Operating Instructions

Leak locator
Hydrolux
HL 5000 / 5000 H₂

Measuring and Locating Technologies

Power Networks

Communication Networks

Water Networks

Line Locating
Terms of Warranty

SebaKMT accept responsibility for a claim under warranty brought forward by a customer for a product sold by SebaKMT under the terms stated below.

SebaKMT warrant that at the time of delivery SebaKMT products are free from manufacturing or material defects which might considerably reduce their value or usability. This warranty does not apply to faults in the software supplied. During the period of warranty, SebaKMT agree to repair faulty parts or replace them with new parts or parts as new (with the same usability and life as new parts) according to their choice.

SebaKMT reject all further claims under warranty, in particular those from consequential damage. Each component and product replaced in accordance with this warranty becomes the property of SebaKMT.

All warranty claims versus SebaKMT are hereby limited to a period of 12 months from the date of delivery. Each component supplied by SebaKMT within the context of warranty will also be covered by this warranty for the remaining period of time but for 90 days at least.

Each measure to remedy a claim under warranty shall exclusively be carried out by SebaKMT or an authorized service station.

To register a claim under the provisions of this warranty, the customer has to complain about the defect, in case of an immediately detectable fault within 10 days from the date of delivery.

This warranty does not apply to any fault or damage caused by exposing a product to conditions not in accordance with this specification, by storing, transporting, or using it improperly, or having it serviced or installed by a workshop not authorized by SebaKMT. All responsibility is disclaimed for damage due to wear, will of God, or connection to foreign components.

For damage resulting from a violation of their duty to repair or re-supply items, SebaKMT can be made liable only in case of severe negligence or intention. Any liability for slight negligence is disclaimed.
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1 Safety Advices

This manual contains basic advice for the operation of the measuring system. It is essential to make this manual accessible to the authorized and skilled operator. He needs to read this manual closely. The manufacturer is not liable for damage to material or humans due to non-observance of the instructions and safety advices provided by this manual.

Locally applying regulations must be observed.

General Cautions

- Do not drop the device or subject it to strong impacts or mechanical shocks.
- The limits described under Technical Data may not be exceeded.
- The device must be in a technically perfect condition for measurement.
- The indicated degree of protection can only be ensured if plugs or the provided protection caps are put in all sockets of the device.
- The plugs of the supplied connection cables are only compliant to the indicated degree of protection as long as they are plugged in. Plugs which are not connected or which are connected in a wrong way are not protected from water and dust ingress.
- Original accessories ensure safe operation of the equipment. It is not allowed and the warranty is lost if other accessories than the original ones are used with the equipment.
- Maintenance and repair must be carried out by SebaKMT or authorized service partners only.

Symbols Used in this Manual

Important instructions concerning the protection of staff and equipment as well as technical safety within this document are labelled with one of the following symbols:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUTION</td>
<td>Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or material damage.</td>
</tr>
<tr>
<td>i</td>
<td>Notes have important information and useful tips on the operation of your equipment. Non-observance may result in useless measurement results.</td>
</tr>
</tbody>
</table>
2 Technical Description

2.1 Version Overview

HL 5000
The HL 5000 provides all necessary functions for acoustic leak location on pipe systems. By means of different connectable microphones noises can be recorded directly on the pipe as well as from the ground. The recorded noise is reproduced on the connected headphones and the noise level is also displayed on the screen of the device in form of a bar graph as well as numerically. Thereby the ambient sound insulation of the headphones protects the user’s sense of hearing against impulse type disturbances.

Furthermore, the HL 5000 provides various functions for the target-oriented use of the device and for easy interpretation of the measuring results.

- filter function - for limiting the device’s bandwidth by setting a lower and an upper cut-off frequency - 9 levels selectable
- histogram function - for comparing measured values at a glance
- long-term measurement function - for recording a noise over a longer period of time and for displaying its progress in the form of a graph
- line locating function - for detecting the location and the course of a pipeline - especially a plastic line - in connection with an acoustic pulse generator, such as the ‘Pipe Pecker RSP3’ from SebaKMT

HL 5000 H₂
The HL 5000 H₂ is equal to the HL 5000 in form and function, but additionally not only leak noises can be determined but also tracer gas. For this purpose a gas sensor is connected to the device instead of a ground microphone.

