Operating Instructions

SEWERIN
Protecting Water, Gas and Life.

FS 150

Antenna



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Contents

1 Introduction 1

1.1 Information about this document 1

1.2 Intended use 1

1.3 Qualification of users 2

2 Safety information 3

2.1 General safety information 3

2.2 Safety instructions for headphones 3

2.3 Illustration of warnings and information in this document 4

3 Description of the FS 150 antenna 5

3.1 Overview 6

3.2 How the antenna works 7

3.2.1 Minimum value and maximum value 8

3.2.2 Signals 8

3.2.3 Gain control 9

3.3 Frequencies 9

3.4 Power supply 10

4 Accessories description 11

4.1 TS 150 carrying rod 11

4.2 AQUAPHON A 150 receiver 12

4.2.1 Key functions for locating pipes 12

4.2.2 Display overview 13

4.2.2.1 Main view 14

4.2.2.2 Settings view 15

4.3 Generator 17

4.4 Headphones 18

4.4.1 F8 wireless headphones 18

4.4.2 K3 headphones 18

5 Operation 19

5.1 Starting up the antenna 19

5.1.1 Connecting the antenna to the carrying rod 19
5.1.2 Attaching the carrying handle to the carrying rod 21
5.1.3 Connecting the carrying rod to the receiver 22
5.2 Setting the A 150 receiver 22
5.2.1 Resetting to factory settings (RESET) 23
5.3 Using headphones (optional) 23
5.3.1 Connecting F8 wireless headphones 23
5.3.2 Connecting K3 headphones 24
5.3.3 Adjusting the headphone volume 24
5.4 Locating a pipe 24
5.4.1 Tuning the antenna to the frequency 25
5.4.2 Holding the antenna correctly 25
5.4.3 Locating a pipe for the first time 27
5.4.4 Tracking the pipe 28
5.4.5 Actively locating a pipe 28
5.4.5.1 Locating electroconductive pipes or glass fibre probe systems (TYPE pipe) 28
5.4.5.2 Detecting locating probes (TYPE locating probe) 29
5.4.6 Passively locating a pipe 31
5.4.6.1 Locating live cables (TYPE electricity) 31
5.4.6.2 Locating electroconductive pipes using available radio frequencies (TYPE radio) 32
5.4.7 Locating pipes in a suddenly weakening electromagnetic field 32
5.5 Determining the depth 34
5.5.1 Setting the unit 35

6 Maintenance 36

6.1 Care 36

7 Troubleshooting 37

8 Appendix 38

8.1 FS 150 Technical Data Sheet 38
8.2 Adjustable frequencies 40
8.2.1 Frequencies for active locating 40

8.2.2 Frequencies for passive locating 40
8.2.3 Frequencies for detecting locating probes 40
8.3 Identification plate 41
8.4 Accessories 41
8.4.1 Accessories required 41
8.4.2 Optional accessories 41
8.5 Declaration of conformity 42
8.6 Advice on disposal 42
Index 43

1 Introduction

1.1 Information about this document

This document is a component part of the product.

- Read the document before putting the product into operation.
- Keep the document within easy reach.
- Pass this document on to any subsequent owners.
- Unless otherwise specified, the information in this document refers to the product as delivered (factory settings) and applies to all product variants.
- Contradictory national legal regulations take precedence over the information in this document.
- Hermann Sewerin GmbH is also referred to as SEWERIN hereafter.

Right of reproduction

No part of this document may be edited, duplicated or circulated in any form without the express consent of Hermann Sewerin GmbH.

Registered trademarks

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1.2 Intended use

The **FS 150** antenna is an electronic detector for locating pipes. The product can be used for:

- Locating and tracking electroconductive underground pipes
- Locating and tracking non-electroconductive underground pipes if a glass fibre probe or locating probe is used
- Locating and tracking live or signal-carrying cables
- Determining the depth of a pipe

The product is suitable for the following uses:

- industrial
- commercial

Improper use

The product must only be used for the applications specified in [▸ section 1.2]. All other uses are improper.

1.3 Qualification of users

The appropriate specialist knowledge is required for using this product. The product may only be used by the following persons:

Specialist

A person who, based on technical training, experience and knowledge, is able to assess the work assigned to them and to recognise potential hazards.

Trained person

A person who has been instructed about the assigned tasks and about possible dangers arising from careless conduct.

2 Safety information

This product was manufactured in keeping with all binding legal and safety regulations. The product is safe to operate when used in accordance with the instructions provided.
However, when handling the product, there may be risks to persons and property. For this reason, observe the following safety information without fail.

2.1 General safety information

- Observe all the applicable safety standards and accident prevention regulations. This applies in particular to work on electrical systems (e.g., live cables).
- Use the product only as intended.
- Never use this product near explosive areas.
- Handle the product carefully and safely, both during transport and when working.
- Do not make any changes or modifications to the product unless these have been expressly approved by SEWERIN.
- Do not use the product if it is damaged or faulty. Do not use any damaged or defective accessories.
- Always observe the permitted operating and storage temperatures.
- Before starting any locating work, contact the local utility companies to find out the location of underground cables and pipes.
- Always adequately cordon off the work area.
- Protect the ports and sockets against dirt, and electrical ports in particular against moisture.

