

Operating Instructions

Leak locator

Hydrolux

HL 5000 / 5000 H₂

Mess- und Ortungstechnik
Measuring and Locating Technologies

Elektrizitätsnetze
Power Networks



Kommunikationsnetze
Communication Networks



Rohrleitungsnetze
Water Networks



Leitungsortung
Line Locating



Consultation with SebaKMT

The present system manual has been designed as an operating guide and for reference. It is meant to answer your questions and solve your problems in as fast and easy a way as possible. Please start with referring to this manual should any trouble occur.

In doing so, make use of the table of contents and read the relevant paragraph with great attention. Furthermore, check all terminals and connections of the instruments involved.

Should any question remain unanswered, please contact:

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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:

Symbol	Description
	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or material damage.
	Notes have important information and useful tips on the operation of your equipment. Non-observance may result in useless measurement results.

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:

Analysis bandwidth:	0 Hz – 4000 Hz
Filter cut-off frequencies:	0 - 70 Hz, 106 Hz, 160 Hz, 240 Hz, 360 Hz, 540 Hz, 800 Hz, 1200 Hz, 1800 – 4000 Hz
Histogram recordings:	9 dual displays
Long-term measurement:	3 or 10 or 30 min
Display:	130 x 36 mm LCD display
LCD illumination:	available
Power supply:	10 x AA batteries, (1.5 V) or alternatively 10 x rechargeable batteries (1.2 V, >1000 mAh)
Operating time:	> 35 h (battery), > 18 h (rechargeable battery)
Storage:	9 measurements
Mute button:	available
Operating temperature:	-10 to +50 °C
Storage temperature:	-10 to +70 °C
Protection class when in operation:	IP 54
Dimensions (L x W x D):	215 x 95 x 110 mm
Weight: HL 5000	1.2 kg (with batteries)
Weight: PAM W-2	3.5 kg (with carrying pole)
Weight: PAM B-2	0.5 kg

Additional data of HL 5000 H₂:

Sensitivity of the sensor:	1 ppm H ₂ in air
Analysis bandwidth of the sensor:	0 – 1% H ₂ in air
Analysis bandwidth displayed:	0 – 10000 divisions
Warm-up time:	10 min
Operating time:	> 12 h (batteries), > 8 h (rechargeable batteries)
Operating life of the replaceable gas sensor:	2 to 5 years (depending on intensity of use)

2.4 Scope of Delivery

HL 5000 Device

Leak location device with batteries	HL 5000
Headphones (extraneous noises filtered)	KR 2
Carrying strap	
Case	HLK
Operating instructions	

Selectable Microphone Sets

Professional set:

Piezo ground microphone (with wind shield)	PAM W-2
Connection cable to PAM W-2	VK 65
3-point foot adapter	PAM W-2-D
Carrying pole for PAM W-2	
Piezo ground microphone	PAM B-2
Magnetic adapter	
Sensor rod for PAM B-2	PAM T-3-1
3-point foot for PAM B-2	PAM U-D
Extension rod	VST T-1

Ground microphone (with wind shield):

Piezo ground microphone (with wind shield)	PAM W-2
Connection cable to PAM W-2	VK 65
3-point foot adapter	PAM W-2-D
Carrying pole for PAM W-2	

Ground microphone:

Piezo ground microphone	PAM B-2
3-point foot for PAM B-2	PAM U-D

Gas Sensor Set

Standard sensor for the HL 5000 H₂:

Handheld sensor including telescopic rod with bell-shaped receptacle of rubber	PAM H-2-2
Connection cable	VK 95

Optional Accessories

Piezo sensor rod	PAM T-3-1
Sensor rod extension	VST T-1
Foot rest for PAM T-3	
Sliding adapter 42 mm	AD S-42
Sliding adapter 20 mm	AD S-20
Magnetic adapter	

3 Design

3.1 Control Panel

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

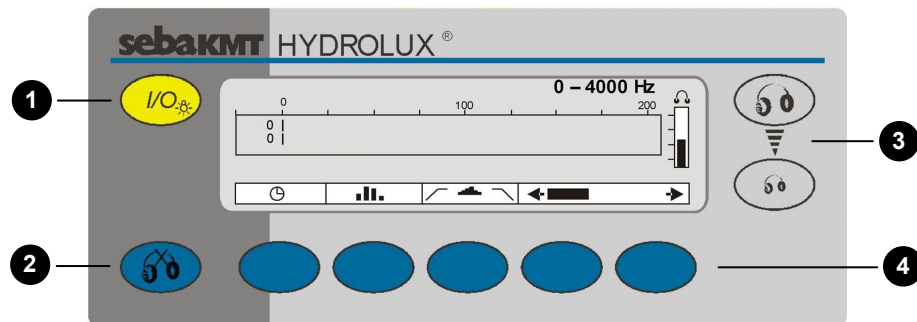


Fig.: Control panel

Element	Description
1	ON/OFF button of the device and of the backlight
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.

