

Operating- Instructions

FERROPHON® EL
AQUAPHON® ELW/EW




SEWERIN

GB

102691

Measurable success by Sewerin equipment

You settled on a precision instrument.
A good choice!

Our equipment stands out for guaranteed safety, optimal output and efficiency.

They correspond with the national and international guide-lines.

These operating instructions will help you to handle the instrument quickly and competently.

Please pay close attention to our operating instructions before usage.


In case of further queries our staff is at your disposal at any time.

Yours

Hermann Sewerin GmbH

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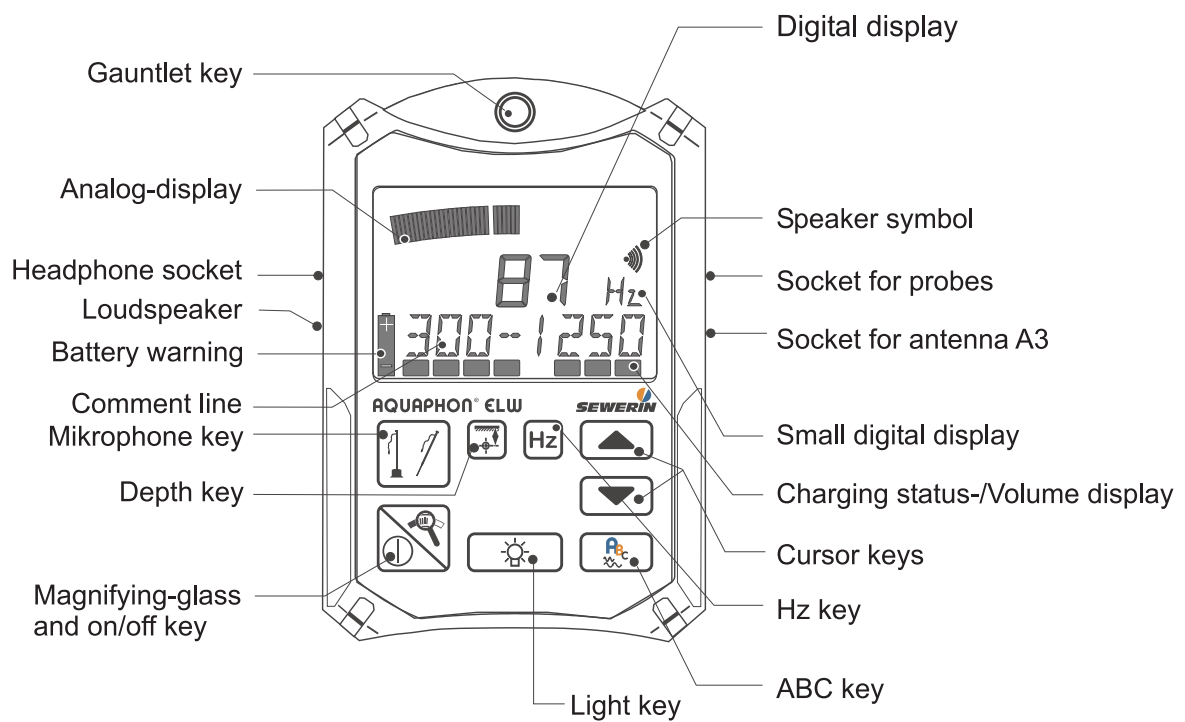
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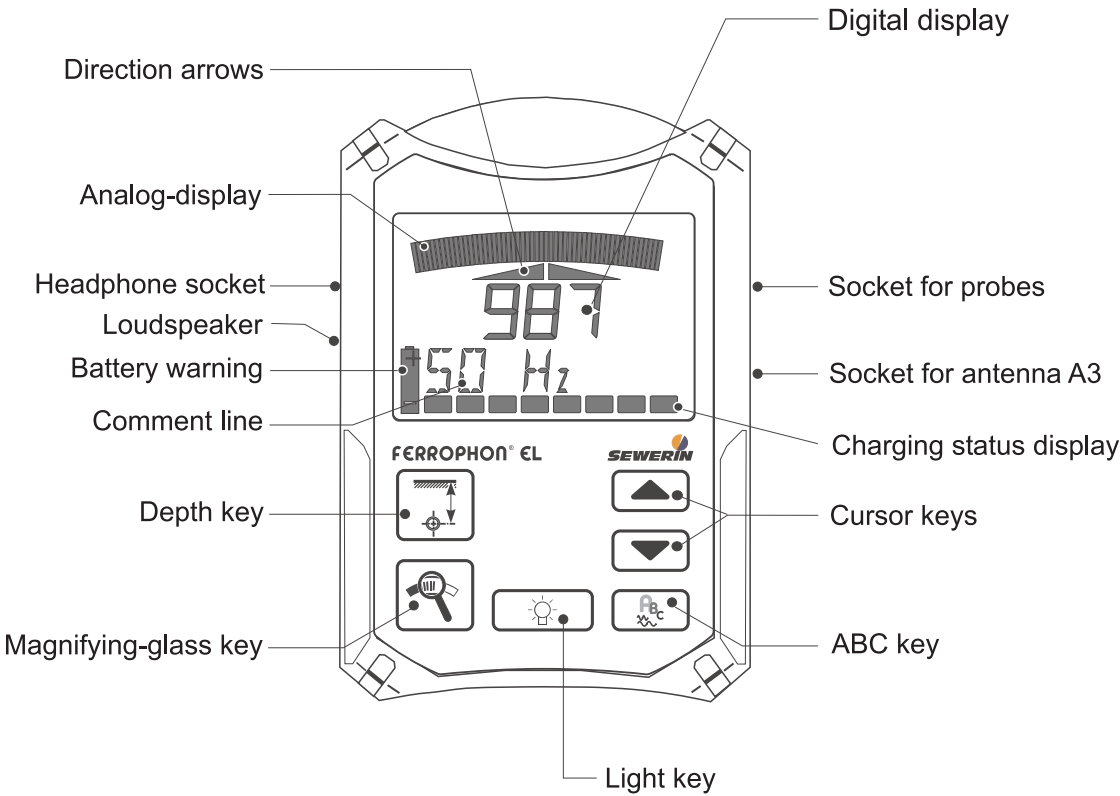
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Illustration AQUAPHON ELW





Operating Instruction

FERROPHON[®] EL

AQUAPHON[®] ELW/EW

Brief instruction on pipeline location 46

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NB

The present operating manual describes softwareversion 5.X , where the „X“ stands for any number. The softwareversion used in your **FERROPHON/AQUAPHON** is displayed when it is switched on.

For your safety

This product may only be used after the operating instructions have been read and understood and only by appropriately trained operators.

This product may only be used for its designated purpose, and only in industry and trade.

Repair work may only be carried out by appropriately trained persons.

Changes and modifications to the product may only be carried out with the consent of Hermann Sewerin GmbH. Unauthorised modifications to the product render the warranty null and void.

Only accessories from Hermann Sewerin GmbH may be used with this product.

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

Hermann Sewerin GmbH bears no liability for damage attributable to non-compliance with these instructions. The terms of warranty and liability of the conditions of sale and delivery of Hermann Sewerin GmbH are not extended by the above.

We reserve the right to make technical modifications in the interests of further development.

Please comply with general safety rules in addition to these instructions!

Symbols used:



CAUTION!

This symbol warns of dangers to the user or product.



Note:

This symbol indicates information and tips that go beyond actual operation for the product.

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The following instruments are described in this operating manual:

- **FERROPHON EL**
for the location of all electrical conductive underground lines
- **AQUAPHON EW**
for electro-acoustic water-leak detection
- **AQUAPHON ELW**
combination instrument for pipeline location and water-leak detection

The standard versions of the **AQUAPHON EW, ELW/FERROPHON EL** do not always incorporate the following functions:

- radio reception from microphones
- headphones output of 50-60 Hz and 100 Hz tones for cathodic corrosion protection
- analog output for the Pearson method
- Battery-powered device

Functions that are not available with your **AQUAPHON EW, ELW/FERROPHON EL** cannot be activated. If you need a version that includes one of them, please contact the manufacturer or distribution partner direct.

2 Function description

2.1 Pipeline location (FERROPHON EL/AQUAPHON ELW only)

The **FERROPHON EL** and **AQUAPHON ELW** are instruments for the location of all electrically conductive underground lines, henceforth called „lines“ for short. Together with special probes they are suitable for locating cable faults and damage to lines with cathodic protection.

Lines can be searched for electronically provided that they have an alternating current of a suitable frequency and adequate intensity flowing through them.

Using special probes connected to the **FERROPHON EL** or **AQUAPHON ELW** the magnetic field resulting from the alternating current is reconverted to current (induction). This current is then evaluated and displayed by the **FERROPHON EL/AQUAPHON ELW**.

The cases described in this operating manual relate exclusively to the presence of a single straight line. If there are several live lines in parallel their individual magnetic fields may be superimposed to form a single resultant. This may give rise to discrepancies between the measurement results and the actual location of the line(s). However, judicious use of the various filters (reception frequencies) can often avoid such interference.

There are two basic location procedures:

- a) **Passive location:** the required alternating current is already present „as a matter of course“. The **FERROPHON EL/AQUAPHON ELW** have appropriate reception frequencies for this case:
 - „Radio“: underground lines act like antennas for very-long-wavelength radio transmitters (VLF range), resulting in a corresponding alternating current. Since the radio transmitters cannot always be received at the same intensity, under certain conditions a line may be „overlooked“.
 - „50-60 Hz“: for cables that are under load, i.e. not merely live!
 - „100 Hz“: for lines with cathodic protection.
- b) **Aktive location:** the alternating current is produced using a generator. See the relevant operating manual, e.g. for the generator G1.

2.2 Water-leak detection (AQUAPHON EW/ELW only)

The **AQUAPHON EW/ELW** is used in combination with various microphones (listed in the „Accessories“ section) for the electro-acoustic detection of water-leaks.

When a pressurised pipeline develops a leak, water flows through it into the surrounding soil at high speed. In consequence the pipeline material vibrates at the exit point. This vibration is transmitted by the pipe, with the result that it can be picked up even at remote contact points (valves and the like). This structure-borne noise is rendered audible by the **AQUAPHON EW/ELW**.

The water jet - and the pipe, in the vicinity of the leak - also induce vibration in the soil. This is transmitted to the surface, where it can be picked up as ground-borne noise.

Even with electro-acoustic leak detection the human ear retains its importance. Suitable practice enables noises of different types and tones to be compared, and leak noise distinguished from extraneous, unrelated noise.

2.3 Acoustic line location (EW/ELW only)

Plastic lines cannot be located by the classical electromagnetic method because they do not conduct electricity.

The acoustic method of line location uses a different principle: the lines transmit mechanical vibration better than the surrounding earth. If suitable vibrations are applied to the line, they are transmitted along its length and through the earth to its surface, and can then be located there with an ground microphone and receiver with headsets according to the **water-leak detection** principle. As with water-leak detection, the line is in the place where the greatest intensity is found. Fibrous-cement and metallic pipes can also be located in this way.

If you wish to detect the lines acoustically, follow the operating instructions for the vibration emitter (eg, **COMBIPHON**). Proceed as with for water-leak detection. The **AQUAPHON EW/ELW** also offers an additional mode to assist in detecting lines (see chapter 5.2.1.1).

3 Commissioning

3.1 First use



Caution! Before the **FERROPHON EL/AQUAPHON EW, ELW** are used for the first time their rechargeable batteries must be fully charged. A partial charge can lead to a reduction in their capacity and thus their operating time.

3.2 Switching on and off



- Plug a probe into the appropriate input .

Antenna A3: **input 1**
other probes: **input 2**

- A brief signal tone sounds.
- The software version appears in the display.
- The charge status of the rechargeable batteries appears in the display.
- The type of probe plugged in is automatically determined.

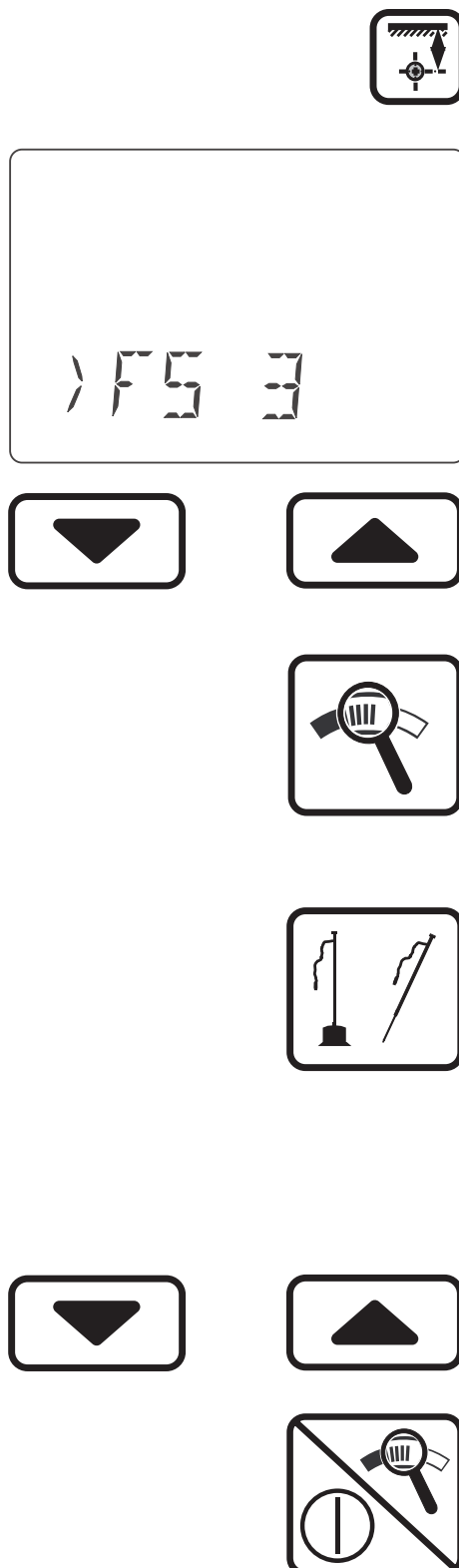
The probe type briefly appears in the display.