2.2 Safety instructions for headphones

- When you are wearing headphones, you are not fully aware of ambient noise. Be especially vigilant, especially in environments with an increased risk of accident (e.g. traffic).
- Only set the volume as high as absolutely necessary. Excessive noise can cause permanent damage to hearing.

2.3 Illustration of warnings and information in this document



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

NOTICE
Risk of damage to property

Notice
Unpredictable product behaviour

3 Description of the FS 150 antenna

The **FS 150** antenna allows the **AQUAPHON A 150** receiver to be used to locate pipes. Carrying rod **TS 150** is also required for pipeline location, and possibly a generator.

The antenna package includes:

- antenna **FS 150**
- carrying handle **FS 150**
- bag **FS 150**

The antenna can also be used with wireless or wired headphones.

3.1 Overview

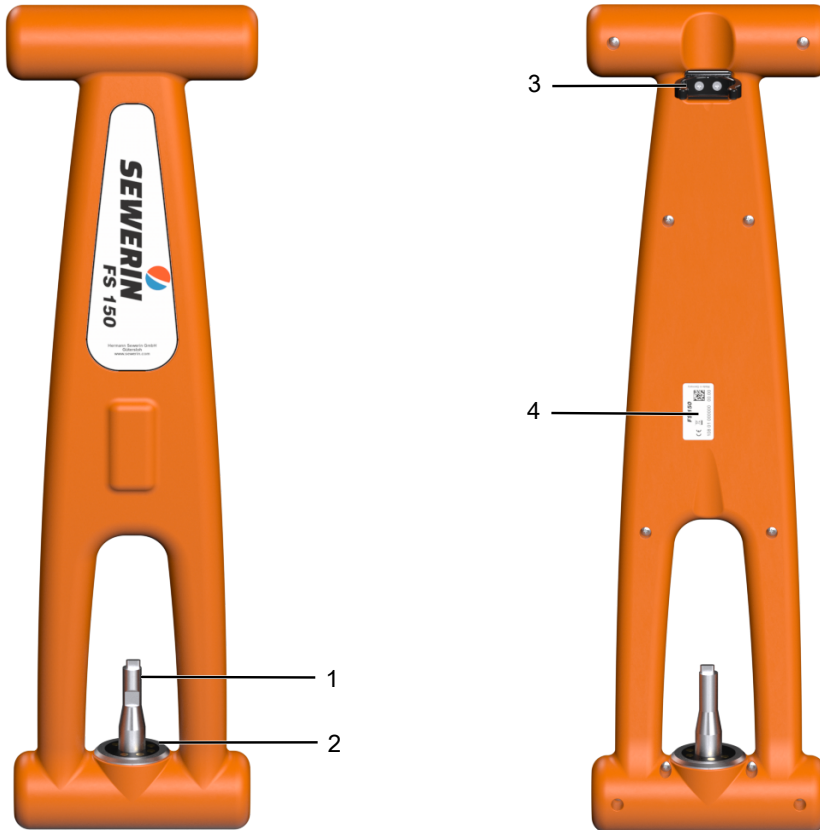


Fig. 1: Overview of **FS 150** front and back

1	Bolt	2	Electrical contacts
3	Clamp	4	Identification plate

The antenna is fitted to the **TS 150** carrying rod using the bolt and the clamp and an electrical connection is established.

Carrying handle FS 150



*Fig. 2: Carrying handle **FS 150***

The carrying handle makes it easier to carry the antenna, especially during longer periods of work. The carrying handle is attached to the carrying rod using the toggle fastener [▸ section 5.1.2].

Bag FS 150



*Fig. 3: Bag **FS 150***

The bag is specifically designed to fit the **FS 150** antenna and is used to store the antenna and the carrying handle. The bag is water-repellent.

3.2 How the antenna works

The antenna locates pipes by comparing the different strengths of the electromagnetic field directly above and next to the pipe. The electric field is strong directly above the pipe, and weaker next to the pipe. By comparing the values, the antenna recognises where the strongest electromagnetic field, and therefore the pipe, is located in relation to its surroundings.
Thus, in order to locate a pipe, the antenna must be moved back and

forth between the minimum and maximum values of the electric field to determine the strongest electromagnetic field.
Information on how to locate pipes using an antenna can be found here: [▸ section 5.4].

3.2.1 Minimum value and maximum value

The strength of the electromagnetic field directly above the pipe is also referred to as the maximum value hereafter. The strength of the electromagnetic field beside the pipe is also referred to as the minimum value hereafter.

