SEWERIN
Technologies for leak detection.

AQUAPHON®

A 200 receiver

Operating Instructions

16.09.2019 a – 107378 – en

A 200 receiver

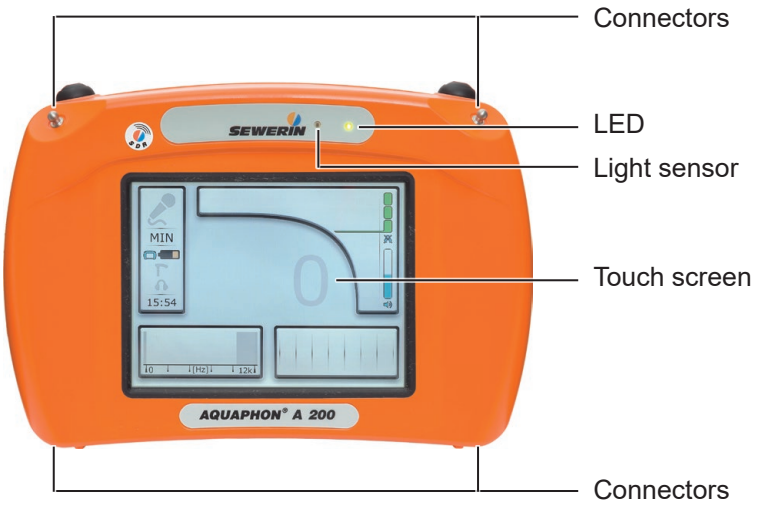

Fig. 1: Front

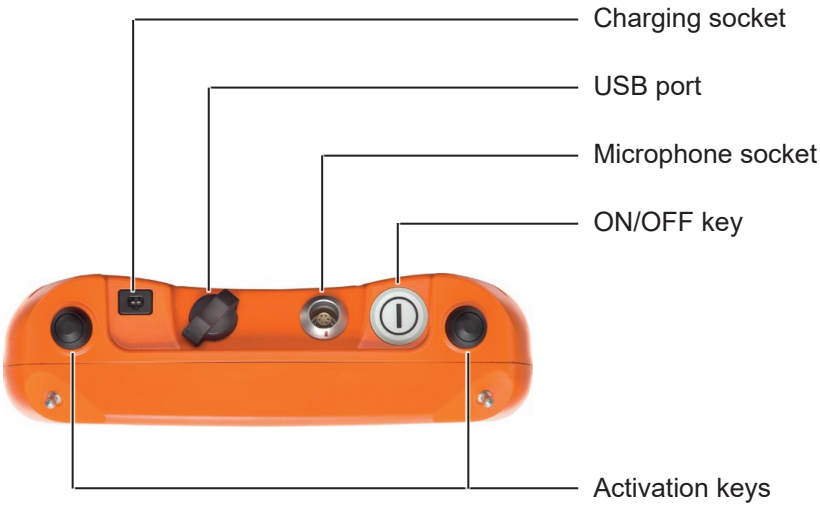

Fig. 2: View from above

TS 200 carrying rod

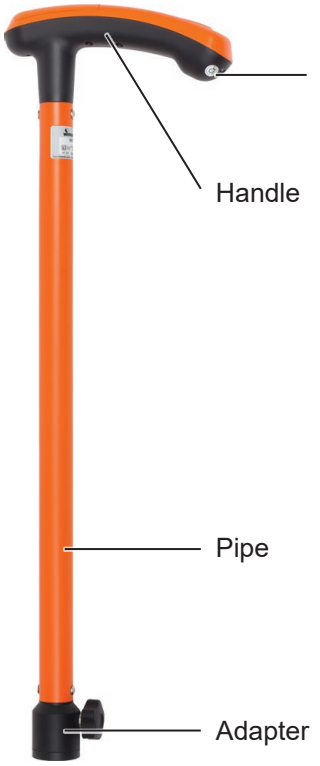

Fig. 3: Full view

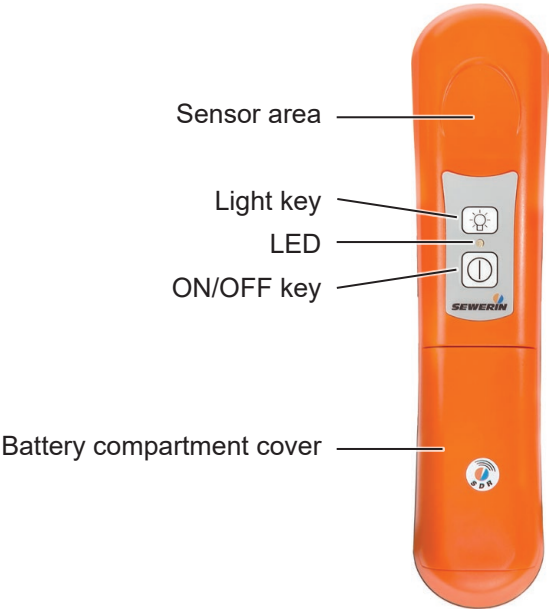

Fig. 4: Handle (view from above)

Fig. 5: Adapter
Left image: Fastening screw with seal
Right image: Star knob in fastening screw

Information about this document

The warnings and notes in this document mean the following:

WARNING!
Risk of personal injury. Could result in serious injury or death.

CAUTION!
Risk of personal injury. Could result in injury or pose a risk to health.

NOTICE!
Risk of damage to property.

Note:
Tips and important information.

Numbered lists (numbers, letters) are used for:

- Instructions that must be followed in a certain order

Lists with bullet points (point, dash) are used for:

- Lists
- Instructions that only involve one step

1 Introduction

1.1 Warranty

The following instructions must be complied with in order for any warranty to be applicable regarding functionality and safe operation of this equipment.

- Read these operating instructions prior to operating the product.
- Use the product only as intended.
- Repairs and maintenance must only be carried out by specialist technicians or other suitably trained personnel. Only spare parts approved by Hermann Sewerin GmbH may be used when performing repairs.
- Changes or modifications to this product may only be carried out with the approval of Hermann Sewerin GmbH.
- Use only Hermann Sewerin GmbH accessories for the product.

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

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

The manufacturer reserves the right to make technical changes.

1.2 Purpose

AQUAPHON is a system for the acoustic location of water leaks and water pipes.

The **AQUAPHON** system can be used for:

- Leak detection
- Pipe location

Note:
All descriptions in these operating instructions refer to the system as delivered (factory settings). The operating instructions apply to the **A 200** receiver with firmware version 2.x and higher. The manufacturer reserves the right to make changes.

1.3 Intended use

The **AQUAPHON** system is intended for professional industrial and commercial use. The appropriate specialist knowledge is required to operate the system.

Note:
If necessary, learn more about the principles of the technology before commencing practical work with the system.

The system must only be used for the applications specified in section 1.2.

1.4 General safety information

This product was manufactured in keeping with all binding legal and safety regulations. It corresponds to the state-of-the-art and conforms to EC requirements. The product is safe to operate when used in accordance with the instructions provided.

However, if you handle the product improperly or not as intended, the product may present a risk to persons and property. For this reason, observe the following safety information without fail.

Risk of personal injury (health risk)

- Handle the components carefully and safely both during transport and when working.
- Proceed with extreme caution in the vicinity of electrical lines.

Hazards for the product and other property

- Always handle the components carefully.
- Do not drop the components.
- Do not place the components in places where they are at risk of falling.
- Before starting work, check that the components are in good working order. Never use damaged or defective components.
- Ensure that no dirt or moisture gets into the connections on the components.
- Always observe the permitted operating and storage temperatures.

2 AQUAPHON system

2.1 General information about the system

2.1.1 Communication

The components of the **AQUAPHON** system communicate by bidirectional SDR (SDR: Sewerin Digital Radio). Wireless communication allows the user considerable freedom of movement. The sound quality of the acoustic playback is not affected by swinging cables.

2.1.2 Hearing protection

The **AQUAPHON** system protects the user's hearing against sudden, loud interference noise. This type of interference noise can occur, for example, when vehicles drive by or when the user with a touch microphone slips off the contact point.

The hearing protection function activates when the individual hearing protection threshold setting is exceeded. When the noise from the source of interference ceases, hearing protection switches off again automatically.

The way the hearing protection works depends on the settings (**Measurement** menu > **Hearing protection**).

Note:
Another way of protecting the hearing from loud noises is to set the volume only as high as is absolutely necessary.

2.1.3 Operating concept

Working with the **AQUAPHON** system requires specialist knowledge of leak and pipeline location. You do not, however, require any special skills to use the system itself, as it can guide you through the process.

To ensure successful location with the **AQUAPHON** system, all users must know:

- What is to be located?

  The purpose determines the choice of **application**.

- Where is it to be located?

  Conditions on the ground determine the choice of **contact point**.

2.1.3.1 Switch-on mode

The receiver always automatically determines the switch-on mode. There are two options:

- **Startup with user guide**
- **Direct startup**

The situation when the receiver is switched on determines which switch-on mode is used. The receiver checks whether or not certain steps have already been performed. These steps include:

- System components have been connected (e.g. carrying rod and a ground microphone).
- System components have already been switched on before the receiver.

For more detailed information about switching on dependent on switch-on mode, please refer to section 3.2 on page 21.

Startup with user guide

Target group: Users with little experience of using the system.
– The user is unsure of which system components to select for a certain application and the corresponding contact point.

The user first switches on the receiver. Once an application and the contact point have been selected, the receiver provides detailed instructions about which components are to be connected and switched on in what order.

Direct startup

Target group: Experienced users.
– The user knows which components of the system to select for a certain application and the corresponding contact point.

The user starts by selecting the suitable components. Components that need to be connected mechanically are connected by the user. The user then switches on the components before switching on the receiver last. The receiver automatically recognises the components as it is switched on.

With Direct startup, the system is ready to use as soon as the receiver is switched on.

2.1.3.2 Applications

The names of the applications correspond to their possible uses. The system can be used for:

- **Leak detection**
- **Pipe location**

2.1.3.3 Contact points

Each application allows the system to be used on certain contact points. The contact point is the area on which a microphone is placed.