2.2 Construction

The leak location device is in a splash-proof housing made of robust plastic. The few control buttons can be operated wearing gloves. The display is equipped with backlighting what allows working under poor lighting conditions or at night.

The connections for the microphone / gas sensor and headphones are on the two sides of the device, so the accessories can quickly be plugged in or removed.

The batteries are in the base of the device and can easily be exchanged.
2.3 Technical Data

The Hydrolux leak locators are specified by the following technical parameters:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis bandwidth</td>
<td>0 Hz – 4000 Hz</td>
</tr>
<tr>
<td>Filter cut-off frequencies</td>
<td>0 - 70 Hz, 106 Hz, 160 Hz, 240 Hz, 360 Hz, 540 Hz, 800 Hz, 1200 Hz, 1800 – 4000 Hz</td>
</tr>
<tr>
<td>Histogram recordings</td>
<td>9 dual displays</td>
</tr>
<tr>
<td>Long-term measurement</td>
<td>3 or 10 or 30 min</td>
</tr>
<tr>
<td>Display</td>
<td>130 x 36 mm LCD display</td>
</tr>
<tr>
<td>LCD illumination</td>
<td>available</td>
</tr>
<tr>
<td>Power supply</td>
<td>10 x AA batteries, (1.5 V) or alternatively 10 x rechargeable batteries (1.2 V, &gt;1000 mAh)</td>
</tr>
<tr>
<td>Operating time</td>
<td>&gt; 35 h (battery), &gt; 18 h (rechargeable battery)</td>
</tr>
<tr>
<td>Storage</td>
<td>9 measurements</td>
</tr>
<tr>
<td>Mute button</td>
<td>available</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-10 to +50 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-10 to +70 °C</td>
</tr>
<tr>
<td>Protection class when in operation</td>
<td>IP 54</td>
</tr>
<tr>
<td>Dimensions (L x W x D)</td>
<td>215 x 95 x 110 mm</td>
</tr>
<tr>
<td>Weight: HL 5000</td>
<td>1.2 kg (with batteries)</td>
</tr>
<tr>
<td>Weight: PAM W-2</td>
<td>3.5 kg (with carrying pole)</td>
</tr>
<tr>
<td>Weight: PAM B-2</td>
<td>0.5 kg</td>
</tr>
<tr>
<td>Sensitivity of the sensor</td>
<td>1 ppm H₂ in air</td>
</tr>
<tr>
<td>Analysis bandwidth of the sensor</td>
<td>0 – 1% H₂ in air</td>
</tr>
<tr>
<td>Analysis bandwidth displayed</td>
<td>0 – 10000 divisions</td>
</tr>
<tr>
<td>Response time</td>
<td>&lt; 1 sec</td>
</tr>
<tr>
<td>Warm-up time</td>
<td>6 sec</td>
</tr>
<tr>
<td>Operating time</td>
<td>&gt; 12 h (batteries), &gt; 8 h (rechargeable batteries)</td>
</tr>
<tr>
<td>Operating life of the replaceable gas sensor</td>
<td>2 to 5 years (depending on intensity of use)</td>
</tr>
</tbody>
</table>
### 2.4 Scope of Delivery

**HL 5000 Device**

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leak location device with batteries</td>
<td>HL 5000</td>
</tr>
<tr>
<td>Headphones (extraneous noises filtered)</td>
<td>KR 2</td>
</tr>
<tr>
<td>Carrying strap</td>
<td></td>
</tr>
<tr>
<td>Case</td>
<td>HLK</td>
</tr>
<tr>
<td>Operating instructions</td>
<td></td>
</tr>
</tbody>
</table>

**Selectable Microphone Sets**

**Professional set:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piezo ground microphone (with wind shield)</td>
<td>PAM W-2</td>
</tr>
<tr>
<td>Connection cable to PAM W-2</td>
<td>VK 65</td>
</tr>
<tr>
<td>3-point foot adapter</td>
<td>PAM W-2-D</td>
</tr>
<tr>
<td>Carrying pole for PAM W-2</td>
<td></td>
</tr>
<tr>
<td>Piezo ground microphone</td>
<td>PAM B-2</td>
</tr>
<tr>
<td>Magnetic adapter</td>
<td></td>
</tr>
<tr>
<td>Sensor rod for PAM B-2</td>
<td>PAM T-3-1</td>
</tr>
<tr>
<td>3-point foot for PAM B-2</td>
<td>PAM U-D</td>
</tr>
<tr>
<td>Extension rod</td>
<td>VST T-1</td>
</tr>
</tbody>
</table>