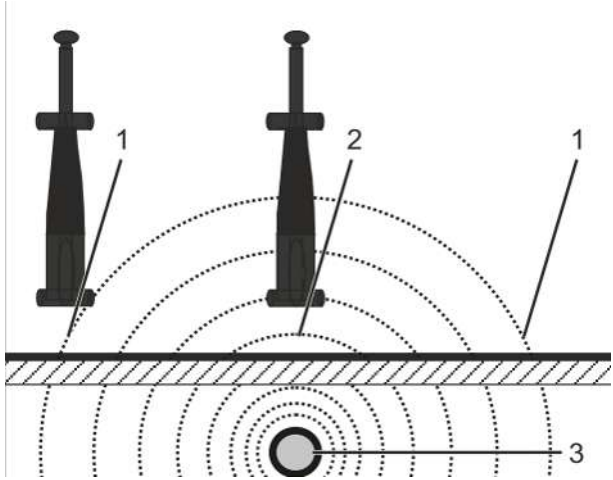


Fig. 4: FS 150 - How it works

1 Minimum value
2 Maximum value
3 Pipe

3.2.2 Signals

The antenna detects the electromagnetic fields and emits them as signals.

Type of signal output

The signal is emitted:

- acoustically

- haptically (as a vibration)

The type of signal output can be set at the receiver to detect the maximum value (rapidly interrupted signal). [▸ section 4.2.2.2]. The other signals are automatic and cannot be adjusted.

What the signals mean

Signal	Meaning
long, steady signal	The antenna has detected an electromagnetic field for the first time
single short signal	The antenna has detected the minimum value
fast, discontinuous signal	The antenna has detected the maximum value/is positioned directly above the pipe

3.2.3 Gain control

Automatic

The antenna features automatic gain control. During the locating process, it automatically adjusts itself to the optimal sensitivity when determining the location.

Semi-automatic

In certain locating situations, the antenna cannot automatically regulate the gain, e.g. if the electromagnetic field suddenly weakens. In this case, reception of the electromagnetic field can be amplified by pressing the activation key on the receiver. If the electromagnetic field becomes stronger again, the antenna automatically adjusts to it.

3.3 Frequencies

Various frequencies are available for locating with the antenna. An overview of the adjustable frequencies for active and passive locating can be found here [▸ section 8.2]. Pipes can only be located with the **FS 150** antenna at these frequencies.

3.4 Power supply

The antenna is powered by the receiver via the carrying rod.

4 Accessories description

4.1 TS 150 carrying rod

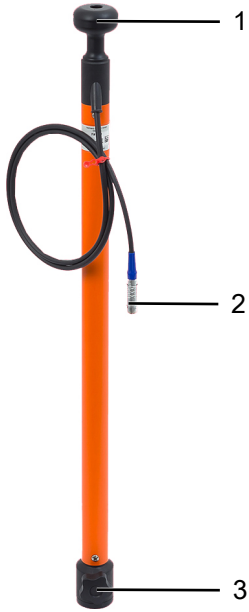


*Fig. 5: **TS 150** carrying rod*

1	Handle	2	Jack
3	Adapter with fastening screw and star knob		

The carrying rod holds the antenna and connects it to the receiver. The star knob of the fastening screw can be removed to save space, for example. The jack can be inserted into the top of the handle when not in use or for storage.

4.2 AQUAPHON A 150 receiver

Notice

This document describes the **A 150** receiver exclusively for locating pipes with the **FS 150** antenna.
Firmware version V2.100 or higher is required for the functions described. Any updates that may be required must be performed by SEWERIN Service.
This description supplements the operating instructions for the **A 150** receiver. More details about the **A 150** receiver can be found in the accompanying operating instructions.

The receiver allows you to adjust the antenna settings.
The following special features apply when using the **A 150** receiver to detect pipes:

- Once the antenna and receiver are connected using a carrying rod, the main view for locating pipes appears on the display.
- The main view [▸ section 4.2.2.1] and the settings view [▸ section 4.2.2.2] look different compared with water leak detection.
- The function of some keys changes compared to water leak detection.
- Various functions, such as location mode, can be set for the antenna.
- The gain control can be activated semi-automatically.
- The volume of acoustic signals can only be controlled when using headphones by adjusting the volume on the headphones.
- There is no hearing protection function.

4.2.1 Key functions for locating pipes

The receiver's keys are assigned as follows for locating pipes:

Symbol	Name	Function
	Activation key	amplify electromagnetic field semi-automatically
	Up key Down key	Change settings When using head-phones: in main view: Adjusting the volume
	Filter key	in main view: select frequency
	Menu key	for switching between the main view and the Settings view
	Enter key	in Settings view: change settings

4.2.2 Display overview

The receiver's display shows two different views when locating a pipe.

Pressing the menu key allows you to toggle between the main view and the **Settings** view.

Main view

The main view displays the current values of the pipeline location in measuring mode [▸ section 4.2.2.1].

Settings

The antenna can be individually configured in the Settings view [▸ section 4.2.2.2].

Press the Enter key to toggle between the individual setting options.