If the probe type is not automatically identified it can be selected manually (see below).

- If a microphone has been plugged in, the bandpass currently set for the frequency filter is briefly displayed.
- Depending on the probe being used the display may be slightly different. Measurement can now begin.
- To switch off, unplug the probe from the input.

3.2.1 Manual probe selection

If the probe is not automatically identified (if it is an old model, for example), it can be selected manually:



FERROPHON EL

- Hold down the depth key.
- Plug in the probe.
- The „>“ symbol appears on the left of the bottom text line and the name of the probe that can be selected, e.g. „FS3“ in the middle.

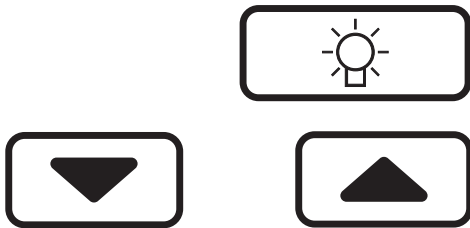
- Pressing the cursor keys switches between possible probes.
- Pressing the magnifying-glass key displays the selected probe.

AQUAPHON ELW/EW

- Hold down the microphone key.
- Plug in the probe.
- The „>“ symbol appears on the left of the bottom text line and the name of the probe that can be selected, e.g. „FS3“ in the middle.

- Pressing the cursor keys switches between possible probes.
- Pressing the magnifying-glass key displays the selected probe.

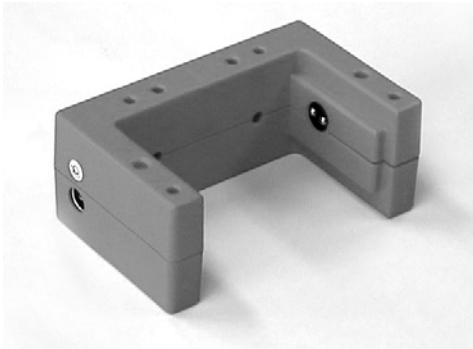
3.3 Adjusting the display contrast



The display contrast can be adjusted as follows:

- Hold down the light key.
- Press the cursor-down key to reduce the contrast.
- Press the cursor-up key to increase the contrast.

3.4 Charging equipment



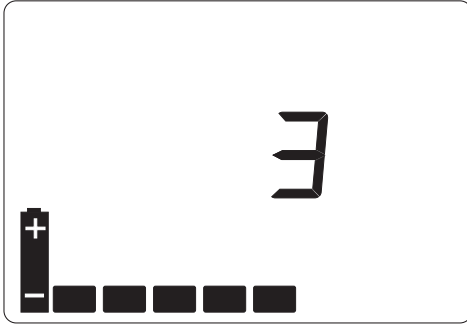
When fully charged the instruments have a maximum operating time of 8 hours.

To charge an instrument you need the charging adapter HS (see fig.), which can be used either in the workshop or in the emergency vehicle.

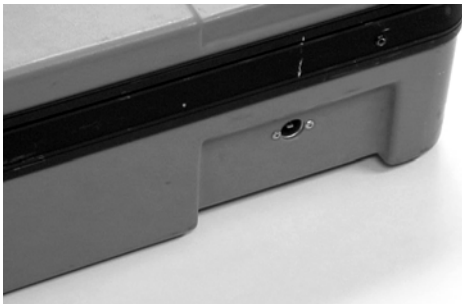
The charging adapter has the following sockets on its side:

- 230 V plug-in AC/DC adapter
- 12 V vehicle-connection adapter
- 24 V vehicle-connection adapter

3.5 Charging



- Switch off the instrument and plug it into the charger. The following (or similar) appears in the display:
- The instrument now has 5 operating hours (= 5 bars) left. It will take another 3 hours to be fully charged.
- When it is fully charged all the bars appear and the number display disappears.
- You can leave the instrument in the charger until you need it again.



If you have a case for your **FERROPHON EL/AQUAPHON EW/ELW**, it can be charged inside.



- Connect cable 1 to the charger inside the case.
- Connect the plug-in AC/DC adapter or vehicle-connection adapter to socket 2.



3 Commissioning

3.5.1 Self-discharge

If the instrument is not placed in the charger when switched off the rechargeable batteries will self-discharge, thus reducing available operating hours.

After no more than 30 days the instrument will indicate zero operating hours, and it must be recharged.

Short periods of use and protracted disuse can lead in the long term to the so-called „memory effect“, i.e. the true remaining battery capacity is lower than shown in the display .

You can counteract this by fully discharging the instrument regularly (e.g. once a month) until it spontaneously switches off, then recharging it!

3.6 Connecting the headphones



FERROPHON EL/AQUAPHON EW/ELW are fitted with a **speaker 1** through which confirmation and alarm signals are emitted, as well as a sound which is helpful with pipeline location.

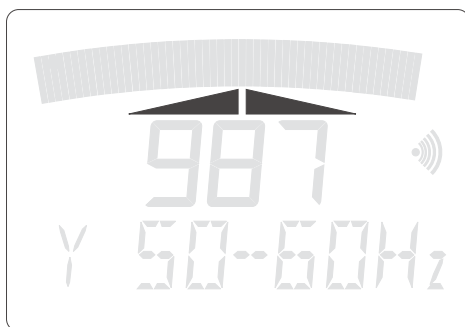
During water-leak detection no leak noise is emitted over the speaker: headphones must be used.



- Plug the headphones jack-plug into **socket 2**.
The speaker is switched off.
Sound is output to the headphones.
- When the headphones are unplugged the sound is once more output to the speaker.

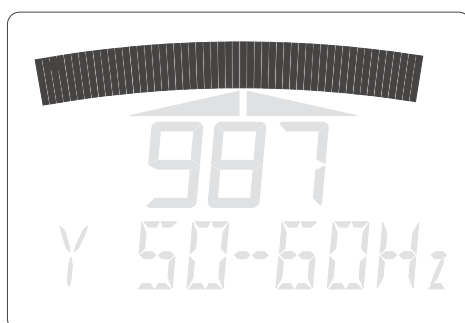
4.1 Displays

4.1.1 Positional display



The two direction arrows indicate the direction in which the line is located. There are also symbols of the two arrows at the top of the antenna A3. If the left arrow is displayed, for example, the line is located to the left of the antenna A3.

4.1.2 Analog display



The analog display shows, depending on the set method, via the line a minimum (minimum-method) or a maximum (maximum-and maximum difference method). The volume received by the headset corresponds to the display.

If the minimum method is set, you will hear a tone on the speaker, which loudness corresponds to the analog display.

With the Maximum- and Maximum-Difference method the time difference between the tones changes:

- Loud response, close to line, short spacing between tones
- Quiet response, further from line, greater spacing between tones

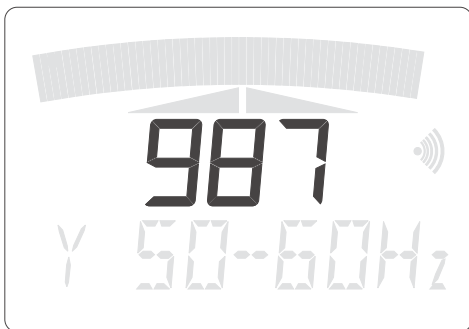
4 Pipeline location (FERROPHON EL/AQUAPHON ELW)

4.1.3 Frequency display



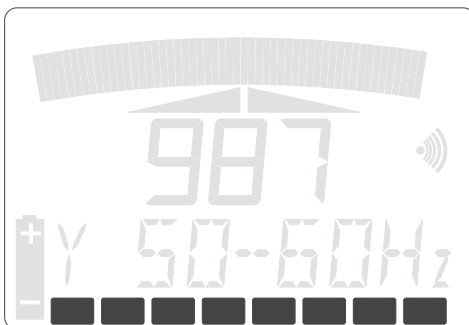
The frequency display indicates the measurement range set. Possible displays are: 50-60 Hz, 100 Hz, A (42 kHz), B (9.95 kHz), C (1.1 kHz), FIG, Bs and Cs.

4.1.4 Digital display



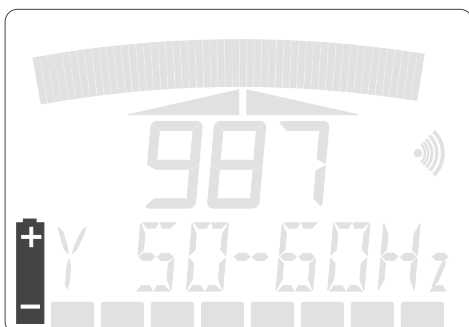
The digital display indicates field strength for pipeline location. Field strength is measured at the bottom coil of the antenna A3.

4.1.5 Battery status



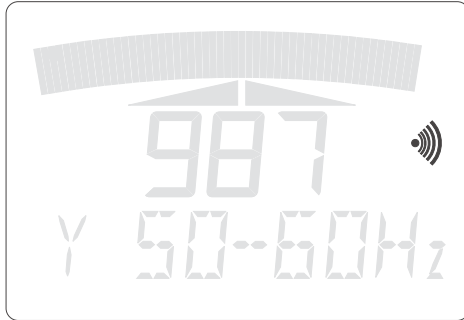
The bars in the display indicate charging status. Each bar stands for one more operating hour. For example, if 5 bars are visible the remaining charge is sufficient for another 5 hours' operation.

4.1.6 Battery warning



When the battery-warning symbol appears in the display, the remaining charge is only sufficient for another 15 minutes or so.

4.1.7 Speaker symbol



The speaker symbol appears in the display when direct acoustic output is activated. Direct acoustic output means that the 50-60 Hz and 100 Hz frequency ranges are output to the headphones.

When direct acoustic output is not switched on a 1.1 kHz tone is output to the headphones.

Direct acoustic output is not available with all models of the **FERROPHON EL/AQUAPHON ELW**.

4.2 Key functions

4.2.1 Frequency selection (ABC key)



Repeatedly pressing the ABC key steps through the individual frequency ranges.

The last used method is saved for each frequency range. This information is retained even after switching off the **FERROPHON EL/AQUAPHON ELW**.

Passive location

The alternating current necessary for pipeline location is already present. The **FERROPHON EL/AQUAPHON ELW** has three reception frequencies: radio, 50-60 Hz and 100 Hz.

Radio

Underground lines act as antennas for very-long-wavelength radio transmitters (VLF range). A corresponding alternating current therefore flows. As radio transmitters do not induce current in all lines and the induced current is not the same at all points, it may not be possible to locate some lines.

The radio measurement range is only available with the antenna A3.

Radio frequency switching

The default setting is for the instrument to search for a suitable radio transmitter in the 20 kHz reception range. Manually switching to 25 kHz may produce better results.

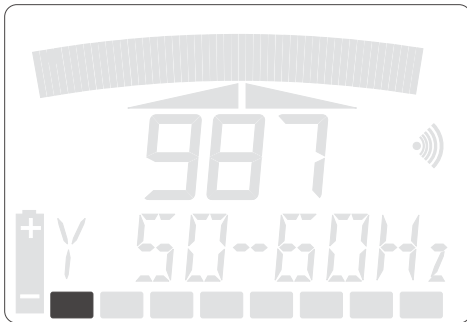


- With the radio frequency range selected, hold down the cursor-up key and then press cursor-down key.

The radio frequency range is switched.

If the bar on the left is visible, the 25 kHz frequency is selected.

If the bar on the left is not visible, the 20 kHz frequency is selected.



50-60 Hz

This frequency range is for lines bearing a 50-60 Hz alternating current, e.g. electrical transmission lines. A line must be under load for the **FERROPHON EL/AQUAPHON ELW** to locate it. If the line is live but no current is being drawn from it, it cannot be located.

100 Hz

This frequency range is for lines with cathodic protection.

Active location

The alternating current is produced by a special generator. The **FERROPHON EL/AQUAPHON ELW** operates at the following frequencies:

A = 41.66 kHz

B = 9.95 kHz

C = 1.1 kHz

See the operating manual of the relevant generator, e.g. the generator G1.

The PIG = 21.5 Hz frequency can also be used in combination with the FS20 probe for some pigs.

4.2.1.1 Tuning the reception frequency

This is necessary with older Sewerin generators and some pigs that are not quartz-controlled.

- Switch on the generator or pig.
- Use the ABC key to select the set generator or small pig frequency range, „B“ or „C“.
- Take the measurement probe into the reception area of the generator.



The reception area is in the immediate vicinity of the generator or the connected line.

- The reception probe should be about 0.5 m away from the small pig.
- Press the ABC key until the clearance tone sounds. „Bs“ or „Cs“ appears in the display.



