Leak Locators
of Montana

SEWERIN
Technologies for leak detection.

# Multitec® 560

Operating instructions

# Multitec® 560



Operating instructions

# Multitec® 560



| | |
|---|---|
| Connector | Signal light |
| Supporting bracket | Gas input |
| Buzzer | |
| USB port | Display |
| | Function keys |
| | Jog dial |
| ON/OFF key | |
| Connection for power supply | Connector |

**Fig. 1:** **Multitec 560** device overview



| | |
|---|---|
| Alarm | |
| Gas | |
| Measured value | Unit |
| Warning ExTox symbol | |
| Capacity disposable battery/ rechargeable battery | |

Current assignment of
function keys F1 – F3
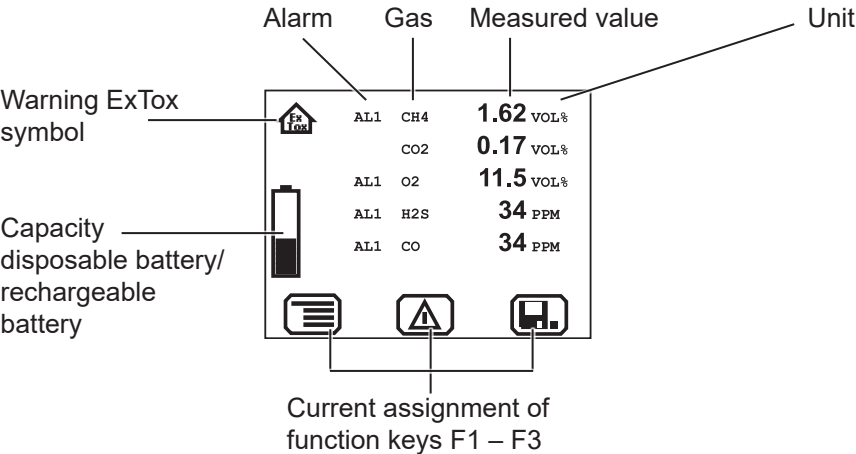
**Fig. 2:** **Multitec 560** display

# Display symbols

| Symbol | Description | | Symbol | Description |
|--------|-------------|--|--------|-------------|
| | Menu | | | Fault |
| | OK | | | Carry out device inspection |
| Esc | Cancel | | | Tab (jump to next input field) |
| | Buzzer off | | | Clear |
| | Save | | | Information |
| | Stop measurement | | | Warning ExTox |
| | | | | Gas measuring |
| | Capacity disposable battery/ rechargeable capacity | | | Open stored comment Open stored inspector |

# Information about this document

The warnings and notes in the document mean the following:

⚠ **DANGER!**
Risk of personal injury. Results include serious injury or death.

⚠ **WARNING!**
Risk of personal injury. Can result in serious injury or death.

⚠ **CAUTION!**
Risk of personal injury. Can result in injury or a risk to health.

**CAUTION!**
Risk of damage to property.

**Note:**
Tips and important information.

Enumerated lists (numbers, letters) are used for:

● Instructions that must be followed in a specific sequence

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

● Lists

● Instructions comprising only one action

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

# 1 General

## 1.1 Warranty

The following instructions must be complied with in order for any warranty to be applicable regarding functionality and safe operation of this equipment. This product must only be commissioned by qualified professionals who are familiar with the legal requirements (Germany: DVGW).

- Read these operating instructions prior to operating the product.

- Use the product only as intended.

- Repairs and maintenance must only be carried out by specialist technicians or other suitably trained personnel. Only spare parts approved by Hermann Sewerin GmbH may be used when performing repairs.

- Use only suitable battery types, otherwise the device will not be explosion-proof.

- Changes or modifications to this product may only be carried out with the approval of Hermann Sewerin GmbH.

- Use only Hermann Sewerin GmbH accessories for the product.

Hermann Sewerin GmbH shall not be liable for damages resulting from the non-observance of this information. The warranty conditions of the General Terms and Conditions (AGB) of Hermann Sewerin GmbH are not affected by this information.

In addition to the warnings and other information in these Operating Instructions, always observe the generally applicable safety and accident prevention regulations.

The manufacturer reserves the right to make technical changes.

## 1.2     Purpose

The **Multitec 560** can be used as a gas measuring and gas warning device.

The device is fitted with infrared sensors for measuring hydrocarbons $C_xH_y$ and carbon dioxide $CO_2$ as standard. It can also be equipped with electrochemical sensors for measuring $O_2$, $H_2S$ and CO.

The infrared sensors operate on the principle of absorption via infrared-active gases, and the electrochemical sensors operate on the electrochemical cell principle.

### Multitec 560 as a gas warning device

As a warning device it is used to monitor the ambient air at the workplace. The device can measure up to five gases simultaneously, thus offering comprehensive protection against dangerous gas concentrations. It provides warnings including:

● explosive gas concentrations

● lack of oxygen/excessive oxygen

● toxic gases

### Multitec 560 as a gas measuring device

As a gas measuring device it determines the composition of gas mixtures that are formed in biological processes (biogas, landfill gas). It measures the concentration of several gases in the gas mixture simultaneously. The device is ideal for use in waste disposal sites, sewage plants and biogas plants.

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**Note:**

These operating instructions describe the **Multitec 560** with all additional equipment (firmware version 1.XXX). All descriptions refer to the device as delivered (factory settings). The manufacturer reserves the right to make changes.

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## 1.3 Intended use

This device is intended for professional residential and commercial use including small firms and commercial operations. The appropriate specialist knowledge is required to operate the device.

The device may only be used to measure the following gases (depending on additional equipment):

- Methane $CH_4$
- Carbon dioxide $CO_2$
- Oxygen $O_2$
- Hydrogen sulphide $H_2S$
- Carbon monoxide CO

The device must **not** be used for:

- Gas analysis of technical processes
- Monitoring liquids

The device can be used up to a temperature of 40 ºC. However, high temperatures reduce the lifetime of the sensors and rechargeable batteries.

If a device with an electrochemical sensor is exposed to gas concentrations above the measuring range limit, this can reduce the lifetime of the sensor.

## 1.4    General safety information

- The device has been tested to ensure that it is explosion-proof in accordance with European standards (CENELEC).
- The work area must be well ventilated.
- The device must only be switched on with fresh air.
- In measuring mode, only change applications with fresh air.
- When switching from the **Gas measuring** application (using the device as a gas measuring device) to the **Warning ExTox** application (using as a gas warning device), the device should only be used as a gas warning device once the zero points have appeared.
- Do not use this device in oxygen-enriched atmospheres, otherwise it will not be explosion-proof.
- Observe the relevant safety regulations when working at agricultural biogas plants.
- Only probe hoses with a hydrophobic filter may be used.

  **Exception:**

  If the probe has a built-in hydrophobic filter, the hose does not require any other filters.
- The device must only be tested and adjusted with test gases in well ventilated rooms or in the open air. Test gases must be handled in a professional manner.
- Always carry out a device inspection after the device has suffered an impact (for example, if dropped accidentally).
- The device complies with the limits of the EMC directive. Always observe the information in the manuals of (mobile) radio equipment when using the device close to (mobile) radio equipment.

---

**Note:**
Follow the advice regarding explosion protection (see Section. 2.3 on page 7).

---

# 2 Features

## 2.1 Visual and audible signals

The device features two alarms:

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

The signals indicate alarms and faults (see Section. 6 on page 49). The device also emits signals when it is switched on and off.

If this symbol appears on the display, the audible signal can be switched off.

When an audible signal has been switched off it cannot be switched back on.

This symbol appears at the top left of the display as soon as the audible signal has been switched off. It disappears automatically if the level falls below the alarm threshold.

### Operating signal

Only applies to **Warning ExTox** application.

The device emits a visual signal and an audible signal at regular intervals. This indicates that the device is working properly.

### Alarm

Only applies to **Warning ExTox** application.

The device can monitor several gases at the same time. If the measured gas concentration of one or more gases exceeds specified limit values (alarm thresholds) the device gives a warning. It emits both audible and visual signals, which are distinctly different from the operating signal.

> ⚠ **WARNING! Danger of death due to hazardous gas concentrations**
> An alarm always indicates danger.
> ● Take all necessary measures for your own safety and the safety of others immediately.

There is detailed information on alarms in Section. 7.2 on page 51.

## 2.2  Sensors

The device features two types of sensor:

● Infrared sensor (IR)

● Electrochemical sensor (EC)

| Application | Gas | Measuring range | Sensor | Features |
|---|---|---|---|---|
| Warning ExTox | $CH_4$ | 0 – 100 % LEL | IR | × |
| | CO | 0 – 500 ppm | EC | ○ |
| | $CO_2$ | 0 – 5 % vol. | IR | × |
| | $H_2S$ | 0 – 100 ppm | EC | ○ |
| | $O_2$ | 0 – 25 % vol. | EC | ○ |
| Gas measuring | $CH_4$ | 0.0 – 100 % vol. | IR | × |
| | CO | 0 – 500 ppm | EC | ○ |
| | $CO_2$ | 0 – 100 % vol. | IR | × |
| | $H_2S$ | 0 – 2000 ppm | EC | ○ |
| | $O_2$ | 0 – 25.0 % vol. | EC | ○ |

× standard
○ optional

## 2.3 Explosion protection

### 2.3.1 Passive explosion protection

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

| Explosion-proof group | For the following atmospheres | When using |
|---|---|---|
| **II2G Ex d e ib IIB T4 Gb** | – Methane $CH_4$<br>– Propane $C_3H_8$<br>– Butane $C_4H_{10}$<br>– Nonane $C_9H_{20}$<br>– Hydrogen sulphide $H_2S$<br>– Carbon monoxide $CO$ | Device **without** carrying bag TG8 |
| **II2G Ex d e ib IIC T4 Gb** | – Methane $CH_4$<br>– Propane $C_3H_8$<br>– Butane $C_4H_{10}$<br>– Nonane $C_9H_{20}$<br>– Hydrogen sulphide $H_2S$<br>– Carbon monoxide $CO$<br>– Hydrogen $H_2$ | Device **with** carrying bag TG8 |

EC type-examination certificate: TÜV 07 ATEX 553353 X

⚠ **DANGER! Risk of explosion due to sparks**
- Only open the battery compartment outside of explosive areas.
- Only charge the device outside of explosive areas.
- Only use the USB port outside of explosive areas.
- Use only suitable battery types.
- When working with hydrogen, always use the carrying bag TG8 for the device.