4.2.2.1 Main view

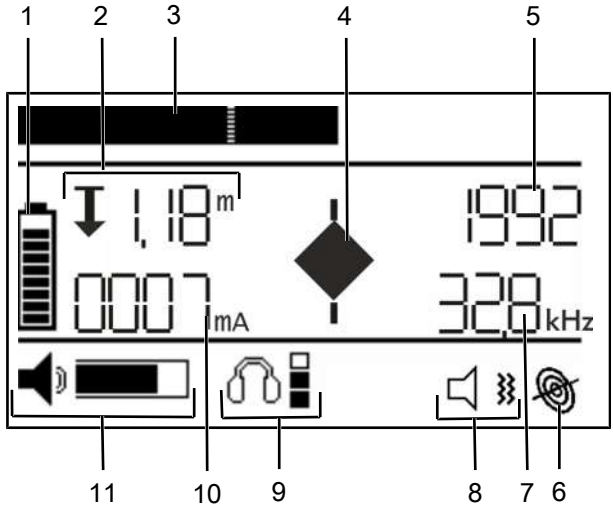


*Fig. 6: Receiver **A 150** display with main view in pipe location*

1	Battery symbol for receiver	2	Pipe depth (symbol and numerical value)
3	Field strength (bar graph)	4	Direction symbol showing current position above pipe
5	Field strength (numerical)	6	Location mode
7	Frequency	8	Type of signal output
9	no function when locating pipes	10	Current
11	Headphone volume (speaker symbol and volume bar)		

Direction symbols

The direction symbols indicate the direction in which the pipe located is situated from the device.

Symbol	Meaning
	Direction arrow ● Pipe in the direction of the arrow beside the device
	Diamond ● Pipe directly beneath the device

4.2.2.2 Settings view

The receiver's display shows the following Settings view when locating a pipe:

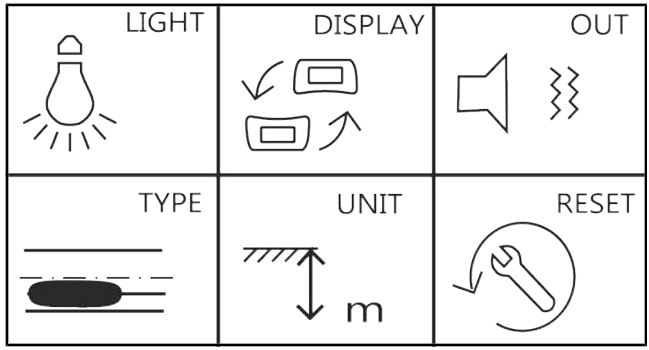


*Fig. 7: Receiver **A 150** display with Settings view in pipe location*

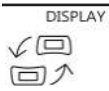
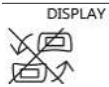
Backlight (LIGHT)

The receiver display features a backlight.

Symbol	Meaning
	Backlight activated
	Backlight deactivated

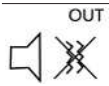
Display rotation (DISPLAY)

If the receiver is rotated through 180° about its longitudinal axis, the display follows the movement.

Symbol	Meaning
	Display rotation activated
	Display rotation deactivated

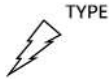
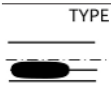
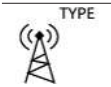
Type of signal output (OUT)

The acoustic signal and vibration of the locating signal on the antenna can be activated or deactivated individually or together. The individual signal for the comparison cannot be switched off.

Symbol	Meaning
	Acoustic signal and vibration activated
	Only vibration activated (only vibrates at frequencies of 32 kHz and higher)
	Only acoustic signal activated
	Acoustic signal and vibration deactivated

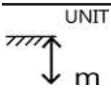
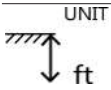
Location mode (TYPE)

Various location modes can be set for the antenna.

Symbol	Name	Suitable objects for location
	Pipe	Electroconductive pipes or glass fibre probe systems energised by a generator
	Current	Live cables ● available mains frequencies: 50 Hz, 100 Hz (Europe) or 60 Hz, 120 Hz (North America etc.)
	Locating probe	Non-metallic pipes in which a locating probe is fitted
	Radio	Metal pipes ● Frequency range 15 – 25 kHz (VLF range)

UNIT

The depth can be displayed in metres or feet.

Symbol	Meaning
	Display in metric units enabled
	Display in imperial units enabled

Factory settings (RESET)

This function restores all individual settings to the factory settings. Factory settings are the settings on the receiver at the time of delivery.

Symbol	Name	Function
	Reset	Restore settings to factory settings

4.3 Generator

A generator is required for actively locating pipes. A generator, e.g. the **FG 150** generator, can power electroconductive pipelines directly

or indirectly. The frequency and signal strength of the generator can be adapted to local conditions.

The antenna can be used to locate the pipe being energised by the generator. The receiving frequency of the antenna and the transmitting frequency of the generator must match.

The **FG 150** generator has the ten frequencies that can be received with the antenna. However, any other generator that transmits on one or more frequencies available in the antenna can also be used.

Information on available frequencies can be found here: [▸ section 8.2].

4.4 Headphones

Pipes can be located with an antenna with or without headphones. If headphones are used, the acoustic signals are also output via headphones.