The following contact points can be selected:

- **Paved**

  The contact point has a smooth, firm surface (e.g. asphalt, concrete, plaster).

- **Unpaved**

  The contact point has an uneven surface, which may sometimes give way (e.g. gravel, crushed stone, grass).

- **Fitting** (only for leak detection)

  The contact point is, for example, a hydrant or slide gate.

- **Universal** (only for leak detection)

  The contact point is located inside a building.

  This option is intended for locating leaks and pipes with the **UM 200** universal microphone.

2.2 System components

2.2.1 Overview

The **AQUAPHON** is a modular system. The main system components are as follows:

- **A 200** receiver
- **F8** wireless headphones
- **TS 200** carrying rod

  The carrying rod is required when using the following microphones:

  - **BM 200** ground microphone
  - **BM 230** ground microphone (with tripod)
  - **TM 200** touch microphone

    A probe tip and possibly an extension are required for the touch microphone.
- **UM 200** universal microphone
- **AC 200 SK4** case

  The system can be transported and stored in the case. The batteries for the components **A 200**, **TS 200** and **F8** can be simultaneously charged in the case using the AC/DC adapter **L**.

Accessories can be added to the system at any time.

Note:
Information about **F8** wireless headphones can be found in the relevant operating instructions.

2.2.2 A 200 receiver

2.2.2.1 Product variants

The receiver is available in two product variants:

- without module for position determination
- with module for position determination

Devices with position determination link the measurement data with the geographical coordinates (e.g. GPS) of the measuring location.

Receivers with position determination module are identified by a sticker.

2.2.2.2 Setup

Overviews with the names of all the parts of the receiver can be found inside the front cover (fig. 1 and fig. 2).

Its symmetrical housing means that it can be operated by both right-handed and left-handed users with ease.

Touch screen

The receiver features a touch screen. Certain areas of the touch screen are touch-sensitive. Actions are performed by touching these areas (buttons).

All of the buttons have a thick, dark grey outline.

Only your finger or a touch pen should be used to operate the touch screen.

- Always touch the buttons briefly without exerting too much pressure.

NOTICE! Risk of damage

The surface of the touch screen is sensitive.

- Do not use any hard or sharp objects (e.g. pens) to operate the screen.
- Protect the touch screen against aggressive substances (e.g. acidic or abrasive detergents).

Overviews with the symbols that might appear on the touch screen can be found in section 6.2 on page 70.

Light sensor

The light sensor analyses the ambient lighting conditions.

If the automatic brightness setting is enabled, the light sensor always adjusts the brightness of the touch screen to the ambient lighting conditions.

Information about the automatic brightness setting can be found in section 4.5.3 on page 54.

ON/OFF key

The ON/OFF key has the following functions:

- Switching the receiver on and off
- Locking and unlocking the display

Activation keys

The receiver has two activation keys. Only one of the two keys needs to be pressed to measure.

LED

The LED indicates the operating status.

Information about what the LED signals mean can be found in section 6.3.1 on page 72.

Ports

The receiver features the following ports:

- Charging socket

  For charging the rechargeable battery.
- Microphone socket

  For connecting the **UM 200** universal microphone.
- USB port

  For connecting to a computer.

Connectors

Carrying systems (**Vario**, lap belt), the **triangle 200** carrying strap or a hand loop can be attached to the connectors.

The connectors are parts of the quick-release fasteners.

2.2.2.3 Carrying the system

The receiver is usually carried in front of the body so that the user looks diagonally down at the touch screen.

SEWERIN recommends: Use a carrying system for locating operations. The carrying system prevents you from tiring during work. It also reduces the possibility of radio interference. Radio interference can occur if the user accidentally covers certain components in the receiver.

2.2.2.4 Playing back noises

The connected microphone records noises. When a measurement is ongoing, the noises are played back through the headphones. You can set the volume of the playback.

The noises are also recorded. Recorded noises can be saved. Both recorded and saved noises can be played back.

2.2.2.5 Displaying the measurement values

Various measurement values are calculated from the recorded noises (e.g. current noise level, extreme value of the measurement).

The measurement values can be displayed in two ways:

- Visually
- Numerically

Visual representation

The measurement values are displayed visually on the touch screen in the main view (volume button):

- Current noise level (level display)
- Extreme value (black line)

Numerical representation

The measurement value for the noise level is displayed as a numeric value in the centre of the main view on the touch screen.

This measurement value is an extreme value. Whether the extreme value is a minimum or maximum depends on the settings (**Measurement** menu > **Type**).

2.2.2.6 Automatic power off

The power supply to the receiver is designed in such a way that a fully charged battery will allow one full day's work without interruption. However, it is still recommended to conserve energy whilst working.

The receiver therefore offers the following automatic power-off options:

- **Switch off device**

  The receiver switches off if it is not operated for a specified period of time. It must be switched back on again when you want to continue work.

- **Switch off backlight**

  The receiver backlight switches off if it is not operated for a specified period of time. The receiver remains switched on.

If and when the automatic power off is activated depends on the settings (**Device** menu > **General** > **Switch off device** or **Switch off backlight**).

2.2.2.7 Main view

The touch screen of the receiver displays the main view when the system is ready for use.

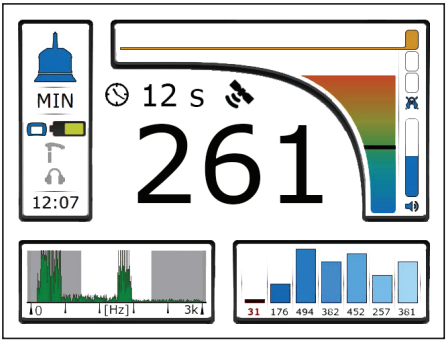

Fig. 6: Main view, *here:* during a measurement

The measurement value for the noise level is displayed in the centre of the main view. The duration of the current measurement and the symbol for satellite reception are displayed above it, if the

device is set accordingly. The values are black during a measurement. As soon as a measurement is finished, they appear grey.

The main view also contains the following buttons:

- **Volume**
- **Audio player**
- **Filter**
- **Settings**

These buttons can be used to open submenus. The buttons also display information. The information displayed depends on the situation.

Volume

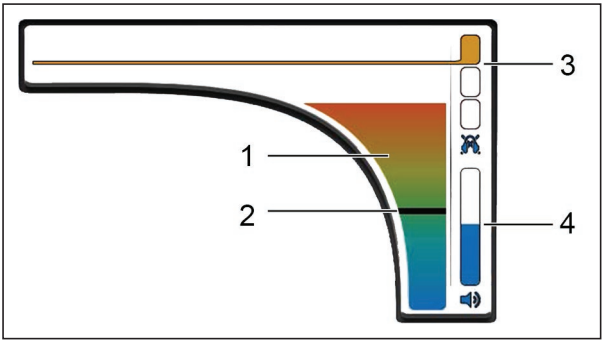

Fig. 7: **Volume** button
1 Current noise level, 2 Extreme value,
3 Hearing protection threshold, 4 Volume

The **Volume** button displays the following information:

- Current noise level
- Extreme value
- Hearing protection threshold setting
- Volume setting

The **Volume** menu is opened using the **Volume** button. The following settings can be made in this menu:

- Hearing protection threshold
- Volume

Audio player

The **Audio player** button displays the following information for the most recent measurements:

- Measurement value

  The measurement value is displayed as a numeric value and a bar.

Up to seven measurements are shown. The current measurement appears on the left and the oldest measurement on the far right.

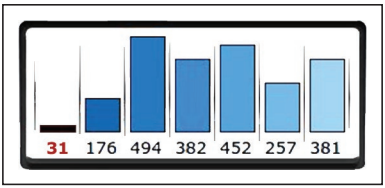

Fig. 8: **Audio player** button

The **Audio player** menu is opened using the **Audio player** button. The following actions can be performed in this menu:

- Play back, delete, save noise
- Load and play back noise from the memory
- Display information about a measurement

Filter

The Filter button displays the following information:

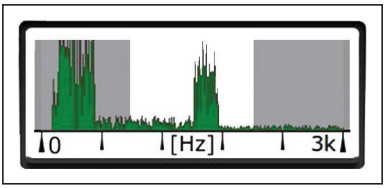

Fig. 9: **Filter** button during a measurement (frequency graph appears in green)

- Frequency graph of the current noise
  - − When there is no measurement ongoing:

    All frequencies are displayed. The frequency graph appears in light blue.

- During a measurement:

  Only the frequency components constantly available are displayed.

  The frequency graph appears in green.

- Frequency range
- Passband and stopbands (current filter limits)

The **Filter** menu is opened using the **Filter** button. The following settings can be made in this menu:

- Filter limits (limit frequencies of the bandpass)
- Scale for the frequency axis

Settings

The **Settings** button displays the following information:

- Application or connected microphone
- Set type of extreme value
- Connected components and information about the charge of the relevant batteries
- Time

The **Settings** menu is opened using the **Settings** button. The following settings can be made in this menu:

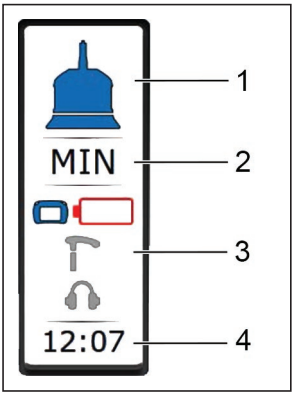

Fig. 10: **Settings** button
1 Application or microphone, 2 Type,
3 Components and charge of relevant batteries, 4 Time

- Measurement
- Application
- Device

For more detailed information on the **Settings** menu, please refer to section 4 on page 45.

2.2.3 TS 200 carrying rod

The **TS 200** carrying rod is for use with microphones **BM 200**, **BM 230** and **TM 200**. The selected microphone must be attached to the carrying rod.

Overviews with the names of all the parts of the carrying rod can be found inside the front cover (fig. 3 to fig. 5).

For more detailed information about the microphones, please refer to section 2.2.4 on page 16.

Safety information for using the TS 200

- Handle the carrying rod carefully and safely both during transport and when working.

  Be particularly careful when the touch microphone and probe tip are screwed onto the carrying rod.
- Do not lean on the carrying rod.