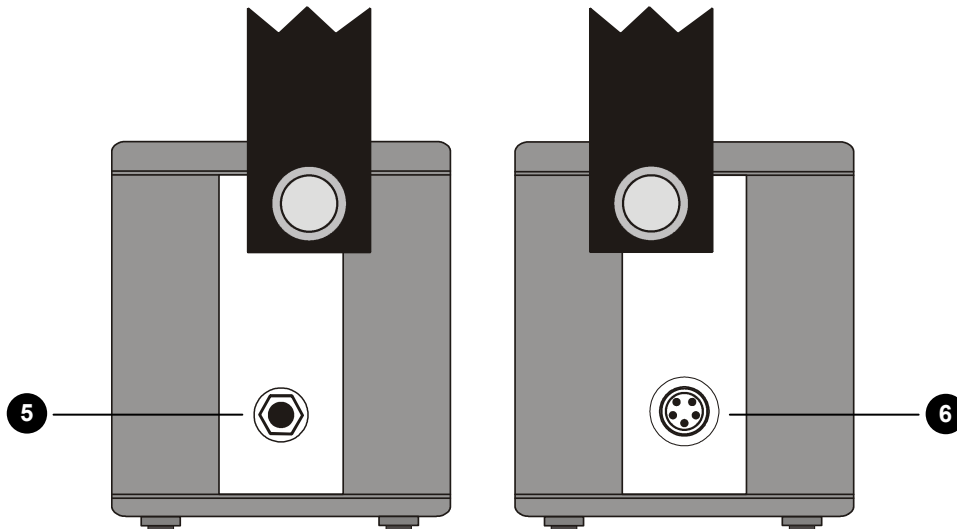



Fig.: Headphone socket on the left and sensor socket on the right hand side of the device

Element	Description
5	3,5mm headphone socket
6	5-pole socket for sensor connection (microphone or gas sensor)

 CAUTION	<p>Caution</p> <p>Connecting other accessories to the Hydrolux device than the ones delivered by SebaKMT can cause malfunctions or can even damage the device.</p>
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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.

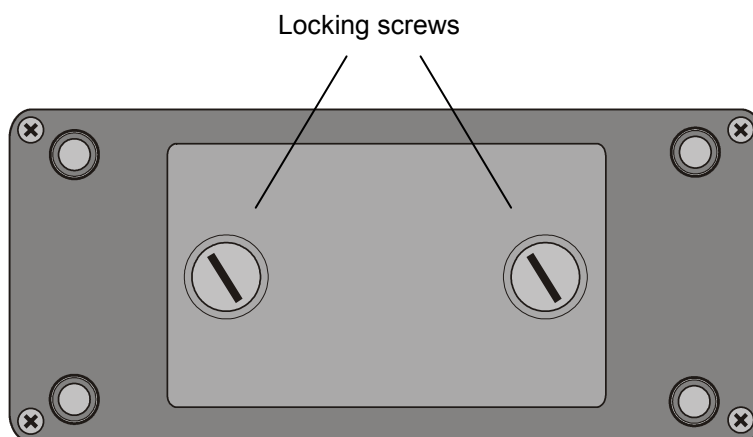


Fig.: Base flap with locking screws



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 1** briefly.

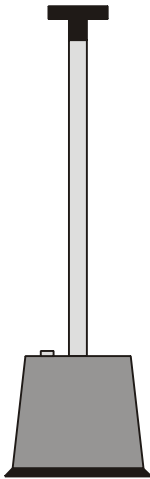
3.5 Headphones

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.)



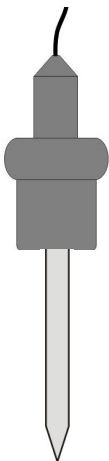
Caution

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.

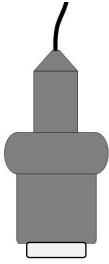
In order to get a more comfortable working posture, an extension rod can be mounted between microphone body and sensor rod, but please note that, as a result, the system becomes more sensitive to wind and surrounding sources of noise.

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

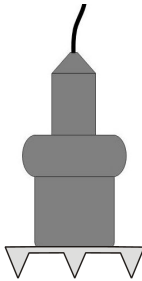
When pulling the microphone out of the ground, always pull on the body of the microphone, not on the cable, otherwise you may damage the cable.

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.

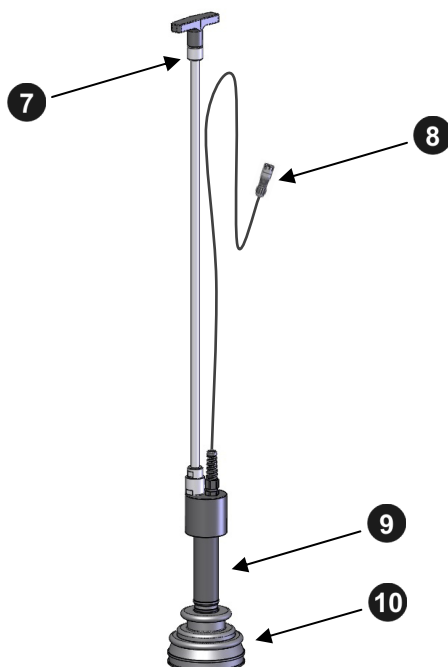


Fig.: Gas sensor with telescopic rod

Element	Description
7	Handle (optional)
8	Connection cable
9	Sensor
10	Bell-shaped receptacle of rubber

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 1** briefly. The initial screen is displayed.