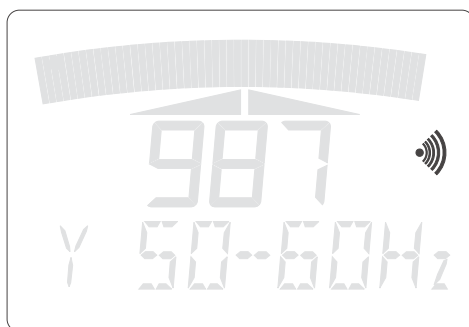
4.2.1.2 Direct acoustic output

If your **FERROPHON EL /AQUAPHON ELW** is fitted with direct acoustic output, this can be activated in the 50-60 Hz and 100 Hz frequency ranges. Headphones are essential, as direct acoustic output does not work with the built-in speaker.

In direct acoustic output the 50-60 Hz or 100 Hz frequency of the line is output direct to the headphones, i.e. you hear a 50-60 Hz or 100 Hz tone through them.

If direct acoustic output is not activated, you always hear a tone at a frequency of about 1.1 kHz through the headphones.

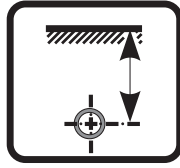
- Plug in the headphones jack-plug.
- Repeatedly press the ABC key until the required frequency (50-60 Hz or 100 Hz) is selected.
- Press and hold down the ABC key until a clearance tone sounds.



The speaker symbol appears in the display.

Direct acoustic output is activated.

4.2.2 Depth key



With the antenna A3 the depth key is used to measure the depth of a line and the current strength in the conductor. A detailed description can be found in section 4.5.5.

4.2.3 Cursor keys



The cursor keys are used to adjust the volume of the headphones or the speaker.

4.2.4 Magnifying-glass key



(EL)



(ELW)

The magnifying-glass key is used to adjust the deflection of the analog display.

If you use antenna A3 for measuring, there is an automatic adjustment of the analog display with the maximum and minimum methods. It may be practical in exceptional cases to adjust the analog display by hand. When changing to a frequency range with the ABC key there is an automatic adjustment.

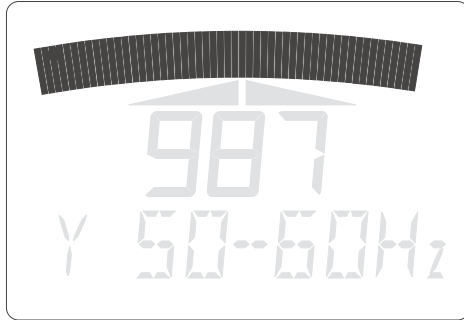
If you are using the Maximum-Difference method, the analog display must be adjusted manually. This is indicated by „MAN“ in the display. Press the magnify-key to enable the **FERROPHON EL/ AQUAPHON ELW** to work in the ideal range.

If the display shows „OVERFLOW“ the internal amplifier is over-controlled, and you will have to press the magnify-key.

NB



When searching for defects with the antenna A3 the display should be adjusted manually. Automatic adjustment to obtain optimum deflection is useful for pipeline location, but not when searching for defects.



If you are not using the antenna A3 the display must be manually adjusted so that any change in the display is clearly visible.

To optimise deflection, proceed as follows:



(EL)



(ELW)



(EL)



(ELW)

- Start a measurement with any probe.
- The analog display indicates a reading.
- If the display does not deflect far enough, look for a measurement point at which the analog display changes very little.
 - Press the magnifying-glass key.
The analog display is set to half the maximum value.
 - Continue measurement.
- If the display deflects too far, look for a measurement point at which the analog display shows a full deflection.
 - Press the magnifying-glass key.
The analog display is set to half the maximum value.
 - Continue measurement.
- The analog display can be set to half the maximum value as often as required.

4 Pipeline location (FERROPHON EL/AQUAPHON ELW)

4.3 Probe overview

4.3.1 Antenna A3



The antenna A3 is used to locate underground lines and determine their depth. These lines may be live electric cables or other metal lines such as water pipes.

The antenna A3 is a combination of 3 coils, which makes it extremely versatile. All the **FERROPHON EL/AQUAPHON ELW** frequencies can be used with the antenna A3.

4.3.2 Search coil SK3



The search coil SK3 is used to locate cables in a bundle of cables and to find lines covered by plaster.

The 1.1 kHz (-C- frequency) and 10 kHz (-B-frequency) can be received.

4.3.3 Search coil FS20



The search coil FS20 is specially designed for low frequencies (20 Hz - 100 Hz). It is used particularly to locate lines with cathodic protection.

4.3.4 Cable clamps AZ5 and AZ9



The cable clamps AZ5 and AZ9 (50 and 90 mm in diameter respectively) are used to locate individual cables among a large number of other identical or different cables.

The cable clamps can also be used to transmit a signal along individual lines (see generator operating manual).

4.3.5 Search coil FS3 A



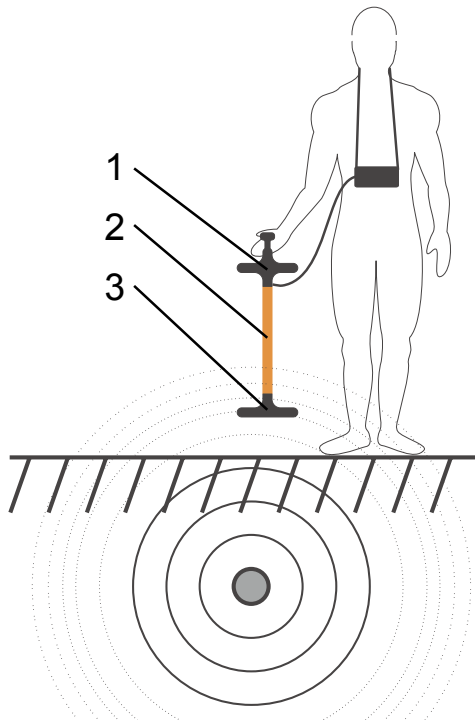
The search coil FS3 A is used to locate underground lines. The search coil proper of the FS3 A can be operated in 3 different positions: vertical, at an angle of 45° and horizontal. This is useful in determining the depth of a line.

The 1.1 kHz (-C- frequency) and 10 kHz (-B- frequency) reception frequencies can be received.

4.3.6 Other probes

The use of other probes (e.g. the step-voltage probe EL02) is covered in separate operating manuals. Please contact our Technical Information Department if you have any problems.

4.4 Antenna A3

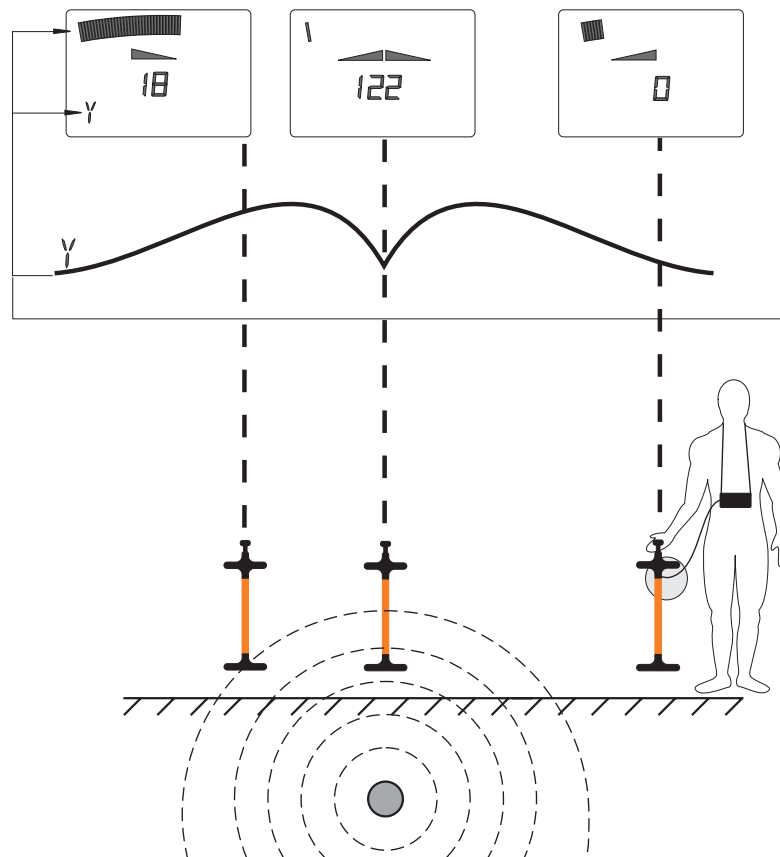


The antenna A3 is actually a combination of 3 coils (items 1, 2 and 3). To obtain exact results the antenna A3 must be held vertically by the knob between the index and middle fingers.

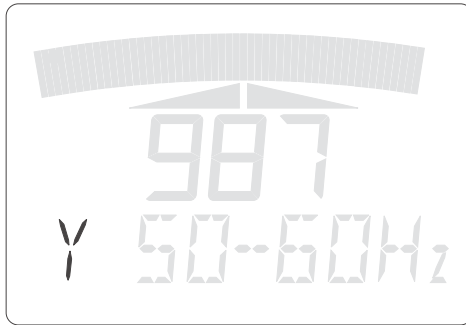
4.4.1 Displays

The graphic shows how the display changes when you cross a line with the antenna A3.

The analog display and the diagram show what happens when the minimum-method is set.

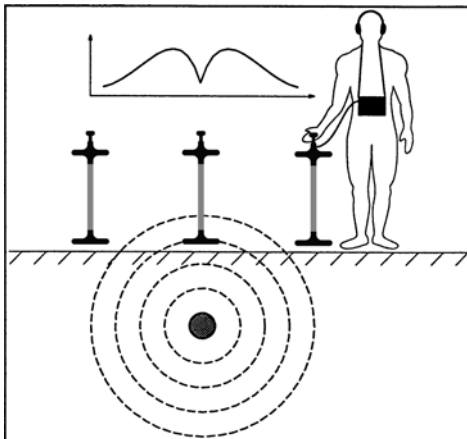


4.4.2 Methods



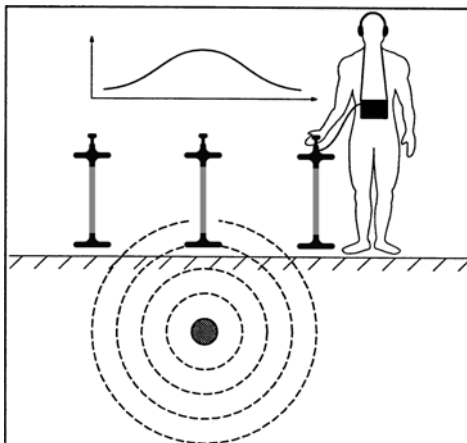
3 different methods can be used with the antenna A3. You can see which method is selected by the symbol in the lower left of the display (see table on the following page).

The analog display responds differently when a line is crossed depending on which method is set (see table).



With the **minimum-method** the analog display initially rises steeply when approaching a line. But directly above the line it is at a minimum.

Minimum-method

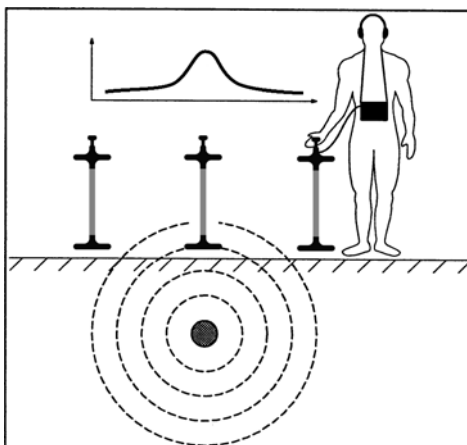


With the **maximum-method** the analog display rises at a constant rate when approaching the line, reaching its maximum directly above the line.

Maximum-method

With the **maximum-difference-method** the analog display at first rises very slowly when approaching the line. In the direct vicinity of the line it rises sharply.

Regardless of which method is set, the field-strength display always responds as for the maximum-method.



Maximum-difference-method

4 Pipeline location (FERROPHON EL/AQUAPHON ELW)



- To change methods, press down illuminated key and press magnifying-glass key.

4.4.3 Pipeline location

The antenna A3 is used to locate underground lines and determine their depth. These lines may be live electric cables or other metal lines such as water pipes.

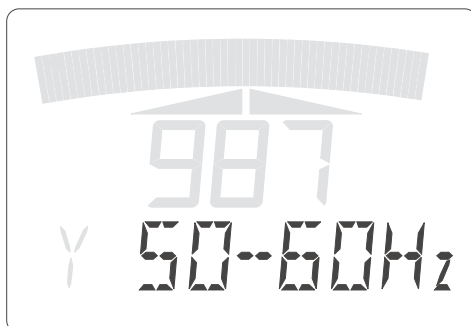
Non-metallic lines can be located if a metal wire was placed with them when they were laid. The **FERROPHON EL/AQUAPHON ELW** is then in a position to locate this wire.

If no wire is present the location of non-metallic lines requires a glass-fibre probe system (GFS / GSK). This system consists of a glass-fibre cable with a metal wire embedded in it and a small pig. The glass-fibre cable is passed along the line and can then be located with the **FERROPHON EL/AQUAPHON ELW**. The small pig serves to determine the end position of the glass-fibre cable.