Star knob and fastening screw on the adapter

There is a star knob on the adapter. The star knob is fixed in a fastening screw.

The microphone is screwed onto to the carrying rod with the star knob. The star knob can be removed from the adapter if necessary.

Information on attaching microphones to the carrying rod can be found in section 3.1 on page 21. Please note in particular the warning.

Sensor area

A measurement can be started by touching the sensor area. The sensor area can be operated in two different modes. Information about the modes can be found in section 4.3.4 on page 49.

Note:
Instead of using the sensor area on the carrying rod to start a measurement, you can also press an activation key on the receiver. For more detailed advice on selecting a control, please refer to section 6.5 on page 75.

Do not touch the sensor area while switching on the carrying rod.

Light key

The light key on the carrying rod is used to switch the light source for the **TM 200** touch microphone on and off.

Note:
The light source of the **UM 200** universal microphone is switched on and off via the receiver. If the **UM 200** is connected to the receiver, a button with the **light source** symbol appears on the touch screen.

2.2.4 Microphones

2.2.4.1 Microphones depending on the application (overview)

The system can be fitted with various microphones. The application determines which microphone is used.

Microphone	Symbol	Connection to	Application	Contact point	Remark
Touch microphone **TM 200** 		**TS 200** carrying rod	Leak detection (prelocation)	Fitting	• Only ready for use when probe tip is screwed on • Extensions available for the probe tip • Integrated light source to illuminate the measuring point
Ground microphone **BM 200** 			Leak detection (pin pointing) Pipe location	Paved	
Ground microphone **BM 230** 				Unpaved Paved	• If ground is very soft, use extra spike • Orientation of tripod can be changed (180° rotation)
Universal microphone **UM 200** 		**A 200** receiver	Leak detection	Unpaved Paved Fitting Universal	• Connected to **A 200** with cable • Cable is permanently connected to **UM 200** • Integrated light source to illuminate the measuring point
			Pipe location	Unpaved Paved	

2.2.4.2 UM 200 universal microphone

The **UM 200** is a highly sensitive microphone for picking up structure-borne noise.

The **UM 200** is connected directly to the receiver with a cable.

Accessories can be attached to the **UM 200**. The right accessories can be used to secure the microphone at various measurement locations.

The microphone features a light source which can be used to illuminate the measurement location (torch function).

CAUTION! Risk of glare
The light source consists of two powerful LEDs.

- Do not look directly into the light.
- Never shine the light into the eyes of another person.

Contact adapter

The contact adapter is an accessory with which the microphone can be attached directly to the measuring point.

CAUTION!
The contact adapter contains a strong magnet.

- Keep the contact adapter away from magnetic storage media (e.g. hard drives, credit cards) and medical devices (e.g. pacemakers, insulin pumps).

The contact adapter is supplied with a short-circuit disc.

- Remove the short-circuit disc before using the contact adapter for the first time.

2.2.4.3 Other microphones

All microphones apart from **UM 200** are attached to the **TS 200** carrying rod. The carrying rod is connected to the receiver.

2.3 Switching on and off

2.3.1 Components

Each of the following components features a dedicated on/off button:

- **A 200** receiver
- **TS 200** carrying rod
- **F8** wireless headphones

The components can be switched on and off independently using the on/off key.

Microphones are not switched on or off.

2.3.2 System

Switching on

When the system is turned on, the order in which the individual components are switched on determines the so-called switch-on mode.

If you want the system to start in a specific switch-on mode, you have to switch on the components in a certain order.

When the system is switched on, a radio connection is established between the components of the system. (Applies to all components that are not connected by cables.)

For more detailed information on switch-on mode, please refer to section 2.1.3.1 on page 5.

For more detailed information on switching on the system, please refer to section 3.2 on page 21.

Switching off

When the receiver is switched off, the carrying rod and headphones also switch off automatically.

2.4 Power supply to the components

The following components are powered by a special, inbuilt rechargeable lithium-ion battery.

- **A 200** receiver
- **TS 200** carrying rod

The **F8** wireless headphones come with a rechargeable NiMh battery.

For information on charging the batteries, please refer to section 5.1 on page 57.

NOTICE! Risk of damage when changing lithium-ion batteries

The battery compartments of the components contain parts that could get damaged when the batteries are being replaced.

- Only SEWERIN service personnel or other authorised specialists may replace rechargeable lithium-ion batteries.

WARNING! Risk of explosion due to short-circuit

Faulty lithium-ion rechargeable batteries can explode due to internal short-circuit.

- Components containing a faulty lithium-ion battery must not be shipped.

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3 Using the system

3.1 Attaching the microphone to the carrying rod

The carrying rod and microphone are neatly connected to each other.

NOTICE! Risk of malfunctions caused by dirt or water seepage

Moisture and dirty contacts can impair the system's functionality. The microphone connection must be clean and dry for attachment.

The seal of the fastening screw must not be dirty or damaged, otherwise water could get in through the thread.

- If dirty, clean the contacts on the carrying rod adapter with a damp cloth. Never use compressed air or a water jet for cleaning. (Microphones can be rinsed under running water.)
- Dry the entire microphone connector if necessary.
- Never unscrew the fastening screw all the way out of the thread to minimise the risk of getting dirty.

---

1. Push the microphone into the carrying rod adapter.
2. Turn the carrying rod until it clicks into the stop.

   The carrying rod and microphone are neatly connected to each other.
3. Tighten the microphone using the star knob.

   The carrying rod is ready for use.

3.2 Switching on the system

If you want the system to start in a specific switch-on mode, you have to switch on the components in a certain order.

If the components are switched on in any order, the receiver selects the appropriate switch-on mode.

Information about the switch-on mode can be found in section 2.1.3.1 on page 5.

Note:
When switching on the **A 200** receiver, the on/off key must be held down until the LED lights up green. This can take a few seconds.

3.2.1 Startup with user guide

Starting with the user guide works from the following starting point:

- All components are switched off.
- A microphone has not yet been selected or connected.

1. Switch the **A 200** receiver on.

   A start screen appears briefly on the touch screen. The **Application** menu will then appear.

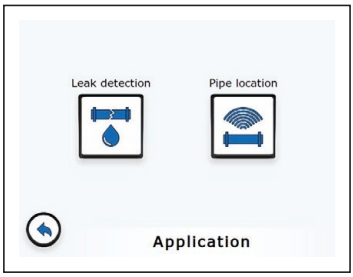

Fig. 11: **Application** menu

2. Select the desired application. The menu for the respective application appears.

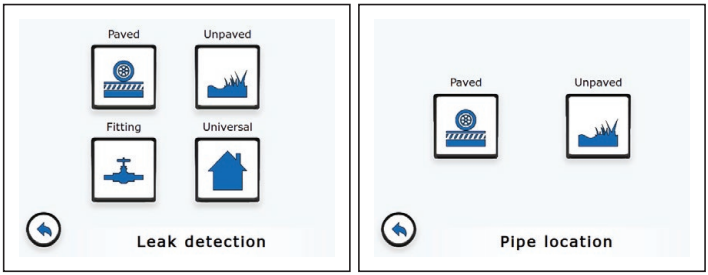

Fig. 12: Left image: **Leak detection** menu
Right image: **Pipe location** menu

3. Select the contact point according to the conditions at the measuring point. The **Searching** menu appears.

   This menu contains instructions. The symbols of the corresponding components are shown in grey beside each step.

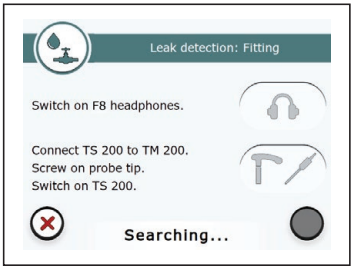

Fig. 13: **Searching** menu
Application: leak detection, contact point: Fitting

4. Follow the instructions in the specified order.

   As soon as a step is complete, the corresponding symbols appear in colour.

   - **Blue**

     The specified component has been connected.

   - **Red**

     A different component than that specified has been connected.

   Once all the specified components have been connected, the receiver automatically switches to the main view.

   If components other than those specified have been connected, the receiver will indicate this (red symbol or **Microphone**

unknown symbol. The switch-on process can be completed manually or cancelled.

- Tap **Confirm** if you want to complete the switch-on process manually.

3.2.2 Direct startup

With Direct startup, the receiver automatically recognises the connected components.

Direct startup works from the following starting point:

- An appropriate microphone has been selected. The microphone is connected:
  - Microphones **BM 200**, **BM 230** or **TM 200** to **TS 200** carrying rod
  - Universal microphone **UM 200** to receiver **A 200**
- All components are switched off.

1. Switch on carrying rod **TS 200**.

Note:
Do not touch the sensor area of the carrying rod when switching it on.

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2. Switch on the **F8** wireless headphones.
3. Switch the **A 200** receiver on.

   The start screen appears briefly on the touch screen.

   The main view appears. The system is ready for use.

3.3 Naming measurements

Data belonging to a measurement includes:

- Noise recorded
- Calculated measurement value
- Information recorded (e.g. volume setting, filter limits, connected microphone)

Each measurement is named with the date and time of the recording.

When saving a measurement you can store optional additional information (e.g. a comment).

In order to compare measurements, they should be taken in the same conditions where possible. The following factors affect comparability:

- Environmental noise
- Selected filter limits
- Recording time

3.4 Starting and ending a measurement

To start and end a measurement you must use either:

- Activation key on **A 200** receiver
- Sensor area on **TS 200** carrying rod

More detailed advice on which controls are best suited to which microphone can be found in section 6.4 on page 74.

The easiest way to tell whether or not a measurement is being taken is by looking at the main view. A measurement value is displayed during a measurement (black figure).

3.5 Adjusting the hearing protection threshold and volume

CAUTION! Health hazard
Excessive noise can damage hearing and lead to irreversible damage to health.
This risk applies to both sudden loud sound interference and the volume being set too high.

- Always adjust the hearing protection threshold and volume to the current situation.
- Set the hearing protection threshold as low as possible.
- Choose as low a volume as possible.

The hearing protection threshold and volume are set in the **Volume** menu.