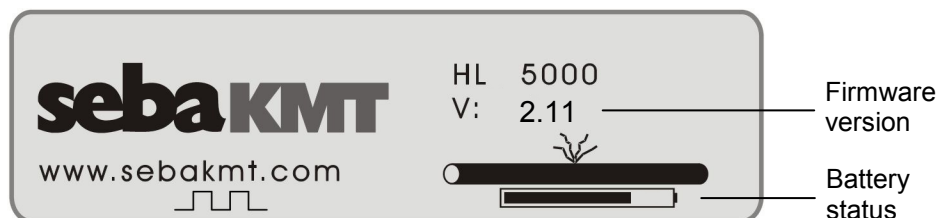


Fig.: Initial screen

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.

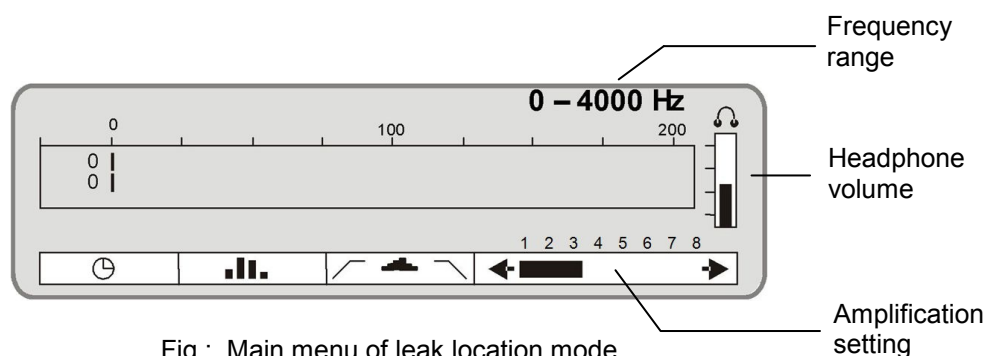


Fig.: Main menu of leak location mode

4.3 Adjusting the Headphone Volume

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

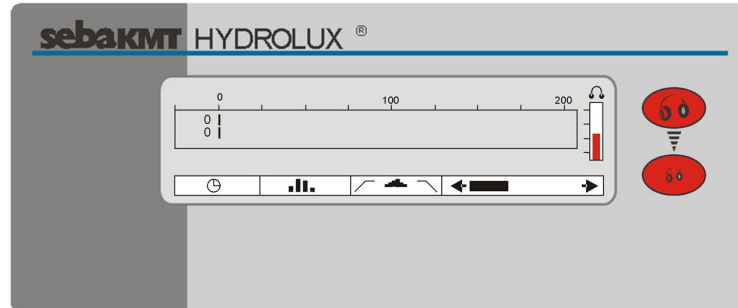


Fig.: Headphone volume adjustment

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

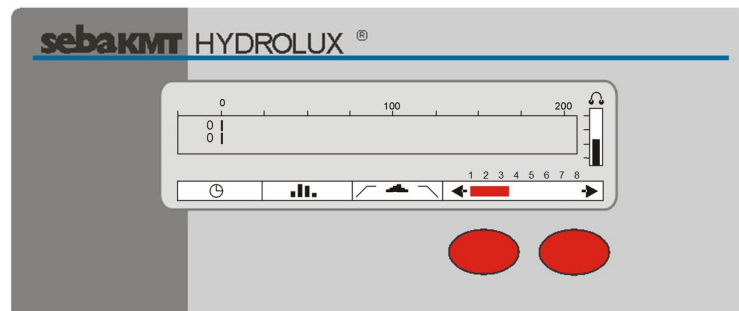


Fig.: Signal gain adjustment

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:

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

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.

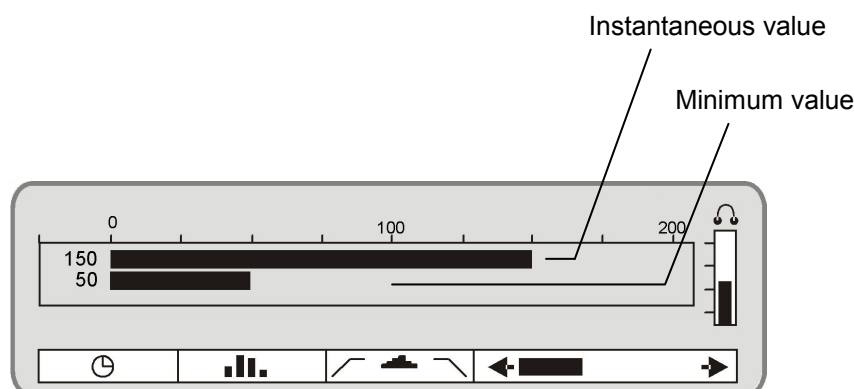



Fig.: Display of measured values in leak location mode

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.