4.4.4 Locating lines

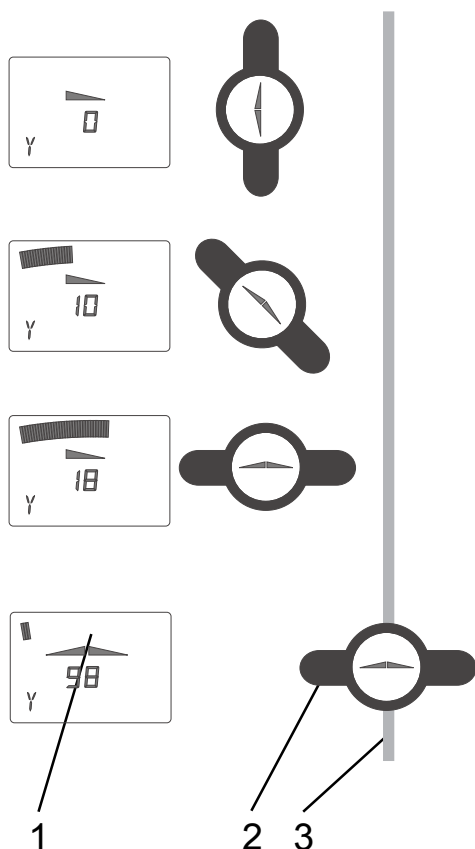


Caution! when using a generator to locate lines, refer to the generator operating manual as well.



- Keep pressing the ABC key until a suitable reception range is set, e.g. 50-60 Hz for live electric cables or A, B or C for lines into which a generator is transmitting a signal.
- Select a suitable method. There are pros and cons for the 3 possible methods. (See table). To switch methods, hold down the illuminated key and press the magnifying-glass key.
- Traverse the ground with the antenna A3.
- Watch the analog display: it must rise in the vicinity of lines.

4 Pipeline location (FERROPHON EL/AQUAPHON ELW)



- When the display shows a clear deflection, rotate the antenna A3 about its own axis while watching the display.
- Turn the antenna A3 so that the deflection is at its greatest. In this position the front of the antenna A3 is parallel to the line, i.e. the black coil housings of the **antenna A3 (item 2)** are transverse to the **line 3**.
- Take the antenna A3 in the direction indicated by the arrow in the display.
(With the maximum-difference-method there are no arrows. The maximum must be sought by moving sideways.)
- As soon as you are above the line a double arrow appears in the display and the analog display is at a minimum.

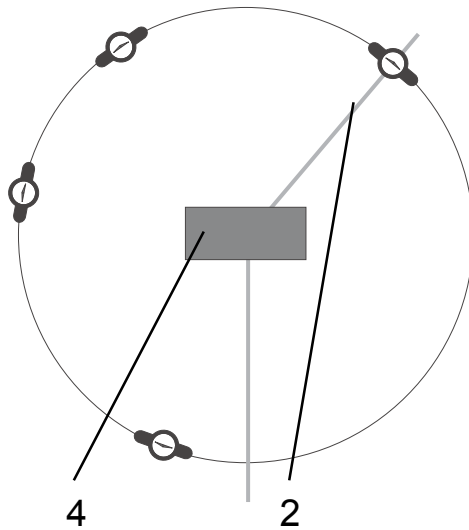
NB



It is the arrows on the **antenna A3 (item 2)** that determine the direction in which it must be moved to locate the **line 3**.

With the minimum-method the **display (item 1)** shows a double arrow if it is directly above the line. Furthermore the analog display indicates a minimum value and the field-strength display a maximum.

4.4.5 Special features when using a generator



To locate a point on the line, circle the **generator 4** at a distance of at least 10 metres. Be careful to hold the antenna A3 as shown in the illustration.

- As soon as you are above the **line 2** a double arrow appears in the display and the analog display is at a minimum.

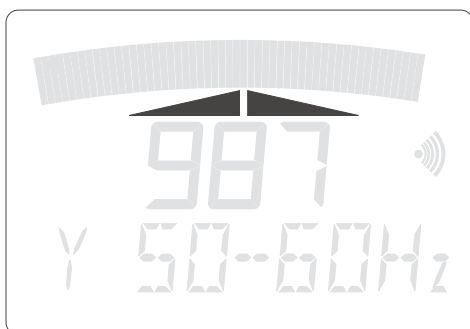
4.4.6 Following a line



NB

The best method for following the line is the minimum-method. Due to special influences (eg, external lines) , you may have to use a different method. With the maximum-method the arrow in the display is not available.

If the arrow in the display is not available, you will have to follow the line by watching the digital and analog display. The digital display must always have its maximum via the line.



If you know or have located a point on the line you can follow it like this:

- Hold the antenna A3 above the known position. Rotate the antenna about its own axis until the field-strength display is at a maximum.
- If there is a method set with which the arrow display is available, there must be a double arrow displayed.



NB

If reception is poor the double arrow is not displayed. You will have to use the digital and analog displays to locate the line.

- Move slowly forwards with the antenna A3. As long as you are above the line the double arrow is displayed.
- If only one arrow is displayed, search for the line in the direction it indicates until the other one reappears.

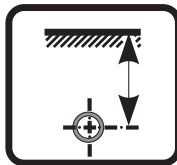
4.4.7 Depth measurement



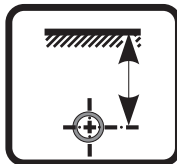
NB

Depth measurement with the radio frequency range is very inexact. Some other frequency should be used if possible.

To obtain correct values the antenna A3 must be standing vertically on the ground exactly above the line. The figure shown is the distance between the underside of the antenna A3 and the centre point of the line.



- Stand the antenna A3 on the ground.
- Press the depth key.
The depth of the line and the current strength in the conductor in mA appear in the display.



- To check the measurement, raise the antenna A3 about 30 cm above the ground.
- Press the depth key again. The depth now displayed should be about 30 cm greater than the first measurement.

The following measuring tolerances may be assumed for a single straight line:

depth	tolerance
0 m	0.1 m
1 m	0.1 m
3 m	0.3 m



Notes

- Magnetic field overlap where lines curve or branch and if there are other lines nearby. This renders readings useless !
- If the magnetic field is very weak, the depth cannot be determined. The display will then show: 0.0 m (flashing).
- If the line is very deep, 8.0 m (flashing) appears in the display.
- When working in shafts you are generally recommended to check depth readings by carrying out repeated measurements.
- You can identify insulation defects and branch points by comparing the current strength in mA displayed at various points along the line.
- The values displayed are relatively accurate with respect to individual measurements, but the actual, absolute current flow may deviate more radically .

4.4.8 Location and depth measurement using a small pig



- Activate the small pig (see its operating manual).
- Use the ABC key to set the reception frequency at which the small pig transmits.



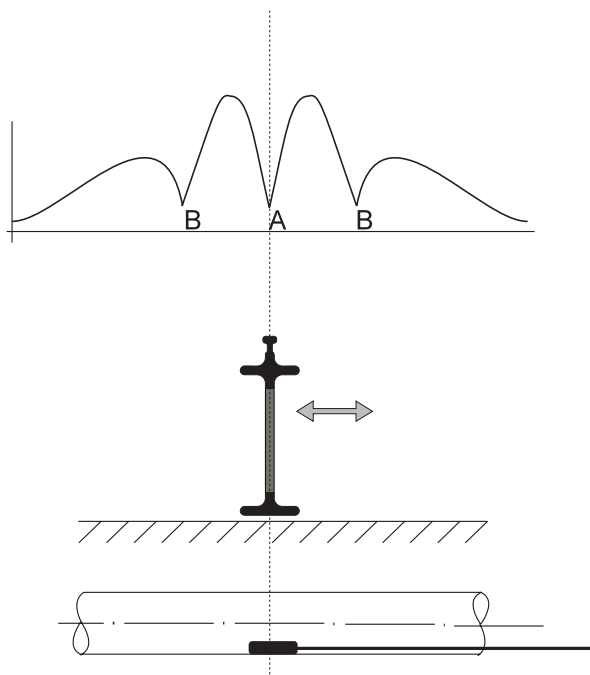
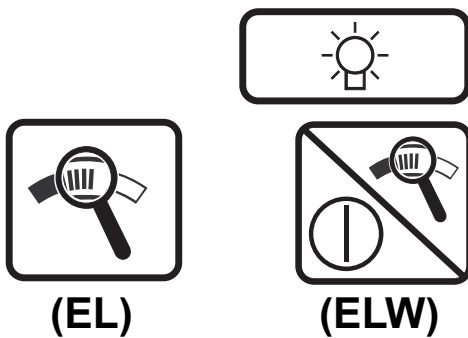
NB

If using a small pig manufactured before April 1998 or so, please read section 4.2.1.1 „Tuning the reception frequency“.

End-point determination

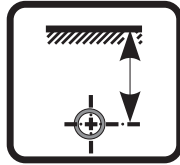
To locate the end-point of a line a small pig must be used with a glass-fibre probe. The small pig marks the end-point.

- To locate the end-point no signal must be transmitted to the glass-fibre rod; switch the generator off.
- The minimum-method must be switched on. If another method is set, hold down the light key and press the magnifying-glass key. This activates the minimum-measuring method.
- If you pass the antenna A3 over the line as shown in the illustration, the analog display shows a minimum (A) directly above the small pig. Look out for the two „extra minima“ (B). At (B) the positional display also changes.



Depth determination

Depth can only be determined directly above the small pig. Place the antenna A3 with respect to the small pig as for end-point determination.



- Press the depth key.



- Press either of the cursor keys to switch to „small-pig depth measurement“ mode.

- The depth is displayed in [m].



- Press either of the cursor keys to switch between the two modes.

Remember that there may be discrepancies between the actual and displayed depth of the small pig, e.g. because of conductive objects or lines. When working in shafts you are therefore recommended to check depth readings by carrying out repeated measurements.

4.5 Cable clamp AZ5 or AZ9



The cable clamps are an auxiliary instrument used to pick out one particular cable from a bundle.

A cable cannot be picked out unless it is an electric-power cable under load or a generator is transmitting a signal into it. Cable clamps can also be used to transmit signals into individual lines (see generator operating manual).



Caution: high tension !

Closing the clamps round individual power cables cores under heavy load can induce high voltages in them that are sufficient to electrocute the user and/or destroy the **FERROPHON EL/AQUAPHON ELW**. Current strength in the cables must not exceed 300 A.

Locating a single cable in a bundle

- Close the Cable clamp AZ5 or AZ9 round the cable.
- Connect these cable clamps to the generator (see generator operating manual).
- Connect a second set of cable clamps to the **FERROPHON EL/AQUAPHON ELW**.
- Use the ABC key on the **FERROPHON EL/AQUAPHON ELW** to set the same frequency as the generator.
- Close the cable clamps round all possible cables in turn.
- The cable into which the generator is transmitting a signal shows a maximum.



4.6 Search coil SK3



The search coil SK3 is a small, hand-operated probe for the selection of individual cables in a bundle and the location of lines covered by plaster.

The search coil SK3 is used to find lines into which a generator signal at the 1.1 kHz or 10 kHz frequencies is being transmitted.

- Transmit a generator signal into the line.
- Connect the search coil SK3 to the **FERROPHON EL/AQUAPHON ELW**.
- Use the ABC key to set the same frequency as the generator.
- Use the search coil to test the cable bundle or the plaster-covered area of the concealed line.



4.7 Search coil FS20



The search coil FS20 is designed for low frequencies (20 Hz - 100 Hz), to which it is highly sensitive. It is thus particularly suitable for the location of lines with cathodic protection.