The main view is open.

1. Tap the **Volume** button. The **Volume** menu appears.

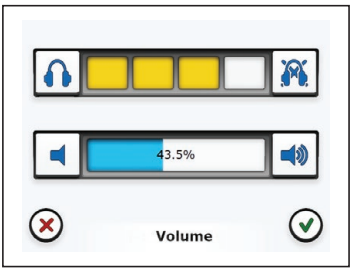


Fig. 14: **Volume** menu
Top: Hearing protection threshold (set: level 3)
Bottom: Volume (set: mid volume)

2. Please set:
   - Hearing protection threshold
     - volume limit, which if exceeded, activates hearing-protection
     - adjustable in four levels

Level	Hearing protection threshold	Protective effect	Display colour
1	very high	low	red
2	high	medium	orange
3	medium	high	yellow
4	low	very high	green

CAUTION! Health hazard
If the hearing protection threshold is set very high, the hearing protection will only activate in the case of very loud noises. This means that there is little protection for the hearing.
- Set the hearing protection threshold as low as possible to ensure optimal protection for your hearing.

   - Volume
     - determines the playback of noise via headphones
     - infinitely adjustable

To set the volume, tap either on the symbols or the area in between the symbols.

3. Apply the settings by pressing **Confirm**. The receiver will switch back to the main view.

   The settings are stored until they are next adjusted.

3.6 Adjusting the filter settings

3.6.1 Notes on the filter settings

The receiver analyses the frequencies of the noise. This frequency analysis is displayed in a graph.

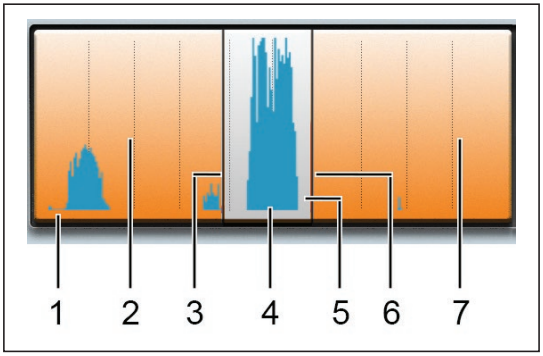


Fig. 15: Frequency graph
1 Frequency axis, 2 Lower stopband,
3 Lower filter limit, 4 Graph of frequency analysis,
5 Passband, 6 Upper filter limit, 7 Top stopband

3.6.1.1 Filter limits and stopband

The two filter limits determine the position and width of the stopband within the frequency range. The passband always has a minimum width. The minimum width depends on the frequency range.

Frequency range	Minimum width of passband
0 – 5 kHz	300 Hz
5 – 12 kHz	500 Hz

3.6.1.2 Default settings for every application

Each application has its own default settings for:

- Position of the two filter limits
- Scale for the frequency axis

If the system is started with the user guide, the default settings are automatically preset.

If the system is started directly, the settings that applied the last time the system was switched off will apply.

SEWERIN recommends: Adjust the filter settings to the locating situation after switching on the system.

3.6.1.3 Purpose of adjustment

The filter limits should be set in such a way that any leak noise is accentuated above other noises (e.g. sound interference) and is thus clearly audible.

The filter limits are at the optimal setting when:

- The passband contains the widest and greatest maximum possible of the frequency analysis.The position and width of the passband is selected so that single, very narrow and acute maximums lie within one stopband where possible.

3.6.1.4 Adjustment options

You can adjust the filter settings in the following ways:

- Scanning
- Manually adjusting filters
- Scaling the display
- Resetting filter settings

3.6.1.5 Display of adjusted filter settings in the main view

The main view shows whether or not filter settings have been adjusted. If the filter settings have been adjusted, the **Settings** button will show the symbol for the connected microphone instead of the symbol for the application.

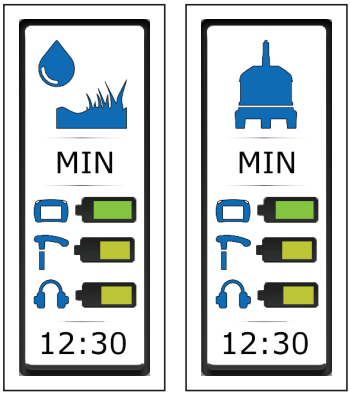


Fig. 16: **Settings** button in the main view
Left image: View for default settings (shows the application)
Right image: View for adjusted filter settings (shows the microphone)

3.6.2 Opening the Filter menu

Note:
Noise can always be heard in the **Filter** menu, even when there is no measurement underway. This allows you to directly check how the filter setting adjustment has affected the noise to be heard.

The main view is open.

- Tap the **Filter** button. The **Filter** menu appears.

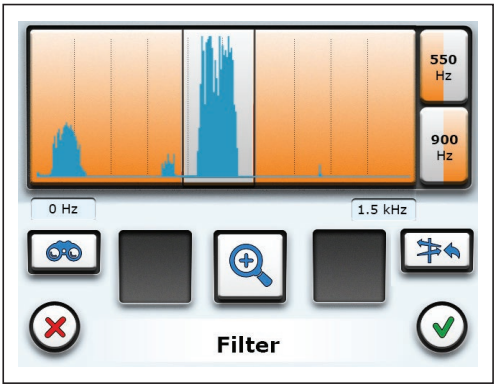


Fig. 17: **Filter** menu, **Quick adjustment** view
Top: Frequency graph
Right: **Upper filter limit**, **Lower filter limit** buttons
Centre: **Scan**, **Scale**, **Reset** buttons

The current values of the filter limits are displayed on the **Upper filter limit** and **Lower filter limit** buttons.

Applying filter settings

Once the filter settings have been adjusted, the settings need to be applied.

The **Filter** menu is open.

- Tap **Confirm**. The filter settings will now be applied. The receiver will switch back to the main view.

The receiver works with the current filter settings until they are next adjusted.

3.6.3 Scanning

The scanning function is used to suggest filter settings suitable for the current location scenario. These can be applied to the measurement or further manually adjusted.

During scanning the receiver checks which parts of the incoming noise have the greatest output. Sound interference is not excluded.

Scanning always takes place over the maximum available frequency range, not just over the frequency range displayed.

The **Filter** menu is open.

1. Tap the **Scan** button. The scanning process starts. The **Scan** menu opens. The frequency graph appears in green. The progress display shows the progression of the scanning process.

   Once the scanning process is complete, the **Confirm** button appears. The frequency graph appears again in blue. The receiver suggests suitable filter settings.
2. Confirm the filter settings with **Confirm**. The receiver will return to the **Filter** menu.
3. If necessary optimise the filter settings.

   The options are:

   - Manually adjusting filters
   - Scaling the display

3.6.4 Manually adjusting filters

There are two ways of manually adjusting the filter limits:

- Quick adjustment
- Exact adjustment

3.6.4.1 Adjusting filter limits quickly

A quick adjustment involves resetting both filter limits.

Where the filter limit is set depends on where in the frequency graph you are typing.

The **Filter** menu is open.

1. Tap in the frequency graph to set the lower filter limit.
2. Tap to the right of the lower filter limit to set the upper filter limit.
3. Repeat the two previous steps if you want to correct the filter limits.
4. Apply the settings by pressing **Confirm**. The receiver will switch back to the main view.

3.6.4.2 Adjusting filter limits precisely

With precise adjustment, the lower and upper filter limits are changed independently of each other in fixed increments.

The increment depends on the frequency range.

Frequency range	Increment
0 – 1 kHz	50 Hz
1 – 2.5 kHz	100 Hz
2.5 – 5 kHz	250 Hz
5 – 12 kHz	500 Hz

The **Filter** menu is open.

1. Tap one of the buttons **Lower filter limit** or **Upper filter limit**.

   The **Filter** menu changes its appearance. The filter limit stop range that can be adjusted is displayed in orange.
2. Reset the selected filter limit. Tap on one of the **Move** buttons until the desired position is reached.
3. Apply the filter limit with **Confirm**.

Note:
You cannot move the filter limits below the minimum width of the passband.

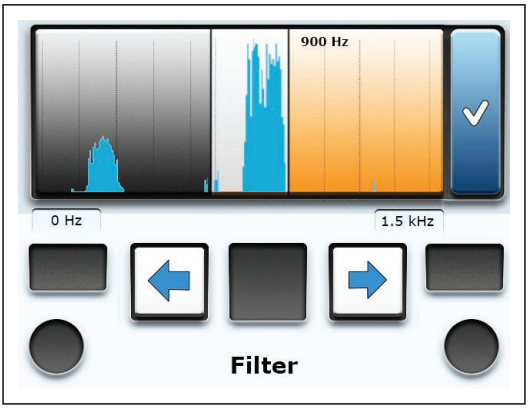


Fig. 18: **Filter** menu, **Precise adjustment** view
Top: Frequency graph with active upper stopband and display of the current filter limit
Bottom: **Move** button

3.6.5 Scaling the display

Scaling changes the reproduction scale of the frequency axis. Each scaling halves the displayed frequency range. As a result the display doubles in size.

The receiver rolls through the scale. Once the smallest possible level has been reached, the largest level is displayed again. The levels correspond to the frequency ranges in the table below.

Note:
Whether and to what extent scaling is possible depends on the position of the filter limits.

- Scaling is only possible if the upper filter limit is set at or below half of the frequency range.

Frequency range (scaling levels)	Display scalable if upper filter limit …
0 – 12 kHz	≤ 6 kHz
0 – 6 kHz	≤ 3 kHz
0 – 3 kHz	≤ 1.5 KHz
0 – 1.5 kHz	≤ 750 Hz
0 – 750 Hz	≤ 375 Hz

The **Filter** menu is open.

- Tap the **Scale** button. The display is scaled immediately.
- Repeat the scaling process until you achieve the best display of the frequency axis.

3.6.6 Resetting filter settings

The filter settings can be reset to the default settings of the current application at any time.

The **Filter** menu is open.

- Tap the **Reset** button. The filter settings are reset immediately without further prompting.

3.7 Playing back noise repeatedly

Noises can be played back repeatedly using the audio player.