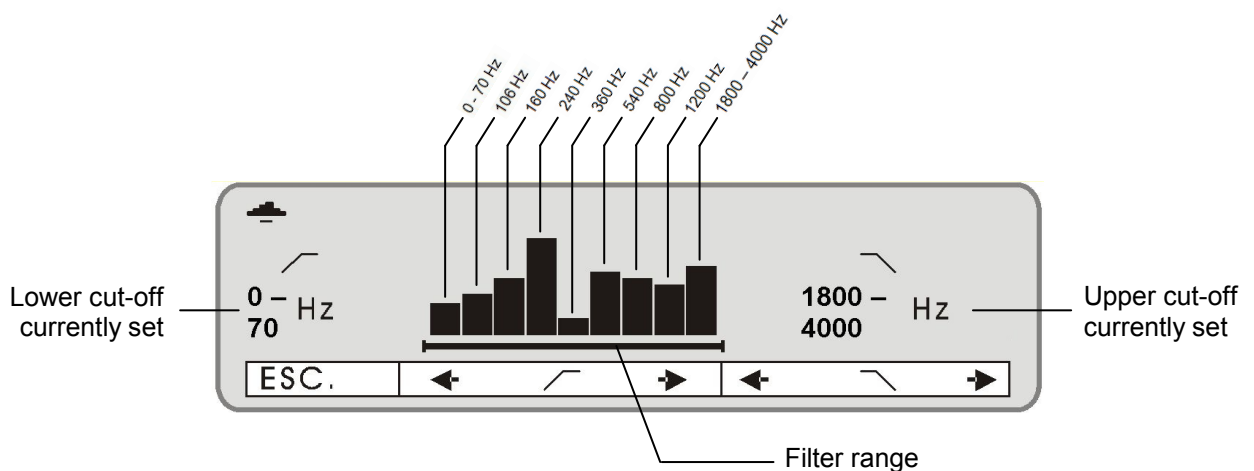


Fig.: Filter settings menu

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

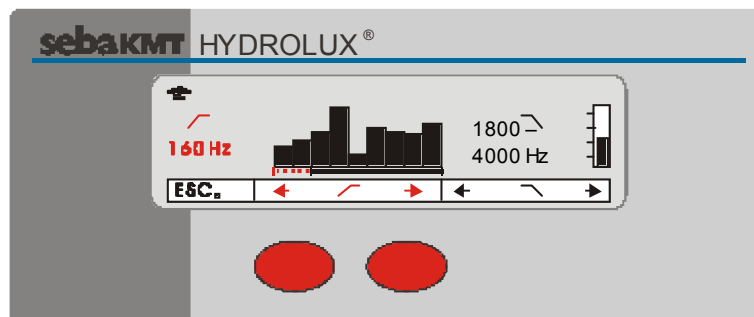



Fig.: Adjusting lower cut-off frequency

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

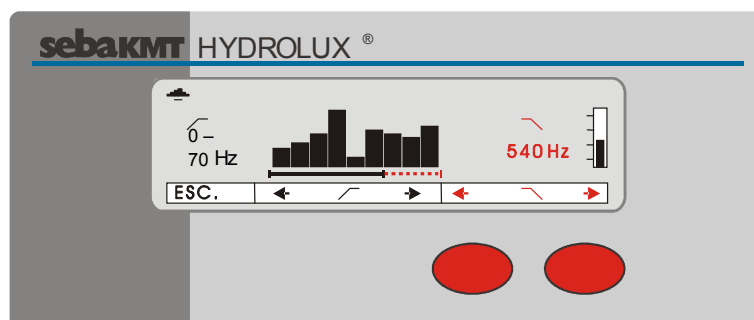


Fig.: Adjusting upper cut-off frequency

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.

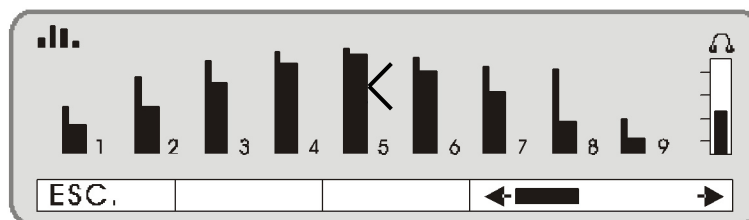


Fig.: Histogram menu in leak location mode

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)

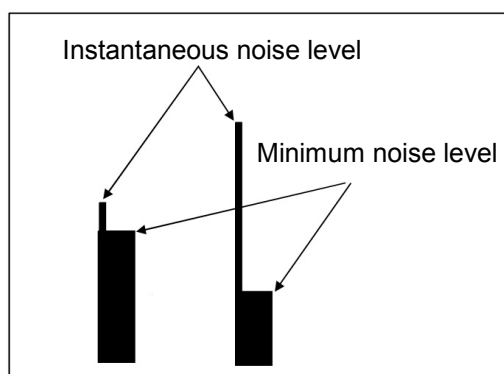



Fig.: Dual segment analysis (DSA) of the histogram function

Proceed in the following steps:

Step	Action
1	Press the button beneath the histogram symbol  briefly in order to open the histogram menu.
2	Perform your first measurement at the first measuring point.
3	Press the Mute button ② . Result: The current measuring values - instantaneous and minimum noise level - are stored and displayed. The headphones are deactivated.
4	Go on to the next measuring point, place the microphone and press the Mute button ② in order to reactivate the headphones and to start a new measurement.
5	Press the Mute button ② to store the current values.
6	Carry out the measurements at the remaining positions by repeating the steps 4 and 5.

