100 ppm
- step size	1 ppm

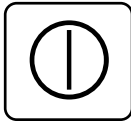


- repeatedly pressing a **arrow key** brings you to the exit from the test gas menu



EXIT >>

- signpost (>>) to menu level 2



- pressing the on/off key leaves the test gas menu



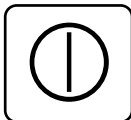
- pressing the **arrow-up key** brings you to the inspection

7.9 Inspection confirmation



INSPECTION OK

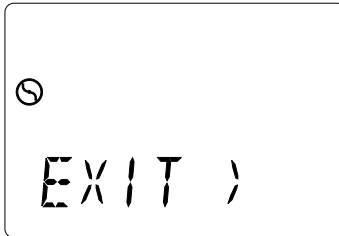
- the **EX-TEC Combi** can remind you of scheduled inspection and adjustment dates
- this requires the **inspection interval** and the **inspection block** to be set in the system menu (cf. sections 9.3 „Setting the inspection interval“ and 9.4 „Setting the inspection block“)
- confirm the inspection or adjustment you have carried out with the **on/off key** (OK appears in the LCD):
- this date is stored as a function of the set date (cf. section 9.2 „Setting the date/time“)





- the next inspection or adjustment date is calculated in accordance with the set inspection interval
- pressing the **arrow-up key** brings you to the exit from the adjustment menu

7.10 Leaving the adjustment menu

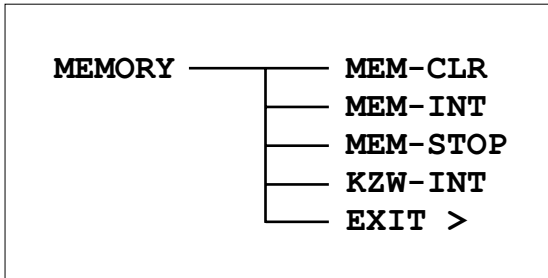


EXIT >

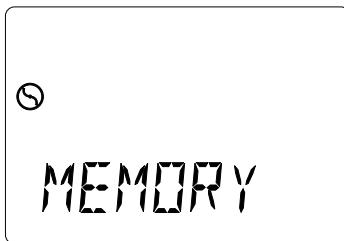
- signpost (>) to menu level 1
- pressing the **on/off key** leaves the adjustment menu
- you are now back at the top main-menu level and can switch between the following menu items:
 - **JUSTAGE**
 - **MEMORY**
 - **SYSTEM**
 - **EXIT**

8 Memory menu

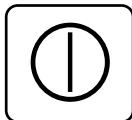
8.1 Menu structure



- the **EX-TEC Combi** continuously stores readings from the sensors that are present
- these can later be read out with the appropriate evaluation software (separate user manual) via the RS-232-interface (item 8)

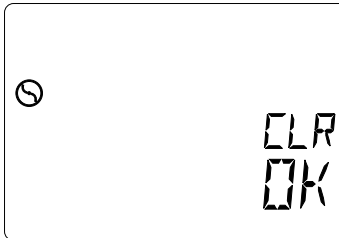
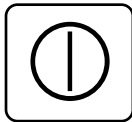


- you are in the **MEMORY** menu item



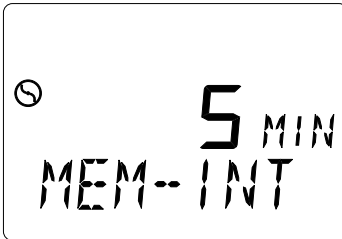
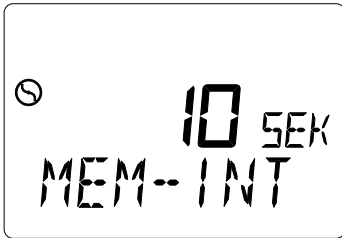
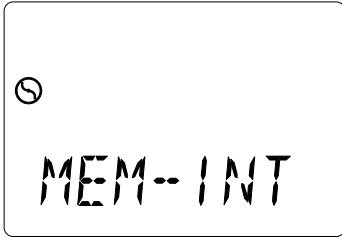
- briefly pressing the **on/off key** brings you to the memory menu

8.2 Clearing memory (Ⓢ)

**MEMORY CLEAR**

- if you have set the **memory mode = stack memory** (cf. section 8.4: Setting memory mode), this function enables you to clear the entire readings memory
- confirm the clearance with the **on/off key** (**OK** appears in the LCD)
- pressing the **arrow-up key** brings you to the memory-interval setting facility

8.3 Setting the memory interval (Ⓢ)



MEMORY INTERVAL

- briefly pressing the **on/off key** brings you to the memory-interval setting facility

- by repeatedly pressing or holding down a **arrow key** you can select the following memory intervals:

Seconds range:

- 1 second
- 10 seconds
- 20 seconds
- 30 seconds

Minutes range:

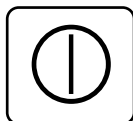
- 1 minute
- 2 minutes
- 3 minutes
- 5 minutes
- 10 minutes
- 20 minutes
- 30 minutes

Data-memory capacity

- the **EX-TEC Combi** stores the following values in its data memory:
 - readings for each gas (instantaneous values at the moment of scanning)
 - event values for each gas (MIN, MAX, KZW, LZW values and alarm overshoots)
 - special error displays, alarms
- depending on the set memory interval and the number of gases, data memory can continuously record the following periods (times in hh:mm):

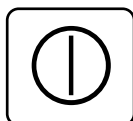
M e m o r y interval	3 gases	4 gases	5 gases
1 sec	01:02	00:41	00:29
10 sec	10:28	06:58	04:51
20 sec	20:56	13:56	09:43
30 sec	31:25	20:54	14:35
1 min	62:50	41:48	29:11
2 min	125:40	83:37	58:23
3 min	188:30	125:25	87:34
5 min	314:10	209:02	145:58
10 min	628:20	418:05	291:56
20 min	1256:40	836:10	583:52
30 min	1885:00	1254:15	875:48

Example: when the instrument is set to warn for 4 gases and with the memory interval set to 1 minute you can record event values over a period of 41 hours 48 minutes.



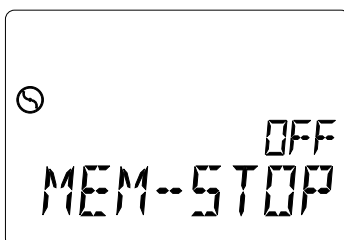
- confirm the interval with the **on/off key**
- this setting is preserved even when the instrument is switched off
- pressing the **arrow-up key** brings you to the memory-mode setting facility

8.4 Setting the memory mode (⊗)



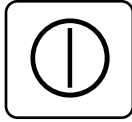
MEMORY STOP

- you have the possibility to choose the memory mode between the ring memory or the stack memory
- briefly pressing the **on/off key** brings you to the memory-mode setting facility
- by repeatedly pressing a **arrow key** you can select the following memory modes:



OFF (ring memory)

readings are continuously written to memory; when memory is full the oldest values are overwritten

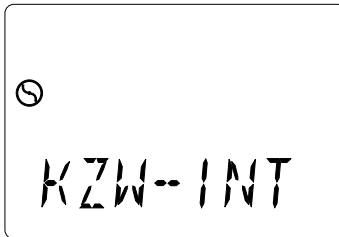


ON (stack memory)

readings are only written to memory until it is full, thus write-protecting the oldest values

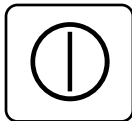
- confirm the memory mode with the **on/off key**
- this setting is preserved even when the instrument is switched off
- pressing the **arrow-up key** brings you to the short-term value-interval setting facility

8.5 Setting the short-term value interval



SHORT-TERM VALUE INTERVAL

- for the meaning of the KZW alarm (cf. section 3.7 Short-term value alarm (KZW), long-term value alarm (LZW), minimum and maximum values MIN / MAX)

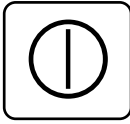


- briefly pressing the **on/off key** brings you to the short-term value-interval setting facility

- by repeatedly pressing or holding down a **arrow key** you can select the following short-term value-interval settings:

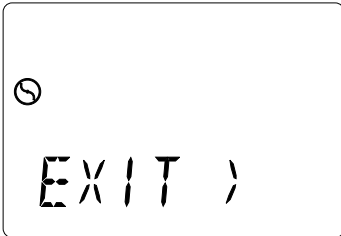
Adjustment range:

- 1 – 30 minutes
- 1 minute step size



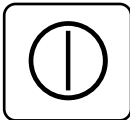
- the usual setting is for a **15 minutes** averaging interval
- confirm the interval with the **on/off key**
- this setting is preserved even when the instrument is switched off
- pressing the **arrow-up key** brings you to the exit from the memory menu