The following noises can be played back:

- Recorded noises

  Recorded noises are displayed in the measurement value selection.

- Saved noises

  Saved noises have to be loaded from the memory into the measurement value selection.

3.7.1 Opening the Audio Player menu

Note:
Most of the audio player functions only become available when at least one measurement has been recorded. Alternatively, you can also load a measurement from the memory.

The main view is open.

- Tap the **Audio player** button. The **Audio player** menu appears.

The **Audio player** menu is divided into two views. View **Audio player 1/2** contains the functions for saving, playing back and deleting measurements. View **Audio player 2/2** shows information about a measurement.

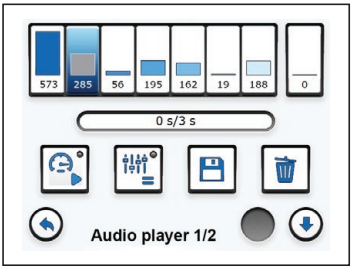


Fig. 19: **Audio player 1/2** menu
Top: Measurement value selection (selected measurement inverted)
Centre: Duration of selected measurement
Bottom: **Speed**, **Filter settings**, **Save**, **Delete** buttons

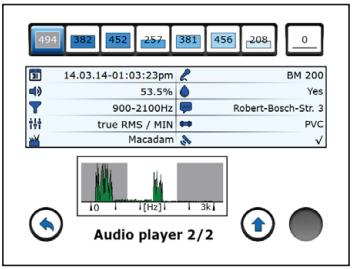


Fig. 20: **Audio player 2/2** menu
Top: Measurement value selection
Below: Information about the selected measurement including frequency graph

Measurement value selection

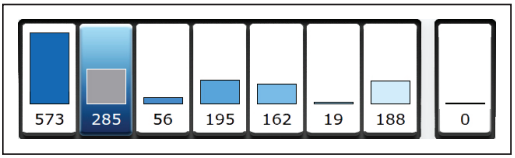


Fig. 21: Measurement value selection in **Audio player 1/2**
Left: 7 connected segments for up to 7 recorded measurements
Right: 1 separate segment for 1 saved measurement

The measurement value selection represents measurements by their measurement value (numeric value and bar).

The measurement value selection is divided into the following two areas:

- 7 connected segments for up to 7 recorded measurements
  - The current measurement is displayed on the left. The oldest measurement is shown on the right.
  - If fewer than 7 measurements have been recorded, the empty segments are grey.
  - The display of the selected measurement is inverted.
- 1 separate segment for loading and playing back a saved measurement
  - The saved measurement is displayed after it has been loaded.

Note:
When the receiver is switched off, the measurement value selection is totally cleared. Measurements that have not been saved are deleted.

3.7.2 Playing back noise

Note:
If the radio connection between the receiver and headphones is interrupted, noise cannot be played back.

- Tap **Back** to switch from the audio player to the main view. Then open the audio player again.

You can play back a noise in the following ways:

- With recorded filter limits
- With current filter limits
- Faster than recorded

Note:
You cannot adjust the volume during playback of a recorded noise.

3.7.2.1 Playing back noise with recorded filter limits

The filter limits set during a measurement are automatically recorded too. The noise can be played back after the measurement with these recorded filter limits.

The **Audio player 1/2** menu is open.

- Tap the measurement you want to play back in the measurement value selection. The noise will be played back with the recorded filter settings.

3.7.2.2 Playing back noise with current filter limits

Measurements that have been taken with different filter settings can be compared with each other by playing them back with identical filter settings. The current filter limits can be used as identical filter settings.

The **Audio player 1/2** menu is open.

1. Tap the **Filter settings** button. Playback mode changes. The dot on the **Filter settings** button turns red.
2. Tap the measurement you want to play back in the measurement value selection. The noise is played back with the current filter settings.

Disable playback mode when it is no longer required.

- To do this, tap the **Filter settings** button again. The dot on the **Filter settings** button turns grey again.

3.7.2.3 Playing back noise faster

If a noise contains a lot of low frequencies, it is often hard to hear. Audibility usually improves if this type of noise is played back faster. Playing it back faster creates the effect of a higher frequency.

Note:
Playing back a noise faster disables the recorded filter settings. The noise is played back over the maximum frequency range (0 – 12 kHz).

The **Audio player 1/2** menu is open.

1. Tap the **Speed** button. Playback mode changes. The dot on the **Speed** button turns red.
2. Tap the measurement you want to play back in the measurement value selection. The noise is played back faster than it was recorded.

Disable playback mode when it is no longer required.

- To do this, tap the **Speed** button again. The dot on the **Speed** button turns grey again.

3.8 Saving recorded measurements

Recorded measurements can be saved. Over 70 measurements can be saved.

Measurements lasting up to 60 seconds are saved in full. If the measurement is longer, only the first 60 seconds are saved.

A message will appear when the memory is full. Measurements can be deleted from the memory to free up space. For information about deleting saved measurements, please refer to section 3.11 on page 41.

Note:
Measurements that are not saved are automatically deleted when the receiver is switched off.

SEWERIN recommends: Save measurements that contain a lot of information. In this way, you can create a database to compare noises.

The **Audio player 1/2** menu is open.

1. Tap the measurement you want to save in the measurement value selection.
2. Tap the **Save** button. The **Save noise** menu appears.
3. Measurements can be saved with or without additional information.
   - Tap **Confirm** to save the measurement without additional information.

   OR

   a) First add the relevant additional information to the measurement.
      - Additional information about the **surface**, **pipe material** and **suspected leak** is selected from lists.
      - Free text can be entered under **Comment**. The comment can be up to a maximum of 25 characters long.

− If several measurements are saved one after the other and the receiver is not switched off in between:

The additional information from the previous measurement can be applied to the following measurement. To do this tap on **Use last data**. The applied data can be edited.

b) Finally tap on **Confirm** to save the measurement with the additional information.

Adding to or editing additional information

Each measurement is only saved once. As long as a measurement is displayed as a recorded measurement in the measurement value selection, however, you can add to or edit the additional information about this measurement.

- Save the recorded noise again. and in doing so add the relevant additional information. Previous additional information is overwritten.

3.9 Deleting the recorded measurement

Recorded measurements can be deleted individually.

The **Audio player 1/2** menu is open.

1. Tap the measurement you want to delete in the measurement value selection.
2. Tap the **Clear** button. The measurement will be deleted immediately without further prompting.

For information about deleting saved measurements, please refer to section 3.11 on page 41.

3.10 Loading a saved measurement

Saved measurements can be loaded from the memory. The noise from loaded measurements can be played back repeatedly. Information about the measurement can also be displayed.

Note:
Only one measurement can be loaded at a time.

The **Audio player 1/2** menu is open.

1. Tap the separate segment on the right in the measurement value selection. The **Open** button appears.

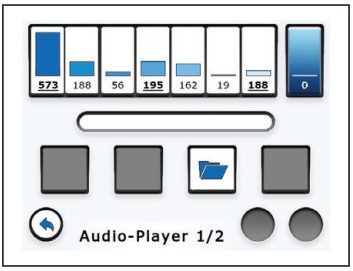


Fig. 22: **Audio player** menu, view 1/2
Top right: The separate segment for loading a measurement is selected. The segment is inverted.

2. Tap the **Open** button. The **Load noise** menu appears.

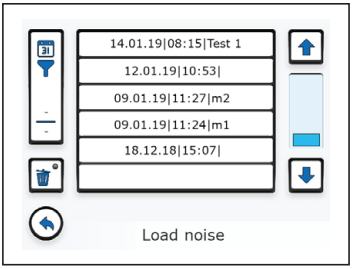


Fig. 23: **Load noise** menu
Top left: **Filter by date** button
Centre: List of saved measurements

3. Tap the relevant measurement in the list. The measurement immediately appears in the **Audio player 1/2** view.

Filtering saved measurements

Filters can be used to search for specific measurements in the list of saved measurements.

The following filters are available:

- Year
- Year and month

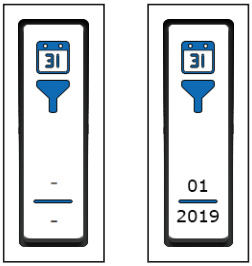


Fig. 24: **Filter by date** button
Left image: No filter set
Right image: Filter set (2019 as year, 01 (January) as month)

The **Load noise** menu is open.

1. Tap the **Filter by date** button on the top left. The **Filter by date** menu will appear.
2. Set the values for the filters.
   - Left field: Year, right field: month
   - The **Any** value means that no filter is set.
   - Only values that have been saved for the data can be selected as filter criteria.

     Example:

     Measurements were saved in 2017 and 2019. No measurements were saved in 2018. The filter criteria available for selection are: Any, 2017, 2019.
3. Apply the filters by pressing **Confirm**. The receiver returns to the **Load noise** menu.

   The list shows all the measurements that meet the filter criteria. The filters set are displayed on the **Filter by date** button.

3.11 Deleting a saved measurement

Saved measurements can be deleted individually. To do this delete mode needs to be enabled.

NOTICE! Risk of data loss
In delete mode, measurements are deleted immediately without further prompting.
- Work with extreme care in delete mode.

The **Audio player 1/2** menu is open.

1. Tap the separate segment on the right in the measurement value selection. The **Open** button appears.
2. Tap the **Open** button. The **Load noise** menu appears.
3. Tap the **Clear** button. Delete mode is enabled. The dot on the **Clear** button turns red. The measurements in the list appear in red.
4. Tap the measurement you want to delete in the list. The measurement will be deleted immediately without further prompting.
5. Finally, disable delete mode.
   - To do this, tap the **Clear** button again. Delete mode is disabled. The dot on the **Clear** button turns grey again. The measurements in the list appear in black.

   OR

   - Tap **Back**.

You can find information on deleting recorded measurements in section 3.9 on page 39.

3.12 Displaying information about a measurement

You can display the information belonging to a measurement. Information cannot be edited.

The **Audio player 1/2** menu is open.

1. Tap on the relevant measurement in the measurement value selection.
2. Tap **Scroll**. The **Audio player 2/2** view appears. The available information about the selected measurement is displayed.