### 2.3.2  Active explosion protection

The functional safety test applies to:

Application:                Warning ExTox

Gas types:                  Measuring range:  As per:
– Methane $CH_4$            0 – 100 % LEL      /9/

Gases:                      Measuring range:  As per:
– Oxygen $O_2$             0 – 25 % $O_2$     /7/
– Carbon dioxide $CO_2$    0 – 5 % $CO_2$     /4/, /5/
– Carbon monoxide CO       0 – 500 ppm CO     /4/, /5/
– Hydrogen sulphide $H_2S$ 0 – 100 ppm        /4/, /5/

Tested accessories:         – Test set SPE VOL
                            – Flexible hand probe, 1 m
                            – Floating probe 2 m, 6 m

**Type examination**

Testing institute:          DEKRA EXAM GmbH

Certificates:               PFG 08 G 002 X

                            BVS 09 ATEX G 001 X

The following points were not part of the type examination:

● Saving measurement data (see Section. 3.2.6 on page 17)
● Saving protocols from the integrated device inspection (see Section. 5.1.1.4 on page 33)
● Disposable alkaline batteries for the power supply (see Section. 4.1 on page 27)

# 3 Operation

## 3.1 General information on operation

### 3.1.1 Keys and jog dial

The ON/OFF key is the only control on the device that does not change its function.

When switched on, the device is operated using the jog dial and function keys to navigate the display.

| Control | Action | Function |
|---|---|---|
| **ON/OFF key** | Press | ● Switches the device on<br>● Switches the device off |
| **Function keys F1, F2, F3** | Press | ● Variable<br>● As indicated on the display at the bottom of the screen<br>● Function keys may also have no function assigned in some cases |
| **Jog dial** | Turn | ● Selects functions, settings, measurement data, etc.<br>● Modifies values |
| | Press | ● Opens the next program level (e.g. menu item, function, measurement data, selectable values)<br>● Accepts values |

### 3.1.2　Selecting/exiting menus and menu items

Functions, applications and settings etc. are selected via the main menu (for short: **Menu**). This **menu** has submenus and menu items. Refer to Section. 3.2.1 on page 15 for information on accessing the menu.

### Selecting submenus/menu items

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

In measuring mode the selected application is indicated by the symbol at the top left of the display.

### Exiting menus/menu items

There are generally two ways to exit open menus/menu items and go back up a level:

● **Press Esc**
● Select **Exit** menu item

### 3.1.3    Switching the device on

**Note:**

Always switch the device on with fresh air.

● Press the ON/OFF key. The device switches on.

The switching on process involves an internal check.

| Process | Test purpose |
|---|---|
| Buzzer emits audible signal. | Is the audible signal working? |
| Signal light gives visual signal. | Is the visual signal working? |
| Display is inverted. | Are there pixels missing from the display? |

The start screen appears on the display.
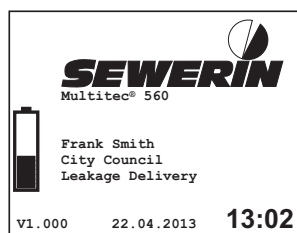


Fig. 3:    Start screen

Display:
– Device type: Multitec 560
– User:
  Frank Smith
  City Council
  Leakage Delivery
– Firmware version: V1.000
– Date and time
– Capacity disposable battery/ rechargeable battery

The start screen for the application set under **Autostart** then appears (see Section. 3.3.4 on page 24).

Display:
– Symbol: Warning ExTox
– Detectable gases
– Measuring range
– Alarm thresholds
– Capacity disposable battery/
rechargeable battery
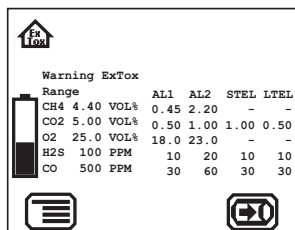
Fig. 4:    Start screen for gas measuring

The device switches to measuring mode.

Display:
– Current readings: zero when
device is switched on with fresh
air
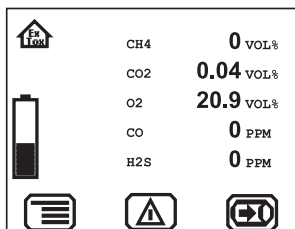
Fig. 5:    Measuring mode – display of current readings

The device is ready for use.

⚠ **WARNING! Danger of death due to incorrectly ad-
justed or faulty devices**
Gas warning instruments must be inspected before use
at regular intervals.
● Carry out a device inspection every day before starting
work.

### 3.1.4    Selecting/switching application

---

⚠️ **WARNING! Danger of death due to incorrectly ad-
justed or faulty devices**

If the device is used as a gas warning instrument (**Warn-
ing ExTox** application), it must be regularly inspected
before use.

● Carry out a device inspection every day before starting
work.

---

---

**Note:**

You may only switch applications when the device is drawing in
fresh air.

---

The current application is indicated by the symbol at the top left
of the display. The symbol at the bottom right shows the next ap-
plication that can be selected via function key **F3**. The **Settings**
under **System** (see Section 3.3.4) are used to specify which ap-
plication is first activated when you switch the device on.

● Press **Menu**. Select the menu item for the application you
want to use.

OR

a) Press function key **F3**. The device switches to the next ap-
plication.

b) Repeat until the symbol for the application you want to use
appears at the top left.

### 3.1.5    Differences between measuring mode and settings mode

The device is operated in two modes:

● **Measuring mode** (see Section. 3.2 on page 14)

Measurements are taken in measuring mode. All functions
needed to take readings can be accessed from one menu.

- **Settings** (see Section. 3.1 on page 9)

  The device settings can be changed in settings mode. Information about the device can also be retrieved. Measurements cannot be taken in settings mode.

  Settings are accessed via the menu in measuring mode. The settings are access-protected by a PIN code.

---

⚠ **WARNING!**
**Danger of death due to lack of alarm signal**
The device only issues alarms in measuring mode. As soon you access the menu, alarms are no longer triggered.
- Only change the settings outside of explosive areas and away from toxic or low-oxygen atmospheres.

---

## 3.2    Measuring mode

When switched on, the device is in measuring mode. In measuring mode, the current measurements are always displayed (fig. 5). However, to save the data from a measurement, you must always start the measurement manually (see Section. 3.2.6 on page 17).

---

⚠ **WARNING!**
**Danger of death due to operating signal failure**
If the operating signal fails in the **Warning ExTox** application, the device is not safe to use.
- Stop using the device immediately.
- Move away from explosive areas or toxic or low-oxygen atmospheres immediately.

---

### 3.2.1   Accessing the menu (measuring mode menu structure)

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

| |
|---|
| `Zero point` |
| `Gas measuring` |
| `Warning ExTox` |
| `Settings` |
| `Start measurement` |
| `Protocol` |
| `Device inspection` |
| `Device information` |
| `Exit` |

Fig. 6:    Menu with submenus/menu items

Once you have started a measurement, **Start measurement** in the menu becomes **Stop measurement.** You can find detailed information on starting and stopping measurements in Section. 3.2.6 on page 17.

**Protocol** does not appear in the menu until you save a protocol for the first time.

### 3.2.2   Zero point

The zero point can be set manually in the **Zero point**  menu item. This is only necessary if the displayed fresh air measurement is not zero after the end of the warm-up period.

| Gas | Content in fresh air | Correct zero point on device |
|---|---|---|
| $CH_4$ | 0 % vol. | 0.0 % vol. |
| CO | 0 ppm | 0 ppm |
| $CO_2$ | 0.04 % vol. | 0.04 % vol. |
| $H_2S$ | 0 ppm | 0 ppm |
| $O_2$ | 20.9 % vol. | 20.9 % vol. |

The manual zero point setting is not saved. The zero point can be corrected by adjustment as often as zero point deviations occur.

**Requirements for correct setting of the zero point**

● Device has been switched on with fresh air.

● Device continues to draw in fresh air.

**Setting zero point (manual zero point setting)**

1. Press **Menu**.

2. Select **Zero point** menu item. The values are automatically adjusted. The device returns to measuring mode.

### 3.2.3   Gas measuring

You can find an overview of detectable gases under **Gas measuring** in the menu. The device automatically returns to measuring mode.

### 3.2.4   Warning ExTox

You can access the overview of detectable gases and corresponding alarm thresholds under **Warning ExTox** in the menu. The device automatically returns to measuring mode.

⚠ **CAUTION! Health risk due to late alarm**
If you switch from **Warning ExTox** to **Gas measuring**, data that could initiate a STEL or LTEL alarm is reset to zero.
● Only switch from **Warning ExTox** to **Gas measuring** once you have left the work area being monitored.