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).

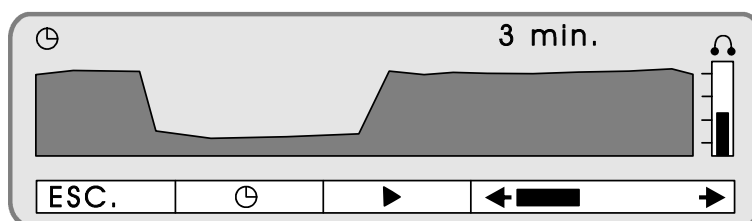


Fig.: Long-term measurement menu

Proceed in the following steps:

Step	Action
1	Press the button beneath the long-term measurement symbol ⌚ briefly in order to open the long-term measurement menu.
2	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.
3	Press the button beneath the start symbol ▶ in order to start the long term measurement.
	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.

i 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

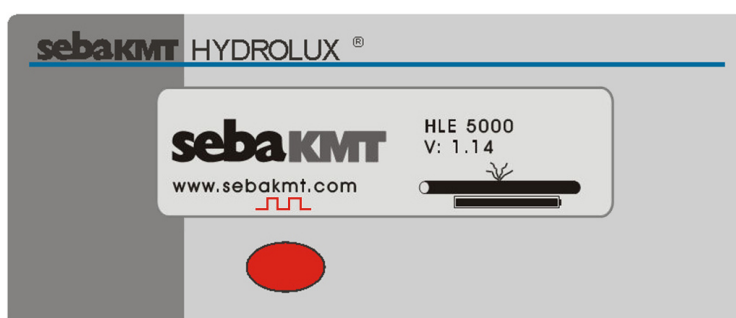


Fig.: Starting the device in line location mode

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

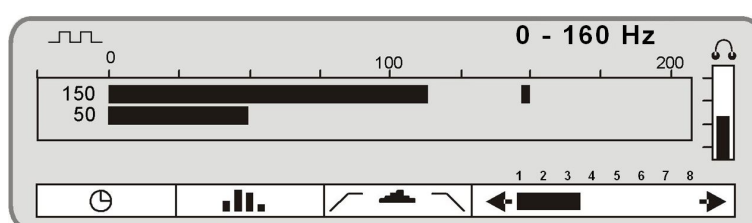


Fig.: Main menu of line location mode

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 2** 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.

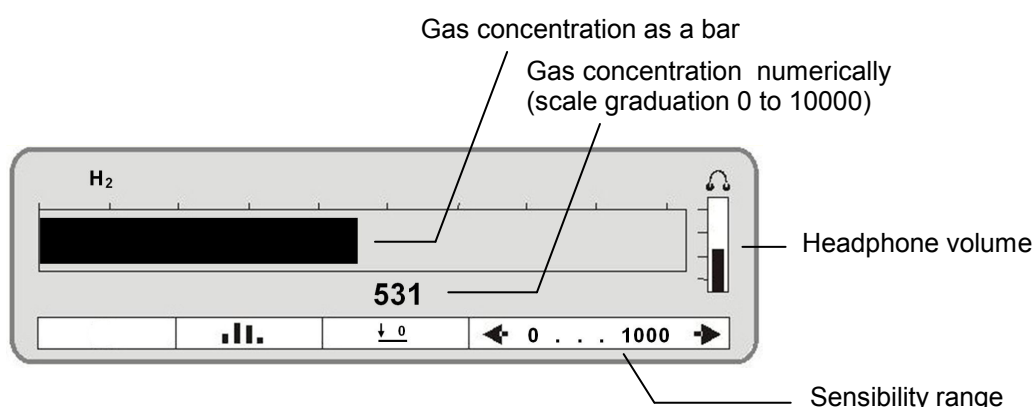




Fig.: Main menu of gas mode

i 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

Always connect headphones and gas sensor to the HL 5000 before switching the device on. In detail, proceed as follows:

Step	Action
1	<p>Connect the headphones.</p> <p>Use the 3.5 mm socket on the left hand side of the device. Make sure you feel the plug latch in.</p>
2	<p>Connect the gas sensor.</p> <p>Use 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.</p>
3	<p>Switch the device on.</p> <p>Press the ON/OFF button 1 briefly.</p> <p>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.</p>

4	<p>Allow the sensor to warm up.</p> <div data-bbox="375 286 1353 398" style="border: 1px solid black; padding: 5px;"> The sensor 'Pam H2-2' takes about 10 minutes as warm-up period. Only then readings can be considered accurate.</div>
5	<p>Carry out a zero balance.</p> <p>Make sure that the sensor is situated in 'clean' air without tracer gas. On the HL 5000, press the button beneath the zero balance symbol  briefly.</p> <hr/> <p>Result: The ambient hydrogen concentration is determined and stored. The device now is ready for measurement.</p>

By means of the zero balance, 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.