The following information is always displayed:


Date, time


Volume


Filter limits


Measuring method


Surface

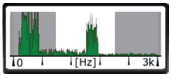

Connected microphone


Suspected leak


Comment


Pipe material


Satellite reception



Frequency graph of noise with filter limits

3.13 Locking and unlocking the display

The display can be locked against unintentional operation.

Note:
If the display is locked during a measurement, the measurement is terminated and not saved.

Locking

1. Briefly press the ON/OFF key. The receiver switches to the **Switching off** menu for 3 seconds.
2. Tap **Lock display**. The display switches off immediately.

Unlocking

- Briefly press the ON/OFF key again. The receiver displays the **Switching off** menu. The display changes to the last view shown after 3 seconds.

4 Settings

4.1 Overview

All settings are managed using the **A 200** receiver. The settings can be changed at any time. The following menus are available:

- **Measurement**

  The settings affect the system.

- **Application**

  The application can be set via the menu.

- **Device**

  The settings only affect the receiver.

4.2 Setting actions

The settings in the **Measurement** and **Device** menus are implemented as follows:

- Select
- Enable/disable
- Set value

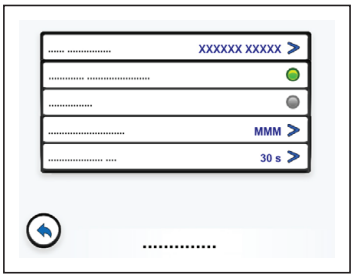


Fig. 25: Menu (sample diagram)
Very top: Menu item with selected settings
Below: Menu items with enabled/disabled settings
Bottom: Menu items with set values

Menu items in which settings can be selected or values set are indicated by the **next** symbol.

Menu items in which settings can be enabled/disabled are marked with a check box (dot).

4.2.1 Selecting

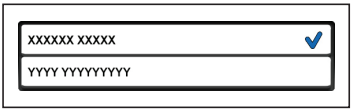


Fig. 26: Selecting a setting (sample diagram)
Top: Setting selected
Bottom: Setting not selected

Selected settings are indicated by the **tick** symbol.

1. In one of the menus, tap on the menu item for which you wish to change the setting.

   A sub-menu will appear.

2. Tap the relevant setting.

   The setting is applied immediately without further confirmation. The receiver goes back up a menu level.

   The selected setting is displayed in the higher menu level.

4.2.2 Enabling/disabling

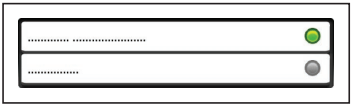


Fig. 27: Enabling/disabling a setting (sample diagram)
Top: Setting enabled
Bottom: Setting disabled

Enabled settings are indicated by a green check box. Disabled settings have a grey check box.

- In one of the menus, tap on the menu item you wish to enable or disable.

  The setting is applied and displayed immediately without further confirmation.

4.2.3 Setting a value

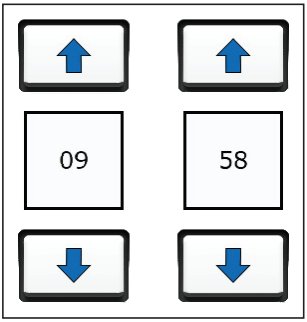


Fig. 28: Setting a value (sample diagram)

Values are set using the arrow keys.

1. Tap an arrow key.
   - The up key increases the value.
   - The down key decreases the value.
2. Apply the settings by pressing **Confirm**.
   The receiver goes back up a menu level.

4.3 Settings in the Measurement menu

Note:
The settings in the **Measurement** menu affect the system.

The main view is open.

1. Tap the **Settings** button. The **Settings** menu appears.
2. Tap the **Measurement** button. The **Measurement** menu appears.

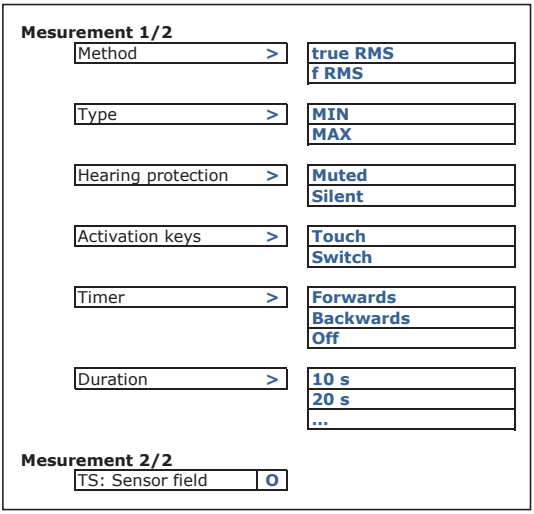


Fig. 29: **Measurement** menu

3. Adjust the settings as required.

   The settings options are explained in the next sections.

4. Finally, tap **Back**. The **Settings** menu appears.
5. Tap **Back** again to return to the main view.

4.3.1 Method

The average noise level is displayed. There are two ways of calculating the average noise level. The difference between the two methods is whether or not the frequencies are taken into account.

The options are:

- **true RMS**

  (abbreviation for: true root mean square)

  This method does not take the frequencies into account.

- **f RMS**

  (abbreviation for: frequency based root mean square)

  This method takes the frequencies into account. High frequencies are given greater consideration than low frequencies.

4.3.2 Type

The displayed extreme value can be either the quietest or the loudest noise of a measurement.

The options are:

- **MIN**

  The lowest measurement value (minimum) is displayed.

- **MAX**

  The highest measurement value (maximum) is displayed.

SEWERIN recommends: Select **MIN** for leak detection.

4.3.3 Hearing protection

There is a hearing protection threshold for acoustic playback of the noise. The hearing protection activates when the set hearing protection threshold is exceeded. Hearing protection can work in two ways.

The options are:

- **Muted**

  The noise is muted so that it can just about be heard above the hearing protection threshold.

- **Silent**

  The noise cannot be heard above the hearing protection threshold.

For information about setting the hearing protection threshold, please refer to section 3.5 on page 25.

4.3.4 Activation keys

Note:
This setting determines how the activation keys on both the receiver and the sensor area on the carrying rod are operated.

The activation keys / sensor area can be operated in two different modes.

The options are:

- **Touch**
  - Activation key

    The activation key is held down for the duration of the measurement.
  - Sensor area

    Keep your thumb on the sensor area for the duration of the measurement.
- **Switch**
  - Activation key

    The activation key is pressed briefly to start the measurement. Pressing the activation key again ends the measurement.
  - Sensor area

    Briefly press the sensor area with your thumb to start the measurement. Pressing the sensor area again ends the measurement.

4.3.5 Timer

A timer can be displayed on the touch screen. The timer shows how long a measurement has been running for. The timer can work in two different modes.

The options are:

- **Forwards**

  Time is counted upwards (0 s, 1 s, 2 s, 3 s, etc.).
- **Backwards**

  Time is counted down (3 s, 2 s, 1 s, 0 s, etc.). The timer works in countdown mode.

  Once the specified time is up, the measurement does not end automatically.

  The duration of the countdown is set under **Duration** in the menu.
- **Off**

  The timer is disabled.

4.3.6 Duration

Note:
Duration only appears in the menu when the **Backwards** option has been set under **Timer**.

The duration of the countdown can be set for a countdown timer.

The options are:

- **10 s** | **20 s** | **30 s** | **40 s** | **50 s** | **60 s**

  Duration that can be selected.

4.3.7 TS: Sensor area

This function can be used to enable or disable the sensor area on the **TS 200** carrying rod.

4.4 Setting the application

An application can be selected via the **Application** menu. This allows you to change the application when the receiver is switched on.

Typically you might want to change application in the following locating situations:

- When changing from prelocation to pinpointing during leak detection.
- When a locating procedure is already underway and you want to continue with a different microphone (e.g. if the surface at the measuring location changes from paved to unpaved).

The main view is open.

1. Tap the **Settings** button. The **Settings** menu appears.
2. Tap the **Application** button. The **Application** menu appears.
3. Switch off the carrying rod.
4. Select the desired application. The menu for the respective application appears.

5. Select the type of contact point according to the conditions at the measuring point. The **Searching** menu appears.
6. Follow the instructions in the specified order.

Once all the specified components have been connected, the receiver automatically switches to the main view.

4.5 Settings in the Device menu

Note:
The settings in the **Device** menu only affect the receiver.

The main view is open.

1. Tap the **Settings** button. The **Settings** menu appears.
2. Tap the **Device** button. The **Device** menu appears.

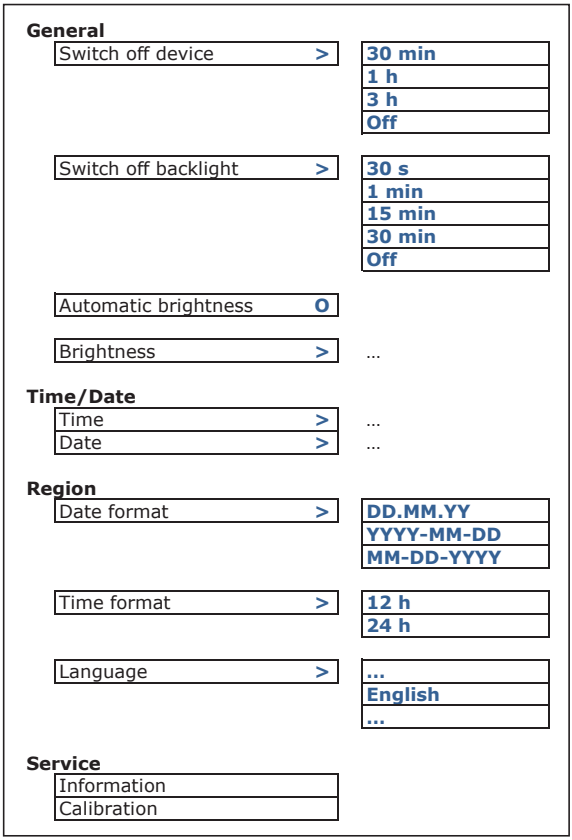


Fig. 30: **Device** menu

3. Adjust the settings as required.

   The **Device** menu is divided into the four views **General**, **Time/Date**, **Region** and **Service**.