### 3.2.5   Settings

You can change the device settings and access information about the device under **Settings** in the menu (see Section. 3.3 on page 20).

### 3.2.6    Starting/stopping a measurement

Measurements must always be started and then stopped. When the measurement is stopped, the measurement data is stored in a file.

---

**Note:**

Measurements cannot be cancelled. The only way to cancel a measurement is to stop it.

---

Up to 80 measurements can be saved.

The measured values can be saved with or without a comment. Comment entries are saved automatically (ring memory with max. 10 entries).

 Once the first comment has been entered, the **Open stored comments** function will become available.

The stored measurement files can be displayed on a computer using a **readout program**. The program is available at www.sewerin.com.

**Starting a measurement**

1. Press **Menu**.
2. Select **Start measurement** from the menu. This starts measurement plot recording.

Measurement plot recording must always be concluded with **Stop measurement**.

**Stopping a measurement**

1. Press **Stop measurement**.

   OR

   a) Press **Menu**.

   b) Select **Stop measurement** from the menu.

2. Answer **Yes** to the warning prompt.

3. Enter a **comment** for the measurement.

   a) Select the characters required using the jog dial. Confirm each character using the jog dial.

      OR

      − Press **Open stored comments**. A list of the stored comments will appear.

      − Select the desired comment. Open the comment with **OK**.

   b) Then confirm your entry/selection with **OK**.

      OR

      Press **Esc** if you do not wish to enter a comment for the measurement.

   The measurement is saved as a protocol. The protocol name is formed from the date, time and comment.

## 3.2.7 Protocols

You can retrieve or clear protocols of saved data under **Protocol** in the menu. When saved, the protocols are assigned to different protocol types.

The following protocol types are available:

- Device inspection
- Measurements

Protocols can only be cleared individually.

You can find information on how to clear all protocols of one protocol type in Section. 3.3.7 on page 26.

### 3.2.8  Device inspection

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

---

**Note:**

The integrated device inspection is switched off in the factory settings. More detailed information about the device inspection can be found in Section. 5.1 on page 32.

---

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

⚠️ The **Carry out device inspection** symbol will appear when the inspection is due. It is visible in the display until the complete integrated device inspection has been carried out successfully.

### 3.2.9  Device information

The following device information is shown under **Device information** in the menu:

- Installed electrochemical sensors: gas, installation date, warranted/expected lifetime
- Firmware: version, date
- Service: date of the last service, date of the next service

## 3.3    Settings

The following menus and menu items are included under **Settings** :

- ● Adjustment
- ● System
- ● Alarms
- ● Date/time
- ● Memory

You can find information on selecting and exiting menus and menu items in Section. 3.1.2 on page 10.

### 3.3.1    Opening Settings

1. Press **Menu**.

---

⚠ **WARNING!**
**Danger of death due to lack of alarm signal**
The device only issues alarms in measuring mode. As soon you access the menu, alarms are no longer triggered.
- ● Only change the settings outside of explosive areas and away from toxic or low-oxygen atmospheres.

---

2. Select the **Settings** menu item.

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

---

**Note:**
You can change the PIN code at any time.
SEWERIN recommends setting a different PIN code after initial start-up, so only authorised personnel have access to the settings.

---

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

| Digit | To change | To confirm |
|-------|-----------|------------|
| **1st digit** | | Press the jog dial |
| **2nd digit** | | Press the jog dial |
| **3rd digit** | Turn the jog dial | Press the jog dial |
| **4th digit** | | ✔ |

If the PIN code has been entered correctly, the **Settings** menu will appear once the last digit has been confirmed (fig. 7). Otherwise the device will revert to measuring mode.

| Adjustment |
|------------|
| System |
| Alarms |
| Date/time |
| Memory |
| Exit |

Fig. 7:   **Settings** menu

### 3.3.2 Settings menu structure



| Settings | PIN Code → | Adjustment | → | Adjustment gas mixture warning |
|---|---|---|---|---|
| | | | | Adjustment gas mixture measuring |
| | | | | Test gas |
| | | | | Adjustment CH4 |
| | | | | Adjustment CO2 |
| | | | | Adjustment O2 |
| | | | | Adjustment CO |
| | | | | Adjustment H2S |
| | | | | Inspection OK |
| | | | | Exit |

| System | → | PIN Code |
|---|---|---|
| | | Service interval |
| | | Display |
| | | Battery |
| | | Autostart |
| | | Unit %LEL |
| | | Device inspection |
| | | Language |
| | | Exit |

Alarms

Date/time

| Memory | → | Clear |
|---|---|---|
| | | Interval |
| | | Memory mode |
| | | Exit |

Exit

Measuring mode ←

Fig. 8: **Settings** menu structure for Multitec 560 (gas type: methane)

---

**Note:**

The number of available menu items depends on the optional additional equipment.

---

### 3.3.3 Adjustment

The Adjustment menu is used to set the sensors.

---

⚠ **WARNING! Danger of death due to incorrect adjustment**

Incorrect adjustment can lead to incorrect measurement results. This means that the user may not be warned about dangerous gas concentrations in time.
- Only specialist technicians may perform adjustments
- Adjustments must be made in well ventilated rooms or in the open air.

---

A detailed description of adjustment along with important information is provided in Section. 5.2 on page 41.

**Adjustment gas mixture warning**

Used to adjust the infrared and electrochemical sensors for all components of the test gas (gas mixture).

Application:          – Warning ExTox

**Adjustment gas mixture measuring**

Used to adjust the infrared sensors for methane $CH_4$ and carbon dioxide $CO_2$.

Application:          – Gas measuring

**Test gas**

Used to adjust the concentration of the test gases used.

**Adjustment CO2**

Used to adjust the infrared sensor for carbon dioxide $CO_2$ in the % vol. range.

**Adjustment O2**

Used to adjust the electrochemical sensor for oxygen $O_2$ in the % vol. range.

**Adjustment CO**

Used to adjust the electrochemical sensor for carbon monoxide CO in the ppm range.

**Adjustment H2S**

Used to adjust the electrochemical sensor for hydrogen sulphide $H_2S$ in the ppm range.

**Inspection OK**

Confirms the device is in proper working order. This extends the service interval.

### 3.3.4  System

General information and specifications for operation are set in the System menu.

**PIN code**

Used to change or reset the PIN code.

**Note:**
If you lose the PIN code, you must contact SEWERIN Service. If the PIN code is set to **0000**, you will not be asked to enter it. The settings can then be accessed by anyone.

**Service interval**

Specifies the regular inspections/maintenance required for the device. You can also activate the automatic switch-off function once the set interval has passed.

**Display**

Used to set how long the display remains illuminated after any key is pressed as well as the display contrast.

**Battery**

Used to set the type of disposable/rechargeable battery used.

---

**CAUTION! Damage possible due to device overheating**
If the battery type is not correctly set, the device can overheat.
● Always enter the correct battery type.

---

**Autostart**

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

**Unit %LEL**

Used to set the unit of measurement.

**Device inspection**

Used to switch the integrated device inspection on or off.

**Language**

Sets the language.

### 3.3.5 Alarms

Sets the alarm thresholds for methane $CH_4$.

There is detailed information on alarms in Section. 7.2 on page 51.

**AL1 alarm**

Used to set the pre-alarm.

**AL2 alarm**

Used to set the main alarm.

### 3.3.6 Date/time

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

### 3.3.7 Memory

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

**Clear**

Used to clear protocols.

The different protocol types must each be cleared separately. All protocols in one protocol type are cleared at once.

You can find information on clearing individual protocols in Section. 3.2.7 on page 18.

**Interval**

Sets the interval at which measurement data is automatically saved.

**Memory mode**

Switches between ring memory and stack memory.

# 4        Power supply

This device can be operated using:

● Disposable (non-rechargeable) alkaline batteries

● Rechargeable NiMH batteries

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

⚠ **WARNING! Risk of explosion due to leaking batteries**
Leaking electrolytes can shorten the creepage distance and air gap between the poles. As a result, the requirements for the batteries may no longer be met.
  ● Replace leaking batteries immediately.
  ● Clean the battery compartment (and, if necessary, the device) before inserting the new disposable/rechargeable batteries.

## 4.1        Suitable disposable/rechargeable battery types

⚠ **WARNING! Risk of explosion due to unsuitable batteries**
To ensure that the device remains explosion-proof as per /16/, only certain disposable/rechargeable batteries may be used:
  ● Only use batteries supplied by SEWERIN. Other disposable/rechargeable batteries, which have not been supplied by SEWERIN, may only be used if they meet the specifications in accordance with /8/.
  ● In each battery compartment use only batteries that are identical with respect to type (disposable or rechargeable), capacity and manufacturer.

**Disposable battery requirements**

- Alkaline disposable batteries

- Size: AA, type: LR6 as per /11/

- The creepage distance and air gap between the poles must not be less than 0.5 mm in accordance with /8/.

**Rechargeable battery requirements**

- NiMH rechargeable batteries

- Size: AA, type: HR6 as per /13/

- The creepage distance and air gap between the poles must not be less than 0.5 mm in accordance with /8/.

- The rechargeable batteries must be fast charging (I > 1.25 A) and remain within the temperature range.

---

**Note:**

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

---

## 4.2    Operation with rechargeable batteries

The operating time of the device depends on the battery capacity.

If the device is not used or not kept in the docking station, the batteries will lose their charge due to self-discharge. The self-discharge intensity depends on the battery type.

### 4.2.1  Charging

The device can be charged via:

- Connection for power supply

- Docking station TG8

⚠️ **DANGER! Risk of explosion due to sparks**
High charging current occurs when batteries are being charged.
The power supply is not explosion-proof.
● Only charge the device outside of explosive areas.