8.6 Leaving the memory menu



EXIT >

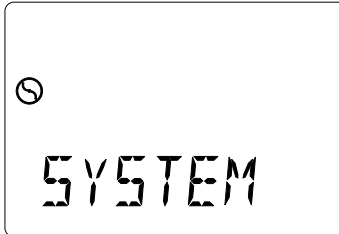
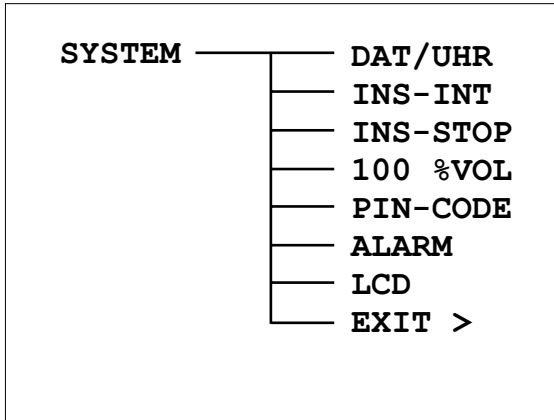
- signpost (>) to menu level 1



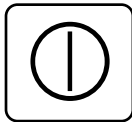
- pressing the **on/off key** leaves the memory menu
- you are now back at the top main-menu level and can switch between the following menu items:
 - **JUSTAGE**
 - **MEMORY**
 - **SYSTEM**
 - **EXIT**

9 System menu

9.1 Menu structure

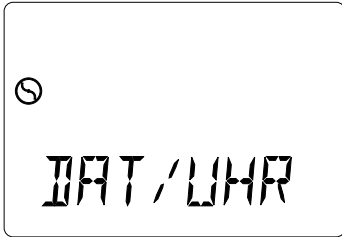


- you are in the **SYSTEM** menu item

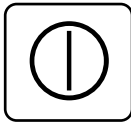


- briefly pressing the **on/off key** brings you to the system menu

9.2 Setting the date/time



DATE/TIME



- briefly pressing the **on/off key** brings you to the date/time setting

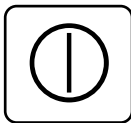


Date

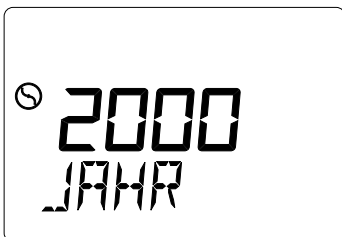
- the last **day** (24 - flashing) and **month** (02) to be set are displayed



- by repeatedly pressing or holding down a **arrow key** ...



- ... and confirming with the **on/off key** you can first set the day and then the month to the current date

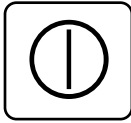


Year

- the last **year** (2000 - flashing) to be set is displayed



- by repeatedly pressing or holding down a **arrow key** ...

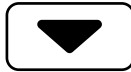


- ... and confirming with the **on/off key** you can set the current year

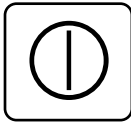


Time

- the last **hours** (17 - flashing) and **minutes** (49) to be set are displayed



- by repeatedly pressing or holding down a **arrow key** ...



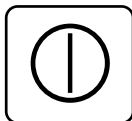
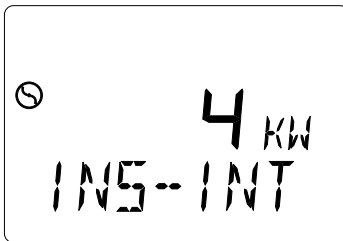
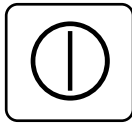
- ... and confirming with the **on/off key** you can first set the hours and then the minutes to the current time

- these settings are preserved even when the instrument is switched off



- pressing the **arrow-up key** brings you to the inspection-interval setting facility

9.3 Setting the inspection interval



INSPECTION INTERVAL

- the **EX-TEC Combi** can remind you of regular scheduled tests (e.g. inspections, adjustments)
- this reminder is based on the inspection interval
- briefly pressing the **on/off key** brings you to the inspection-interval setting facility

Inspection interval = 0 – 52 CW

- the last interval to be set is displayed in CW (calendar weeks), e.g.:
 - **0 CW** = function inactive
 - **4 CW** = monthly
 - **52 CW** = annual
- by repeatedly pressing or holding down a **arrow key** ...
- ... and confirming with the **on/off key** you can set the desired interval
- this setting is preserved even when the instrument is switched off
- pressing the **arrow-up key** brings you to the inspection-block setting facility

Example: inspection interval

Februar 2004						
Mo	Di	Mi	Do	Fr	Sa	So
						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
März 2004						
Mo	Di	Mi	Do	Fr	Sa	So
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 section 7.9):

10.02.2004

from these settings follows:

the next inspection has to be effected
between **09. – 15.03.2004**

During the next 3 weeks the **EX-TEC Combi** will display the following references to the inspection date:

24.02.2004 – 01.03.2004 (> 1 week before)

LCD:

the **coming** inspection date is displayed for about 3 seconds on switch-on

lamp/buzzer:

inactive

instrument:

the instrument then automatically switches to measuring operation

02.03.2004 – 08.03.2004 (1 week before)

LCD:

the **coming** inspection date is displayed for about 3 seconds on switch-on

lamp/buzzer

interval lamps / interval tone

instrument:

the instrument then automatically switches to measuring operation

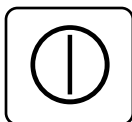
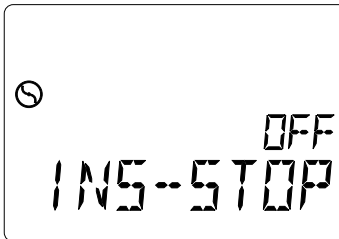
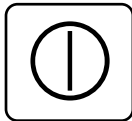
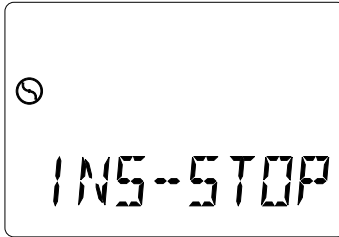
09.03.2004 – 15.03.2004 (scheduled)

LCD:	the due inspection date is displayed on switch-on
lamp/buzzer:	interval light/sound
instrument:	when the display is cleared with the buzzer key (item 4) or after waiting for about 15 seconds the instrument automatically switches to measuring operation.

16.03.2004 – ... (from 1 week later)

LCD:	the overdue inspection date is displayed on switch-on
lamp/buzzer:	interval light/sound
instrument:	depending on the setting of the INS-STOP function (cf. section 9.4: Setting the inspection block) the following conditions are possible: <u>INS-STOP = OFF</u> when the display is cleared with the buzzer key (item 4) or after waiting for about 15 seconds the instrument automatically switches to measuring operation <u>INS-STOP = ON</u> when any key is pressed (item 4) or after waiting for about 15 seconds the instrument automatically switches off.

9.4 Setting the inspection block



INSPECTION STOP

- to make sure your **EX-TEC Combi** is regularly checked you can activate an inspection block
- this block does not become active until the next inspection date has passed (cf. section 9.3: Setting the inspection interval)
- after that you cannot use the instrument until the inspection has been **carried out and confirmed** (cf. section 7.9: Inspection confirmation)
- briefly pressing the **on/off key** brings you to the inspection-block setting facility

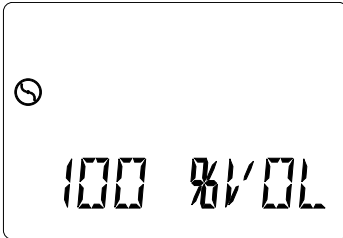
Inspection-block condition

- the last setting is displayed, e.g.:
 - **OFF** = block inactive
 - **ON** = block active
- by repeatedly pressing a **arrow key** ...
- ... and confirming with the **on/off key** you can set the desired condition



- this setting is preserved even when the instrument is switched off
- pressing the **arrow-up key** brings you to the operating-signal setting facility

9.5 Setting the 100 vol.% range



100 %VOL (GAS-MEASURING)

- the **EX-TEC Combi** has two modes (cf. section 3.3: Modes):

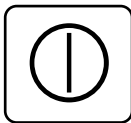
WARNING mode

monitoring the atmosphere (workplace monitoring) in shafts and chambers

GAS-MEASURING mode

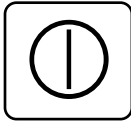
determining gas concentrations

- if you wish to use the instrument purely as a warning device, you can switch off the **100 %VOL (GAS-MEASURING)** range
- briefly pressing the **on/off key** brings you to the 100 %VOL range setting