   − Switch between the views using the **Scroll** buttons.

   The settings options are explained in the next sections.

4. Finally, tap **Back**. The **Device** menu appears.
5. Tap **Back** again to return to the main view.

4.5.1 Switching off the device

The receiver can switch off automatically if it is not operated for a specified period of time.

Note:
This function helps save energy. It means that the receiver can be used for longer without being recharged.

The options are:

- **30 min** | **1 h** | **3 h**

  Duration that can be selected.

- **Off**

  The receiver does not switch itself off.

4.5.2 Switching off the backlight

The touch screen backlight can switch off automatically if it is not operated for a specified period of time. The receiver remains switched on.

Note:
This function helps save energy. It means that the receiver can be used for longer without being recharged.

The options are:

- **30 s** | **1 min** | **15 min** | **30 min**

  Duration that can be selected.

- **Off**

  The backlight does not switch itself off.

4.5.3 Automatic brightness

The brightness of the touch screen can automatically adjust to the ambient lighting conditions thanks to the light sensor. This means that the touch screen is clearly legible in every situation.

This function can be enabled or disabled.

- When this function is disabled, you can set the brightness manually.

  Information about setting the brightness manually can be found in section 4.5.4 on page 55.

4.5.4 Brightness

Note:
Brightness only appears in the menu when the **Automatic brightness** function is disabled.

When the **Automatic brightness** function is disabled, a permanent value can be set for the brightness of the touch screen.

4.5.5 Time

The receiver features an internal clock. The set time is displayed in the main view on the **Settings** button. The time is also used to identify the measurements.

Note:
The format of the time can be set under **Time format** in the menu.

4.5.6 Date

The date is used to identify the measurements.

Note:
The format of the date can be set under **Date format** in the menu.

4.5.7 Date format

The date can be written in various ways.

The options are:

- **DD.MM.YY**
- **YYYY-MM-DD**
- **YYYY-MM-DD**

The letters refer to the following:

D: day

M: month

Y: year

4.5.8 Time format

The time can be written in various ways.

The options are:

- **12 h**

  12 hour clock

- **24 h**

  24 hour clock

4.5.9 Language

The text on the user interface can be displayed in various languages.

There is a range of languages to choose from.

4.5.10 Information

The relevant current technical information is stored in each receiver.

The following information will be displayed:

- Firmware version number
- Hardware version number

4.5.11 Calibration

The touch screen can be calibrated by the user.

For more detailed information on calibration, please refer to section 5.3 on page 63.

5 Maintenance

5.1 Charging the batteries

The batteries for the following components must be recharged when necessary:

- **A 200** receiver (lithium-ion rechargeable battery)
- **TS 200** carrying rod ((lithium-ion rechargeable battery)
- **F8** wireless headphones (NiMH rechargeable battery)

The typical charging time is less than 7.5 hours. The batteries are protected against overcharging. The components can, therefore, remain connected to the power supply after they are fully charged.

Always observe the permitted temperature range during charging. If the temperature falls below or exceeds the limit values, charging stops until the temperature returns to within the permitted range.

There are two ways of charging the components:

- All components at the same time in the **AQUAPHON A 200** case
- Each component individually using the AC/DC adapter or vehicle cable

5.1.1 Charging the batteries in the case

The batteries of the components can all be charged simultaneously in the **AC 200 SK 4** case. The case is connected to the power supply using AC/DC adapter **L** or vehicle cable **L**.

The AC/DC adapter and the vehicle cable are available to buy as accessories.

The connection cable for the components can be found in the case. There is a connection socket on the outside of the case for connecting to the power supply.

Fig. 31: **AC 200 SK 4** case
White circle: Connection cable
Black arrow: Connection socket (on the outside)

1. Place the components in the dedicated spaces in the case.
2. Connect the components using the connection cables.
3. Connect the case to the power supply using the AC/DC adapter **L** or vehicle cable **L**. Charging starts automatically.

After less than 7.5 hours the charging process is complete.

5.1.2 Charging batteries individually using the AC/DC adapter or vehicle cable

The components are connected directly to the power supply for charging using AC/DC adapter **M4** or vehicle cable **M4**. Each component is charged individually.

The AC/DC adapter and the vehicle cable are available to buy as accessories.

When the battery is fully charged, the LED on the **A 200** receiver and **TS 200** carrying rod emits a double flash (green).

5.2 Handling faulty lithium-ion rechargeable batteries

Lithium-ion batteries are always classed as dangerous goods for transport purposes.

The transportation of faulty lithium-ion batteries is only permitted under certain conditions (e.g. must not be transported as air freight). Where transportation is permitted (e.g. by road or rail), it is subject to strict regulations. Faulty lithium-ion batteries must, therefore, always be removed from components before shipping. Transportation by road or rail must occur in compliance with the current applicable version of the ADR regulations [1].

NOTICE! Risk of damage when removing lithium-ion rechargeable batteries

When opening the housing, the components can be damaged mechanically or by electrostatic discharge.

- Lithium-ion batteries must only be removed if there is reasonable suspicion that they might be faulty.

Only SEWERIN Service personnel or an authorised specialist may replace rechargeable batteries.

5.2.1 Identifying faulty batteries

A lithium-ion battery is considered to be faulty if one of the following criteria applies[2]:

- Housing damaged or badly deformed
- Liquid leaking from battery
- Smell of gas from battery
- Rise in temperature with the receiver switched off (more than hand-hot)
- Plastic parts melted or deformed
- Connection leads melted

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[1] French abbreviation for: Accord européen relatif au transport international des marchandises dangereuses par route, Engl.: European Agreement concerning the International Carriage of Dangerous Goods by Road

[2] As per: EPTA – European Power Tool Association

5.2.2 Removing the batteries from the A 200 receiver

NOTICE! Risk of damage

There are parts in the battery compartment of the receiver which can be damaged mechanically or by electrostatic discharge when removing the batteries.

- Always read section 5.2 and section 5.2.1 before removing the batteries.
- Avoid electrostatic discharges at all costs, e.g. by using an ESD workstation.

Fig. 32: Back of the A 200 receiver
White circles: Screws of the battery compartment cover

The batteries are in the battery compartment. The battery compartment is sealed with the battery compartment cover.

The receiver must be switched off.

1. Undo the four screws securing the battery compartment cover.
2. Lift off the battery compartment cover with extreme care.

NOTICE! Risk of damage

There is an aerial in the battery compartment cover. That is why the battery compartment cover has an electrical connection (cable) from the inside into the device interior.

- Please ensure that the cable does not get severed.
- Never touch the solder joint on the inside of the battery compartment cover.

3. Disconnect the electrical supply to the faulty battery by pulling off the white plug.

   Never sever the cable.

4. Remove the battery.
5. Screw the battery compartment cover back on.

5.2.3 Removing the battery from the TS 200 carrying rod

NOTICE! Risk of damage

There are parts in the battery compartment of the carrying rod which can be damaged mechanically or by electrostatic discharge when removing the batteries.

- Always read section 5.2 and section 5.2.1.
- Avoid electrostatic discharges at all costs, e.g. by using an ESD workstation.

Fig. 33: Handle of the **TS 200** carrying rod (view from underneath)
White circles: Screws of the battery compartment cover

The battery is in the battery compartment. The battery compartment is sealed with the battery compartment cover.

The carrying rod must be switched off.

1. Undo the three screws securing the battery compartment cover on the underside of the handle.
2. Remove the battery compartment cover.
3. Disconnect the electrical supply to the faulty battery by pulling off the white plug.

   Never sever the cable.
4. Remove the battery.
5. Screw the battery compartment cover back on.

5.3 Calibrating the touch screen

The touch screen comes calibrated. If the touch screen responds incorrectly when operated, it can be recalibrated.

Note:
Usually the touch screen does not need to be recalibrated by the user.

Calibration involves two stages, which occur automatically in succession. Firstly the areas are reset. Then the reset areas need to be confirmed.

Note:
If the calibration process is interrupted, the touch screen may be so misaligned that it cannot be used.

- Never switch the receiver off during the calibration process.
- Always use a touch pen for calibration.
- Work with extreme care.

The main view is open.

1. Tap the **Settings** button. The **Settings** menu appears.
2. Tap the **Device** button. The **Device** menu appears.
3. Switch to the **Service** view (**Device 4/4**).
4. Tap **Calibration**. The calibration begins.
5. Follow the instructions.
   - The individual steps must be completed within a limited time. If the time limit is exceeded, the calibration process will be aborted.
   - The active area is marked with crosshairs. Non-active areas are grey.
     - **Blue** crosshairs: Set area
     - **Red** crosshairs: Confirm area
   - Try to hit the centre of the active area as accurately as possible.

Once the screen has been successfully calibrated, the receiver automatically switches back to the **Service** view.

5.4 Care

All that is necessary to care for the components is to wipe them down with a damp cloth.

SEWERIN recommends: Always remove significant contamination immediately.

Please note the following special points:

- Carrying rod
  - Never use compressed air or a water jet for cleaning.
- Microphones
  - Microphones can be rinsed under running water.

5.5 Maintenance

SEWERIN recommends: Have the system serviced regularly by SEWERIN Service or an authorised professional. Only regular servicing can ensure that the system is always ready for use.