For charging you will need either:

● AC/DC adapter M4

● Vehicle cable M4

Please note the following points:

● The device or docking station must not be directly connected to a 24-V on-board power supply in the vehicle. The voltage is too high for the charging process.

● The battery should be charged at approximately room temperature.

● It is not permitted to connect (cascade) several TG8 adapters in series.

### 4.2.2    Rechargeable battery maintenance

If the device is not used for a long period of time, it is advisable to fully discharge the battery before recharging it again.

A full discharging and recharging process takes approx. 11 hours (8 hours to discharge + 3 hours to recharge). The duration depends on the capacity of the rechargeable batteries used.

⚠️ **DANGER! Risk of explosion due to sparks**
High charging current occurs when batteries are being charged.
The power supply is not explosion-proof.
● Only charge the device outside of explosive areas.

● Connect the device (switched on) to the power supply via the side connection.

OR

Place the device (switched on) into the docking station.

The rechargeable batteries will be fully discharged. Once the device has been discharged, it will automatically switch to charging mode.

## 4.3    Battery alarm

As soon as the remaining capacity of the batteries gets low, a battery alarm will go off:

Level 1:    Battery almost empty
- **Capacity disposable battery/rechargeable battery** symbol flashes
- Audible signal (one-off)
- Operating signal doubles
- Remaining operating time: approx. 15 min

Level 2:    Battery empty
- Blank display apart from **Capacity disposable battery/rechargeable battery** symbol
- Continuous audible signal
- Measuring mode unavailable
- Device shuts off

## 4.4    Replacing disposable/rechargeable batteries

---

⚠ **DANGER! Risk of explosion due to sparks**
When the housing is open, the device is not explosion-proof.
● Only open the battery compartment outside of explosive areas.

---

A 2.5 mm Allen key (supplied) is required to open the battery compartment on the back of the device.

1. Loosen the two screws securing the battery compartment. Remove the screws by repeatedly turning them alternately a short way; this ensures that the battery compartment does not twist.

2. Lift out the battery compartment.

3. Remove the disposable/rechargeable batteries and insert new ones. Ensure that the batteries are inserted with the correct polarity.

4.  Replace the battery compartment so it fits neatly into place and secure firmly with the screws.

5.  When you switch the device back on again, you will be asked which battery type is in use. Enter the correct battery type.

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

# 5        Maintenance

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

● Device inspection including test of indication accuracy

● Adjustment

● Maintenance

All inspections must be documented. The documentation must be retained for at least one year.

---

⚠ **WARNING! Danger of death due to incorrectly adjusted or faulty devices**
Gas warning instruments must be inspected before use at regular intervals.
● Carry out a device inspection every day before starting work (as per /1/, /2/, /6//10/).

---

## 5.1      Device inspection

### 5.1.1    General information on the device inspection

#### 5.1.1.1  Scope

The device inspection includes the following tests:

● Analysis of the general status

● Test of the indication accuracy with supply of fresh air

● Test of the indication accuracy with supply of test gas

### 5.1.1.2  Frequency

The frequency of the device inspection depends on the application.

| Application | When to test | Legal basis |
|---|---|---|
| Warning ExTox | Each work day | /1/, /2/, /4/, /6/, /10/ |
| Gas measuring | Weekly to every six months | /3/ |

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

### 5.1.1.3  Documentation

The device inspection procedure must be documented. There are two ways of doing this:

● On paper
● Saved electronically supported by the device (**integrated device inspection**)

Only the integrated device inspection is described in these operating instructions.

---

**Note:**

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

---

### 5.1.1.4  Integrated device inspection

The integrated device inspection is accessed via the **menu** (fig. 6).

The results of the device inspection are stored in the device as a protocol.

The device inspection protocols can be opened at any time. They can also be displayed on a computer using a **readout program**. The program is available at www.sewerin.com.

⚠ The **Carry out device inspection** symbol appears when a device inspection is due. It is visible in the display until the complete integrated device inspection has been carried out successfully.

If the device inspection was completed but the device failed on some points, the symbol will remain visible.

The integrated device inspection is switched off in the factory settings. The integrated device inspection has to be switched on (once only) before it can be performed.

**Switching on the integrated device inspection**

1. Press **Menu**.
2. Select **Settings**.
3. Enter your **PIN code**.
4. Select **System**.
5. Select **Device inspection**.
6. Select **Yes**.
7. Accept the setting with **OK**.
8. Exit the **settings** with **Exit**.

### 5.1.1.5 Order

You can carry out the tests that make up the device inspection in any order you wish. You can repeat the tests as often as you wish provided you have not yet concluded the device inspection.

### 5.1.1.6 Test gases for the device inspection

The following test gases can be used to check the indication accuracy when supplying test gas:

| Test | Recommended test gases |
|---|---|
| Gas measuring | Gas mixture **Bio IR** |
| Warning | Gas mixture **ExTox IR** |

---

**Note:**

Use of test gases not provided by SEWERIN can cause inter-ference.

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

---

**Changing the test gas concentration**

If there is no test gas with the specified concentrations available for the inspection, the values can be adjusted to the test gas used in the adjustment menu under **Test gas** (see Section 3.3.3).

### 5.1.2    Carrying out the device inspection

#### 5.1.2.1    Accessing the device inspection

The device is in measuring mode.

1. Press **Device inspection**.

   OR

   a) Press **Menu**.

   b) Select **Device inspection** menu item.

   The **Device inspection** menu appears.

```
Gas measuring
Warning
```

Fig. 9:    **Device inspection** menu

2. Select the application for which you wish to perform the de-vice inspection (**Gas measuring** or **Warning**). A submenu will appear.

```
General status
Fresh air
Gas mixture Gas measuring
```

```
General status
Fresh air
Gas mixture Warning
```

Fig. 10: Submenus for the device inspection:
**Dev. test Gas measuring** (left) / **Dev. Test Warning** (right)

---

3. Select a test from the menu (**Device inspection, Fresh air, Gas mixture…**).

4. Carry out the test.

   For detailed information, refer to the following sections:

   − General status    Section. 5.1.3 on page 37

   − Fresh air        Section. 5.1.4 on page 39

   − Test gas …      Section. 5.1.5 on page 40

### 5.1.2.2  Concluding the device inspection

After all the tests have been carried out as described in Section 5.1.3 to Section 5.1.5, the **Save** symbol will appear in the display.

An integrated device inspection is concluded by saving it. Up to 40 device inspections can be saved. The following information can be stored along with the device inspection:

● Inspector (e.g. inspector's name or initials)

● Password to protect the protocol from being accessed by unauthorised people

Inspector entries are saved automatically (ring memory with max. 10 entries).

 Once the first inspector has been entered, the **Open stored inspectors** function will become available.

1. Press **Save**.

2. If necessary enter the name of the **inspector**.

   a) Select the characters required using the jog dial. Confirm each character using the jog dial.

   OR

   − Press **Open stored inspectors**. A list of the stored inspectors will appear.

   − Select the desired inspector. Open the inspector with **OK**.

b) Then confirm your entry/selection with **OK**.

OR

Press **Esc** if you do not wish to enter an inspector for the device inspection.

3. Enter a **password**.

a) Select the characters required using the jog dial. Confirm each character using the jog dial.

b) Then confirm your entry with **OK**.

OR

Press **Esc** if you do not wish to enter a password for the device inspection.

The device inspection is saved as a protocol. An overview with the device inspection results is displayed.

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

### 5.1.3   Testing the general status

The general status test is part of the device inspection. The general status test is based on estimations by the user. The following must be tested:

● Housing

● Signals

● Probe

● Filter

● Pump

The battery charge status and the working condition of the controls are automatically tested during the integrated device inspection.

The device inspection has been opened.

1. Select the **General status** menu item from the **Dev. Test …** submenu.

2. Test all associated subitems as described in Section 5.1.3.1 to Section 5.1.3.5.

3. Confirm the prompt **General status OK?** by pressing **Yes** if **all** subitems show no faults during testing. **General status OK** appears on the display.

This concludes the **General status** test.

### 5.1.3.1 Housing

- Is the housing free from external damage?

### 5.1.3.2 Signals

During the integrated device inspection the signals are emitted at short intervals.

- Can the audible signal be heard?
- Is the visual signal visible?

### 5.1.3.3 Probe

Probes are accessories. They only need to be tested if they are likely to be used in the course of the working day.

- Are the probes free from external damage?

Probe hoses are tested with a simple leak check.

1. Connect the probe hose to the gas input.

2. Seal the free end of the probe hose.

   An error message should appear after approx. 10 seconds. This indicates that the probe hose is in good condition.

#### 5.1.3.4  Filter

The fine dust filter is located behind the gas input. It is tested by means of a visual inspection.

1. Unscrew the gas input.

2. Remove the fine dust filter.

3. Check that there is no dirt in the fine dust filter.

   As soon as there are any signs of deposits, the filter must be replaced. If you do not replace the filter, you must reinsert it exactly as you found it.

#### 5.1.3.5  Pump

The pump function is tested with a simple leak check.

1. Seal the gas input.

   After a maximum of 10 seconds an error message should appear. This indicates that the pump is working correctly.

   If the error message does not appear, the pump may be faulty. The device must be tested by SEWERIN Service.

2. Release the gas input again.

   After approximately 5 seconds, the error message should disappear again. Otherwise there is a fault.

#### 5.1.4  Testing indication accuracy with supply of fresh air

The indication accuracy with supply of fresh air test is part of the device inspection.

The device inspection has been opened.