**Ground microphone (with wind shield):**

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piezo ground microphone (with wind shield)</td>
<td>PAM W-2</td>
</tr>
<tr>
<td>Connection cable to PAM W-2</td>
<td>VK 65</td>
</tr>
<tr>
<td>3-point foot adapter</td>
<td>PAM W-2-D</td>
</tr>
<tr>
<td>Carrying pole for PAM W-2</td>
<td></td>
</tr>
</tbody>
</table>

**Ground microphone:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piezo ground microphone</td>
<td>PAM B-2</td>
</tr>
<tr>
<td>3-point foot for PAM B-2</td>
<td>PAM U-D</td>
</tr>
</tbody>
</table>

**Gas Sensor Set**

**Standard sensor for the HL 5000 H₂:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handheld sensor including telescopic rod with bell-shaped receptacle of rubber</td>
<td>PAM H-2-1</td>
</tr>
<tr>
<td>Connection cable</td>
<td>VK 95</td>
</tr>
</tbody>
</table>
### Optional Accessories

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piezo sensor rod</td>
<td>PAM T-3-1</td>
</tr>
<tr>
<td>Sensor rod extension</td>
<td>VST T-1</td>
</tr>
<tr>
<td>Foot rest for PAM T-3</td>
<td></td>
</tr>
<tr>
<td>Sliding adapter 42 mm</td>
<td>AD S-42</td>
</tr>
<tr>
<td>Sliding adapter 20 mm</td>
<td>AD S-20</td>
</tr>
<tr>
<td>Magnetic adapter</td>
<td></td>
</tr>
</tbody>
</table>
3 Design

3.1 Control Panel

The following picture shows the upper side of the Hydrolux device with its display and control buttons.

![Control panel diagram]

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ON/OFF button of the device and of the backlight</td>
</tr>
</tbody>
</table>
| 2       | Mute button  
By pressing this button, the sound in the headphones is interrupted and the currently displayed measuring value is ‘frozen’. Pressing the button once again switches the headphones back on and updates the displayed value. |
| 3       | Volume control of the headphones |
| 4       | Function keys  
The symbol above a function key in the display specifies which function can be started or which action can be performed by pressing the button. |
3.2 Connector Sockets

The sockets to connect the sensors and the headphones are on the sides of the Hydrolux device.

![Diagram of Hydrolux device with labeled sockets]

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3.5mm headphone socket</td>
</tr>
<tr>
<td>6</td>
<td>5-pole socket for sensor connection (microphone or gas sensor)</td>
</tr>
</tbody>
</table>

**CAUTION**

Connecting other accessories to the Hydrolux device than the ones delivered by SebaKMT can cause malfunctions or can even damage the device.
3.3 Batteries

Low battery is indicated by a flashing battery symbol in the top right of the display. From that point, there is about 4 hours of battery life remaining.

In order to change the batteries, loosen the locking screws at the bottom of the device and open the base flap.

![Base flap with locking screws](image)

It is recommended to change always all batteries at one time. When fitting the batteries make sure that the polarity is correct.

Low rechargeable batteries have to be removed from the device to be recharged by means of an external charger. A suitable charger is available from SebaKMT.

3.4 Backlight

The display of the Hydrolux device has a backlight illumination which can be activated additionally.

If the device is on, you can switch the backlight on and off by pressing the **ON/OFF button** briefly.

3.5 Headphones

As standard the KR 2 headphones with ambient sound insulation are supplied. Other headphone models should be avoided as hearing protection cannot be guaranteed.
3.6 Microphones

There are various microphones available for leak noise recording.

3.6.1 Ground Microphone PAM W-2

The PAM W-2 is an active piezo-electric ground microphone for roads and hard ground coverings.

The microphone is particularly well shielded from the wind, using a bell-shaped guard.