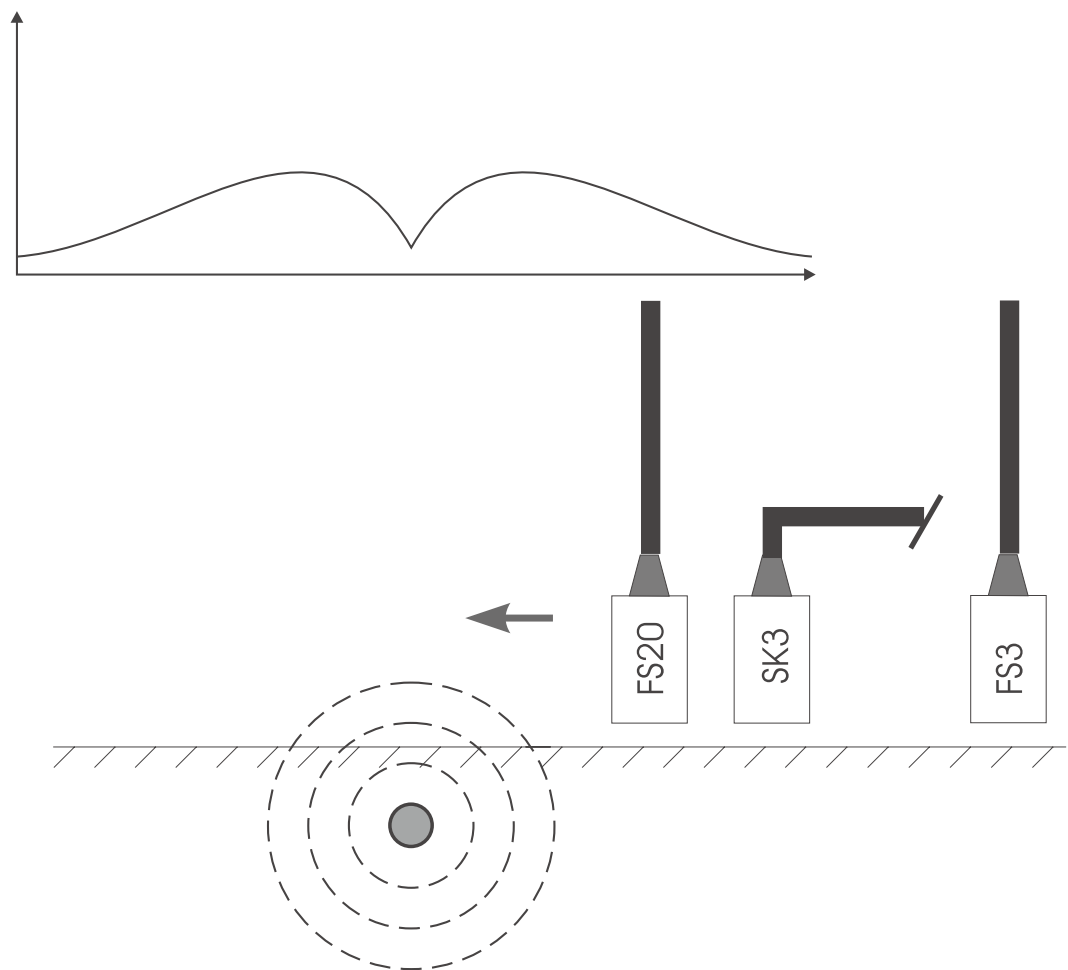
- Connect the search coil FS20 to the **FERROPHON EL/AQUAPHON ELW**.
- Use the search coil to test the cable bundle.

4.8 Search coil FS3 A



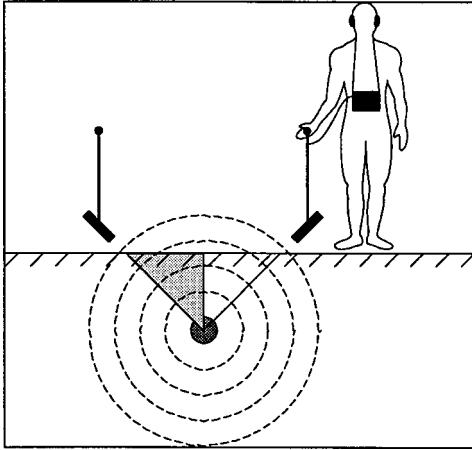
The search coil FS3 A is used to find lines into which a generator signal at the 1.1 kHz and 10 kHz frequencies is being transmitted.

- Connect the search coil FS3 A to the **FERROPHON EL/AQUAPHON ELW**.
- Use the search coil to test the cable bundle.



The diagram shows the response of the analog and field-strength displays when the line is crossed in the direction of the arrow with an FS20, SK3 or FS3 A probe.

4.8.1 Depth determination with the search coil FS3 A



The search coil FS3 A can also be used for depth determination, provided that one point on the line and its track are known.

- Connect the search coil FS3 A to the **FERROPHON EL/AQUAPHON ELW**.
- Swivel the search coil to an angle of 45° .
- Move to one side of the known point on the line.
- Look for the field-strength minimum to the side of the line.

The distance from the known point on the line to the point at which the field-strength display reaches its minimum is equal to the depth of the line.

- The result should be checked by repeating the measurement on the other side of the line.

4.9 Hints and tips

4.9.1 Undefined displays

- In areas where extraneous lines intersect with the line being sought it is not always possible to determine its location exactly, as its magnetic field is distorted. Similar effects can be observed where the line branches or curves.

The course of the line must be deduced on the basis of readings taken on each side of the intersection point.

- For a line to be located the (search) current in it must always be of adequate strength, otherwise the magnetic field will be too small and the display unreliable. A weak magnetic field is indicated by a field-strength display less than 10-20 V/m. This can often be improved by:

- a) altering the transmission frequency
- b) changing the coupling (galvanic or inductive)
- c) improving the earthing contact, e.g. by wetting the spike

4.9.2 Field distortions

Field distortions are caused by parallel iron masses or by metal lines when the individual fields overlap. The effect is a lateral shift in the display of the line.

In such cases you should consider whether the selected coupling procedure is suitable. Both the current strength and the frequency should be as low as possible.

4.9.3 Locating cable faults

It may be possible to locate cable faults, depending largely on the type of the fault and its resistance. The two extremes are best: full short circuit (fault resistance zero) and cable breakage (fault resistance infinite). It may be possible to induce a full short circuit with a burn-in transformer. It is generally advisable to verify the fault location by determining it from both ends of the cable.

If the transmitted signal is suitable the cable default can generally be recognised by the interference it causes to the structure of the magnetic field. The type of interference varies from case to case, as it is a function of a number of factors (e.g. type of fault, generator connection). We shall now consider a few examples.

4.9.4 Short circuit between two or more cores

When the generator is galvanically connected to two of the short-circuited cores (preferably at low frequency), the location of the fault is indicated by a sudden drop in field strength.

4.9.5 Earth fault in one core

If there is an earth or sheathing fault in the core the generator is galvanically connected. The location of the fault is indicated by a sudden drop in field strength (preferably at low frequency). See also accessories, „step voltage probe“.

4.9.6 Core breaks

The generator is also galvanically connected in some suitable way in order to identify breaks in a core or in the cable as a whole. If a single core is broken, for example, it might be connected to this core and to all other cores in parallel with it; if the whole cable is broken, perhaps to all the other cores in parallel with it and the cable sheathing. The cores should be grouped together so as to result in the maximum possible capacity.

High frequencies (frequency -A- = 42 kHz) should be used if possible in order to achieve maximum current strength.

As the location of the fault is approached, the current strength and hence the field-strength signal constantly tend towards zero, which means that the location cannot be determined exactly. In this case it is thus particularly important to maximise measuring accuracy by carrying out the process from both ends of the line.

4.9.7 Locating insulation fault

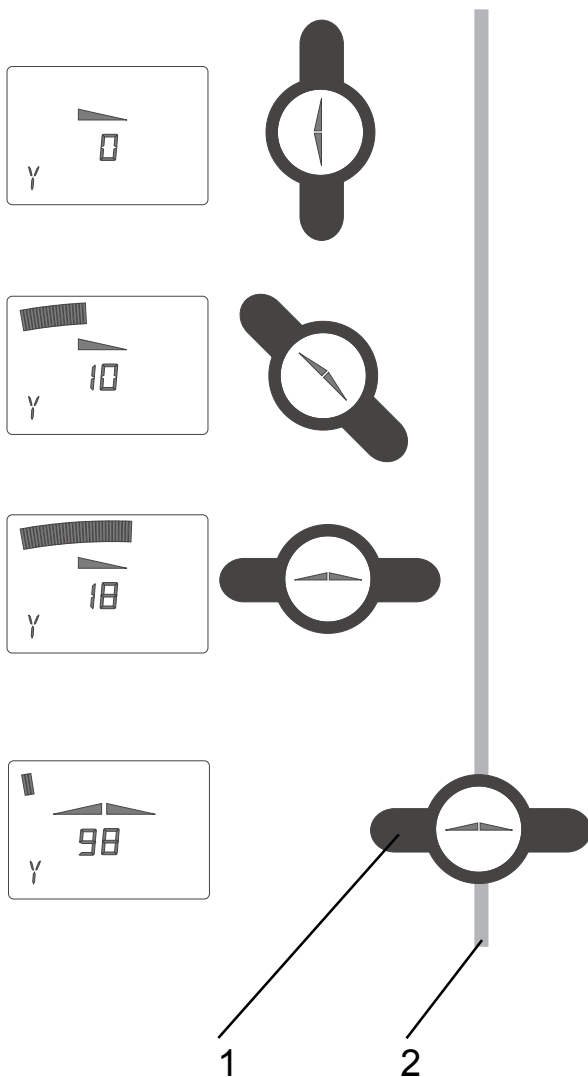
The circumstances are comparable with the case covered in section 4.10.5; the same techniques can be employed.

When searching for defects with the antenna A3 the display should be adjusted manually. Automatic adjustment to obtain optimum deflection is useful for pipeline location, but not when searching for defects.

4.9.8 Weak currents

With weak currents it is absolutely necessary to adjust the deflection on the display manually. Besides headphones are to be used.

Locating lines



- Keep pressing the ABC key until a suitable reception range is set, e.g. 50-60 Hz for live electric cables or A, B or C for lines into which a generator is transmitting a signal.
- Select a suitable method. There are pros and cons for the 3 possible methods. (See table). To switch methods, hold down the illuminated key and press the magnifying-glass key.
- Traverse the ground with the antenna A3.
- Watch the analog display: it must rise in the vicinity of lines.
- When the display shows a clear deflection, rotate the antenna A3 about its own axis while watching the display.
- Turn the antenna A3 so that the deflection is at its greatest. In this position the front of the antenna A3 is parallel to the line, i.e. the black coil housings of the **antenna A3 (item 1)** are transverse to the **line 2**.
- Take the antenna A3 in the direction indicated by the arrow in the display.
(With the maximum-difference-method there are no arrows. The maximum must be sought by moving sideways.)
- As soon as you are above the line a double arrow appears in the display and the analog display is at a minimum.

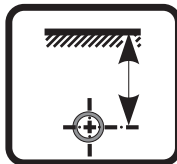
Depth measurement



NB

Depth measurement with the radio frequency range is very inexact. If possible, use some other frequency.

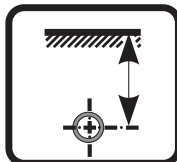
To obtain correct values the antenna A3 must be standing vertically on the ground exactly above the line. The figure shown is the distance between the underside of the antenna A3 and the centre point of the line.



- Stand the antenna A3 on the ground.

- Press the depth key. The depth of the line and the current strength in the conductor in mA appear in the display.

- To check the measurement, raise the antenna A3 about 30 cm above the ground.

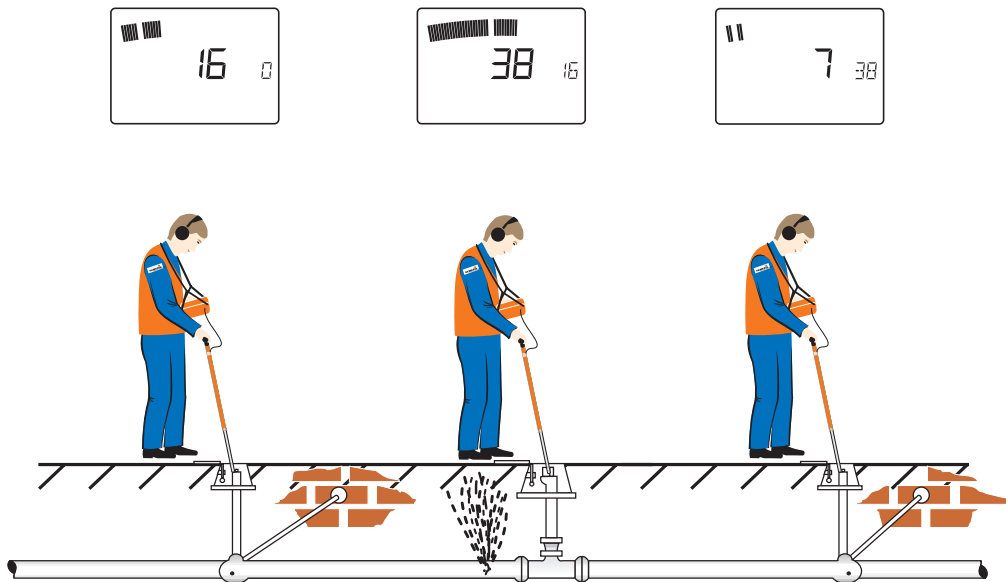


- Press the depth key again. The depth now displayed should be about 30 cm greater than the first measurement .

The following measuring tolerances may be assumed for a single straight line:

depth	tolerance
0 m	0.1 m
1 m	0.1 m
3 m	0.3 m

Brief instructions on water-leak detection



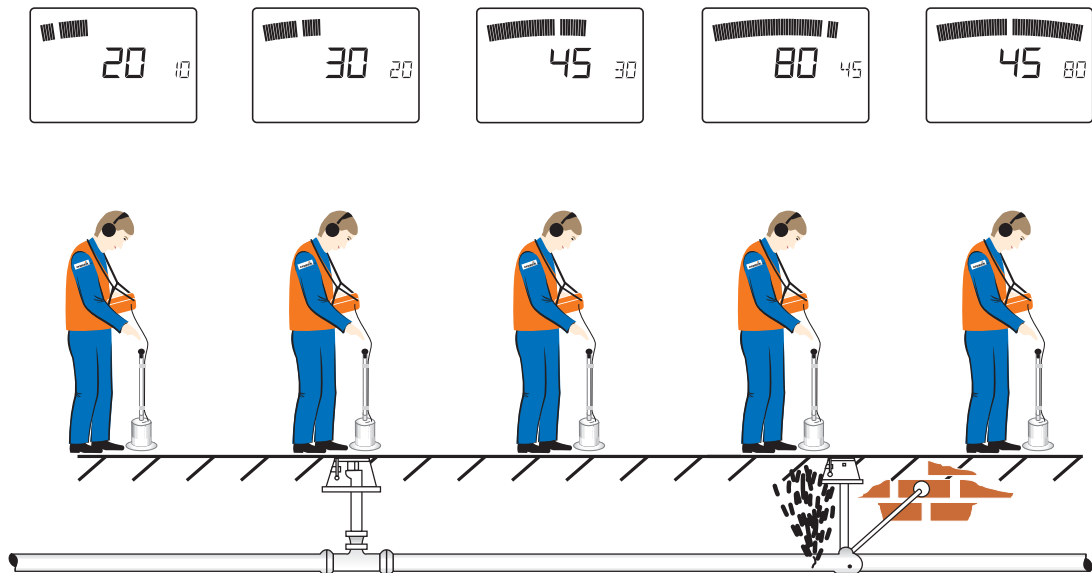
Preliminary location

- Connect the headphones with the **AQUAPHON ELW/ELW**.
- Connect the test rod to the **AQUAPHON ELW/ELW**.
- Place the test rod on the first measurement point.
- Activate the **AQUAPHON ELW/ELW** with the gauntlet key or the microphone key.