1. Make sure that only fresh air is being drawn in.

2. Select the **Fresh air** menu item from the **Dev. Test …** submenu.

3. Wait until the displayed readings are stable. A **Status: OK** message will appear.

4. Press **OK** to confirm. **Fresh air OK** will appear on the display.

This concludes the **Fresh air** test.

If the **Status: OK** message does not appear within a reasonable amount of time, the air inflow does not correspond to the limit val-

ues stored in the device (see Section. 7.3 on page 56). Move the device to another location and repeat the test.

If the **Status: OK** message still does not appear when the test is repeated, the device must be re-adjusted (see Section. 5.2 on page 41).

### 5.1.5    Testing indication accuracy with supply of test gas

The indication accuracy with supply of test gas test is part of the device inspection.

All test gases specified in the device must be tested. The number of specified test gases is dependent on the optional additional equipment.

The following resources are needed for the test:

● Test gas (e.g. gas mixture **ExTox IR**)

   Information on test gases for the device inspection can be found in Section. 5.1.1.6 on page 34.

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

---

**Note:**
Details of how to use the test set can be found in the accompanying operating instructions.

---

The device inspection has been opened.

1. Select the menu item **Gas mixture measuring/ Gas mixture warning** menu item from the **Dev. Test…**  submenu.

2. Check whether the test gas concentration specified by the device matches the test gas you intend to use. To do this press **Information**.

3. Add the test gas

4. Wait until the displayed readings are stable. A **Status: OK** message will appear.

5. Press **OK** to confirm.

6. Stop the test gas supply.

   The device switches back to the **Dev. test...** menu. A **Test gas OK** message will appear.

Once all tests have been successfully completed, the full test of the indication accuracy with supply of test gas is also complete.

**Test gas test unsuccessful**

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

A test may be unsuccessful for the following reasons:

| Cause | Corrective action |
|---|---|
| Connections leaking | Repeat check, checking the seal on the connections |
| Measurement values outside the specified limit values (see Section. 7.3 on page 56) | Adjustment required |

## 5.2    Adjustment

⚠ **WARNING! Danger of death due to incorrect adjustment**

Incorrect adjustment can lead to incorrect measurement results. This means that the user may not be warned about dangerous gas concentrations in time.

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

### 5.2.1 Scope

Adjustments must be made separately for each measuring range.

- Zero point
- Sensitivity

---

**Note:**

For each measuring range always adjust the zero point first, followed by the sensitivity.

---

Only gases for which the readings are outside the predefined limits need to be adjusted during the adjustment process (see Section. 7.3 on page 56).

### 5.2.2 Test gases for the adjustment

The following test gases can be used for adjustment:

| Gas | Suitable test gases for | |
|---|---|---|
| | **Zero point** | **Sensitivity** |
| CO | • Fresh air | • Gas mixture ExTox IR |
| $CO_2$ | • Fresh air | • Gas mixture ExTox IR and gas mixture Bio IR |
| $CH_4$ | • Fresh air | • Gas mixture ExTox IR and gas mixture Bio IR |
| $H_2S$ | • Fresh air | • Gas mixture ExTox IR and gas mixture Bio IR |
| $O_2$ | • Gas mixture ExTox IR<br>• Gas mixture Bio IR | • Fresh air |

If more than one test gas can be used to adjust a gas, it does not have to be adjusted with all test gases. However, adjusting with more than one test gas increases the measurement quality.

Fresh air contains 20.9 % vol. $O_2$ and is therefore used with oxygen to adjust the sensitivity.

---

**Note:**

Use of test gases not provided by SEWERIN can cause inter-ference.

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

---

**5.2.3** **Special features of adjustment with gas mixture**

If a SEWERIN gas mixture is used as a test gas, several gases can be adjusted **in a single step**:

**Gases which can be adjusted simultaneously with a SEWERIN gas mixture**

| Test gas: **ExTox IR**<br>Menu item:<br>**Adjustment**<br>**gas mixture warning** | Test gas: **Bio IR**<br>Menu item:<br>**Adjustment**<br>**gas mixture measuring** |
|---|---|
| ● Methane $CH_4$<br>● Carbon dioxide $CO_2$<br>● Hydrogen sulphide $H_2S$<br>● Oxygen $O_2$<br>● Carbon monoxide CO | ● Methane $CH_4$<br>● Carbon dioxide $CO_2$<br>● Hydrogen sulphide $H_2S$<br>● Oxygen $O_2$ |

**Zero point**

The **zero point** is adjusted under **Fresh air** in the menu. The following parameters are adjusted in a single step:

● Zero points of $CH_4$, $CO_2$, $H_2S$ and CO

● Sensitivity of $O_2$

**Sensitivity**

The **sensitivity** is adjusted under **Gas mixture** in the menu. The following parameters are adjusted in a single step:

● Sensitivities of $CH_4$, $CO_2$, $H_2S$ and CO

● Zero point of $O_2$

### 5.2.4    Preparation

An adjustment always requires time. Leave yourself plenty of time to prepare the necessary steps of the procedure.

● Have all necessary tools available.

● Let the device run for several minutes to guarantee that the temperature is correct, for example.

### 5.2.5    Performing the adjustment

The zero point and sensitivity are adjusted following the same procedure for all gases. The adjustment of **oxygen** is an **exception**. It is therefore described separately.

You can find detailed information on the adjustment of various gases (for example, test gas concentration, installation date of the sensor, date of last adjustment) under **Information**.

The symbol appears after the corresponding **Adjustment…** menu item has been selected.

#### 5.2.5.1  Adjusting the zero point

For all gases except oxygen $O_2$, the zero point is adjusted following the same procedure.

---

**Note:**

When adjusting the zero point of carbon dioxide $CO_2$, a carbon dioxide filter **must** be used.
This applies to both the zero point adjustment for **Adjustment CO2** in the menu and **Adjustment gas mixture warning**.

---

1. Make sure that only fresh air is being drawn in.

2. Open **Settings**.

3. Select the **Adjustment** menu item.

4. Select the desired adjustment (e.g. **Adjustment CH4**, **Adjustment gas mixture warning**).

5. Wait at least 1 minute. The displayed reading must be stable.

---

**Note:**

For **Adjustment gas mixture warning** and **Adjustment gas mixture measuring**, **all** values must be stable. The time required for this can vary depending on the specific gas.

---

6. From the menu select the method you wish to use to adjust the zero point.

   − e.g. for **Adjustment CH4**:            **Zero point**

   − for **Adjustment gas mixture warning**:    **Fresh air**

7. Press **OK** to confirm.

   This adjusts the zero point. The reading shows zero (0.00 % vol. / 0 ppm). (Except for **Adjustment gas mixture**: the value for oxygen $O_2$ is 20.9 % vol.)

### 5.2.5.2  Adjusting the sensitivity

For all gases except oxygen $O_2$, the sensitivity is adjusted following the same procedure.

The following resources are needed for adjusting the sensitivity:

● Test gas

   Information on test gases for adjustment can be found in Section. 5.2.2 on page 42.

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

---

**Note:**

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

---

---

**Note:**

When adjusting the sensitivity, never use a carbon dioxide filter.

---

1. Connect the device to the test set.

2. Open **Settings**.

3. Select the **Adjustment** menu item.

4. Select the desired adjustment (e.g. **Adjustment CH4**, **Adjustment gas mixture warning**).

5. Select the menu item that specifies the sensitivity to be tested.

   − e.g. for **Adjustment CH4**:           **2.20 %VOL. CH4**

   − for **Adjustment gas mixture warning**: **Gas mixture**

   **Do not confirm with OK yet**.

6. Press and hold the release button on the test set. The test gas is added. **Do not let go of the release button**.

7. Wait at least 1 minute. The displayed reading must be stable.

---

**Note:**

For **Adjustment gas mixture warning** and **Adjustment gas mixture measuring**, **all** values must be stable. The time required for this can vary depending on the specific gas.

---

8. Press **OK** to confirm. The device is adjusted. The reading shows the specified value (e.g. 2.20 % vol. $CH_4$).

9. Let go of the release button on the test set.

## 5.2.6 Carrying out an oxygen adjustment

As oxygen is a component of fresh air, the procedure for adjusting oxygen is different from the procedure for all other gases.

### 5.2.6.1 Adjusting the zero point for oxygen

The zero point of oxygen must be adjusted using a gas that does not contain any oxygen and which will not damage the sensor.

The following resources are needed for adjusting the zero point of oxygen:

- Test gas

  Information on test gases for adjustment can be found in Section. 5.2.2 on page 42.

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

---

**Note:**
Details of how to use the test set can be found in the accompanying operating instructions.

---

1. Connect the device to the test set.
2. Open **Settings**.
3. Select the **Adjustment** menu item.
4. Select the **Adjustment O2** menu item.
5. Select **Zero point** menu item. **Do not confirm with OK yet**.
6. Press and hold the release button on the test set. The test gas is added. **Do not let go of the release button**.
7. Wait at least 1 minute. The displayed reading must be stable.
8. Press **OK** to confirm. The device is adjusted. The reading shows zero (0.0 % vol.).
9. Let go of the release button on the test set.

### 5.2.6.2  Adjusting the sensitivity for oxygen

The sensitivity for oxygen is adjusted with fresh air.

1. Make sure that only fresh air is being drawn in.
2. Open **Settings**.
3. Select the **Adjustment** menu item.
4. Select the **Adjustment O2** menu item.
5. Wait until the displayed reading is stable. (The reading may still flash.)
6. Select **20.9 % VOL. (fresh air)** from the menu (select and confirm with **OK** ).