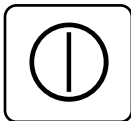
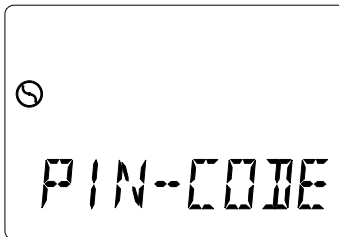
100 %VOL range condition

- the last setting is displayed:
 - **OFF** = 100 %VOL inactive
 - **ON** = 100 %VOL active



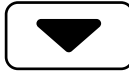
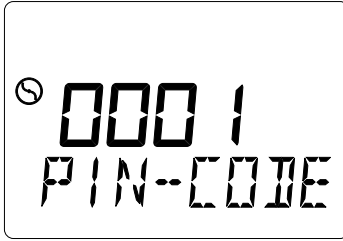
- by repeatedly pressing a **arrow key** ...
- ... and confirming with the **on/off key** you can set the desired condition
- this setting is preserved even when the instrument is switched off
- pressing the **arrow-up key** brings you to the setting of the PIN-code

9.6 Setting the PIN code



PIN CODE

- you can set your **EX-TEC Combi** so that only authorised persons, e.g.:
 - instrument technicians
 - experts
 have access to the info menu with all its subfunctions
- this involves setting a PIN code that must be entered every time the info menu is called
- when an incorrect PIN code is entered the instrument reverts to its switch-on routine
- briefly pressing the **on/off key** brings you to the PIN-code setting facility



Setting the PIN CODE

- the last PIN code to be set (**0001** = factory setting) appears in the LCD
- we recommend you to use a different PIN code
- by repeatedly pressing or holding down a **arrow key ...**
- ... and confirming with the **on/off key** you can set each of the 4 digits from left to right to the desired PIN code

PIN code = 0000

- the function is inactive, every user has access to the info menu

PIN code = 0001 – 9999

- the function is active, only persons who know the set PIN code have access to the info menu
- this setting is preserved even when the instrument is switched off
- pressing the **arrow-up key** brings you to the alarm-threshold setting facility



Note:

Make a note of your PIN code and only give it to authorised persons.

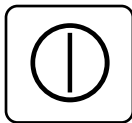
If you forget your PIN, please contact SEWERIN Service.

9.7 Setting the alarm thresholds

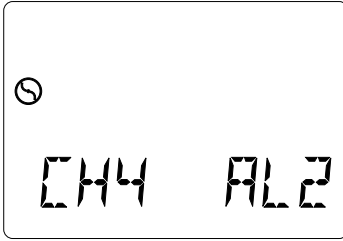
ALARM	CH4	AL1
	CH4	AL2
	CO2	AL1
	CO2	AL2
	O2	AL1
	O2	AL2
	H2S	AL1
	H2S	AL2
	CO	AL1
	CO	AL2
	EXIT	>>



- you can set your own alarm thresholds if you do not wish to use those pre-set by SEWERIN
- you are in the **ALARM** menu item

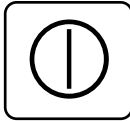


- briefly pressing the **on/off key** brings you to the alarm-thresholds menu

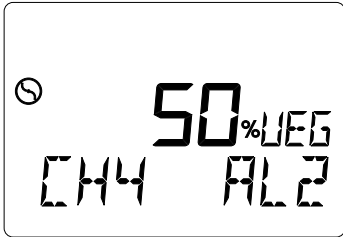


Example: CH₄ alarm threshold 2

- you are now in the CH₄ AL2 menu item



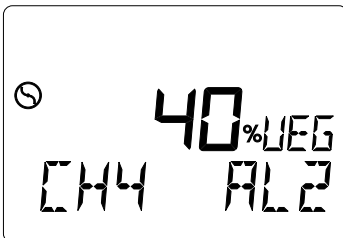
- briefly pressing the **on/off key** brings you to the facility to set alarm threshold 2 for methane CH₄



- the current alarm threshold is displayed (e.g.: **50 %UEG = 2.20 %VOL**)



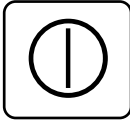
- by repeatedly pressing or holding down a arrow key you can set the desired alarm threshold



- the selected alarm threshold is displayed (e.g. **40 %UEG = 1.75 %VOL**)

- the setting ranges for the individual alarm thresholds are: (factory settings in bold):

Gas	AL1 threshold	AL2 threshold
Methane CH₄ (vol.%)	0.90 vol.%	2.20 vol.%
- adjustment range:	0.45 – 4.15 vol.%	0.50 – 4.20 vol.%
- step size:	0.05 Vol.%	0.05 Vol.%
Methane CH₄ (%LEL)	20 %LEL	50 %LEL
- adjustment range:	10 – 94 %LEL	11 – 95 %LEL
- step size:	1 %LEL	1 %LEL
Propane C₃H₈ (vol.%)	0.34 vol.%	0.86 vol.%
- adjustment range:	0.18 – 1.60 vol.%	0.20 – 1.62 vol.%
- step size:	0.02 vol.%	0.02 vol.%
Propane C₃H₈ (%LEL)	20 %LEL	50 %LEL
- adjustment range:	10 – 94 %LEL	11 – 95 %LEL
- step size:	1 %LEL	1 %LEL
Nonane C₉H₂₀ (%LEL) (⊗)	0.15 vol.%	0.35 vol.%
- adjustment range	0.05 – 0.60 vol.%	0.10 – 0.65 vol.%
- step size:	0.05 vol.%	0.05 vol.%
Carbon dioxide CO₂	0.50 vol.%	1.00 vol.%
- adjustment range:	0.10 – 4.90 vol.%	0.20 – 5.00 vol.%
- step size:	0.10 vol.%	0.10 vol.%
Oxygen O₂	18.0 vol.%	23.0 vol.%
- adjustment range:	15.0 – 24.9 vol.%	15.1 – 25.0 vol.%
- step size:	0.1 vol.%	0.1 vol.%
Hydrogen sulphide H₂S	10 ppm	20 ppm
- adjustment range:	5 – 99 ppm	6 – 100 ppm
- step size:	1 ppm	1 ppm
Carbon monoxide CO	30 ppm	60 ppm
- adjustment range:	5 – 199 ppm	6 – 200 ppm
- step size:	1 ppm	1 ppm
Ammonia NH₃ (⊗)	50 ppm	75 ppm
- adjustment range	5 – 99 ppm	6 – 100 ppm
- step size:	1 ppm	1 ppm



- confirm the alarm threshold with the **on/off key**
- this setting is preserved even when the instrument is switched off
- repeatedly pressing a **arrow key** brings you to the exit from the alarm-threshold menu



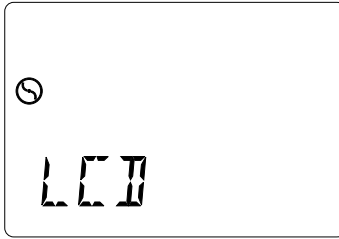
EXIT >>

- signpost (>>) to menu level 2
- pressing the **on/off key** leaves the alarm thresholds menu



- pressing the **arrow-up key** brings you to the LCD-check facility

9.8 Checking the LCD



- with this function you can carry out a **visual check** that all segments of the LCD are in working order
- confirm the LCD check with the **on/off key**
- all the possible LCD characters and symbols are activated
- pressing the **arrow-up key** brings you to the exit from the menu

9.9 Leaving the system menu



EXIT >

- signpost (>) to menu level 1
- pressing the **on/off key** leaves the memory menu
- you are now back at the top main-menu level and can switch between the following menu items:
 - **JUSTAGE**
 - **MEMORY**
 - **SYSTEM**
 - **EXIT**

10 Application hints

10.1 Application hints from report of suitability examination PFG-No. 41300401P

On the basis of the measurement results and remarks contained in the test report PFG-No 41300401P, the EX-TEC portable gas warning device from Hermann Sewerin GmbH is suitable for measuring carbon monoxide up to 500 ppm CO, hydrogen sulphide up to 100 ppm H₂S, oxygen up to 25 % O₂ (with respect to the use of the device to monitor the ambient air for oxygen deficit or excess) and carbon dioxide at concentrations up to 5 % CO₂, provided that its properties and version correspond to the documents specified in the test report PFG-No 41300401P, and that it is operated accordingly and that the following requirements are fulfilled:

- The operating manual submitted and tested by the DMT must be followed in every respect.
- When using the gas warning device it is essential to check whether the response times are short enough to enable its warning function to be triggered quickly enough to avoid potentially hazardous situations. If necessary the alarm threshold should be set substantially below the safety threshold.
- Please keep in mind that if the device is used in a location with high temperatures and high humidity, the measured value in the oxygen-measurement range will be considerably increased. If necessary, recalibrate the device before use under these conditions.
- The device must be checked regularly, particularly for the measurement ranges 0 – 100 ppm H₂S and 0 – 500 ppm CO, to insure that its display for dummy and test gases is accurate.
- The devices are to be provided with a permanent name plate where the manufacturer, type and serial number and the following inscription is to be included:

„PFG-No. 41300401“

Other identification regulations, especially those of ElexV, remains unaffected. By attaching this name plate, the manufacturer confirms that the devices meet the properties and technical requirements described in this report. Any device not bearing this name plate does not conform to the present report.