A speaker symbol appears in the display during measurement. The analog display indicates the current measured volume. The noise can be heard through the headphones. During this measurement the big digital display indicates the smallest value measured. During this measurement the small digital display indicates the smallest value of the precedent measurement. For the first measurement this value was 0. During this measurement the smallest measured value is shown in the analog display in reverse video.
- To deactivate the **AQUAPHON ELW/ELW** release the gauntlet key or press the microphone key again.

If the **AQUAPHON ELW/ELW** is not deactivated when the gauntlet key is released, the function of the gauntlet key has been changed (see section 5.9). In this event press the gauntlet key again.
- Place the test rod on the next measurement point and proceed exactly as described above.

The previously-measured value now appears in the small digital display for the purposes of comparison.

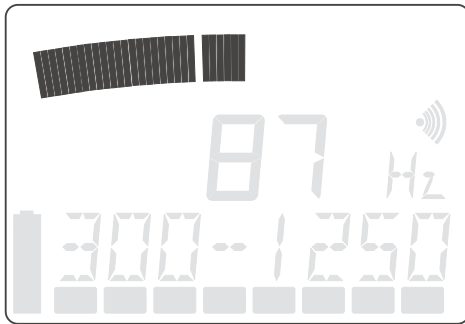


Locating

- Instead of a test rod connect a ground microphone to the **AQUAPHON ELW/EW**.
- Place the microphone on the ground.
- Activate the **AQUAPHON EW/ELW** with the gauntlet key or the microphone key.
 A speaker symbol appears in the display during measurement.
 The analog display indicates the current measured volume.
 The current noise can be heard through the headphones.
 The big digital display indicates the smallest value measured.
 The small digital display indicates the smallest value of the precedent measurement. (For the first measurement this value was 0.)
 The smallest measured value is shown in the analog display in reverse video.
- To deactivate the **AQUAPHON EW/ELW** release the gauntlet key or press the microphone key.
 If the **AQUAPHON EW/ELW** is not deactivated when the gauntlet key is released, the function of the gauntlet key has been changed (see section 5.9). In this event press the gauntlet key again.
- Place the ground microphone on the next measurement point and proceed exactly as described above.
 The previously-measured value now appears in the small digital display for the purposes of comparison.
- Use the ground microphone to check the area of the section where the leak is thought to be.

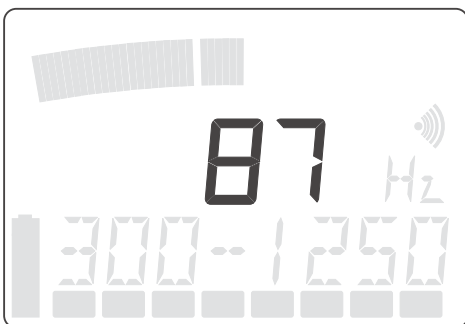
5.1 Displays

5.1.1 Analog display



The analog display indicates the current reading.

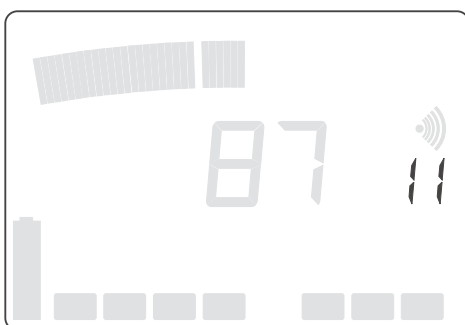
5.1.2 Digital display



The digital display indicates the smallest value measured during a single measurement.

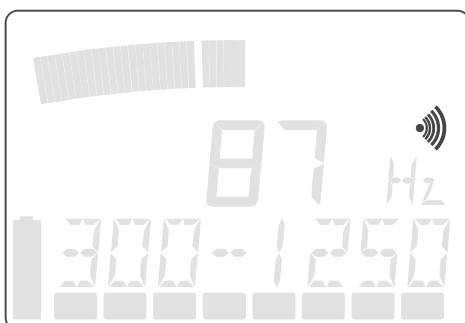
In the „MAX“ mode, the digital display always shows the greatest measured value. In „MAX“ mode you can switch by holding the micro key for 3 seconds (only with microphones with cable connection, not with radio microphones).

5.1.3 Small digital display



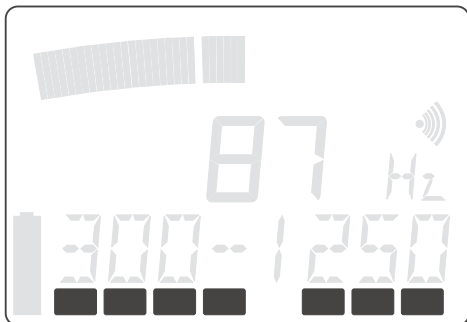
For the purposes of comparison the small digital display always indicates the precedent value measured.

5.1.4 Speaker symbol



The speaker symbol indicates that the **AQUAPHON EW/ELW** headphones are activated.

5.1.5 Volume display

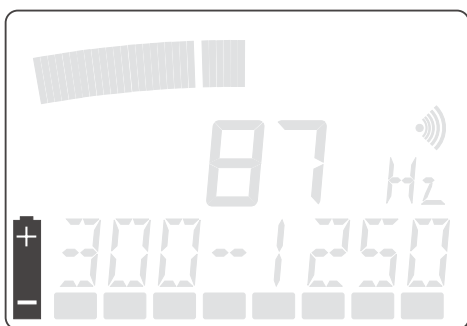


The volume display indicates the volume set. If the bar on the extreme left is shown in reverse video, the volume is low; if the bar on the extreme right is shown in reverse video, the volume is maximum.



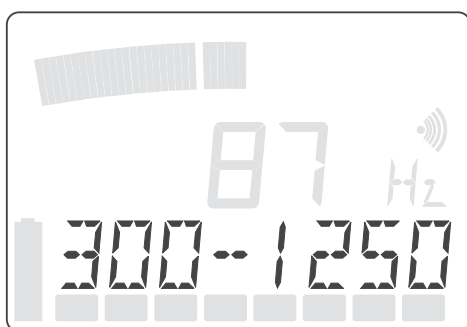
The volume can be adjusted with the cursor keys.

5.1.6 Battery symbol



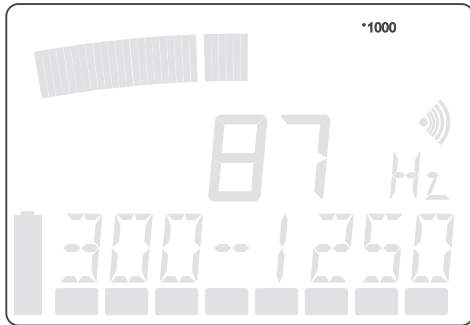
The battery symbol appears about 15 minutes before the battery runs out.

5.1.7 Comment line



Various possible settings and parameters are displayed in the comment line. The filter setting is shown here, for example.

5.1.8 Basic amplification



Basic amplification is useful for coping with extreme situations. The higher the basic amplification, the louder the noise in the headphones. The values 10, 100 or 1000 appear in the display.



(EL)



(ELW)

Basic amplification can be altered with the magnifying-glass key (see section 5.2.6).

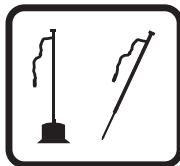
10 = high amplification

100 = medium amplification

1000 = low amplification

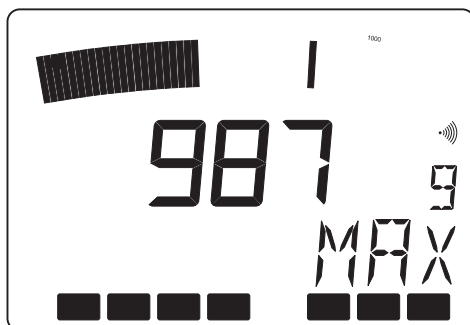
5.2 Key functions

5.2.1 Microphone key



Pressing the microphone key activates the **AQUAPHON EW/ELW**. Pressing it again deactivates it.

5.2.1.1 Modus „MAX“



If you hold down the micro key for 3 seconds, you can switch to „MAX“-mode. This mode helps with acoustic line detection. Instead of minimum values, only max values are shown in this mode (only with microphones with cable connection, not with radio mikes).

5.2.2 Gauntlet key



Pressing the gauntlet key activates the **AQUAPHON EW/ELW**. Depending on the options selected in the set-up menu it is deactivated either by releasing the gauntlet key or by pressing it again.

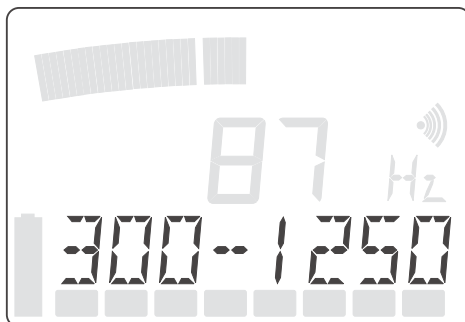
5.2.3 Hz key



The Hz key is used to alter the frequency-filter setting. The filter bandpass - which is at least 300 Hz wide - can be set anywhere between 50 Hz and 10000 Hz (10 kHz).

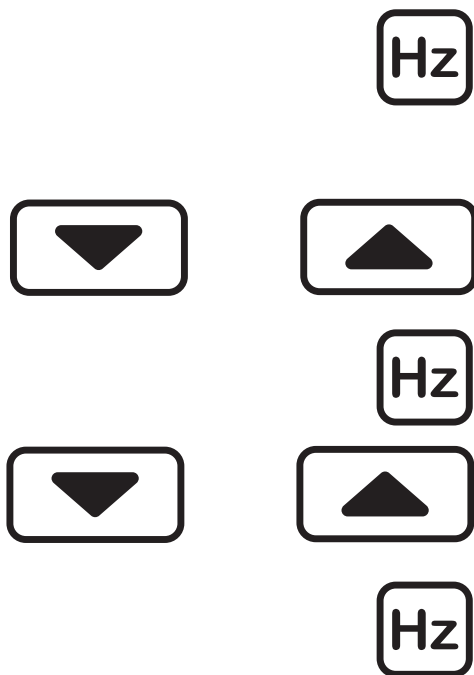


Pressing both cursor keys at once resets the bandpass to its default setting, which depends on the probe.



Different leak noises can be heard best in different frequency ranges, and two people may hear the same noise differently. To optimise acoustic perception a bandpass can be set, in which case only a particular frequency range is fed to the headphones. The best setting can be found by experiment, or alternatively the **AQUAPHON EW/ELW** can search for it automatically.

Setting the frequency-range manually



- Press the Hz key.
The most recently set limits are displayed; the lower filter limit flashes.
- The cursor keys change the lower filter limit step by step.
- Press the Hz key again.
The upper filter limit flashes.
- The cursor keys change the upper filter limit step by step.
- Press the Hz key again.
The filter limits are saved.

Automatic search for the best frequency range

The **AQUAPHON EW/ELW** has a filter-optimisation function that automatically searches for the best frequency range. It should not be activated if there is any significant extraneous noise, and the leak noise - particularly ground-borne noise - should already be audible.



- Press the Hz key until a clearance tone sounds.
- The **AQUAPHON EW/ELW** takes a „noise sample“ and analyses it.

While analysis is under way the display indicates various frequency ranges, and the noise produced by the filter values displayed can be heard over the headphones.

- The **AQUAPHON EW/ELW** selects the frequency range in which the leak noise is especially clear.
- The bandwidth of this bandpass is always 300 Hz.

5.2.4 Cursor keys



The cursor keys are used to adjust the volume of the speaker or headphones. The volume setting is shown in the display by a bar in reverse video.

5.2.5 Light key



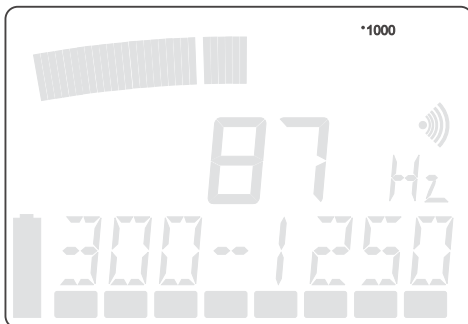
The light key switches the display illumination on and off.

It switches off automatically after about 4 minutes.