The carrying pole can be removed with a quarter turn to the left. This is particularly useful in reducing extraneous noise to a minimum when there is a strong wind.

(For this ground microphone a VK 65 connection cable is required.)

Caution
Piezo-electric microphones should not be subject to shocks, so always put them gently on the ground!

3.6.2 Universal Microphone PAM B-2

The PAM B-2 can be used universally by exchanging the contact point for various adapters.

Sensor rod variant:

In this variant the PAM B-2 is suitable for listening to valves, hydrants or even directly on a pipe.

Furthermore, it can be used as a ground microphone on soft ground (soil, meadow etc.). Push the point into the ground as deep as possible to get optimum acoustic contact to the source of the noise.

In order to get a more comfortable working posture, an extension rod can be mounted between microphone body and sensor rod, but please note that, as a result, the system becomes more sensitive to wind and surrounding sources of noise.

In order to be able to push the sensor rod even easier into the ground, a foot rest can be mounted between sensor rod and extension rod.

Caution
When pulling the microphone out of the ground, always pull on the body of the microphone, not on the cable, otherwise you may damage the cable.
Magnetic variant:

If the magnetic adapter is mounted, the PAM B-2 can be easily put directly on ferromagnetic valves, hydrants or pipes. Due to the high holding force of the magnet an excellent acoustic coupling is achieved.

Caution

When removing the microphone, always pull on the body of the microphone, not on the cable, otherwise you may damage the cable.

3-point foot variant:

If the 3-point foot is mounted, the PAM B-2 can be used as a ground microphone on hard ground.
3.7 Gas Sensor

For leak location by means of tracer gas the Hydrolux version HL 5000 H₂ is available. It comes with a gas sensor.

![Gas sensor with telescopic rod](image)

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Handle (optional)</td>
</tr>
<tr>
<td>8</td>
<td>Connection cable</td>
</tr>
<tr>
<td>9</td>
<td>Sensor</td>
</tr>
<tr>
<td>10</td>
<td>Bell-shaped receptacle of rubber</td>
</tr>
</tbody>
</table>
4 Commissioning in Leak Location Mode

If a microphone is connected, the Hydrolux device automatically works in the mode for acoustic leak location - hereinafter called 'leak location mode'.

The recorded noise is amplified and reproduced through the headphones. At the same time the noise level is shown in the display in the form of a graph as well as numerically.

4.1 Connecting Accessory Parts

It's important to connect the microphone and the headphones to the Hydrolux device before it is switched on.

Connect the microphone via the 5-pole socket on the right hand side of the device. Make sure that the guide on the plug fits in the groove in the socket.

Connect the headphones via the 3.5 mm headphone socket on the left hand side of the device. Make sure you feel the plugs latch in.

4.2 Switching the Device On

Prior to the start the microphone and the headphones have to be connected.

The device is switched on by pressing the ON/OFF button briefly. The initial screen is displayed.

![Initial screen](image)

After a few seconds the main menu of the leak location mode appears with the last equipment settings. The frequency range, however, is reset to the full bandwidth.

![Main menu of leak location mode](image)
4.3 Adjusting the Headphone Volume

The headphone volume can be set using the two buttons to the right of the display.

Fig.: Headphone volume adjustment

The current volume level is reported by the level bar on the right in the display.
At the beginning of a measurement a medium volume (3 scale units) is recommended.

4.4 Setting the Gain

The microphone signal is amplified by the Hydrolux device. The gain level can be adjusted in 8 steps using the two buttons to the right below the display.

- left button - lower amplification
- right button - higher amplification

Fig.: Signal gain adjustment

The active gain level is reported by the level bar at the bottom right of the display.
At the beginning of a measurement a medium gain level (3 or 4) is recommended. Changing the gain level has an impact on the noise level displayed and also on the headphone volume.
4.5 Performing a Measurement and Reading the Values Displayed