- Upon request, the operator must be supplied with a copy of this report and test report PFG-No. PFG-Nr. 41300401P.

11 Technical aspects

11.1 Technical notices

Heavy gas

When working in probe holes (GAS-MEASURING mode), you may find that carbon dioxide CO₂ (heavy gas) overlays the methane CH₄ (light gas). In this event the instrument will indicate no concentration (0 vol.%).

If it is carbon dioxide (monitoring over the CO₂ measurement range), we recommend the use of a CO₂ filter (accessory kit) to suppress the heavy-gas component.

High CO₂ concentrations (from approx. 5 vol.% on) will have a damaging effect on the CO₂ sensor.

Gas injection/blanketing

If you wish to carry out a gas injection (an increase in concentration to 100 vol.%) or blanketing (a reduction in concentration to 0 vol.%), select **GAS-MEASURING mode** (device variation 1) with the **pump key** (device variation 2) (cf. section 9.5: Setting the 100 vol.% range).

Only in this mode can measurement be reliably monitored.

Probe hoses

The rule of thumb is: the concentration display is delayed by about 1 second per metre of hose.

Always use SEWERIN probe hoses 1 m, 2 m or 6 m long. The maximum length of 12 m should not be exceeded.

Sensitivity of the thermal-shading sensor

The sensor sensitivity of the thermal-shading sensor can be falsified under the following conditions:

- an atmosphere low in oxygen will lead to the reduction of the value displayed (the sensor will choke).
- the device may not be operated in an oxygen-enriched atmosphere due to the explosion protection.

The operation of the sensors is impaired by gaseous components, e.g. of silicons, oils and phosphate esters. These irreversibly reduce sensitivity.

Sensor sensitivity is also reduced by pollution of the measuring environment, e.g. by halogens, burnt neoprene, PVC or trichloroethylene - but not irreversibly.

Cleaning

The instrument should be cleaned with a damp cloth. Use no solvents, benzene 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.

Fine dust filters

There are fine dust filters in the removable probe connection (item 3) and in most probes.



Note:

Heavily-soiled filters should be replaced (cf. section 11.5: Wearing parts)!



CAUTION!

Do not use other than the original SEWERIN fine dust filters with the **EX-TEC Combi**. Never use activated carbon filters, as these will collect H₂S gas particles, thus causing the warning feature to stop working properly.

11.2 Technical data


Instrument data

Serial no.:	045 01 0001 (type - model - number)
Dimensions:	129 x 192 x 65 mm (W x H x D)
Weight:	1500 g (depending on sensor equipment)
Type of protection:	IP 54

Fields of application

Operating temperature:	-10 °C – +40 °C
Storage temperature:	-20 °C – +40 °C
Humidity range:	15% r.h. – 90% r.h. (not condensing) (5 % r.h. – 90% r.h. short-time)
Pressure range:	800 hPa – 1200 hPa

Explosion protection (CENELEC)

Testing institution:	Physikalisch-Technische Bundesanstalt, Braunschweig
Test number:	PTB 96 ATEX 2166, 1. + 3. supplement
Identification mark:	 II 2 G EEx ib d IIB T3

Measuring function

Testing institution:	DMT GmbH, Essen
Test number	DMT 01 ATEX G 002, 1. supplement Measuring range 0 – 100 %LEL methane/ propane
PFG-Number	41300401

Power supply

Operating time:	min. 9,5 h
Battery type:	NiCd, rechargeable
Charging voltage:	12 V=
Charging current:	380 mA
Charging time:	13 h

Pump performance

Gas-warning: > 30 l/h and >150 mbar

Gas-measuring: > 50 l/h and >150 mbar

Sensors warm-up time

for all sensors: < 60s

Sensor - Methane CH₄

Sensor data

- measurement principle: combined sensor, thermal shading (TS) and thermal conductivity (TC)
- measurement range: 0 – 4.40 vol.% (AL3) in 0.05 vol.% steps or
0 – 100 %LEL (AL3) in 1 %LEL steps
- t_{90} time: < 30 seconds
- storage temperature: -20 °C – +60 °C (for repl. sensors)

Alarm thresholds (factory settings)

- CH₄: AL1 = 0.90 vol.% AL2=2.20 vol.%
or
AL1 = 20 %LEL AL2 = 50 %LEL

Lifetime

- guaranteed: 1 year
- expected: 5 years

Test gases

- zero point: fresh air
- sensitivity 1: 2.20 vol.% (50 %LEL) CH₄ in synth. air
- sensitivity 2: 100 vol.% CH₄

Sensor - Carbon dioxide CO₂

Sensor data

- measurement principle: infra-red sensor (IR)
- measurement range: 0.06 – 5.00 vol.% (AL3) in 0.02 vol.% steps
- zero point drift: 0.12 vol.%
- t₉₀ time: < 20 seconds
- storage temperature: -20 °C – +60 °C (for repl. sensors)

Alarm thresholds (factory settings)

- CO₂: AL1 = 0.50 vol.% AL2=1.00 vol.%

Temperature influence

- zero point: up to 40 ppm CO₂/°C
- sensitivity: up to 1.3 % of the measuring value/°C

Time drift: < 70 ppm/month

Cross-sensitivity

- none known

Lifetime

- guaranteed: 2 years
- expected: 5 years

Test gases

- zero point: fresh air
- sensitivity: 2.00 vol.% CO₂ in synth. air

Sensor - Oxygen O₂

Sensor data

- measurement principle: electrochemical sensor (EC)
- measurement range: 0 – 25.0 vol.% (AL3) in 0.1 vol.% steps
- t₉₀ time: < 30 seconds
- storage temperature: -0 °C – +20 °C (for repl. sensors)

Alarm thresholds (factory settings)

- O₂: AL1 = 18.0 vol.% AL2=23.0 vol.%

Temperature influence

- sensitivity < 0.3 % Signal/°C

Cross-sensitivity

- CO₂: at 5 vol.% CO₂ in 23 vol.% O₂ ≤ 1 % O₂

Lifetime

- guaranteed: 20 months
- expected: 24 months

Test gases

- zero point: 100 vol.% CH₄
- sensitivity: fresh air

Sensor - Hydrogen sulphide H₂S

Sensor data

- measurement principle: electrochemical sensor (EC)
- measurement range: 2 – 100 ppm (AL3) in 1 ppm steps
- zero point drift: 3 ppm
- t_{90} time: < 30 seconds
- storage temperature: -0 °C – +20 °C (for repl. sensors)

Alarm thresholds (factory settings)

- H₂S: AL1 = 10 ppm AL2 = 20 ppm

Temperature influence

- zero point no temperature influence
- sensitivity < 0.5 % Signal/°C

Time drift < 0.3 ppm/month

Cross-sensitivity at 20 °C

- 100 ppm CO: ~ +3 ppm H₂S
- 20 ppm CL₂: ~ -1 ppm H₂S
- 500 ppm C₂H₄: ~ +2 ppm H₂S
- 2 Vol.-% H₂: ~ +100 ppm H₂S
- 10 ppm SO₂: ~ +3 ppm H₂S
- none known

Lifetime

- guaranteed: 2 years
- expected: 3 years

Test gases

- zero point: fresh air
- sensitivity: 40 ppm H₂S in synthetic air

Sensor - Carbon monoxide CO

Sensor data

- measurement principle: electrochemical sensor (EC)
- measurement range: 2 – 500 ppm (AL3) in 1 ppm steps
- zero point drift: 4 ppm
- t_{90} time: < 30 seconds
- storage temperature: -0 °C – +20 °C (for repl. sensors)

Alarm thresholds (factory settings)