   This adjusts the sensitivity. The reading shows 20.9 % vol.

## 5.3      Servicing

The device must only be serviced and repaired by SEWERIN Service.

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

---

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

---



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

Fig. 11:  Inspection plate

---

**IMPORTANT! Damage from leaking sensors**
Electrochemical sensors that are faulty or have exceeded their expected service life can leak. The leaking substance can cause permanent damage to the device.
You can tell if a sensor is faulty because, for example, the corresponding adjustment will no longer be possible.
The installation date of a sensor and the expected service life can be found in the **Device information**.

● Always get SEWERIN Service to replace faulty or out of date sensors immediately.

---

# 6 Faults

If a fault occurs during operation, an error message will appear on the screen.

Error messages are displayed in the order in which they occur. Up to five errors can be displayed.

Error messages continue to be displayed until the error is corrected.

**Overview of possible error messages**

| Error code | Error message on the display | Error correction |
|---|---|---|
| 9 | No calibration<br>IR sensor adjustment | Adjustment required (**Adjustment CH4**, **Adjustment CO2** or **Adjustment gas mixture ...**) |
| 10 | Adjustment failed<br>Test gas | Check test gas |
| 11 | Zero point<br>Adjustment required | Adjustment required |
| 52 | XFLASH<br>SEWERIN Service | Error can only be corrected by SEWERIN Service |
| 59 | Error unknown<br>SEWERIN Service | Error can only be corrected by SEWERIN Service |
| 62 | IR sensor | Error can only be corrected by SEWERIN Service |
| 80 | Error unknown<br>SEWERIN Service | Error can only be corrected by SEWERIN Service |
| 100 | Pump error<br>Probe/filter | Check all filters, probes and hose connections for porosity and dirt |
| 105 | Pump error<br>Gas outlet | Check pressure at gas input/gas outlet |
| 200 | I2C HOST – IR<br>SEWERIN Service | Error can only be corrected by SEWERIN Service |
| 201 | I2C HOST – EC<br>SEWERIN Service | Error can only be corrected by SEWERIN Service |
| 202 | I2C HOST – EX<br>SEWERIN Service | Error can only be corrected by SEWERIN Service |

# 7      Appendix

## 7.1      Specifications and permitted operating conditions

| | |
|---|---|
| Dimensions (W×D×H): | Approx. 148 × 57 × 205 mm<br>Approx. 148 × 57 × 253 mm with supporting bracket |
| Weight: | Approx. 1000 g, depending on equipment |
| Operating position: | Any |
| Protection rating: | IP54 |
| Power supply: | 4 cells, either:<br>– Rechargeable batteries:    NiMH<br>– Disposable batteries:        Alkaline |
| Operating time: | Minimum 8 h |
| Charging time for rechargeable batteries: | Approx. 3 h (full charge),<br>depending on capacity |
| Charging voltage: | 12 V DC (max. 1 A) |
| Operating temperature: | -20 ºC – +40 ºC |
| Storage temperature: | -25 ºC – +60 ºC |
| Pressure: | 800 – 1100 hPa |
| Permissible relative humidity: | 5 – 90 % r.h., non-condensing |
| Sensors: | – IR for $CO_2$, $CH_4$<br>Optional:<br>– EC for $O_2$, $H_2S$, CO |
| Warm-up time: | – < 30 s<br>– Up to 90 s for EC |
| PC connection: | USB |
| Memory: | 8 MB |
| Display: | 320 × 240 pixels |
| Buzzer: | Frequency:    2.4 kHz<br>Volume:        80 dB (A)/ 1 m |
| Signal light: | Red |
| Pump: | Vacuum:                  > 250 mbar<br>Volume flow:          Typically 50 l/h ±20 l/h<br>Pump error (F100) dependent on volume flow:<br>– ≤ 20 l/h               F100 certain<br>– > 20 l/h – ≤ 35 l/h F100 possible |
| Pressure at gas input: | max. 100 mbar |
| Operation: | – ON/OFF key<br>– Jog dial<br>– 3 function keys |

**7.2**    **Alarms**

Only applies to **Warning ExTox** application.

---

⚠️  **WARNING! Danger of death due to hazardous gas concentrations**

An alarm always indicates danger.

● Take all necessary measures for your own safety and the safety of others immediately.

---

The type of action depends on the situation. In the event of a pre-alarm, it may be sufficient to ventilate thoroughly. In the event of a main alarm, it may be necessary to leave the danger zone immediately.

**7.2.1**    **Features**

**AL1**

| Type: | Pre-alarm |
|---|---|
| Adjustable: | Yes |
| Latching: | No |
| Trigger: | Alarm threshold AL1 exceeded |
| Indicator: | – Audible signal<br>– Visual signal<br>– **AL1** message on display |
| Acknowledge-ment: | – Possible for audible signal when alarm threshold AL1 is exceeded |
| Reset: | – Automatic when level falls below alarm threshold AL1 |

Exception for **oxygen**: alarm AL1 is triggered when the level falls below alarm threshold AL1.

### AL2

| | |
|---|---|
| Type: | Main alarm |
| Adjustable: | Yes |
| Latching: | Yes |
| Trigger: | Alarm threshold AL2 exceeded |
| Indicator: | – Audible signal<br>– Visual signal<br>– **AL2** message on display |
| Acknowledge-ment: | – Possible for audible signal when alarm threshold AL2 is exceeded<br>– Possible overall after level falls below alarm threshold AL2 |
| Reset: | – By acknowledgement after level falls below alarm threshold AL2<br>– By switching device off |

Exception for **oxygen**: alarm AL2 is not latching.

### AL3

| | |
|---|---|
| Type: | End of measuring range |
| Adjustable: | No |
| Latching: | Yes |
| Trigger: | Alarm threshold AL3 exceeded |
| Indicator: | – Audible signal<br>– Visual signal<br>– **AL3** message on display<br>– Reading flashes |
| Acknowledge-ment: | – Possible after level falls below alarm threshold AL2 |
| Reset: | – By acknowledgement after level falls below alarm threshold AL2<br>– By switching device off |

## STEL

| Type: | Main alarm (short-time exposure limit) |
|---|---|
| Adjustable: | No |
| Latching: | Yes |
| Trigger: | Sum of the concentrations of a gas is greater than the product of the OEL and the excess factor over the averaging time |
| Indicator: | – Audible signal<br>– Visual signal<br>– **STEL** message on display |
| Acknowledge-ment: | – Not possible |
| Reset: | – By switching device off |

## LTEL

| Type: | Main alarm (long-time exposure limit) |
|---|---|
| Adjustable: | No |
| Latching: | Yes |
| Trigger: | Sum of the concentrations of a gas is greater than the OEL over the averaging time |
| Indicator: | – Audible signal<br>– Visual signal<br>– **LTEL** message on display |
| Acknowledge-ment: | – Not possible |
| Reset: | – By switching device off |

### 7.2.2 Occupational exposure limits (OELs) and excess factors (STEL and LTEL)

The short-time exposure limit (STEL) is calculated by multiplying the OEL value by the excess factor over an averaging time of 15 minutes, as per /15/.

The long-time exposure limit (LTEL) is obtained from the OEL value over an averaging period of 8 hours, as per /15/.

| Gas | OEL | Excess factor |
|---|---|---|
| CO | 30 ppm | 1 |
| $CO_2$ | 0.50 % vol. | 2 |
| $H_2S$ | 5 ppm | 1 |

### 7.2.3 Alarm thresholds (factory settings)

| Gas | AL1 | AL2 | AL3 | STEL | LTEL |
|---|---|---|---|---|---|
| $CH_4$ | 10 % LEL | 50 % LEL | 100 % LEL | — | — |
| CO | 30 ppm | 60 ppm | 500 ppm | 30 ppm | 30 ppm |
| $CO_2$ | 0.50 % vol. | 1.00 % vol. | 5 % vol. | 1.00 % vol. | 0.50 % vol. |
| $O_2$ | 18.0 % vol. | 23.0 % vol. | 25 % vol. | — | — |
| $H_2S$ | 5 ppm | 20 ppm | 100 ppm | 5 ppm | 5 ppm |

### 7.2.4 Setting ranges for gas types

LEL values are specified as per /14/.