Proceed in the following steps:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Press the Mute button ② in order to deactivate the headphones temporarily.</td>
</tr>
<tr>
<td>2</td>
<td>Go to a measuring point and place the microphone.</td>
</tr>
<tr>
<td>3</td>
<td>Press the Mute button ② in order to reactivate the headphones and to start the measurement.</td>
</tr>
<tr>
<td>4</td>
<td>Read the measured values displayed or listen to the noise through the headphones.</td>
</tr>
<tr>
<td>5</td>
<td>Press the Mute button ② in order to deactivate the headphones.</td>
</tr>
<tr>
<td>6</td>
<td>Repeat steps 2 to 5 at the remaining measuring points.</td>
</tr>
</tbody>
</table>

Muting the system:

By pressing the Mute button ② the sound in the headphones is interrupted and the currently displayed measuring value is ‘frozen’. This is to protect the user’s ear when moving the microphone from one measuring point to another. Pressing the button once again switches the headphones back on and updates the displayed values.

Data displayed:

There are two values shown in the display. The upper bar represents the currently measured and amplified noise level (instantaneous value).

The lower bar shows the lowest value of the measurement so far (minimum value). When considering the nature of a leak sound, which is a continuous noise, the display of this value provides a much better result and is much less susceptible to pulses of interference.

The scale graduation of the noise level from 0 to 200 is arbitrarily chosen and has no unit.
4.6 Adjusting the Frequency Range

The Hydrolux device covers a frequency range of 0 to 4000 Hz. Sometimes it can be useful to limit the regarded frequency range in order to exclude certain noises from consideration.

The device provides the opportunity to specify a lower and an upper cut-off frequency in order to limit the analysis bandwidth. Setting these filters is very easy. Proceed as described in the following sections.

4.6.1 Opening the Filter Settings Menu

Press the button beneath the filter symbol in the main menu briefly. The filter settings menu opens.

![Filter settings menu](image)

There are 9 vertical level bars displayed, each of them representing the current noise level of a certain frequency range. Underneath, there is a horizontal bar, which defines the selected filter range. The lower and the upper cut-off selected are shown to the left and to the right of the bars numerically.
4.6.2 Adjusting the Cut-Off Frequencies

The following 9 cut-off frequencies can be set:
0 - 70 Hz, 106 Hz, 160 Hz, 240 Hz, 360 Hz, 540 Hz, 800 Hz, 1200 Hz, 1800 - 4000 Hz

In order to adjust the lower cut-off frequency, use the two buttons beneath the \( \) symbol.
- left button - moves the cut-off to the left
- right button - moves the cut-off to the right

Fig.: Adjusting lower cut-off frequency

In order to adjust the upper cut-off frequency, use the two buttons beneath the \( \) symbol.
- left button - moves the cut-off to the left
- right button - moves the cut-off to the right

Fig.: Adjusting upper cut-off frequency

After the filter range has been set, you can return to the main menu using the button beneath ESC.
4.6.3 Filter Selection in Practice

In general, one can say that, for measurements with ground microphones, lower frequency ranges should be selected. For measurements directly on the pipe or valve using the sensor rod higher frequency ranges should be selected. If a measurement was not successful, then a broadband setting is recommended to ensure that none of the leak sounds is filtered away.

The frequency range to be used always depends on the specific conditions on site. Several factors have to be taken into account: pipe material, pipe diameter, water pressure, leak size, depth of the pipe, etc.

Since a general recommendation cannot be given, the user has to decide for himself, which frequency range he wants to use.
4.7 Comparing Measured Values  (Histogram Function)

By the help of the histogram function successively recorded measurements can be compared to each other at a glance. This can be useful when pre-locating a burst pipe with a sensor rod microphone as well as when pinpointing the actual leak.

The last 9 values recorded are displayed in form of vertical bars side by side. Each bar consists of two segments - so called ‘Dual Segment Analysis’ (DSA).

- wide segment - minimum value (lowest value of the measurement so far)
- narrow segment - instantaneous value (currently measured noise level)

Proceed in the following steps:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Press the button beneath the histogram symbol briefly in order to open the histogram menu.</td>
</tr>
<tr>
<td>2</td>
<td>Perform your first measurement at the first measuring point.</td>
</tr>
<tr>
<td>3</td>
<td>Press the <strong>Mute button</strong>. <strong>Result</strong>: The current measuring values - instantaneous and minimum noise level - are stored and displayed. The headphones are deactivated.</td>
</tr>
<tr>
<td>4</td>
<td>Go on to the next measuring point, place the microphone and press the <strong>Mute button</strong> in order to reactivate the headphones and to start a new measurement.</td>
</tr>
<tr>
<td>5</td>
<td>Press the <strong>Mute button</strong> to store the current values.</td>
</tr>
<tr>
<td>6</td>
<td>Carry out the measurements at the remaining positions by repeating the steps 4 and 5.</td>
</tr>
</tbody>
</table>
If more than 9 measurements are performed, the first value stored will be deleted and all the other values in the display will be shifted one position to the left. Thus, always the last 9 values recorded are available.