4.4.1 F8 wireless headphones

More details about headphones can be found in the relevant operating instructions.

4.4.2 K3 headphones

More details about headphones can be found in the relevant operating instructions.

5 Operation

5.1 Starting up the antenna

Procedure

1. Attach the antenna to the carrying rod [▸ section 5.1.1].
2. Attach the carrying handle to the carrying rod [▸ section 5.1.2].
3. Connect the carrying rod to the receiver. [▸ section 5.1.3].

5.1.1 Connecting the antenna to the carrying rod

NOTICE

Risk of malfunctions caused by dirt or water seepage

Moisture and dirty contacts can impair functionality. The product 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.

- Only attach the product to the carrying rod if the contacts are clean and dry.
- Never unscrew the fastening screw all the way out of the thread to minimise the risk of getting dirty.

NOTICE

Risk of malfunctions

Constant or jerky tensile forces can compromise or damage the cable connection to the carrying rod.

- Always carry the carrying rod by the handle.



Fig. 8: Connecting the antenna to the carrying rod

1	Carrying rod	2	Clamp
3	Antenna	4	Fastening screw with star knob
5	Adapter		

Connect the carrying rod and antenna neatly to each other.

Procedure

1. Undo the fastening screw on the carrying rod.
   - Do not unscrew the screw completely.
2. Place the carrying rod with the adapter onto the antenna's bolt and simultaneously press the carrying rod into the clamp.
3. Turn the carrying rod until it clicks into the stop.
   - ✓ There is no gap between the electrical contacts and the adapter.
   - ✓ The thread of the fastening screw is pointing towards the front of the antenna.
4. Tighten the fastening screw again.

5.1.2 Attaching the carrying handle to the carrying rod



Fig. 9: Attaching the carrying handle

1	Carrying rod	2	Toggle fastener
3	Carrying handle towards the front of the antenna		

Notice

The carrying handle must be fitted facing the front of the antenna. This is the only way to make it easier to carry the antenna.

Procedure

1. Place the carrying handle around the carrying rod above the cable.
   - Make sure that the carrying handle is pointing towards the front of the antenna.
   - Make sure the cable is out of the toggle fastener.
2. Tighten the toggle fastener.
3. If the toggle fastener is too tight or too loose:
   - 3.1 Open the toggle fastener the full way.
   - 3.2 Turn the toggle fastener 360° in either direction.
   - 3.3 Tighten the toggle fastener again.

4. Repeat this process, if necessary, until the carrying handle is securely attached to the carrying rod.

5.1.3 Connecting the carrying rod to the receiver

The receiver switches on automatically as soon as the carrying rod with the attached antenna is connected.

Procedure

- Plug the jack of the carrying rod into the microphone socket on the receiver.
  - ✓ The jack clicks into place.
  - ✓ The red dots are in a line.



Fig. 10: Jack (carrying rod) correctly connected to the microphone socket (receiver)

- ✓ The receiver switches on.
- ✓ A start screen appears on the display for approx. 5 seconds.
- ✓ The main view appears.
- ✓ The antenna is ready for use.

5.2 Setting the A 150 receiver

The receiver can be individually configured. The individual settings are permanently saved in the receiver until the next change and can be reset to factory settings at any time.

The meaning of the symbols can be found here: [▸ section 4.2.2.2].

Procedure

- ▷ The antenna is ready for use.
- ▷ The receiver's display shows the main view.

1. Press the Menu key.
   ✓ The Settings view appears.
2. Press the Enter key repeatedly until the desired symbol is inverted.
3. Change the setting.
   - Press the Down key to deactivate the function.
   - Press the Up key to activate the function.
4. Press the Menu key to apply the settings.
   ✓ The receiver returns to the main view.

5.2.1 Resetting to factory settings (RESET)

Notice
The settings are reset immediately and with no further warning.
Saved measurement data is also deleted.

Procedure

▷ The antenna is ready for use.

▷ The receiver's display shows the main view.

1. Press the Menu key.
   ✓ The **Settings** view appears.
2. Keep pressing the Enter key until **RESET** is inverted.
3. Press the Up or Down key.
   ✓ The product is immediately restored to factory settings.
   ✓ The receiver will restart.

5.3 Using headphones (optional)

5.3.1 Connecting F8 wireless headphones

Procedure

1. Start up the antenna.
2. Turn on the wireless headphones.

✓ The receiver automatically detects the **F8** wireless headphones when they are within range.

5.3.2 Connecting K3 headphones

The wired **K3** headphones must be used with the 3.5 mm jack.

Procedure

1. Remove the adapter (6.3 mm) from the jack if necessary.
2. Plug the jack into the headphone socket on the receiver.

5.3.3 Adjusting the headphone volume

CAUTION
Health hazard
Excessive noise can damage hearing and lead to irreversible damage to health.
- Always adjust the volume to the current situation.
- Choose as low a volume as possible.

Any change to the volume can be heard immediately through the headphones. The volume bar will change in the main view.