6 Appendix

6.1 Technical data

6.1.1 A 200 receiver

Device data

Dimensions (W x D x H)	225 x 62 x 155 mm
Weight	1.2 kg
Material	Polycarbonate (housing)

Certificates

Certificate	FCC, CE, IC, MIC
Marking	Contains: FCC ID WSP-EZ1300102 IC 7994A-EZ1300102

Features

Display	5.7" TFT display 640 x 480 pixels (VGA), LED backlight
Interface	micro USB
Memory	90 MB (internal)
Processor	RISC 32 bit, DSP
Operation	Touch screen, ON/OFF key, two activation keys

Operating conditions

Operating temperature	-20 – 60 °C
Storage temperature	-25 – 50 °C (briefly 60 °C)
Humidity	15 – 90 % r.h., non-condensing
Protection rating	IP65/IP67
Non-permitted operating environments	in potentially explosive areas

Power supply

Power supply	2 x lithium-ion batteries (rechargeable) [1357-0002]
Operating time, typical	> 10 h
Battery power	2 x 24 Wh
Charging time	< 7.5 h
Charging temperature	0 – 40 °C
Charging voltage	12 V
Charging current	1.2 A
Charger	AC/DC adapter **L** for charging in the case

Data logging

Filter	Bandpass: adjustable between 0 Hz and 12 kHz Passband, minimum: 300 Hz Increment, minimum: 50 Hz
Sampling rate	16 bit / 24 kHz

Data transmission

Transmission frequency	2.408 – 2.476 GHz, 38 channels
Radio range	> 2 m
Transmission bandwidth	0 – 12 kHz
Communication	SDR (Sewerin Digital Radio)
Power	10 mW

Positioning GNSS (GPS, Galileo, GLONASS)

Accuracy	2.5 m CEP, 50 %
Antenna	integrated

Additional data

Attachment option	Quick-release fastener
Transport	AQUAPHON A 200 SK4 case, SK10 case
Shipping instructions	UN 3481: lithium-ion batteries contained in equipment or lithium-ion batteries packed with equipment net weight of battery/batteries: 0.196 kg

6.1.2 TS 200 carrying rod

Device data

Dimensions (W x D x H)	50 x 216 x 702 mm
Weight	780 g
Material	Plastic, aluminium

Features

Operation	Membrane keypad with 2 keys Capacitive sensor area

Operating conditions

Operating temperature	-20 – 60 °C
Storage temperature	-25 – 50 °C (briefly 60 °C)
Humidity	15 – 90 % r.h., non-condensing
Protection rating	IP65 (without microphone) IP67 (with microphone)
Non-permitted operating environments	in potentially explosive areas

Power supply

Power supply	lithium-ion battery (rechargeable) [1357-0003]
Operating time, typical	> 10 h at 23 °C
Battery power	2.2 Ah, 8 Wh
Charging time	< 4 h
Charging temperature	0 – 45 °C
Charging voltage	12 V
Charging current	0.6 A
Charger	AC/DC adapter L for charging in the case

Data transmission

Transmission frequency	2.408 – 2.476 GHz, 38 channels
Radio range	> 2 m
Transmission bandwidth	0 – 12 kHz
Communication	SDR (Sewerin Digital Radio)
Power	10 mW

Additional data

Shipping instructions	UN 3481: lithium-ion batteries contained in equipment or lithium-ion batteries packed with equipment net weight of battery/batteries: 0.0475 kg

6.1.3 BM 200 and BM 230 ground microphones

Device data

Dimensions (H × Ø)	BM 200: 178 x 163 mm BM 230: 198 x 149 mm
Weight	BM 200: 3 kg BM 230: 2.84 kg
Material	Glass fibre-reinforced polyamide (housing) BM 200: EPDM rubber (base) BM 230: Aluminium (tripod)

Operating conditions

Operating temperature	-20 – 60 °C
Storage temperature	-25 – 70 °C
Protection rating	IP65 (without TS 200 carrying rod) IP67 (with TS 200 carrying rod)
Non-permitted operating environments	in aggressive media in potentially explosive areas
Normal position of use	vertical

6.1.4 TM 200 touch microphone

Device data

Dimensions (H × Ø)	155 x 45 mm
Weight	725 g
Material	Stainless steel

Operating conditions

Operating temperature	-20 – 60 °C
Storage temperature	-25 – 70 °C
Protection rating	IP65 (without TS 200 carrying rod) IP67 (with TS 200 carrying rod)
Non-permitted operating environments	in aggressive media in potentially explosive areas

6.1.5 UM 200 universal microphone

Device data

Dimensions (H × Ø)	123 x 45 mm (without cable)
Weight	1055 g
Material	stainless steel
Models	3 cable lengths available

Features

Signal light	2 LEDs white (each 15 cd)

Operating conditions

Operating temperature	-20 – 80 °C
Storage temperature	-25 – 80 °C
Protection rating	IP68
Non-permitted operating environments	in aggressive media in potentially explosive areas

Measurement

Measurement principle	piezo microphone (analogue)
Sensitivity	approx. 10 V/g (20 – 1000 Hz)

Additional data

Cable type	6-pin, outer diameter 6.2 mm, tensile strength > 3000 N
Cable length	1.3 m / 2.8 m / 6 m

6.2 Symbols on the touch screen of the A 200 receiver

The following tables provide an overview of what the main symbols represent. The symbols can also occur in combination during the program sequence. Many symbols on the touch screen can be displayed in different ways:

- Coloured symbol

  Function enabled, system component connected, etc.

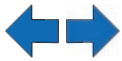
- Symbol greyed out

  Function disabled, system component not connected, etc.

Symbol	Significance
	Confirm
	Cancel
	Back
	Scroll
	A 200 receiver
	TS 200 carrying rod
	Microphone
	No microphone connected
	Microphone unknown
	BM 200 ground microphone
	BM 230 ground microphone
	TM 200 touch microphone
	UM 200 universal microphone

Symbol	Significance
	Rechargeable battery
	Battery fully charged
	Battery flat
	Headphones
	Hearing protection threshold low
	Hearing protection threshold high
	Volume
	Volume low
	Volume high
	Brightness
	Brightness low
	Brightness high

Symbol	Significance
	Light source on universal microphone
	Pipe location
	Leak detection
	Paved
	Unpaved
	Fitting
	Universal
	Measurement settings
	Application settings
	Device settings
	Timer forwards
	Timer backwards (countdown)
	Scan

Symbol	Significance
	Reset
	Speed
	Filter settings
	Open
	Filter by date
	Save
	Delete
	Selected
	Next
	Move
	Scale
	Crosshairs
	Satellite reception
	No satellite reception

6.3 Significance of LED signals

6.3.1 A 200 receiver

Colour	Type of signal	Activation (repeat)	Significance
Green	Light permanently on		● **A 200** switched on
	Flashing	0.1 s on > 0.9 s off (ongoing)	● Battery charging
	Double flash	0.1 s on > 0.1 s off > 0.1 s on > 0.7 s off (ongoing)	● Battery is fully charged
Red	Light permanently on		● **A 200** switched on ● Undervoltage: Battery needs charging
	Flashing	0.1 s on > 0.9 s off (ongoing)	● Error when charging battery (temperature below or above permitted charging temperature)

6.3.2 TS 200 carrying rod

Colour	Type of signal	Activation (repeat)	Significance
Green	Light permanently on		● **TS 200** switched on ● Radio connection to **A 200** established
	Slow flash	0.5 s on > 0.5 s off (ongoing)	● **TS 200** switched on ● No radio connection to **A 200**
	Flashing	0.1 s on > 0.1 s off (1 s long)	● **TS 200** switches off
	Flashing	0.1 s on > 0.9 s off (ongoing)	● Battery charging
	Double flash	0.1 s on > 0.1 s off > 0.1 s on > 0.7 s off (ongoing)	● Battery is fully charged
Red	Light permanently on		● **TS 200** switched on ● Radio connection to **A 200** established ● Undervoltage: Battery needs charging
	Slow flash	0.5 s on > 0.5 s off (ongoing)	● **TS 200** switched on ● No radio connection to **A 200** ● Undervoltage: Battery needs charging
	Flashing	0.1 s on > 0.1 s off (ongoing)	● Error
	Flashing	0.1 s on > 0.9 s off (ongoing)	● Error when charging battery (temperature below or above permitted charging temperature)

6.4 Suitability of the microphones for the applications

The following table provides an overview of which microphones are suitable for which applications and contact points.

Application	Contact point	Microphone
Leak detection	Paved	 **BM 200**
	Unpaved Paved	 **BM 230**
	Unpaved Paved Fitting Universal	 **UM 200**
Pipe location	Paved	 **BM 200**
	Unpaved Paved	 **BM 230**
	Unpaved Paved	 **UM 200**
Prelocation	Fitting	 **TM 200**

6.5 Operating the system by activation key or sensor area

The following table provides an overview of which controls are suitable depending on the microphone.

Component	Operated using (on)	Operating mode	
		Touch	Switch
BM 200  **BM 230** 	Activation key (**A 200**)	+	o
	Sensor area (**TS 200**)	o	o
TM 200 	Activation key (**A 200**)	o	o
	Sensor area (**TS 200**)	+	o
UM 200 	Activation key (**A 200**)	+	o

Key:
+ Recommended operation
o Operation possible

6.6 Accessories

Part	Order number
BM 200 ground microphone	EM24-10000
BM 230 ground microphone	EM25-10000
Touch microphone TM 200	EM20-10200
Probe tip M10 / 350 mm	4000-1213
Probe tip extension M10 / 600 mm	4000-1215
Probe tip extension M10 / 300 mm	4000-1216
Universal microphone UM 200	EM20-10300
Case AC 200 SK4	ZD-10000
Vario carrying system	3209-0012
Lap belt carrying system	EA20-Z1000
Triangle 200 carrying strap	3209-0022
Hand loop EA 200	3209-0017
AC/DC adapter L	LD26-10000
Vehicle cable L 12 V =	ZL05-10200

Other accessories are available for the system. Please contact our SEWERIN sales department for further information.

6.7 Declaration of conformity

Hermann Sewerin GmbH hereby declares that the **A 200** receiver and the **TS 200** carrying rod fulfil the requirements of the following directive:

- 2014/53/EU

The complete declarations of conformity can be found online.

6.8 Note about the firmware (open source software)

The firmware is based on open source software. The source code is provided in accordance with the licence terms for this open source software (GPL / LGPL). Sewerin GmbH stresses that it is not responsible for the source code and it does not form part of the services due.

The source code is available on request at cost price by emailing info@sewerin.com.

The full licence terms can be found online www.sewerin.com.

6.9 Advice on disposal

The European Waste Catalogue (EWC) governs the disposal of appliances and accessories in accordance with EU Directive 2014/995/EU.

Description of waste	Allocated EWC waste code
Device	16 02 13
Disposable battery, rechargeable battery	16 06 05 / 20 01 34

Alternatively, used equipment can be returned to Hermann Sewerin GmbH.

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