A small arrow symbol on the right of a bar indicates the maximum measurement for easy recognition.

You finish the histogram function and return to main menu by pressing the button beneath ESC briefly.

It is recommended not to change the gain of the signal (see section 4.4) during histogram measurement. Otherwise the displayed bars would no longer be comparable to each other.

**Example:** The histogram measurement as shown in the figure on the previous page shows very different instantaneous values. On the other hand the 5th DSA shows a clear maximum for the minimum values. The burst pipe is thus in the vicinity of the 5th measurement location.
### 4.8 Performing a Long-Term Measurement

This function allows recording a sound over a programmable period of time. The progress of the measurement is displayed as a graph. Thus, e.g., the identity of a water pipe can be proved (see the example below).

![Long-term measurement menu](image)

**Fig.: Long-term measurement menu**

Proceed in the following steps:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Press the button beneath the long-term measurement symbol briefly in order to open the long-term measurement menu.</td>
</tr>
<tr>
<td>2</td>
<td>Press the same button again and again until the required recording duration - 3 or 10 or 30 minutes - is shown on the upper right in the display.</td>
</tr>
<tr>
<td>3</td>
<td>Press the button beneath the start symbol in order to start the long term measurement.</td>
</tr>
</tbody>
</table>

**Result:** The noise level recorded is continuously displayed as a graph.

By pressing the button beneath the stop symbol the measurement can be finished at any time.

By pressing the button beneath ESC briefly you finish the function and return to main menu.

> It is recommended not to change the gain of the signal (see section 4.4) during a long-term measurement since this would have an impact on the displayed graph.

**Example:** The identity of a water pipe can be proved by recording the flow noise of a valve. To do that, the microphone is put onto the pipe and the long-term measurement is started. Then, you close the valve for a certain time (at least 2 minutes) and then open it again. If the pipe at the listening location is identical to the shut-off pipe, this should be visible on the displayed sound level curve (see the figure above).
4.9 Switching the Device Off

In order to switch the Hydrolux device off, press the ON/OFF button 1 for approximately 3 seconds. The display goes out.

After 35 minutes in operation, the equipment switches off automatically.

While using the histogram function the device will also switch off automatically after 35 minutes, unless the Mute button 2 or the ON/OFF button 1 (for turning the backlight on) are pressed.

The microphone and the headphones are not to be removed before the Hydrolux device is switched off.

Please note that any measurements stored will be lost after switch off.
5 Line Location Mode

The Hydrolux device can be used for acoustic pipe location or line tracing purposes. Recorded impulse noise - such as the tapping of the pipe pecker RSP-3 or the PWG 2000 from SebaKMT - is reproduced by the headphones and also displayed on the screen.

For this purpose the device is operated in a special ‘Line Location Mode’. The horizontal level bars respond particularly sensitive to impulses, the instantaneous level bar is delayed more and the filters are set to lower frequencies. Of course, if required, the filter frequencies can be altered as usual (see section 4.6).

The histogram function as well as the long-term measurement function are also available in line location mode and can be used as described in sections 4.7 and 4.8.

Proceed as follows to perform a line location:

Press the button beneath the line location mode symbol in the initial screen right after switch on for approximately 3 seconds, even before the main menu appears.

Then the main menu of line location mode opens instead of the leak location main menu.

The procedure of locating a line actually doesn’t differ from leak location using a ground microphone: Go to various measuring points measuring the noise level of the pulses emitted by the pulse wave generator. Use the Mute button between the single measurements in order to protect your ear. The pipe is supposed to be below the measuring point, where the peak value has been measured.