**The setting for AL1 must not exceed the setting for AL2.**

| Gas type | | | AL1 | AL2 |
|---|---|---|---|---|
| All $C_xH_y$ in % LEL | | Threshold | **10 % LEL** | **50 % LEL** |
| $CH_4$ | | Threshold | **0.45 % vol.** | **2.20 % vol.** |
| | | Setting range | 0.20 – 2.60 % vol. | 0.25 – 2.65 % vol. |
| | | Increment | 0.05 % vol. | 0.05 % vol. |
| CO | | Threshold | **30 ppm** | **60 ppm** |
| | | Setting range | 5 – 499 ppm | 6 – 500 ppm |
| | | Increment | 1 ppm | 1 ppm |
| $CO_2$ | | Threshold | **0.5 % vol.** | **1.0 % vol.** |
| | | Setting range | 0.1 – 4.99 % vol. | 0.11 – 5.0 % vol. |
| | | Increment | 0.01 % vol. | 0.01 % vol. |
| $H_2S$ | | Threshold | **5 ppm** | **20 ppm** |
| | | Setting range | 5 – 99 ppm | 6 – 100 ppm |
| | | Increment | 1 ppm | 1 ppm |
| $O_2$ | | Threshold | **18.0 % vol.** | **23.0 % vol.** |
| | | Setting range | 0.5 – 20.5 % vol. | 21.2 – 25.0 % vol. |
| | | Increment | 0.1 % vol. | 0.1 % vol. |

Factory settings in **bold**

## 7.3 Limit values for the device inspection

### Warning ExTox

| Gas | Zero point | | Sensitivity | |
|---|---|---|---|---|
| | Specification | Deviation | Specification | Deviation |
| $CH_4$ | 0.00 % vol. | ±0.15 % vol. | 2.20 % vol. | ±0.20 % vol. |
| CO | 0 ppm | ±3 ppm | 40 ppm | ±3 ppm |
| $CO_2$ | 0.04 % vol. | ±0.06 % vol. | 2.00 % vol. | ±0.20 % vol. |
| $O_2$ | 0 % vol. | ±0.5 % vol. | 20.9 % vol. | ±0.5 % vol. |
| $H_2S$ | 0 ppm | ±3 ppm | 40 ppm | ±3 ppm |

### Gas measuring

| Gas | Zero point | | Sensitivity | |
|---|---|---|---|---|
| | Specification | Deviation | Specification | Deviation |
| $CH_4$ | 0.00 % vol. | ±2 % vol. | 100 % vol. | ±5 % vol. |
| $CO_2$ | 0 % vol. | ±2 % vol. | 100 % vol. | ±5 % vol. |

## 7.4    Memory capacity

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

| Protocol type | Maximum number of storable protocols |
|---|---|
| Device inspection | 40 |
| Measurement | 80 |

There is a choice of two memory modes (see Section. 3.3.7 on page 26). The selected memory mode applies for all protocol types.

### Measurements

**Note:**

A file is saved after each **Start measurement** – **Stop measurement** cycle, regardless of whether the memory capacity is exhausted.

Each file has a maximum memory capacity of 1800 data records. This means that a file can record data for 30 mins (0.5 h) at a save interval of 1 second. After this, data recording continues automatically in the next file.

| Save interval | Save time for 1 file (1800 data records) | Save time for 80 files (max. memory capacity) |
|---|---|---|
| 1 s | 0.5 h | 40 h |
| 2 s | 1 h | 80 h |
| **5 s** | 2.5 h | 200 h |
| 10 s | 5 h | 400 h |
| 20 s | 10 h | 800 h |

Factory settings in **bold**

## 7.5      Sensors

**Note:**

Probes increase the stated response times.

### 7.5.1      Infrared sensors (IR)

#### 7.5.1.1  Methane CH$_4$ for warning ExTox

| Type: | Infrared sensor |
|---|---|
| Measuring range: | 0 – 100 % LEL |
| Measuring error:<br>– Linearity<br>– Short-term stability<br>– Long-term stability | As per /9/<br>≤ 3 % LEL<br>≤ 2 % LEL<br>≤ 4 % LEL (2 months) |
| Response times: | $t_{50}$ < 8 s       $t_{90}$ < 14 s |
| Temperature range: | -20 ºC – +40 ºC |
| Interference: | All hydrocarbons $C_xH_y$ |
| Lifetime, expected: | 5 years |
| Test gases:<br>– Zero point<br>– Sensitivity | <br>Fresh air<br>2.20 % vol. CH$_4$ |

#### 7.5.1.2  Methane CH$_4$ for gas measuring

| Type: | Infrared sensor |
|---|---|
| Measuring range: | 0 – 100 % vol. |
| Measuring error CH$_4$: | ±2 % vol. |
| Response times: | $t_{50}$ < 9 s         $t_{90}$ < 17 s |
| Temperature range: | -20 ºC – +40 ºC |
| Interference: | All hydrocarbons $C_xH_y$ |
| Lifetime, expected: | 5 years |
| Test gases:<br>– Zero point<br>– Sensitivity | <br>Fresh air<br>100 % vol. |

### 7.5.1.3  Carbon dioxide $CO_2$ for warning ExTox

| Type: | Infrared sensor |
|---|---|
| Measuring range:<br>– Lower limit | 0 – 5 % vol.<br>0.02 % vol. |
| Measuring error:<br>– Linearity<br>– Long-term stability | As per /4/<br>≤ 4 % from measured value / ≤ 0.02 % vol.<br>≤ 8 % from measured value /<br>≤ 0.02 % vol. (3 months) |
| Zero point deviation: | ≤ 0.04 % vol. |
| Response time: | $t_{90}$ < 20 s |
| Decay time: | $t_{10}$ < 14 s |
| Temperature range: | -20 ºC – +40 ºC |
| Interference: | None |
| Lifetime, expected: | 5 years |
| Test gases:<br>– Zero point<br>– Sensitivity | <br>Fresh air<br>2.00 % vol. $CO_2$ |

### 7.5.1.4  Carbon dioxide $CO_2$ for gas measuring

| Type: | Infrared sensor |
|---|---|
| Measuring range: | 0 – 100 % vol. |
| Measuring error: | ±1.5 % vol. |
| Response time: | $t_{90}$ < 20 s |
| Temperature range: | -20 ºC – +40 ºC |
| Interference: | None |
| Lifetime, expected: | 5 years |
| Test gases:<br>– Zero point<br>– Sensitivity | <br>Fresh air<br>100 % vol. $CO_2$ |

## 7.5.2 Electrochemical sensors (EC)

### 7.5.2.1 Oxygen $O_2$

| | |
|---|---|
| Type: | Electrochemical sensor |
| Measuring range: | 0 – 25 % vol. |
| Resolution: | 0.1 % vol. |
| Measuring error:<br>– Linearity<br><br>– Long-term stability | As per /7/<br>≤ 1.5 % from measured value /<br>≤ 0.3 % vol.<br>≤ 0.2 % vol. (3 months) |
| Response time: | $t_{90}$ < 30 s |
| Temperature range: | -20 ºC – +40 ºC |
| Interference: | None |
| Lifetime, expected: | 24 months |
| Test gases:<br>– Zero point<br>– Sensitivity | <br>100 % vol. $CH_4$ or 100 % vol. $N_2$<br>Fresh air (20.9 % vol.) |

### 7.5.2.2 Carbon monoxide CO

| | |
|---|---|
| Type: | Electrochemical sensor |
| Measuring range:<br>– Lower limit | 0 – 500 ppm<br>4 ppm |
| Resolution: | 1 ppm |
| Measuring error:<br>– Linearity<br>– Long-term stability | As per /4/<br>≤ 2 % of measured value / ≤ 1 ppm<br>≤ 10 % of measured value /<br>≤ 1 ppm (3 months) |
| Zero point deviation: | 7 ppm |
| Response time: | $t_{90}$ < 30 s |
| Decay time: | $t_{10}$ < 24 s |
| Temperature range: | -20 ºC – +40 ºC |
| Interference at 20 ºC.<br>– 3000 ppm $H_2$<br>– 100 ppm NO | <br>Approx. 1000 ppm CO<br>Approx. 25 ppm CO |
| Lifetime, expected: | 36 months |
| Test gases:<br>– Zero point<br>– Sensitivity | <br>Fresh air<br>40 ppm CO |

### 7.5.2.3 Hydrogen sulphide H$_2$S for warning ExTox

| Type: | Electrochemical sensor |
|---|---|
| Measuring range:<br>– Lower limit | 0 – 100 ppm<br>1 ppm |
| Resolution: | 1 ppm |
| Measuring error:<br>– Linearity<br>– Long-term stability | As per /4/<br>≤ 2 % from measured value / ≤ 1 ppm<br>≤ 10 % from measured value /<br>≤ 1 ppm (3 months) |
| Zero point deviation: | 1 ppm |
| Response time: | $t_{90}$ < 60 s |
| Decay time: | $t_{10}$ < 90 s |
| Temperature range: | -20 ºC – +40 ºC |
| Alarm thresholds<br>(as delivered): | AL1: 5 ppm<br>AL2: 20 ppm<br>AL3: 100 ppm |
| Interference at 20 ºC.<br>– 100 ppm CO<br>– 1 % vol. H$_2$<br>– 100 ppm NO$_2$ | <br>Approx. 1 ppm H$_2$S<br>Approx. 10 ppm H$_2$S<br>Approx. 3 ppm H$_2$S |
| Lifetime, expected: | 24 months |
| Test gases:<br>– Zero point<br>– Sensitivity | <br>Fresh air<br>40 ppm H$_2$S |

### 7.5.2.4  Hydrogen sulphide $H_2S$ for gas measuring

| | |
|---|---|
| Type: | Electrochemical sensor |
| Measuring range:<br>– Lower limit | 0 – 2000 ppm<br>1 ppm |
| Resolution: | 1 ppm (to 100 ppm)<br>2 ppm (from 100 ppm) |
| Measuring error:<br>– Linearity<br>– Long-term stability | <br>≤ 3 % of measurement value<br>≤ 10 % of measurement value /<br>≤ 5 ppm (3 months) |
| Zero point deviation: | 2 ppm |
| Response time: | $t_{90}$ < 60 s |
| Decay time: | $t_{10}$ < 90 s |
| Temperature range: | -20 ºC – +40 ºC |
| Interference at 20 ºC.<br>– 100 ppm CO<br>– 1 % vol. $H_2$<br>– 100 ppm $NO_2$ | <br>Approx. 2 ppm $H_2S$<br>Approx. 10 ppm $H_2S$<br>Approx. 4 ppm $H_2S$ |
| Lifetime, expected: | 24 months |
| Test gases:<br>– Zero point<br>– Sensitivity | <br>Fresh air<br>180 ppm $H_2S$ |

## 7.6 Technical information

### 7.6.1 Identification sticker (back of device)

The symbols on the sticker mean the following:

Only ever open the battery compartment outside of explosive areas.