Procedure

▷ The antenna is ready for use.

▷ The display shows the main view.

▷ The headphones are switched on.

- Press the Up or Down button on the receiver.
  ✓ The headphone volume changes.
  ✓ The change in volume can be seen on the volume bar.

5.4 Locating a pipe

In order to locate a pipe, there must be an alternating current in the pipe to be located. The frequency of the antenna must match the frequency of the pipe or generator.

5.4.1 Tuning the antenna to the frequency

When starting to locate a pipe or after a frequency change, the antenna must be tuned to the frequency of the generator, locating probe or live pipe.

An overview of the available frequencies can be found here: [▸ section 8.2].

Procedure

- ▷ The frequency to be set is known (frequency of the generator, locating probe, live cable, etc.).
- ▷ The generator, locating probe, or the pipe transmits the set frequency.
- ▷ The antenna is ready for use.

1. Stand near the suspected pipe.
2. Set the required location mode on the receiver [▸ section 5.2].
3. When using a generator:
   move the antenna approx. 5 metres away from the generator.
4. On the receiver, tune the frequency of the generator, locating probe, live cable, etc.
   - 4.1 Switch to the main view.
   - 4.2 Press the filter key repeatedly until the required frequency is displayed.

✓ The frequency is set.

5.4.2 Holding the antenna correctly

The antenna locates the pipe by comparing the maximum and minimum values of the pipe's electromagnetic field. To this end, it must be moved back and forth between the minimum value and the maximum value. It is important to hold the antenna correctly during the procedure.

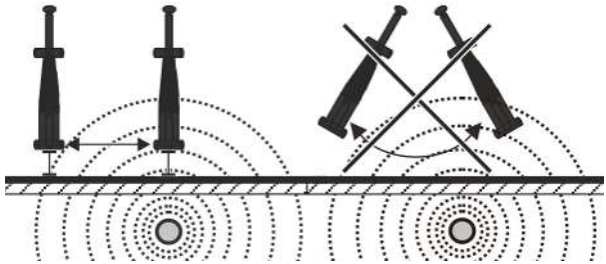


Fig. 11: Holding the antenna correctly

- Always keep the antenna upright.
- Always keep the antenna the same distance from the ground.
- Avoid a pendulum motion.

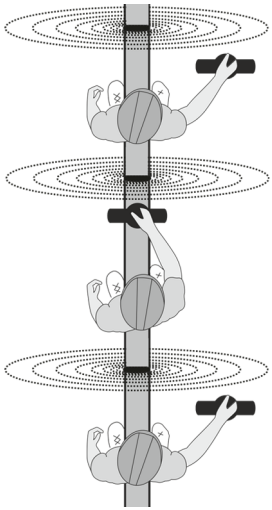


Fig. 12: Moving forward when locating a pipe

- Move the antenna smoothly back and forth between the minimum and maximum values of the pipe's electromagnetic field.

You can proceed in two different ways:

- Move the antenna to one side between the maximum and minimum values.
- Move the antenna back and forth between the two minimum values, crossing the maximum value in the process.

5.4.3 Locating a pipe for the first time

Procedure

▷ The antenna is ready for use.

▷ The antenna is tuned to the frequency [▶ section 5.4.1].

1. With the antenna, approach at a right angle to the direction of the suspected pipe. Hold the antenna perpendicular to the pipe.

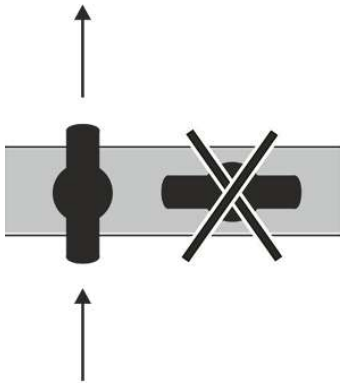


Fig. 13: Aligning the antenna when crossing the pipe

   ✓ A long acoustic signal sounds after the pipe has been crossed for the first time.

   ✓ The directional arrow on the receiver's display indicates the direction in which the pipe is located.

   ✓ The antenna has tuned into the pipe's electromagnetic field.

2. Move the antenna in the direction of the arrow on the display until the arrow becomes a diamond.

   ✓ The diamond shape indicates that the antenna is located directly above the pipe.

   ✓ When signal output is enabled:
   The antenna emits a fast discontinuous signal when it exceeds the maximum value.

✓ The antenna has located the pipe.

5.4.4 Tracking the pipe

Procedure

- ▷ The pipe is energised or live.
- ▷ The antenna is tuned to the frequency of the generator, locating probe or live cable, etc. [▸ section 5.4.1].
- ▷ The antenna has located the pipe for the first time [▸ section 5.4.3].
- ▷ The diamond shape indicates that the antenna is located directly above the pipe.