5.2.6 Magnifying-glass and on/off key

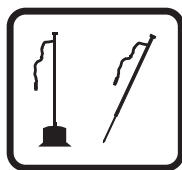


The analog display indicates the relative noise level. The display can be adapted to prevailing conditions to make a change in the display from one measurement point to another easier to detect. This adaptation switches the analog display (instantaneous value) between scale values 10, 100 and 1000 and alters basic amplification for the headphones.



- 10 = high sensitivity,
high amplification
- 100 = medium sensitivity,
medium noise
amplification
- 1000 = low sensitivity,
low noise
amplification

Automatic adjustment takes place to maintain the ratio between the current delayed-action value and the instantaneous value.



- Press the microphone key.
The **AQUAPHON EW/ELW** is activated.



- Press the magnifying-glass key.
The sensitivity of the analog display is altered.

- The current sensitivity setting is shown above and to the right of the display.

5.3 Probe overview

5.3.1 Ground microphone BO-4



The ground microphone BO-4 is used to locate leaks beneath stabilised surfaces.

5.3.2 Ground microphone 3P-4



The ground microphone 3P-4 is used to locate leaks beneath unstabilised surfaces. An earth spike can be screwed onto it for use in soft ground. Its 3 feet guarantee stability at all times.

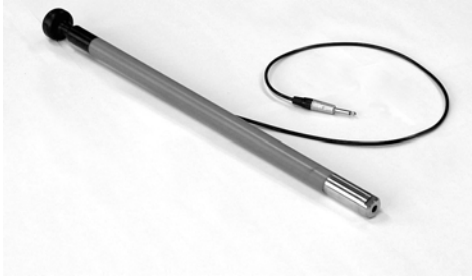
5.3.3 Carrying rod H-4



The carrying rod can be used with both ground microphones. The BO-4 or 3P-4 microphone is screwed onto the lower end of the carrying rod.

5 Water-leak detection (AQUAPHON EW/ELW)

5.3.4 Test rod T-4



The test rod is used for preliminary leak location. The test rod is placed in contact with valves on the line under investigation.

5.3.5 H-4 radio carrying rod



If you have an **AQUAPHON EW/ELW** with radio option, the H-4 radio carrying rod can be used for preliminary location. The BO-4 or 3P-4 microphone is screwed onto its lower end.

5.3.6 Test rod T-4 radio

If you have an **AQUAPHON EW/ELW** with radio option, the test rod T-4 radio can be used for location. The test rod is placed in contact with valves on the line under investigation.

5.4 Switching on and off



- Put the microphone jack-plug into socket 1 on the **AQUAPHON EW/ELW**.
- The **AQUAPHON EW/ELW** switches on.



- If the **AQUAPHON EW/ELW** does not switch on, press the on/off key.
- One of the following displays briefly appears in the display:



for test rod or



for ground microphone or

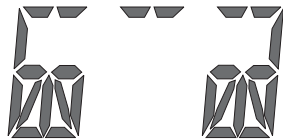


for other microphone types.

- To switch off, unplug the probe from socket 1.

5.5 Sound-protection function

The **AQUAPHON ELW/EW** incorporates a sound-protection function. With a sudden loud noise the sound in the headphones is immediately muffled, and if it gets even louder the headphones are switched off. Once this noise source has ceased the **AQUAPHON ELW/EW** reverts to normal operation. The sound-protection function ensures that no excessive sound pressure reaches the ears.



This headphones symbol appears in the comment line when the sound-protection function is activated.



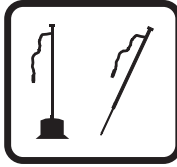
Caution! only Sewerin headphones should be used, as these are adjusted to the **AQUAPHON EW/ELW**. The threshold at which the sound-protection function is triggered can be adjusted: see section 5.9 „Individual adjustments“.

5.6 Preliminary location

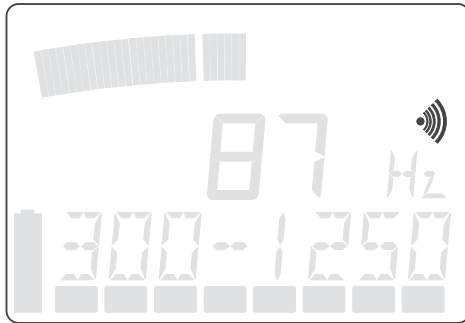
Structure-borne sound is transmitted a very long way by metallic pipes, which makes the test rod very effective for preliminary location.

- Connect the headphones to the **AQUAPHON ELW/EW**.
- Connect the test rod to the **AQUAPHON ELW/EW**.
- Place test rod on the first measurement point.

5 Water-leak detection (AQUAPHON EW/ELW)



- Activate the **AQUAPHON EW/ELW** with the gauntlet key or the microphone key .



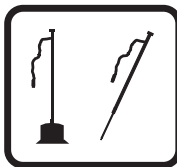
A speaker symbol appears in the display during measurement. The analog display indicates the current measured volume.

The noise can be heard by the headphones.

During this measurement the digital display indicates the smallest value measured.

The small digital display indicates the smallest value measured during the previous measurement. (For the first measurement this value is 0.)

During this measurement the smallest measured value is shown in the analog display in reverse video.



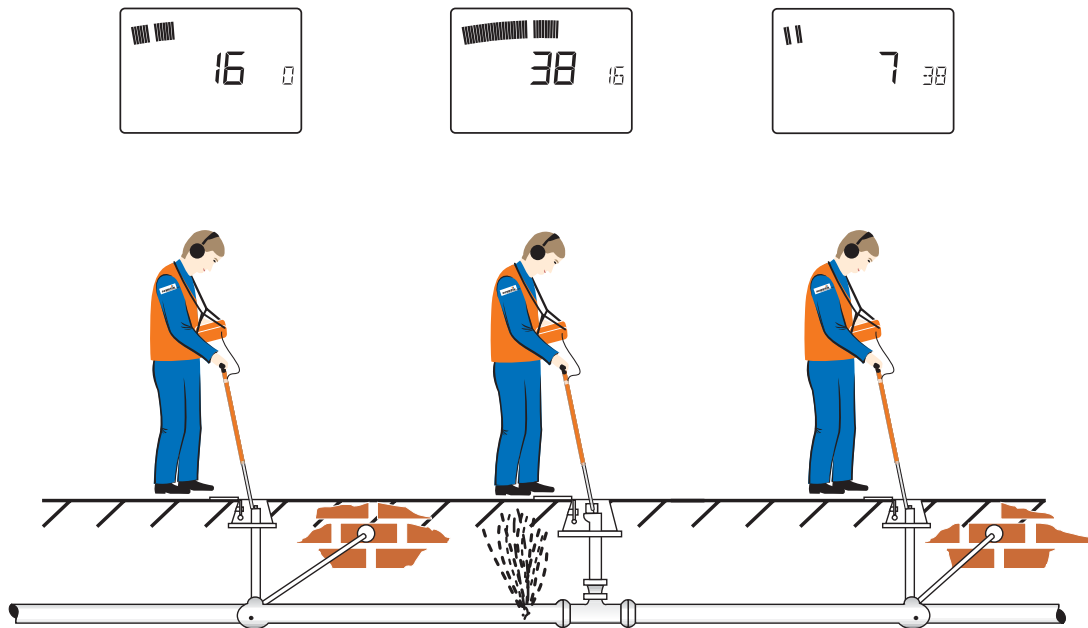
- To deactivate the **AQUAPHON EW/ELW** release the gauntlet key or press the microphone key again.

If the **AQUAPHON EW/ELW** is not deactivated when the gauntlet key is released, the function of the gauntlet key has been changed (see section 5.9). In this event press the gauntlet key again.

- Place the test rod on the next measurement point and proceed exactly as described above.

The previously-measured value appears now in the small digital display for the purposes of comparison.

5 Water-leak detection (AQUAPHON EW/ELW)



In water-leak detection the display will be similar to that shown in the illustration above.

The noise is loudest near the leak and quieter further away.

On the left: the analog display indicates about 30%: this is the **instantaneous noise value**.

However, the analog display often fluctuates substantially because of changing ambient noise. Even a trend can be hard to recognise. This is why the large digital display (figure 16) indicates the smallest noise value measured at this point so far (**the current delayed-action value**). Even if ambient noise grows louder, this display is unaffected - while if it grows quieter the display falls further.

The figure 16 is also shown in the analog display as a segment in reverse video.

The small digital display indicates "0": as yet there is no value in memory.

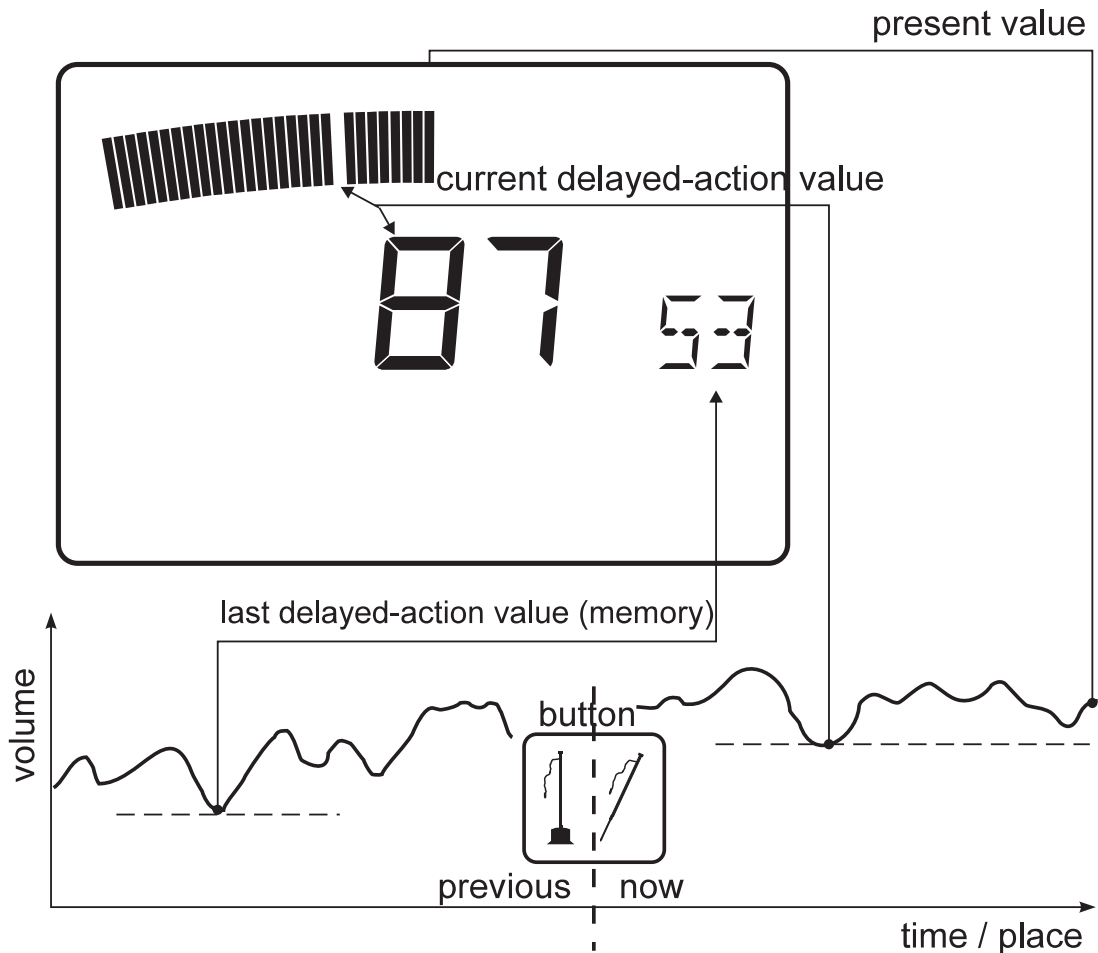
Centre: the analog display indicates about 60%. The large digital display (figure 38) indicates a value greater than the left-hand measurement point, which shows that the leak is closer.

The small digital display now indicates "16": it reminds you of the result from the last measurement point (**last delayed-action value**). This makes it easier to decide whether you have not yet reached the leak or have already gone past it.

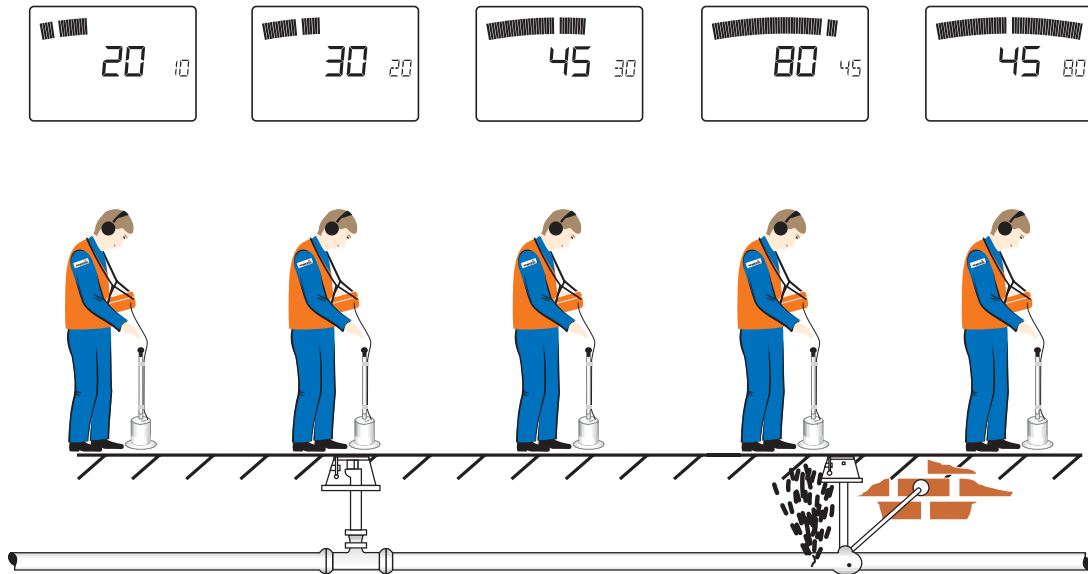
5 Water-leak detection (AQUAPHON EW/ELW)

Right: the current delayed-action value has fallen because the leak is further away. The last delayed-action value, “38”, provides us a further comparison.