The Hydrolux device stays in line location mode until it is switched off. After being turned on again, it will be in leak location mode.
6 Commissioning in Gas Mode (HL 5000 H₂ only)

The HL 5000 in ‘H₂’ version cannot only be used for conventional leak noise location using a microphone, but also for leak location by means of tracer gas. For this purpose, a gas sensor (see section 3.7) is connected to the device instead of a microphone.

If the gas sensor is connected, the Hydrolux device automatically works in gas mode.

The gas concentration recorded is displayed in the form of a bar as well as numerically. At the same time it is reproduced through the headphones in the form of a sound.

Gas concentration as a bar

Gas concentration numerically (scale graduation 0 to 10000)

Headphone volume

Sensibility range

Fig.: Main menu of gas mode

The measured gas concentration can have a value between 0 and 10000. It is a relative measure which does not correspond to an actual measurement unit.

6.1 Connecting Accessory Parts and Switching the Device On

It’s important to connect the gas sensor and the headphones to the Hydrolux device before it is switched on.

Connect the gas sensor via the 5-pole socket on the right hand side of the device. Make sure that the guide on the plug fits in the groove in the socket.

Connect the headphones via the 3.5 mm headphone socket on the left hand side of the device.

Make sure you feel the plugs latch in.
Each time the device is switched on, a zero balance has to be carried out. By that, the device is adjusted to the naturally occurring hydrogen level in the air on site. Then, during the measurement this natural value is deducted from each measured hydrogen level. Thus, always an adjusted, comparable result is displayed.

For turning the device on, proceed in the following steps.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hold the gas sensor up in the air, far from the ground.</td>
</tr>
</tbody>
</table>
| 2    | Switch the Hydrolux device on by pressing the **ON/OFF button** briefly.  
**Result:** The start screen is shown. While the device is booting, a countdown (5 to 1) will appear. Then, the display will switch to the gas detection main menu. |
| 3    | Wait until the displayed value has fallen to "1". |
| 4    | Press the button beneath the zero balance symbol briefly.  
**Result:** The ambient hydrogen concentration now is determined and will from now on be filtered out of the measuring results. This applies until the device is switched off.  
The device now is ready for measurement. |
6.2 Adjusting the Volume

The headphone volume can be set using the two buttons to the right of the display.

![Headphone volume adjustment](image)

The current volume level is reported by the level bar on the right in the display. At the beginning of a measurement a medium volume (3 scale units) is recommended.

6.3 Adjusting the Sensitivity

The sensitivity of the device can be set using the two buttons to the right below the display.

![Sensitivity range adjustment](image)

One of the following ranges can be selected:

<table>
<thead>
<tr>
<th>Range 1</th>
<th>Range 2</th>
<th>Range 3</th>
<th>Range 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 … 20</td>
<td>0 … 50</td>
<td>0 … 100</td>
<td>0 … 500</td>
</tr>
<tr>
<td>0 … 1000</td>
<td>0 … 5000</td>
<td>0 … 10000</td>
<td></td>
</tr>
</tbody>
</table>

The active range is reported at the bottom right of the display. At the beginning of a measurement a medium setting is recommended. Changing the sensitivity has an impact on the displayed bar and also on the headphone volume.
### 6.4 Performing a Measurement

Proceed in the following steps:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Put the gas sensor on a measuring point on the ground</td>
</tr>
</tbody>
</table>
| 2    | Read measured value from the display or listen to the sound on the headphones:  
- deep sound - low gas concentration  
- high sound - high gas concentration  
  Always wait until the displayed value has been leveled out. |
| 3    | Go on to the remaining measuring points in order to measure the single gas concentrations. |

On your way from one measuring point to another you can mute the sound on the headphones in order to protect your ear by pressing the **Mute button** briefly.

The leakage is supposed to be at the peak-value measuring point.
6.5 Comparing Measured Values in Gas Mode (Histogram Function)

As in leak location mode, the histogram function is available in gas mode, too.

As described in section 4.7, by the help of the histogram function the last 9 recorded measurements can be displayed in form of vertical bars side by side. Thus, they can easily be compared to each other.