The zero balance applies until the device is switched off.

6.2 Adjusting the Volume

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

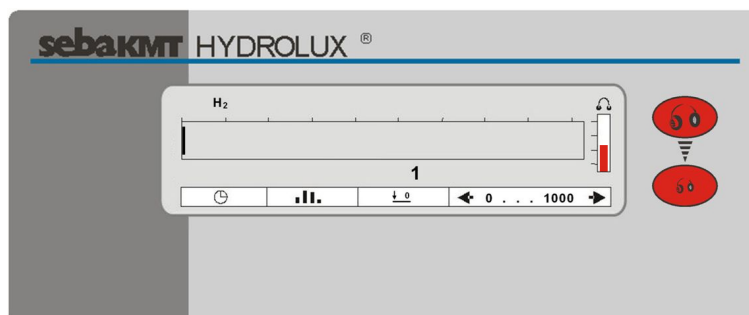


Fig.: Headphone volume adjustment

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.

6.3 Adjusting the Sensitivity

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

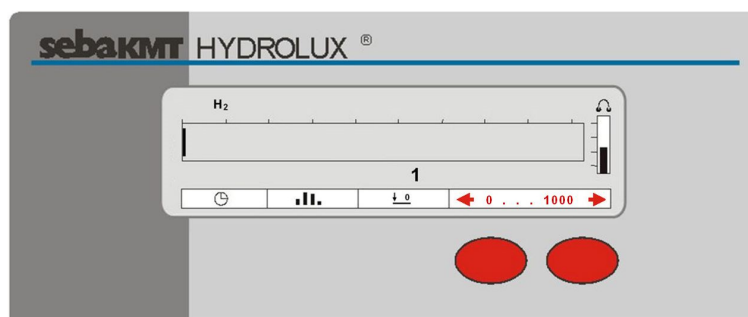


Fig.: Sensitivity range adjustment

One of the following ranges can be selected:

0 ... 20	0 ... 50	0 ... 100	0 ... 500
0 ... 1000	0 ... 5000	0 ... 10000	


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:

Step	Action
1	Put the gas sensor on a measuring point on the ground
2	Read measured value from the display or listen to the sound on the headphones: <ul style="list-style-type: none">• 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:

Step	Action
1	Press the button beneath the histogram symbol  briefly in order to open the histogram menu.
2	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.
3	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.
4	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.

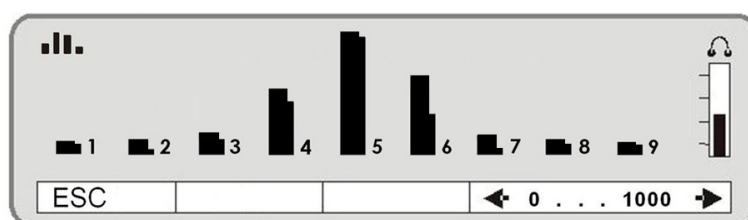


Fig.: Histogram menu in gas mode

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

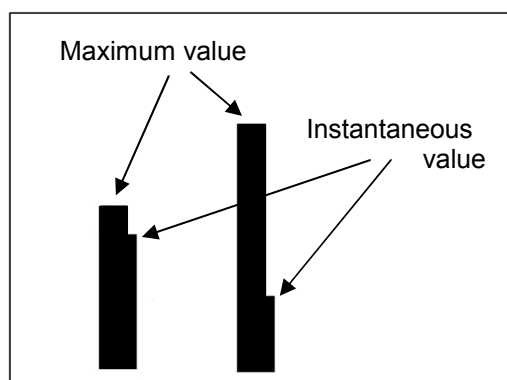



Fig.: Dual segment analysis (DSA) of the histogram function in gas mode

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:

Step	Action
1	Carry out all the measurements at the various measuring points as described in section 6.4.
2	Go back to the measuring point that shows a peak value (suspected leak position).
3	Place the sensor and press the button beneath the long-term measurement symbol  briefly in order to open the long-term measurement menu.
4	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.
5	Press the button beneath the start symbol  in order to start the long term measurement.
	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** **2** is active, which means that the headphones are switched off. Press the **Mute button** **2** 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.



Tento symbol indikuje, že výrobek nesoucí takovéto označení nelze likvidovat společně s běžným domovním odpadem. Jelikož se jedná o produkt obchodovaný mezi podnikatelskými subjekty (B2B), nelze jej likvidovat ani ve veřejných sběrných dvorech. Pokud se potřebujete tohoto výrobku zbavit, obraťte se na organizaci specializující se na likvidaci starých elektrických spotřebičů v blízkosti svého působště.