- CO: AL1 = 30 ppm AL2 = 60 ppm

Temperature influence

- zero point < 5 ppm
- sensitivity 1.4 % Signal/°C

Time drift < 0.3 ppm/month

Cross-sensitivity at 20 °C

- 1000 ppm H₂: ~ +450 ppm CO
- 100 ppm NO: ~ +25 ppm CO
- none known

Lifetime

- guaranteed: 2 years
- expected: 3 years

Test gases

- zero point: fresh air
- sensitivity: 40 ppm CO in synthetic air

Sensor - Hydrogen sulphide H₂S/Carbon monoxide CO

Sensor data

- measurement principle: electrochemical combined sensor (EC)
- measurement range H₂S: 2 – 100 ppm (AL3) in 1 ppm steps
- measurement range CO: 2 – 500 ppm (AL3) in 1 ppm steps
- zero point drift H₂S: 3 ppm
- zero point drift CO: 4 ppm
- t₉₀ time: < 60 seconds for H₂S
< 50 seconds for CO
- storage temperature: -0 °C – +20 °C (for repl. sensors)

Alarm thresholds (factory settings)

- H₂S: AL1 = 10 ppm AL2 = 20 ppm
- CO: AL1 = 30 ppm AL2 = 60 ppm

Temperature influence

- H₂S zero point: no influence for H₂S
- H₂S sensitivity: < 0.5 % Signal/°C
- CO zero point: < 5 ppm
- CO sensitivity: 1.4 % Signal/°C

Time drift

- H₂S: < 0.3 ppm/month
- CO: < 0.3 ppm/month

Cross-sensitivity at 20 °C

- 300 ppm CO: < +3 ppm on H₂S
~ +300 ppm on CO
- 15 ppm H₂S: ~ +15 ppm on H₂S
< +11 ppm on CO
- 100 ppm H₂: ~ +30 ppm on CO
- 5 ppm NO₂: ~ -1 ppm on H₂S
~ -1 ppm on CO
- none known

Lifetime

- guaranteed: 3 years
- expected: 3 years

Test gases

- zero point: fresh air
- H₂S sensitivity: 40 ppm H₂S in synthetic air
- CO sensitivity: 40 ppm CO in synthetic air

Sensor - Propane C₃H₈

Sensor data

- measurement principle: combined sensor catalytic combustion and thermal conductivity
- measurement range: 0 – 1.70 vol.% (AL3) in 0.05 vol.% steps or
0 – 100 %LEL (AL3) in 1 %LEL steps
- t₉₀ time: < 30 seconds
- storage temperature: -20 °C – +60 °C (for repl. sensors)

Alarm thresholds (factory settings)

- C₃H₈: AL1 = 0.35 vol.% AL2=0.85 vol.%
or
AL1 = 20 %LEL AL2 = 50 %LEL

Lifetime

- guaranteed: 1 year
- expected: 5 years

Test gases

- zero point: fresh air
- sensitivity 1: 1.00 vol.% (50 %LEL) C₃H₈ in synth. air
- sensitivity 2: 100 vol.% C₃H₈

Sensor - Nonane C₉H₂₀ (⊗)

Sensor data

- measurement principle: combined sensor catalytic combustion and thermal conductivity
- measurement range: 0 – 0.70 vol.% (AL3) in 0.05 vol.% steps or
0 – 100 %LEL (AL3) in 1 %LEL steps
- t₉₀ time: < 30 seconds
- storage temperature: -20 °C – +60 °C (for repl. sensors)

Alarm thresholds (factory settings)

- C₉H₂₀: AL1 = 0.15 vol.% AL2=0.35 vol.%
or
AL1 = 20 %LEL AL2 = 50 %LEL

Lifetime

- guaranteed: 1 year
- expected: 5 years

Test gases

- zero point: fresh air
- sensitivity 1: 0.35 vol.% (50 %LEL)
at 0.30 vol.% propane (replacement gas)

**Note:**

100 vol.% measurement range not available!

Sensor - Ammoniak NH₃ (⊗)

Sensor data

- measurement principle: electrochemical sensor (EC)
- measurement range: 2 – 100 ppm (AL3) in 1 ppm steps
- zero point drift: 1 ppm
- t_{90} time: < 90 seconds
- storage temperature: 0 °C – +20 °C (for repl. sensors)

Alarm thresholds (factory settings)

- NH₃: AL1 = 50 ppm AL2 = 75 ppm

Temperature influence

- zero point: < 2 ppm
- sensitivity: < no influence

Time drift: < 0,3 ppm/month

Cross-sensitivity at 20 °C

- none known

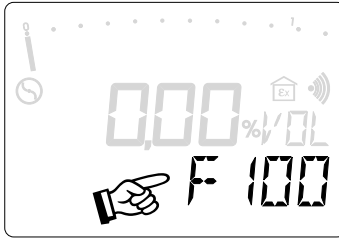
Lifetime

- guaranteed: 1 year
- expected: 2 years

Test gases

- zero point: fresh air
- sensitivity: 50 ppm NH₃ in Nitrogen

11.3 Error messages



- the **EX-TEC Combi** detects faults itself and displays an error code in the LCD

Error code Cause, Remedy and Error properties

- F1 Sensor error:
No sensor found
Remedy : switch the device off/on again,
 contact SEWERIN-Service
Error properties: the device switches off
- F17 Adjustment error:
Zero point of catalytic combustion sensor (CH_4 , C_3H_8 ,
 C_9H_{20}),
Remedy: check test gas, repeat the adjust-
 ment, contact SEWERIN-Service
Error properties: 3s alarm, self-resetting
- F18 Adjustment error:
Sensitivity of catalytic combustion sensor (CH_4 , C_3H_8 ,
 C_9H_{20}),
Remedy: check test gas, repeat the adjust-
 ment, contact SEWERIN-Service
Error properties: 3s alarm, self-resetting
- F19 Adjustment error:
Zero point of thermal conductivity sensor (CH_4 , C_3H_8),
Remedy: check test gas, repeat the adjust-
 ment, contact SEWERIN-Service
Error properties: 3s alarm, self-resetting
- F20 Adjustment error:
Sensitivity of thermal conductivity sensor (CH_4 , C_3H_8),
Remedy: check test gas, repeat the adjust-
 ment, contact SEWERIN-Service
Error properties: 3s alarm, self-resetting

Error code Cause, Remedy and Error properties

- F32 Adjustment error:
Zero point in the O₂ range (EC),
Remedy : check test gas, repeat the adjustment, contact SEWERIN-Service
Error properties: 3s alarm, self-resetting
- F33 Adjustment error:
Sensitivity in the O₂ range (EC),
Remedy: check test gas, repeat the adjustment, contact SEWERIN-Service
Error properties: 3s alarm, self-resetting
- F34 Adjustment error:
Zero point in the H₂S or CO range (EC),
Remedy: check test gas, repeat the adjustment, contact SEWERIN-Service
Error properties: 3s alarm, self-resetting
- F35 Adjustment error:
Sensitivity in the H₂S or CO range (EC),
Remedy: check test gas, repeat the adjustment, contact SEWERIN-Service
Error properties: 3s alarm, self-resetting
- F36 Adjustment error:
Zero point in the CO₂ range (IR),
Remedy: check test gas, repeat the adjustment, contact SEWERIN-Service
Error properties: 3s alarm, self-resetting
- F37 Adjustment error:
Sensitivity in the CO₂ range (IR),
Remedy: check test gas, repeat the adjustment, contact SEWERIN-Service
Error properties: 3s alarm, self-resetting
- F40 Sensor error (catalytic combustion):
Measurement range falling below -10 %LEL,
Remedy: adjust or replace the catalytic combustion sensor
Error properties: self-resetting, non clearable

Error code Cause, Remedy and Error properties

F41	Sensor error CO ₂ : Measurement range falling below -0.5 vol. % Remedy : adjust or replace the CO ₂ sensor Error properties: self-resetting, non clearable
F42	Sensor error O ₂ : Measurement range falling below -1 vol. % Remedy: adjust or replace the O ₂ sensor Error properties: self-resetting, non clearable
F43	Sensor error CO: Measurement range falling below -10 ppm Remedy: adjust or replace the CO sensor Error properties: self-resetting, non clearable
F44	Sensor error H ₂ S: Measurement range falling below -3 ppm Remedy: adjust or replace the H ₂ S sensor Error properties: self-resetting, non clearable
F50	Microcontroller ROM-Test: Self-test faulty Remedy: switch the device off/on again, SEWERIN-Service Error properties: self-retaining, non clearable
F51	Microcontroller RAM-Test: Self-test faulty Remedy: switch the device off/on again, SEWERIN-Service Error properties: self-retaining, non clearable
F52	EEPROM-Test: Read/write error detected Remedy: switch the device off/on again, SEWERIN-Service Error properties: self-retaining, non clearable
F53	A/D converter: A/D converter faulty Remedy: switch the device off/on again, SEWERIN-Service Error properties: self-retaining, non clearable