The following illustration shows how a leak noise overlaid by fluctuating extraneous noise is shown in the display.



5.7 Precise location

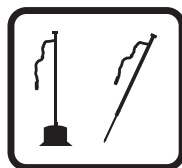


Non-metallic pipe materials do not transmit structure-borne sound as well, so checking at the valves is not enough. The sections between valves must also be checked with a ground microphone.

Listening to the surface of the ground at short intervals enables the leak to be located without digging. Here, too, the **AQUAPHON EW/ELW** provides a precise optical comparison of the noise intensities.

The above illustration, for example, shows how the display changes when passing a leak.

- Connect the ground microphone to the **AQUAPHON ELW/EW**.
- Place the microphone on the ground.
- Activate the **AQUAPHON EW/ELW** with the gauntlet key or the microphone key.



A speaker symbol appears in the display during measurement.

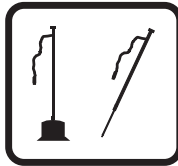
The analog display indicates the current measurement volume.

The current noise can be heard through the headphones.

The digital display indicates the smallest value measured.

The small digital display indicates the previously-measured value. For the first measurement this value is 0.

The smallest measured value is shown in the analog display in reverse video.



- To deactivate the **AQUAPHON EW/ELW** release the gauntlet key or press the microphone key again.

If the **AQUAPHON EW/ELW** is not deactivated when the gauntlet key is released, the function of the gauntlet key has been changed (see section 5.9). In this event press the gauntlet key again.

- Place the ground microphone on the next measurement point and proceed exactly as described above.

The previously-measured value now appears in the small digital display for the purposes of comparison.

- Use the ground microphone to check the area of the section where the leak is thought to be.

The illustration on the previous page shows an example of the display when crossing a leak.

5.8 Radio microphones

5.8.1 General

Instead of a cable connection, noise can be transmitted from the microphone to the **AQUAPHON ELW/EW** by radio. This requires the **AQUAPHON ELW/EW** to be fitted with a radio receiver, and a suitable radio microphone is also necessary. The H-4 radio carrying rod is screwed onto a BO-4 or ground microphone 3P-4. A test rod T-4 radio is required for preliminary location.

Technical notes

transmission range: about 10 m
transmission frequency: 50 Hz - 5 kHz

5.8.2 Using the radio microphone



- Switch the radio microphone on. The key on the radio microphone's knob switches it on and off. When the key is pushed in, the radio microphone is on.

After about 1 hour the radio microphone automatically switches off to avoid draining the batteries.

- Switch on the **AQUAPHON EW/ELW**.

The following messages appear successively in the display:

radio present



Warm-up time.

Display of set frequency range.



5 Water-leak detection (AQUAPHON EW/ELW)



Microphone type: test rod



Microphone type: ground microphone

The **AQUAPHON EW/ELW** is ready for use.



- To switch the **AQUAPHON EW/ELW** off, hold down the on/off key until the instrument switches off.
- Switch off the radio microphone.



NB

As the radio carrying and test rods take a certain period to adjust when switched on, it is advisable to leave them on and switch the **AQUAPHON EW/ELW** off instead.

5.8.3 Changing batteries

The radio carrying rod takes 3 standard or rechargeable batteries (Baby / C / LR14 / AM2). The radio microphone's operating time is about 16 hours with rechargeable batteries and about 70 hours with standard batteries.



- Unscrew the knob on the radio carrying rod.
- Remove the old batteries.
- Insert new batteries.
- Screw the knob back on.

5.8.4 Converting from radio to cable operation

The carrying rod for the radio microphones can be converted to function as a carrying rod without radio.

The radio carrying rod should be converted to cable operation if you encounter problems with radio reception on the **AQUAPHON EW/ELW**, for example in surroundings where there is serious interference from other transmitters.

- Unscrew the knob on the radio carrying rod.
- Remove the batteries.
- Screw the adapter into the radio carrying rod.

The radio carrying rod now acts like an ordinary carrying rod H4 (without radio).

5.8.5 Fault displays with radio microphones



Warming-up, please wait.

The noise does not become audible for about 10 seconds.



Radio microphone in operation.



(flashing)

No radio microphone detected.

e.g. the radio microphone is too far away or something is interfering with transmission



(flashing)

No control signal

poor radio link, extraneous transmitter



(flashing)

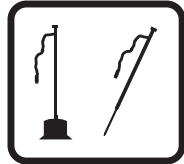
Batteries in radio microphone empty

The cell voltage of the batteries in the radio microphone is less than 1 V; they must be changed.

5.9 Individual settings

On the **AQUAPHON EW/ELW** various settings can be freely selected and permanently saved. The set-up table on the next page highlights the various possibilities.

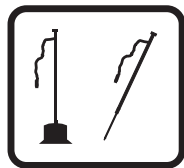
This is a list of settings that you can alter and save. First of all please switch-on the instrument.



- Hold down the microphone key.



- Press the on/off key.
„ELWset“ appears in the comment line.



- The microphone key calls the menu items one after another.



- The cursor-up key alters the status of the selected menu.
- After the last menu the „save“ message appears.



- The cursor-up key saves the current settings and terminates the function.



Notes

The sound-protection function should generally be set to „low threshold“ so that it will be triggered by medium-intensity noise. In situations where there is constant loud ambient noise the threshold can be set to condition (1) to prevent the sound-protection function from interfering with leak location by operating too often. For special cases the condition can be set to (2), when the sound-protection function is only triggered by very loud noises.

5 Water-leak detection (AQUAPHON EW/ELW)

Menu no.	description	condition (0)	condition (1)	condition (2)
1	the gauntlet key (item 1) is a key which <u>does</u> or <u>does not</u> stay down when pressed	does not *	does	/
2	quit tone on pressing button	on *	off	/
3	sound-protection function operates at	low threshold *	medium threshold	high threshold
4	basic amplification	low *	medium *	high
5	headphones switch off completely	yes *	no	/

(* = preset status)

ELW-Setup table

Example:

If the comment line contains „No 3 0“, the sound-protection function operates at the low threshold.

Basic amplification is useful for adapting to extreme situations. The higher the basic amplification, the louder the noise in the headphones at a given volume setting. Pressing the magnifying-glass key is a convenient way to alter basic amplification.

If you do not want the headphones to switch off completely when the sound-protection function is triggered by loud noises, only heavily muffled, select „switch off headphones completely: No“. This means that the user will not lose all ambient noise while using the hearing-protection headphones, for example in traffic.

5.10 Factory settings (reset)

The factory settings (e.g. filter settings) can be restored as follows.



- Plug in a microphone jack-plug while holding down the light key.
- „Reset“ appears in the bottom text line for about 2 seconds.

Serial numbers

FERROPHON EL	035 01
AQUAPHON ELW	036 01
AQUAPHON EW	037 01

Reception frequencies (FERROPHON EL and AQUAPHON ELW):

A=41666 Hz; B=9950 Hz; C=1100 Hz; 50/60Hz; 100 Hz; radio range 15-25 kHz

Transmission bandwidth (AQUAPHON EW/ELW):

50 - 10000 Hz

Filter, adjustable: steps of 50, 500 and 1000 Hz

Filter, minimum bandwidth: 300 Hz

Illuminated display: analog display and digital field-strength display
depth display [m]
positional display (arrows)

Power supply: built-in rechargeable battery
integral automatic charging/buffer system
rechargeable-battery status display
operating time about 8 hours

Type of protection in operation: IP 54 (spray-protected)

Weight: about 1.4 kg

Approximate dimensions (W x H x D): 12.5 x 18 x 6.5 cm

Temperature range: operation - 10 °C ... + 50 °C
storage - 25 °C ... + 70 °C

Accessories for pipeline location

Antenna A3

To determine position and depth

Generator G1

This high-powered transmitter (up to 50 W or 1 A) is designed for the location of water and gas pipes over large distances.

Generator G2

This low-powered transmitter (1 W or 100 mA) is designed for the location of well-insulated gas pipes and cables.

Step-voltage probe EL02

For locating insulation and cable faults.

AZ 5 cable clamps

Used for both transmission and reception with pipes and cables up to 50 mm in diameter.

AZ 9 cable clamps

Used for both transmission and reception with pipes and cables up to 90 mm in diameter.

Small search coil SK 3

Electro mains adapter ENA

Glass-fibre probe system

For locating non-metallic lines.

Accessories for water leak detection

Test rod T-4 with screw-on tip

Ground microphone BO-4

Sound-proofed against extraneous noise, especially suitable for stabilised surfaces.

Carrying rod H-4

For ground microphones 3P-4 and BO-4.

Ground microphone 3P-4

With tripod, for both stabilised and unstabilised surfaces, with screw-on 20-cm measuring spike.

Test rod extension 60 cm

Needed for listening to valves in shafts.

Valve adapter

Gate valve adapter

Piezo-microphone EM30

Especially suitable for use in buildings.

General accessories

Stereo headphones

Charging adapter HS

Case for the AQUAPHON ELW or FERROPHON EL

Foam inlet case with special transport protection, built-in compartments for accessories, in-case charging.

Plug-in AC/DC adapter

12 V or 24 V vehicle adapter

Carrying system „Triangel“ (adjustable padded neckstrap)

Carrying system „Cross Belt“

2 adjustable straps with diagonal attachment points. The straps cross over at the back for extra comfort.

8 Error messages

Error messages are displayed with an F and a number. Please contact Sewerin Service.

F 100 wrong probe

Konformitätserklärung / Declaration of Conformity

Gerätebezeichnung: <i>Type of Product:</i>	Tragbares Leitungssuchgerät portable battery operated pipe-locator	Tragbares Leitungs- und Wasserlecksuchgerät portable battery-operated pipe locator and water leak detector	Tragbares Wasserlecksuchgerät portable battery-operated water leak detector
Geräte-Typ: <i>Product Name:</i>	Ferrophon EL	Aquaphon ELW	Aquaphon EW
Fabrikations-Nr.: <i>Fabr.-No.:</i>	035 01 xxxx	036 01 xxxx	037 01 xxxx

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

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

Norm(en) / Norm(s):

DIN EN 50 081-2	EMV – Fachgrundnorm Störaussendung Generic Emission Standard
DIN EN 50 082-2	EMV – Fachgrundnorm Störfestigkeit Generic Immunity Standard

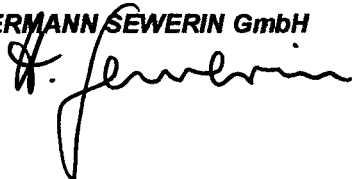
Fundstellen bzgl. EN 50 081/82 sind Amtsblätter der EG Nr. C 44/12 bzw. Nr. C 90/2
The Norms EN 50 081/82 are recorded in the Gazette of the EG No. C 44/12 and No. C90/2 resp.

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

89/336/EWG	EG-Richtlinie : Elektromagnetische Verträglichkeit EG-Directive: Electromagnetic Compatibility
92/31/EWG	Änderung dazu /amendment to above
93/68/EWG	Änderung dazu /amendment to above

Gütersloh, 21.03.2000

HERMANN SEWERIN GmbH



(Geschäftsführer / Managing Director)

Record of changes

Version

4.2 Water-leak detection

- **Display:** set to sensitivity ranges 1-10, 1-100, 1-1000, switch via magnifying-glass key
- **Factory settings:** sound protection functions only active at middle threshold. This threshold is active after renewed power-up.
- **Band filter acc. to micro type** (manually adjustable to 9950 Hz):
 - BO-4: 50 - 1500 Hz
 - T-4: 50 - 3000 Hz
 - EM30, M01: 50 - 9950 Hz
- **Pre-amplification** matched to micro-types

5.0 Water-leak detection

- **Radio mike** usable

Line location

- Receive range 50 Hz extended to 50-60 Hz
- Receive range 16 2/3 Hz removed
- Receive range PIG (21,5 Hz) for inserted for scraper location with FS20.
- Direct hearing of frequencies 50-60 Hz and 100 Hz possible. (Special variation)

General

- If the accu-voltage is lower than the accu-nominal voltage, the device is being recharged.
- The version number of the software is displayed on switch-on.

5.2 Water-leak detection

- Marker for system **COMBIPHON** (max level is stored)

Line location

- Re-work of maximum-difference-method for better suppression with external lines
- Loudspeaker with impulse signals for better audibility

General

- Version with battery power possible

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