1. Track the pipe by moving the antenna back and forth between the minimum and maximum values [▸ section 5.4.2].
   1.1 Make sure that the antenna is always the same distance from the ground.
   - ✓ The directional arrow on the receiver's display indicates the direction in which the pipe is located.
   - ✓ With signal output enabled:
     When the antenna is above its maximum value, it emits a fast discontinuous signal.
     When the antenna is above the minimum value, it emits a single short signal.
2. Continue in this manner and locate the pipe.

5.4.5 Actively locating a pipe

Active locating uses a generator to create an electromagnetic field around the pipe or glass fibre probe system to be located. The energised pipe or glass fibre probe system can be located using the antenna.

5.4.5.1 Locating electroconductive pipes or glass fibre probe systems (TYPE pipe)

Electroconductive pipes or glass fibre probe systems can be actively located in non-electroconductive pipes using a generator.

Procedure

- ▷ The antenna is ready for use.
- ▷ For non-electroconductive pipes:
  The glass fibre probe system has been inserted into the pipe.

1. Switch on the generator. You can find this information in the generator's operating instructions.
2. Set the generator to a frequency that can also be set on the receiver. A list of the possible frequency settings can be found here: [▸ section 8.2.1].
3. Position the antenna at least 5 metres away from the generator.
4. On the receiver, set the location mode to TYPE pipe [▸ section 5.2].
5. On the receiver, tune the antenna to the frequency of the generator [▸ section 5.4.1].
6. Locate the pipe for the first time [▸ section 5.4.3].
7. Track the pipe [▸ section 5.4.4].

5.4.5.2 Detecting locating probes (TYPE locating probe)

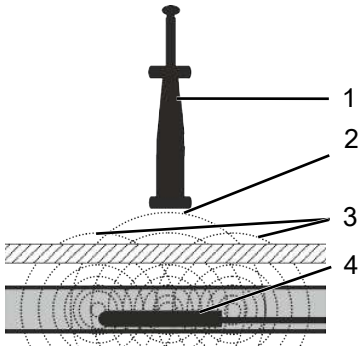


Fig. 14: Multiple maximum values for detecting locating probes

1	Antenna	2	Main maximum of the field strength
3	Secondary maxima of the field strength	4	Locating probe

It is possible to accurately locate the position of a locating probe in a non-electroconductive pipe.
The locating probe is inserted into the pipe. When switched on, locating probes generate an electromagnetic field which can be located by the receiver.
A special feature when detecting a locating probe is that three electromagnetic fields form. The strongest field is directly above the locating probe (main maximum), two other fields form next to it (secondary maxima). The secondary maxima are smaller than the main maximum. Depending on the movement of the antenna above the locating probe, a maximum value may be displayed three times during location.

Procedure

- ▷ The antenna is ready for use.
- ▷ The route of the pipeline is known.
- ▷ The locating probe is switched on and inserted into the pipe to be located.

1. On the receiver, set the location mode to TYPE locating probe [▸ section 5.2].
2. Tune the frequency of the locating probe on the receiver [▸ section 5.4.1].
3. Walk with the antenna along the pipe. Keep the antenna parallel to the pipe.

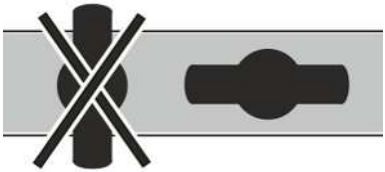


Fig. 15: Detecting locating probes - aligning the antenna parallel to the pipe

- ✓ Once the locating probe has been crossed for the first time, a long acoustic signal sounds.
- ✓ The directional arrow on the display indicates the direction in which the locating probe is located.

✓ The antenna has tuned into the electromagnetic field of the locating probe.

4. To determine the exact location of the locating probe, slowly move the antenna back until a single short signal sounds.
   ✓ The antenna has detected a minimum value.
5. Go back until a fast discontinuous signal appears.
   ✓ The antenna has detected a maximum value. The signal may be displayed over a longer distance than the size of the locating probe. In this case, the antenna detects several maximum values in succession.
6. Move the antenna back and forth several times between the maximum and minimum values.
   ✓ The antenna has tuned into the main maximum directly above the locating probe.

✓ The locating probe has been located.

5.4.6 Passively locating a pipe

Passive location uses electromagnetic fields that are already present on a pipe to be located.

The following can be used for locating

- 50 Hz, 100 Hz (mains frequency in Europe)
- 60 Hz, 120 Hz (mains frequency in North America etc.)
- Radio (VLF)

5.4.6.1 Locating live cables (TYPE electricity)

Procedure

▷ The antenna is ready for use.

1. On the receiver, set the location mode to TYPE current [▸ section 5.2].
2. Tune the receiver to the frequency of the mains [▸ section 5.4.1].
3. Locate the pipe for the first time [▸ section 5.4.3].

4. Track the pipe [▸ section 5.4.4].

5.4.6.2 Locating electroconductive pipes using available radio frequencies (TYPE radio)

Procedure

▷ The antenna is ready for use.

1. On the receiver, set the location mode to TYPE Radio [▸ section 5.2].
   ✓ The antenna automatically tunes into available radio frequencies.
2. Locate the pipe for the first time [▸ section 5.4.3].
3. Track the pipe [▸ section 5.4.4].