Dit symbool duidt aan dat het product met dit symbool niet verwijderd mag worden als gewoon huishoudelijk afval. Dit is een product voor industrieel gebruik, wat betekent dat het ook niet afgeleverd mag worden aan afvalcentra voor huishoudelijk afval. Als u dit product wilt verwijderen, gelieve dit op de juiste manier te doen en het naar een nabij gelegen organisatie te brengen gespecialiseerd in de verwijdering van oud elektrisch materiaal.



This symbol indicates that the product which is marked in this way should not be disposed of as normal household waste. As it is a B2B product, it may also not be disposed of at civic disposal centres. If you wish to dispose of this product, please do so properly by taking it to an organisation specialising in the disposal of old electrical equipment near you.



Този знак означава, че продуктът, обозначен по този начин, не трябва да се изхвърля като битов отпадък. Тъй като е B2B продукт, не бива да се изхвърля и в градски пунктове за отпадъци. Ако желаете да изхвърлите продукта, го занесете в пункт, специализиран в изхвърлянето на старо електрическо оборудване.



Dette symbol viser, at det produkt, der er markeret på denne måde, ikke må kasseres som almindeligt husholdningsaffald. Eftersom det er et B2B produkt, må det heller ikke bortskaffes på offentlige genbrugsstationer. Skal dette produkt kasseres, skal det gøres ordentligt ved at bringe det til en nærliggende organisation, der er specialiseret i at bortskaffe gammelt el-udstyr.



Sellise sümboliga tähistatud toodet ei tohi käidelda tavalise olmejäätmena. Kuna tegemist on B2B-klassi kuuluva tootega, siis ei tohi seda viia kohaliku jäätmekeätluspunkti. Kui soovite selle toote ära visata, siis viige see lähimasse vanade elektriseadmete käitlemisele spetsialiseerunud ettevõttesse.



Tällä merkinnällä ilmoitetaan, että kyseisellä merkinnällä varustettua tuotetta ei saa hävittää tavallisen kotitalousjätteen seassa. Koska kyseessä on yritysten välisen kaupan tuote, sitä ei saa myöskään viedä kuluttajien käyttöön tarkoitettuihin keräyspisteisiin. Jos haluatte hävittää tämän tuotteen, ottakaa yhteys lähimpään vanhojen sähkölaitteiden hävittämiseen erikoistuneeseen organisaatioon.



Ce symbole indique que le produit sur lequel il figure ne peut pas être éliminé comme un déchet ménager ordinaire. Comme il s'agit d'un produit B2B, il ne peut pas non plus être déposé dans une déchetterie municipale. Pour éliminer ce produit, amenez-le à l'organisation spécialisée dans l'élimination d'anciens équipements électriques la plus proche de chez vous.



Cuireann an siombail seo in iúl nár cheart an táirgeadh atá marcáilte sa tsí seo a dhiúscairt sa chóras fuíoll teaghlaigh. Os rud é gur táirgeadh ghnó le gnó (B2B) é, ní féidir é a dhiúscairt ach oiread in ionaid dhiúscairtha phobail. Más mian leat an táirgeadh seo a dhiúscairt, déan é a thógáil ag eagraíocht gar duit a sainfheidhmiú in ndiúscairt sean-fhearas leictirigh.



Dieses Symbol zeigt an, dass das damit gekennzeichnete Produkt nicht als normaler Haushaltsabfall entsorgt werden soll. Da es sich um ein B2B-Gerät handelt, darf es auch nicht bei kommunalen Wertstoffhöfen abgegeben werden. Wenn Sie dieses Gerät entsorgen möchten, bringen Sie es bitte sachgemäß zu einem Entsorger für Elektroaltgeräte in Ihrer Nähe.



Αυτό το σύμβολο υποδεικνύει ότι το προϊόν που φέρει τη σήμανση αυτή δεν πρέπει να απορρίπτεται μαζί με τα οικιακά απορρίματα. Καθώς πρόκειται για προϊόν B2B, δεν πρέπει να απορρίπτεται σε δημοτικά σημεία απόρριψης. Εάν θέλετε να απορρίψετε το προϊόν αυτό, παρακαλούμε όπως να το παραδώσετε σε μία υπηρεσία συλλογής ηλεκτρικού εξοπλισμού της περιοχής σας.



Ez a jelzés azt jelenti, hogy az ilyen jelzéssel ellátott termék tilos a háztartási hulladékokkal együtt kidobni. Mivel ez vállalati felhasználású termék, tilos a lakosság számára fenntartott hulladékgyűjtőbe dobni. Ha a terméket ki szeretné dobni, akkor vigye azt el a lakóhelyéhez közel működő, elhasznált elektromos berendezések begyűjtésével foglalkozó hulladékkezelő központhoz.



Questo simbolo indica che il prodotto non deve essere smaltito come un normale rifiuto domestico. In quanto prodotto B2B, può anche non essere smaltito in centri di smaltimento cittadino. Se si desidera smaltire il prodotto, consegnarlo a un organismo specializzato in smaltimento di apparecchiature elettriche vecchie.