Error code Cause, Remedy and Error properties

F54	External RAM-Test: Self-test faulty Remedy: switch the device off/on again, SEWERIN-Service Error properties: self-retaining, non clearable
F55	Clock module: Clock error Remedy: switch the device off/on again, SEWERIN-Service Error properties: self-retaining, non clearable
F56	LCD driver : LCD driver error Remedy: switch the device off/on again, SEWERIN-Service Error properties: self-retaining, non clearable
F62	Sensor error (thermal conductivity): Sensor error occurred in the GAS-WARNING mode, GAS-MEASURING mode Remedy: switch the device off/on again, SEWERIN-Service Error properties: clearable
F75 – F78	Sensor-component error: Remedy: switch the device off/on again, SEWERIN-Service Error properties: self-retaining, non clearable
F100	Pump performance too low: Switch the device off/on again, Check the filters in the device and in probes Error properties: self-resetting, non clearable
F255	Data memory: Memory end reached in setting stack-memory (see INFO/MEM/MEM-STOP) Error properties: clearable

<u>Alarm</u>	<u>Cause, Remedy and Alarm properties</u>
AL1	<p>Lower alarm threshold: Alarm threshold exceeded Alarm properties:acoustic alarm clearable, optical alarm stays on, self-resetting</p> <p>Exception O₂ sensor (cf. Chap. 3.6): fallen below the alarm threshold Alarm properties:clearable when the level of the alarm threshold exceeds once again</p>
AL2	<p>Upper alarm threshold: Alarm threshold exceeded Alarm properties:clearable when the level falls once again below the alarm threshold</p>
AL3	<p>End of measuring range: Sensor reached end of measuring range Alarm properties:self-resetting when the level falls below the end of measuring range</p>

11.4 Error and Alarm properties

All Fxxx errors do have highest priority i.e. they can only be run as sole errors.

Errors F40-F44 and F62 are exceptions. These messages can occur together with alarm messages AL1, AL2 and AL3. The display then switches between the error and alarm message every 3s. The priority within AL1 to AL3 is from AL1 to AL3 in ascending order i.e. only an ALx message can be run for a sensor.

11.5 Wearing Parts

Fine dust filter in the probe connection from the **EX-TEC Combi** (item 3) to most probes

Hydrophobic filter..... in the 1 m, 2 m and 6 m probe hoses

Test gas can various concentrations for monitoring and adjustment



Note:

Test gas can are under pressure: do not store above 50 °C! Observe the storage time!

11.6 Spare parts



Note:

When ordering spare parts please check the relevant standard offers for reference!

11.7 EC-Sensor Disposal



Note:

EC-Sensors must be disposed of by at a special disposal site!

12 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.

13 Delivery variants and accessories

13.1 Delivery variants



EX-TEC Combi

Part-No.: MG02-10001

Multiple Gas Warning Device

- with built-in pump, data storage and serial port
- with space to plug-in 4 sensors
- for the monitoring of max. 5 different gases

13.2 Accessories

Charging Technique



Docking station HS 1,2 A

Part-No.: LP08-10201

- to charge the instrument,
- with a connection socket for the AC/DC adapter or a car cable



AC/DC adapter M4

Part-No.: LD10-10001

- to connect the docking station HS 1,2 A to a 100 – 240-volt~ mains



Car cable 12 V= mounting

Part-No.: ZL07-10000

- to connect the docking station HS 1,2 A to 12 volt= vehicle electrics
- with built-in fuse and blade receptacles



Car cable M4 12 V= mobile

Part-No.: ZL07-10100

- to connect the docking station HS 1,2 A to 12 volt= vehicle electrics
- with built-in fuse and connector for cigarette lighter



Car cable M4 24 V= mounting

Part-No.: ZL09-10000

- to connect the docking station HS 1,2 A to 24 volt= vehicle electrics
- with voltage transformer and blade receptacles

Carrying Technique



Carrying system "Triangel"

Part-No.: 3209-0005

- upholstered back belt, and 4-point tightening method



Carrying system „Cross Belt“

Part-No.: 3209-0004

- 2 belts to be crossed over on the back and 4-point tightening method



Carrying bag VT/SR

Part-No.: 3204-0033

- leather, with inspection window and recesses for instrument connections
- 4 belt eyes for tightening carrying systems „Triangel“ and „Cross Belt“,
- flap with velcro-fastening to be worn at the belt, useable in hazardous areas



Case VT/SR

Part-No.: ZD08-10000

- with built-in partitions, **charging possibility from the outside**



Case VT/SR universal

Part-No.: ZD11-10000

- with built-in partitions

Probe Systems



Hand probe

Part-No.: ZS14-10100

- 900 mm long, divisible
- with fine dust filter
- probe hose 1 m will be required



Flexible hand probe (⊗)

Part-No.: ZS32-10000

- 360 mm long, flexible tip
- with fine dust filter
- probe hose 1 m will be required



Telescopic hand probe (⊗)

Part-No.: ZS43-10000

- flexible tip
- with fine dust filter
- with probe hose, minimum length 450 mm, maximum length 930 mm



Floating probe (⊗)

Part-No.: ZS21-10100

- to monitor the working place
- probe hoses 2 m or 6 m will be required



Pinpointing probe (⊗)

Part-No.: ZS03-10300

- 345 mm probe tip
- for localizing
- with probe filter inset
- probe hose 1 m will be required



Trench probe (⊗)

Part-No.: ZS03-10400

- 345 mm probe tip
- for localization within trenches
- with probe filter inset
- probe hose 1 m will be required



Probe hose, 1 m long

Part-No.: ZS25-10000

- with hydrophobic filter and quick-connect



Probe hose, 2 m long

Part-No.: ZS17-10100

- with hydrophobic filter and quick-connect



Probe hose 6 m

Part-No.: ZS18-10100

- with hydrophobic filter and quick connect

Testing Technique



Test set SPE VOL

Part-No.: PP01-90101

- for mobile vehicle mounting,
- connection for all SEWERIN test gas cans, flow-rate control, release key and connecting hose



Test gas cans (⊗)

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



Test set SPE2 (⊗)

Part-No.: PP01-70001

- for non-mobile use in the workshop,
- with connections for several SEWERIN pressure cylinders, pressure and flow meter, release key and connection hoses

(not shown)

- The volume flow must be set within a range of 10 – 30 l/h

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



Test manometer

- for test gas cans
- manometer 0 – 16 bar with valve adapter for SEWERIN test gas cans



Carbon dioxide filter

- to „filter-out“ CO₂ shares within test gas samples,
- with Rectus plug connections
- also for adjusting the CO₂ sensor.

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



EG-Baumusterprüfbescheinigung

- (1) EG-Baumusterprüfbescheinigungsnummer
- (2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - **Richtlinie 94/9/EG**
- (3) EG-Baumusterprüfbescheinigungsnummer
PTB 96 ATEX 2166
- (4) Gerät: Gasmess- Gasspürgerät Typ 041 yy xxxx ... 044 yy xxxx
- (5) Hersteller: Hermann Sewerin GmbH
- (6) Anschrift: Robert-Bosch-Straße 3
D-33334 Gütersloh
- (7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.
- (8) Die Physikalisch-Technische Bundesanstalt bescheinigt als benannte Stelle Nr. 0102 nach Artikel 9 der Richtlinie des Rates der Europäischen Gemeinschaften vom 23. März 1994 (94/9/EG) die Erfüllung der grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie.
Die Ergebnisse der Prüfung sind in dem vertraulichen Prüfbericht Nr. PTB Ex 96/2/0081 festgelegt.
- (9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit
DIN EN 50014:1994-03 DIN EN 50018:1995-03 DIN EN 50020:1996-04
- (10) Falls das Zeichen „X“ hinter der Bescheinigungsnummer steht, wird auf besondere Bedingungen für die sichere Anwendung des Gerätes in der Anlage zu dieser Bescheinigung hingewiesen.
- (11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf Konzeption und Bau des festgelegten Gerätes gemäß Richtlinie 94/9/EG. Weitere Anforderungen dieser Richtlinie gelten für die Herstellung und das Inverkehrbringen dieses Gerätes.
- (12) Die Kennzeichnung des Gerätes muß die folgenden Angaben enthalten:



Ex II 2 G EEx ib d IIB T4

Zertifizierungsstelle Explosionsschutz

Braunschweig, 08.01.1997

Im Auftrag

Dr.-Ing. U. Johannsmeyer
Oberregierungsrat



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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

**Anlage**(14) **EG-Baumusterprüfbescheinigung PTB 96 ATEX 2166**(15) Beschreibung des Gerätes

Das Gerät dient zur Messung und zum Aufspüren von Gaskonzentrationen, vorzugsweise Methan vom 10-ppm-Bereich bis zum 100-Vol%-Bereich. Die eingebaute Pumpe fördert das Meßgas.