Proceed in the following steps:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Press the button beneath the histogram symbol briefly in order to open the histogram menu.</td>
</tr>
<tr>
<td>2</td>
<td>Go to the first measuring point and place the sensor. Wait for the displayed value to level out, then press the Mute button in order to store the value.</td>
</tr>
<tr>
<td>3</td>
<td>Go to the next point and press the Mute button to start a new measurement. Wait for the displayed value to level out, then press the Mute button again to store the value.</td>
</tr>
<tr>
<td>4</td>
<td>Go on to the remaining measuring points one after the other in order to measure each gas concentration and to store the values as described.</td>
</tr>
</tbody>
</table>

The last 9 values recorded are displayed in form of vertical bars side by side. Each bar consists of two segments - so called ‘Dual Segment Analysis’ (DSA).

- wide segment - maximum value of the measurement
- narrow segment - instantaneous value

![Histogram menu in gas mode](image1)

![Dual segment analysis (DSA) of the histogram function in gas mode](image2)
The highest bar indicates the measuring point with the highest gas concentration. A maximum of 9 measured values can be displayed side by side. With any further measurement, the oldest value is deleted.

By pressing the button beneath ESC briefly you finish the function and return to main menu.

It is recommended not to change the sensitivity of the device (see section 6.3) during histogram measurement. Otherwise, the displayed bars would no longer be comparable to each other.

6.6 Performing a Long-Term Measurement in Gas Mode

As in leak location mode, the long-term measurement function is available in gas mode, too.

By the help of this function the concentration of tracer gas in the air at one measuring point can be monitored over a longer period of time. The progress of the measurement is displayed as a graph. Thus, one can find out if the measured value is stable and reliable or if it is not.

Proceed in the following steps:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Carry out all the measurements at the various measuring points as described in section 6.5.</td>
</tr>
<tr>
<td>2</td>
<td>Go back to the measuring point that shows a peak value (suspected leak position).</td>
</tr>
<tr>
<td>3</td>
<td>Place the sensor and press the button beneath the long-term measurement symbol briefly in order to open the long-term measurement menu.</td>
</tr>
<tr>
<td>4</td>
<td>Press the same button again and again until the required recording duration - 3 or 10 or 30 minutes - is shown on the upper right in the display.</td>
</tr>
<tr>
<td>5</td>
<td>Press the button beneath the start symbol in order to start the long term measurement.</td>
</tr>
</tbody>
</table>

**Result:** The recorded gas concentration is continuously displayed as a graph. If this graph remains stable and doesn’t fall significantly during the long-term measurement, the measuring value is considered reliable.

By pressing the button beneath the stop symbol the measurement can be finished at any time.

By pressing the button beneath ESC briefly you finish the function and return to main menu.

In order to check whether the gas sensor is still functional and did not ‘hang up’ during the long-term measurement, you can take the sensor away from the measuring point, hold it up in the air for some seconds and then put it back on the ground. If the displayed graph falls and then rises again, the sensor is functional and the measurement can be considered reliable.
7 Trouble-Shooting

Can't switch the device on
Presumably the headphones are not plugged in or headphones are used which do not belong to the system.

Low battery is shown in the initial screen and the device switches itself off shortly after the start
One or more batteries are incorrectly fitted. Open the base flap and check the polarity of the batteries (see section 3.3).
If the polarity of all of the batteries is OK, the state of every single battery must be checked.

No sound can be heard
There are two possibilities:
  a. Headphones are not fitted or fitted incorrectly.
  b. The Mute button is active, which means that the headphones are switched off. Press the Mute button again to restore the sound.

Scratching sounds in the headphones
This is usually caused by a poor contact. Check all contacts.

Gas mode: high deflection doesn’t go down
Possibly an amount of gas is situated under the receptacle that cannot escape. Put the sensor away from the measuring point, turn it around and hold it into the air in order to allow the gas to escape.

Gas mode: full deflection doesn’t go down lastingly
The gas sensor is saturated and cannot be used for a period of time (approx. 1 hour depending on the degree of saturation).

Gas mode: no deflection (display constantly shows ‘0’)
There are two possibilities:
  a. Perhaps the gas sensor came into contact with water. In this case the sensor is damaged and must be replaced.
  b. Maybe the end of the sensor’s operating life (between 2 and 5 years) is reached. It must be replaced.
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