Št zíme noráda, ka izstrādājumu, uz kura tā atrodas, nedrīkst izmest kopā ar parastiem māsaimniecības atkritumiem. Tā kā tas ir izstrādājums, ko cits citam pārdod un lieto tikai uzņēmumi, tad to nedrīkst arī izmest atkritumos tādās izgāztuvēs un atkritumu savāktuvēs, kas paredzētas vietējiem iedzīvotājiem. Ja būs vajadzīgs šo izstrādājumu izmest atkritumos, tad rīkojieties pēc noteikumiem un nogādājiet to tuvākajā vietā, kur īpaši nodarbojas ar vecu elektrisku ierīču savākšanu.



Šis simbolis rodo, kad juo paženklinto gaminio negalima išmesti kaip paprastų buitinių atliekų. Kadangi tai B2B (verslas verslui) produktas, jo negalima atiduoti ir buitinių atliekų tvarkymo įmonėms. Jei norite išmesti šį gaminį, atlikite tai tinkamai, atiduodami jį arti jūsų esančiai specializuotai senos elektrinės įrangos utilizavimo organizacijai.



Dan is-simbolu jindika li l-prodott li huwa mmarkat b'dan il-mod m'ghandux jintrema bħal skart normali tad-djar. Minħabba li huwa prodott B2B , ma jistax jintrema wkoll f'centri civici għar-rimi ta' l-iskart. Jekk tkun tixtieq tarmi dan il-prodott, jekk jogħġbok għamel dan kif suppost billi tiegħu għand organizzazzjoni fil-qrib li tispeċjalizza fir-rimi ta' tagħmir qadim ta' l-elektiriku.



Dette symbolet indikerer at produktet som er merket på denne måten ikke skal kastes som vanlig husholdningsavfall. Siden dette er et bedriftsprodukt, kan det heller ikke kastes ved en vanlig miljøstasjon. Hvis du ønsker å kaste dette produktet, er den riktige måten å gi det til en organisasjon i nærheten som spesialiserer seg på kassering av gammelt elektrisk utstyr.



Ten symbol oznacza, że produktu nim opatrzonego nie należy usuwać z typowymi odpadami z gospodarstwa domowego. Jest to produkt typu B2B, nie należy go więc przekazywać na komunalne składowiska odpadów. Aby we właściwy sposób usunąć ten produkt, należy przekazać go do najbliższej placówki specjalizującej się w usuwaniu starych urządzeń elektrycznych.



Este símbolo indica que o produto com esta marcação não deve ser deixado fora juntamente com o lixo doméstico normal. Como se trata de um produto B2B, também não pode ser deixado fora em centros cívicos de recolha de lixo. Se quiser desfazer-se deste produto, faça-o correctamente entregando-o a uma organização especializada na eliminação de equipamento eléctrico antigo, próxima de si.



Acest simbol indică faptul că produsul marcat în acest fel nu trebuie aruncat ca și un gunoi menajer obișnuit. Deoarece acesta este un produs B2B, el nu trebuie aruncat nici la centrele de colectare urbane. Dacă vreți să aruncați acest produs, vă rugăm s-o faceți într-un mod adecvat, ducând-ul la cea mai apropiată firmă specializată în colectarea echipamentelor electrice uzate.



Tento symbol znamená, že takto označený výrobek sa nesmie likvidovať ako bežný komunálny odpad. Keďže sa jedná o výrobok triedy B2B, nesmie sa likvidovať ani na mestských skládkach odpadu. Ak chcete tento výrobok likvidovať, odneste ho do najbližšej organizácie, ktorá sa špecializuje na likvidáciu starých elektrických zariadení.



Ta simbol pomeni, da izdelka, ki je z njim označen, ne smete zavreči kot običajne gospodinjske odpadke. Ker je to izdelek, namenjen za druge proizvajalce, ga ni dovoljeno odlagati v centrih za civilno odlaganje odpadkov. Če želite izdelek zavreči, prosimo, da to storite v skladu s predpisi, tako da ga odpeljete v bližnjo organizacijo, ki je specializirana za odlaganje stare električne opreme.



Este símbolo indica que el producto así señalado no debe desecharse como los residuos domésticos normales. Dado que es un producto de consumo profesional, tampoco debe llevarse a centros de recogida selectiva municipales. Si desea desechar este producto, hágalo debidamente acudiendo a una organización de su zona que esté especializada en el tratamiento de residuos de aparatos eléctricos usados.



Den här symbolen indikerar att produkten inte får blandas med normalt hushållsavfall då den är förbrukad. Eftersom produkten är en så kallad B2B-produkt är den inte avsedd för privata konsumenter, den får således inte avfallshanteras på allmänna miljö- eller återvinningsstationer då den är förbrukad. Om ni vill avfallshandera den här produkten på rätt sätt, ska ni lämna den till myndighet eller företag, specialiserad på avfallshantering av förbrukad elektrisk utrustning i ert närområde.