(16) Prüfbericht Nr. PTB Ex 96/2/0081 (bestehend aus 3 Seiten und 27 Zeichnungen)(17) Besondere Bedingungen

nicht zutreffend

(18) Grundlegende Sicherheits- und Gesundheitsanforderungen

nicht zutreffend

(19) Hinweisschild

Das Wechseln und Laden des Akkumulators darf nur außerhalb des explosionsgefährdeten Bereiches erfolgen.

Zertifizierungsstelle Explosionsschutz

Braunschweig, 08.01.1997

Im Auftrag

Dr.-Ing. U. Johannsmeyer
Oberregierungsrat



Seite 2/2

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



1. E R G Ä N Z U N G

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

zur EG-Baumusterprüfbescheinigung PTB 96 ATEX 2166

Gerät: Gasmess-Gasspürgerät Typ 041 yy xxxx ... 044 yy xxxx

Hersteller: Hermann Sewerin GmbH

Anschrift: Robert-Bosch-Straße 3
D-33334 Gütersloh

Beschreibung der Ergänzungen und Änderungen

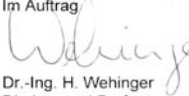
1. Die Sensorkammer des oben genannten Gerätes darf künftig auch mit Sintermetallelementen als Atmungseinrichtung gefertigt werden.
Technische Einzelheiten und Prüfergebnisse enthält der vertrauliche Prüfbericht Nr. PTB Ex 97-17045.
2. Werden die Gasmess-Gasspürgeräte mit einer Meßfunktion für den Explosionsschutz betrieben, ist gemäß Richtlinie 94/9/EG Anhang II Ziffer 1.5.5 bis 1.5.7 eine Funktionsprüfung erforderlich. Dies ist in geeigneter Form dem Betreiber mitzuteilen, z.B. in der Betriebsanleitung.

Prüfbericht Nr.: PTB Ex 97-17045

Zertifizierungsstelle Explosionsschutz

Braunschweig, 12.06.1997

Im Auftrag


Dr.-Ing. H. Wehinger
Direktor und Professor



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**3. E R G Ä N Z U N G**

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

zur EG-Baumusterprüfbescheinigung PTB 96 ATEX 2166

Gerät: Typ EX TEC Combi und Typ EX TEC SR2-DO

Kennzeichnung:  II 2 G EEx d ib IIB T4/T3

Hersteller: Hermann Sewerin GmbH

Anschrift: Robert-Bosch-Straße 3
D-33334 GüterslohBeschreibung der Ergänzungen und Änderungen

Die Typreihe von Gasmess- Gasspürgeräten wird ergänzt um die Varianten Typ 045 yy xxxxx (EX TEC Combi) und Typ 046 yy xxxxx (EX TEC SR2-DO).

Prüfbericht: PTB Ex 00-29353Zertifizierungsstelle Explosionsschutz
Im Auftrag

Braunschweig, 27. Juni 2000

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Seite 1/1

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4. ERGÄNZUNG

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

zur EG-Baumusterprüfbescheinigung PTB 96 ATEX 2166

Gerät: Gasmess- Gasspürgerät Typ 041 yy xxxx ... 044 yy xxxx

Kennzeichnung:  II 2 G EEx d ib IIB T3/T4

Hersteller: Hermann Sewerin GmbH

Anschrift: Robert-Bosch-Straße 3
33334 Gütersloh, DEUTSCHLAND


Beschreibung der Ergänzungen und Änderungen

Die Typreihe von Gasmess- Gasspürgeräten wird auch mit alternativen galvanischen Zellen, Sensoren sowie einer angepassten Leiterplatte gefertigt.

Änderungen für Anwendung und Betrieb ergeben sich nicht.

Prüfbericht: PTB Ex 02-22070

Zertifizierungsstelle Explosionsschutz
im Auftrag


Dr.-Ing. U. Klausmeyer
Regierungsdirektor



Braunschweig, 05. April 2002

Seite 1/1

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5. E R G Ä N Z U N G

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

zur EG-Baumusterprüfbescheinigung PTB 96 ATEX 2166

Gerät: Gasmeß- Gasspürgerät Typ 041 yy xxxx ... 046 yy xxxx
Kennzeichnung:  II 2 G EEx d ib IIB T3/T4
Hersteller: Hermann Sewerin GmbH
Anschrift: Robert-Bosch-Straße 3
33334 Gütersloh, Deutschland

Beschreibung der Ergänzungen und Änderungen

Die Typenreihe von Gasmess- Gasspürgeräten wird auch mit alternativen galvanischen Zellen, Sensoren sowie einer angepassten Leiterplatte gefertigt.

Änderungen für Anwendung und Betrieb ergeben sich nicht.

Prüfbericht: PTB Ex 03-23274

Zertifizierungsstelle Explosionsschutz
Im Auftrag

Braunschweig, 24. Juli 2003

Dr.-Ing. U. Gerlach



Seite 1/1

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EG-Baumusterprüfbescheinigung

- (2) **- Richtlinie 94/9/EG -**
Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung
in explosionsgefährdeten Bereichen

(3) **DMT 01 ATEX G 002**

- (4) **Gerät:** EX-TEC Combi
(5) **Hersteller:** Hermann Sewerin GmbH
(6) **Anschrift:** Robert-Bosch-Straße 3
D-33334 Gütersloh

(7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.

(8) Die Zertifizierungsstelle der Deutsche Montan Technologie GmbH, benannte Stelle Nr. 0158 gemäß Artikel 9 der Richtlinie 94/9/EG des Europäischen Parlaments und des Rates vom 23. März 1994, bescheinigt, dass das Gerät die grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllt.
Die Ergebnisse der Prüfung sind in dem Prüfbericht PFG-Nr. 41300401P niedergelegt.

(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen hinsichtlich der Messfunktion für den Explosionsschutz werden erfüllt durch Anwendung von:


DIN EN 50054 (VDE 0400 Teil 1 / 07.99)
DIN EN 50057 (VDE 0400 Teil 4 / 07.99)
EN 50271 (2001)

Diese EG-Baumusterprüfbescheinigung umfasst die Messfunktion für Methan im Messbereich 0 bis 100 % UEG für Geräte mit der Software-Version V2.1.

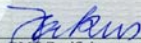
- (10) Falls das Zeichen „X“ hinter der Bescheinigungsnummer steht, wird in der Anlage zu dieser Bescheinigung auf besondere Bedingungen für die sichere Anwendung des Gerätes hingewiesen.
- (11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf die Konzeption und die Baumusterprüfung des beschriebenen Gerätes in Übereinstimmung mit der Richtlinie 94/9/EG.
Für Herstellung und Inverkehrbringen des Gerätes sind weitere Anforderungen der Richtlinie zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.



(12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

 II 2 G EEx ib d IIB T3

Deutsche Montan Technologie GmbH
Essen, den 15. Januar 2002



DMT-Zertifizierungsstelle



Fachbereich



(13) Anlage zur

(14) **EG-Baumusterprüfbescheinigung**

DMT 01 ATEX G 002

(15) 15.1 Gegenstand und Typ

Gasmessgerät EX-TEC Combi

15.2 Beschreibung

Das Gaswarngerät EX-TEC Combi der Firma Hermann Sewerin GmbH ist eine nicht ortsfeste Einrichtung zur Messung brennbarer Gase und Dämpfe, toxischer Gase und Sauerstoff. Das Gaswarngerät kann mit einem Sensor zur Messung brennbarer Gase und Dämpfe, einem Sensor zur Messung von Sauerstoff sowie zwei Sensoren zur Messung toxischer Gase bestückt werden. Dabei können bis zu 5 Gase gleichzeitig gemessen werden. Eine Minderbestückung ist möglich.