Read the operating instructions.

### 7.6.2 Cleaning

The device must only be cleaned with a damp cloth.

---

⚠ **CAUTION! Damage possible due to unsuitable cleaning agents**

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

● Never clean the device with solvents, petrol or cockpit spray containing silicone or similar substances.

---

### 7.6.3 Electrostatic charge

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

---

⚠ **DANGER! Risk of explosion due to sparks**

When working with hydrogen, electrostatic charging can occur.

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

---

## 7.7 Accessories and consumables

### Accessories

| Part | Order number |
|------|--------------|
| Docking station TG8 | LP11-10001 |
| AC/DC adapter M4 | LD10-10001 |
| Vehicle cable M4, 12 V= portable | ZL07-10100 |
| Vehicle cable M4, 12 V= installed | ZL07-10000 |
| Vehicle cable M4, 24 V= portable | ZL09-10000 |
| "Vario" carrying system | 3209-0012 |
| Carrying bag TG8 | 3204-0040 |
| Case TG8-RÜ | ZD29-10000 |
| Compact case TG8 | ZD31-10000 |
| Flexible hand probe | ZS32-10000 |
| Floating probe | ZS21-10100 |
| Probe hose | ZS25-10000 (e.g.) |
| Test set SPE VOL | PP01-90101 |
| Universal test head | PP01-B1700 |
| Gas outlet adapter | MG04-Z2000 |

### Consumables

| Part | Order number |
|------|--------------|
| Fine dust filter | 2499-0020 |
| Hydrophobic filter | 2491-0050 |
| Carbon dioxide filter | ZG02-11000 |
| Rechargeable NiMH battery | 1354-0009 |
| Disposable alkaline battery | 1353-0001 |
| Test gas ExTox IR, test gas can 1 l, pressure approx. 12 bar | ZT47-10000 |
| Test gas Bio IR, test gas can 1 l, pressure approx. 12 bar | ZT49-10000 |

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

## 7.8     Declaration of conformity

Hermann Sewerin GmbH hereby declares that the **Multitec® 560** fulfils the requirements of the following directives:

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


Gütersloh, 2016-04-20

Dr. S. Sewerin
(General Manager)


The complete declaration of conformity can be found online.

## 7.9 Inspection protocol

Sample inspection protocol for inspection with gas mixture.

| TEST PROTOCOL     Gas mixture | *Multitec® 560* | **SEWERIN** |
|---|---|---|
| Serial no. (e.g.: 066 01 0501) | | |

04.12.2018

| 1.0 | **General status** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.1 | – Perfect condition (e.g.: Y / N) | | | | | | | | |
| 1.2 | – Fine dust filter correct (e.g.: Y / N) | | | | | | | | |
| 1.3 | – Capacity disposable battery/ rechargeable battery capacity (e.g.: ¼) | | | | | | | | |

| 2.0 | **Pump check** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.1 | – Pump error F100 in seal | | | | | | | | |

| 3.0 | **Warning ExTox (Test gas Fresh air)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.1 | Zero point $CH_4$ – Display -3 – +3 % LEL or – Display -0.15 – +0.15 % vol. | | | | | | | | |
| 3.2 | Zero point $CO_2$ (0.04 % vol.) – Display -0.02 – +0.10 % vol. | | | | | | | | |
| 3.3 | Fresh air $O_2$ (20.9 % vol.) – Display 20.4 – 21.4 % vol. | | | | | | | | |
| 3.4 | Zero point CO – Display -3 – +3 ppm | | | | | | | | |
| 3.5 | Zero point $H_2S$ – Display -3 – +3 ppm | | | | | | | | |

| 4.0 | **Warning ExTox (Test gas ExTox IR)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4.1 | $CH_4$ (2.20 % vol.) – Display 45 – 55 % LEL or – Display 2.00 – 2.40 % vol. | | | | | | | | |
| 4.2 | $CO_2$ (2.00 % vol.) – Display 1.80 – 2.20 % vol. | | | | | | | | |
| 4.3 | $O_2$ (0 % vol.) – Display -0.5 – +0.5 % vol. | | | | | | | | |
| 4.4 | CO (40 ppm) – Display 37 – 43 ppm | | | | | | | | |
| 4.5 | $H_2S$ 40 ppm – Display 37 – 43 ppm | | | | | | | | |
| 4.6 | Visual alarm (e.g.: Y / N) | | | | | | | | |
| 4.7 | Audible alarm (e.g.: Y / N) | | | | | | | | |

| 5.0 | **Gas measuring (Test gas fresh air)** | | | | | | | | | |
|-----|----------------------------------------|---|---|---|---|---|---|---|---|---|
| 5.1 | Zero point $CH_4$ | | | | | | | | | |
|     | – Display -0.3 – +0.3 % vol. | | | | | | | | | |
| 5.2 | Zero point $CO_2$ | | | | | | | | | |
|     | – Display -0.3 – +0.3 % vol. | | | | | | | | | |
| 5.3 | Zero point $H_2S$ | | | | | | | | | |
|     | – Display -3 – +3 ppm | | | | | | | | | |
| 5.4 | Fresh air $O_2$ (20.9 % vol.) | | | | | | | | | |
|     | – Display 20.4 – 21.4 % vol. | | | | | | | | | |

| 6.0 | **Gas measuring (Test gas Bio IR)** | | | | | | | | | |
|-----|-------------------------------------|---|---|---|---|---|---|---|---|---|
| 6.1 | $CH_4$ (60 % vol.) | | | | | | | | | |
|     | – Display 58 – 62 % vol. | | | | | | | | | |
| 6.2 | $CO_2$ (40 % vol.) | | | | | | | | | |
|     | – Display 38 – 42 % vol. | | | | | | | | | |
| 6.3 | $H_2S$ (180 ppm) | | | | | | | | | |
|     | – Display 175 – 185 ppm | | | | | | | | | |
| 6.4 | $O_2$ (0 % vol.) | | | | | | | | | |
|     | – Display -0.5 – +0.5 % vol. | | | | | | | | | |

| 7.0 | **Comments** | | | | | | | | | |
|-----|-------------|---|---|---|---|---|---|---|---|---|
|     | – Housing damaged | | | | | | | | | |
|     | – Adjustment, repair | | | | | | | | | |
|     | – Inspection at factory | | | | | | | | | |
|     | – Or similar | | | | | | | | | |

| 8.0 | **Inspection** | | | | | | | | | |
|-----|---------------|---|---|---|---|---|---|---|---|---|
|     | – Day | | | | | | | | | |
|     | – Month | | | | | | | | | |
|     | – Year | | | | | | | | | |
|     | – Signature | | | | | | | | | |

- 2 -

**7.10    Advice on disposal**

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

| Description of waste | Allocated EWC waste code |
|---|---|
| Device | 16 02 13 |
| Test gas can | 16 05 05 |
| Disposable battery, rechargeable battery | 16 06 05 |

**End-of-life equipment**

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

## 7.11    Terminology and abbreviations

| | |
|---|---|
| **% vol.** | ● Percent concentration of a gas in a gas mixture with respect to the volume |
| **AL** | ● Alarm |
| **CENELEC** | ● European Committee for Electrotechnical Standardization |
| **EC** | ● Electrochemical sensor |
| **Gas type** | ● Hydrocarbon $C_xH_y$, which can be measured with the IR<br>● One of the available gas types must always be set at a time, as it is not possible to measure more than one gas type at the same time. |
| **IR** | ● Infrared sensor |
| **LEL** | ● Lower Explosion Limit |
| **LTEL** | ● Long-time exposure limit |
| **NiMH** | ● Nickel metal hydride |
| **OEL** | ● Occupational exposure limit |
| **ppm** | ● Parts per million |
| **Ring memory** | ● Type of data storage in the device<br>● If the available storage space is full, the oldest file is automatically overwritten by the current file. |
| **Stack memory** | ● Type of data storage in the device<br>● If the available storage space is full, you are prompted to confirm whether the oldest file should be overwritten by the current file. |
| **STEL** | ● Short-time exposure limit |

## 7.12 Referenced documents

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

/1/ BGI T 021
Berufsgenossenschaft Chemie (Chemical Employers' Liability Insurance Association); Code of Practice T 021: Gaswarneinrichtungen für toxische Gase/Dämpfe und Sauerstoff – Einsatz und Betrieb (Gas Warning Devices for Toxic Gases/Vapours and Oxygen – Use and Operation)
Available for download at: www.bgchemie.de

/2/ BGI T 023
Berufsgenossenschaft Chemie (Chemical Employers' Liability Insurance Association); Code of Practice T 023: Gas Warning Devices for Explosion Protection – Use and Operation
Available for download at: www.bgchemie.de

/3/ DVGW G 465-4
Deutsche Vereinigung des Gas- und Wasserfaches e. V. (German Association of Gas and Water Specialists); Regulation G 465-4: Gasspür- und Gaskonzentrationsmessgeräte für die Überprüfung von Gasanlagen (Gas-Detection and Gas-Concentration Measurement Devices for Inspection of Gas Systems)
Available for download at: www.dvgw.de

/4/ EN 45544
/5/ EN 45544-2
/6/ EN 45544-4
/7/ EN 50104:2010
/8/ EN 60079-7:2007
/9/ EN 60079-29-1
/10/ EN 60079-29-2
/11/ EN 60086-1
/12/ EN 61779-1
/13/ EN 61951-2
/14/ IEC 60079-20
/15/ TRGS 900: 2006
Technical regulations for hazardous substances: Occupational exposure limits
Available for download at: www.baua.de

/16/ 94/9/EC        ATEX 100a

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