15.3 Kenngrößen

entfällt

(16) Prüfbericht

PFG-Nr. 41300401P vom 14.01.2002

EG-Baumusterprüfbescheinigung PTB 96 ATEX 2166 vom 08.01.1997

1. Ergänzung zur EG-Baumusterprüfbescheinigung PTB 96 ATEX 2166 vom 12.06.1997

3. Ergänzung zur EG-Baumusterprüfbescheinigung PTB 96 ATEX 2166 vom 27.06.2000

(17) Besondere Bedingungen für die sichere Anwendung

entfällt



1. Nachtrag

(Ergänzung gemäß Richtlinie 94/9/EG Anhang III Ziffer 6)

zur EG-Baumusterprüfbescheinigung DMT 01 ATEX G 002

Gerät: EX-TEC Combi
Hersteller: Hermann Sewerin GmbH
Anschrift: D-33334 Gütersloh

Beschreibung

Dieser Nachtrag zur EG-Baumusterprüfbescheinigung umfasst einen geänderten Sensor zur Messung brennbarer Gase, der zukünftig wahlweise eingesetzt werden soll. Die grundlegenden Sicherheits- und Gesundheitsanforderungen hinsichtlich der Messfunktion für den Explosionsschutz werden erfüllt durch Anwendung von

DIN EN 50054 (VDE 0400 Teil 1 / 07.1999)
DIN EN 50057 (VDE 0400 Teil 4 / 07.1999)
DIN EN 50271 (VDE 0400 Teil 21 / 05.2002)

Dieser Nachtrag zur EG-Baumusterprüfbescheinigung umfasst die Messfunktion für Methan und Propan im Messbereich 0 bis 100 % UEG für Geräte mit der Software-Version V2.2.

Prüfbericht

PFG-Nr. 41300401P NI vom 29.08.2003
5. Ergänzung zur EG-Baumusterprüfbescheinigung PTB 96 ATEX 2166 vom 24.07.2003
EG-Baumusterprüfbescheinigung PTB 01 ATEX 1155 U vom 04.02.2002

Deutsche Montan Technologie GmbH
Essen, den 01.09.2003


Zertifizierungsstelle


Fachbereich

Konformitätserklärung / Declaration of Conformity

Gerätebezeichnung: Type of Product:	tragbares, batteriebetriebenes Gasmeßgerät portable battery-operated gas measuring device
Geräte-Typ: Product Name:	EX-TEC Combi
Fabrikations-Nr.: Fabr.No.:	045 xx xxxx

Hiermit erklären wir, daß oben genanntes Produkt mit der / den folgenden Norm(en) oder normativen Dokument(en) übereinstimmt. Bei einer mit uns nicht abgestimmten Änderung des Produkts verliert diese Erklärung ihre Gültigkeit.

We hereby declare that the above product complies with the following norms or standardized directives. In case of any modification of this product which has not been authorized by us, this declaration becomes invalid.

Norm(en) / Norm(s):

DIN EN 50 081-1	<i>EMV - Fachgrundnorm Störaussendung Generic Emission Standard</i>
DIN EN 50 082-1	<i>EMV - Fachgrundnorm Störfestigkeit Generic Immunity Standard</i>
DIN EN 50 014/18/20	<i>Ex - Allgemeine Bestimm. /Druckf. Kapselung/ Eigensicherheit General Requirements /Flameproof Encl./ Intrinsic Safety -i-</i>
DIN EN 50 054/057/271	<i>El. Geräte für das Aufspüren brennbarer Gase El. devices to detect and measure combustible gases</i>

Fundstellen bzgl. EN 50 081/82 sind Amtsblätter der EG Nr. C 44/12 bzw. Nr. C 90/2
The norms EN 50 081/82 are recorded in the Gazette of the EG No. C 44/12 and No. C 90/2 resp.

Gemäß den Bestimmungen der Richtlinie(n) / The unit is in accordance with:

89/336/EWG	<i>EG-Richtlinie : Elektromagnetische Verträglichkeit EG-Directive: Electromagnetic Compatibility</i>
92/31/EWG	<i>Änderung dazu /amendment to above</i>
93/68/EWG	<i>Änderung dazu /amendment to above</i>
94/9/EG	<i>ATEX 100a</i>

Gütersloh, den 15.06.2005

HERMANN SEWERIN GMBH



(Geschäftsführer / Managing Director)

INSPECTION PROTOCOL**Sensors:****Serial Number: (e.g.: 045 11 0001)****EX-TEC® Combi**

CH ₄	CO ₂	O ₂	H ₂ S	CO



25.04.2005

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

2.0 Pump test										
2.1	- low pressure > 150 mbar									
2.2	- volume flow > 30 l/h									

3.0 CH ₄ -range										
3.1	zero point (fresh air) - display -0.15 – +0.15 vol.% or - display -3 – +3 %LEL									
3.2	test gas (2.2 vol.% CH ₄ / 50 %LEL) - display 2.0 – 2.4 vol.% or - display 45 – 55 %LEL									
3.3	test gas (100 vol.% CH ₄) - display 98 – 102 vol.%									

4.0 CO ₂ -range										
4.1	zero point (fresh air) - display +0.04 – +0.10 vol.%									
4.2	test gas (2.0 vol.% CO ₂) - display 1.8 – 2.2 vol.%									

5.0 O ₂ -range										
5.1	zero point (test gas 100 vol.% CH ₄) - display -0.5 – +0.5 vol.%									
5.2	test gas (fresh air) - display 20.4 – 21.4 vol.%									

6.0 H ₂ S-range										
6.1	zero point (fresh air) - display -3 – +3 ppm									
6.2	test gas (40 ppm H ₂ S) - display 37– 43 ppm									

7.0 CO-range										
7.1	zero point (fresh air) - display -3 – +3 ppm									
7.2	test gas (40 ppm CO) - display 37 – 43 ppm									

Appendix

8.0 Alarm function													
8.1 optical alarm (e.g.: Y / N)													
8.2 audible alarm (e.g.: Y / N)													

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

10.0 Test													
- day													
- month													
- year													
- signature													

INSPECTION PROTOCOL**Sensors:****Serial Number: (e.g.: 045 11 0001)****EX-TEC® Combi**

C ₃ H ₈	CO ₂	O ₂	H ₂ S	CO



25.04.2005

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

2.0	Pump test												
2.1	- low pressure > 150 mbar												
2.2	- volume flow > 30 l/h												

3.0	C ₃ H ₈ -range												
3.1	zero point (fresh air) - display -0.06 – +0.06 vol. % - display -3 – +3 %LEL												
3.2	test gas (1.0 vol. % C ₃ H ₈ / 59 %LEL) - display 0.9 – 1.1 vol. % or - display 54 – 64 %LEL												
3.3	test gas (100 vol. % C ₃ H ₈) - display 98 – 102 vol. %												

4.0	CO ₂ -range												
4.1	zero point (fresh air) - display +0.04 – +0.10 vol. %												
4.2	test gas (2.0 vol. % CO ₂) - display 1.8 – 2.2 vol. %												

5.0	O ₂ -range												
5.1	zero point (test gas 100 vol. % CH ₄) - display -0.5 – +0.5 vol. %												
5.2	test gas (fresh air) - display 20.4 – 21.4 vol. %												

6.0	H ₂ S-range												
6.1	zero point (fresh air) - display -3 – +3 ppm												
6.2	test gas (40 ppm H ₂ S) - display 37 – 43 ppm												

7.0	CO-range												
7.1	zero point (fresh air) - display -3 – +3 ppm												
7.2	test gas (40 ppm CO) - display 37 – 43 ppm												

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8.0 Alarm function																			
8.1 optical alarm (e.g.: Y / N)																			
8.2 audible alarm (e.g.: Y / N)																			

9.0 Observations - housing broken - adjustment, repair - factory inspection - or the like																			
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10.0 Test																			
- day																			
- month																			
- year																			
- signature																			

INSPECTION PROTOCOL

EX-TEC[®] Combi

Sensors:

C ₉ H ₂₀	CO ₂	O ₂	H ₂ S	CO

Serial Number: (e.g.: 045 11 0001)



25.04.2005

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

2.0	Pump test											
2.1	- low pressure > 150 mbar											
2.2	- volume flow > 30 l/h											

3.0	C ₉ H ₂₀ -range											
3.1	zero point (fresh air) - display -0.05 – +0.05 vol.% or - display -3 – +3 %LEL											
3.2	replacement test gas (0.3 vol.% propane) - display 0.3 – 0.4 vol.% or - display 43 – 57 %LEL											

4.0	CO ₂ -range											
4.1	zero point (fresh air) - display +0.04 – +0.10 vol.%											
4.2	test gas (2.0 vol.% CO ₂) - display 1.8 – 2.2 vol.%											

5.0	O ₂ -range											
5.1	zero point (test gas 100 vol.% CH ₄) - display -0.5 – +0.5 vol.%											
5.2	test gas (fresh air) - display 20.4 – 21.4 vol.%											

6.0	H ₂ S-range											
6.1	zero point (fresh air) - display -3 – +3 ppm											
6.2	test gas (40 ppm H ₂ S) - display 37 – 43 ppm											

7.0	CO-range											
7.1	zero point (fresh air) - display -3 – +3 ppm											
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