5.4.7 Locating pipes in a suddenly weakening electromagnetic field

During locating, the electromagnetic field can become so weak that it can no longer be measured by the receiver/antenna.

This may be the case in the following situations for example:

- The distance between the receiver/antenna and the generator has become too great
- Part of the pipe bends downwards
- Access to a certain section of the pipe is not possible (e.g. due to parked cars)

If the electromagnetic field has become too weak, reception of the electromagnetic field can be amplified semi-automatically on the receiver.

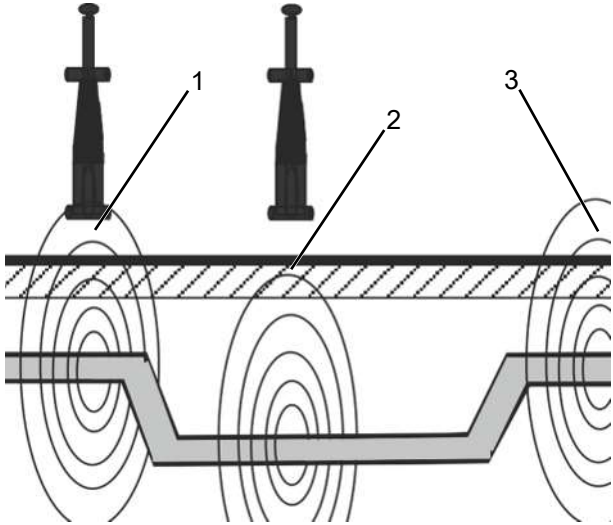


Fig. 16: Locating pipes in a weakening electromagnetic field

1	Strong electromagnetic field	2	Weak electromagnetic field, e.g., in the case of a buried pipe
3	Strong electromagnetic field		

What to do if the pipe is too far from the generator or bends downwards/is buried deep in parts

- ▷ A pipe has been located up to a certain point.
- ▷ The field strength is very low and is no longer being picked up in the measurement.
- ▷ You can guess the further course of the pipeline.

1. Hold the antenna above a point where you suspect the pipe might be and where no signal is received.
2. Press the activation key once.
   - ✓ Reception of the electromagnetic field is amplified.

- ✓ The pipe is located again.

What to do if you cannot access parts of the pipe

- ▷ A pipe has been located up to a certain point.

▷ Access to a certain part of the pipe is blocked by an obstacle.

▷ You can guess the further course of the pipeline.

1. Walk past the obstacle until you reach a point where you are back above where you suspect the pipe might be.
2. Press the activation key once.
   ✓ Reception of the electromagnetic field is amplified.

✓ The pipe is located again.

5.5 Determining the depth

Notice

Before any excavation, please note the following:

- The measured depth always refers to the centre of the electromagnetic field. The centre of the electromagnetic field is usually located in the centre of the pipe.
  ✓ The top edge of large pipelines, therefore, may not be as deep as specified.
- In locating probes, the centre of the electromagnetic field is in the centre of the locating probe. This is not usually the same as the centre of the pipe.
  ✓ When locating with locating probes therefore, the top edge of the pipe may not be as deep as indicated.

Notice

The distance between the antenna and the locating probe must be at least 0.7 m. At smaller distances, the depth measurement of locating probes can lead to inaccurate results.

The depth is displayed as soon as the antenna is positioned exactly upright above the object being located.

The depth value disappears as soon as the antenna is no longer above the object being located.

Procedure

▷ The antenna is ready for use.

▷ The receiver's display shows the main view.

▷ The pipe has been located.

- Hold the antenna upright above the object being located.

✓ The receiver's display shows the distance between the bottom edge of the antenna and the centre of the object being located.

5.5.1 Setting the unit

The depth can be set in metres (m) or feet (ft). Information on setting the unit can be found here: [▸ section 5.2].

6 Maintenance

6.1 Care

All that is necessary to care for the product is to wipe it down with a damp cloth.

SEWERIN recommends: Always remove significant contamination immediately.

Please note the following special points:

- Never use compressed air or a water jet for cleaning.
- Clean any dirty contacts on the antenna's bolt with a damp cloth.
- If necessary, dry the entire antenna port after cleaning.

7 Troubleshooting

Problem	Possible cause	Corrective action
Antenna continuously emits an acoustic signal	Antenna too close to generator when setting the frequency	Reset frequency [▸ section 5.4.1]
Signal suddenly disappears during locating	● Too far from generator ● Part of pipe is buried deeper	Amplify signal reception semi-automatically [▸ section 5.4.7]

8 Appendix

8.1 FS 150 Technical Data Sheet

Series	
Type/model	108 01
Certificates	
Certificate	CE
Device data	
Dimensions (W × D × H)	150 x 72 x 538 mm
Weight	● 1100 g (without TS 150 carrying rod) ● 1790 g (with TS 150 carrying rod)
Material	LEXAN® polycarbonate
Features	
Alarms	● Buzzer ● Vibration sensor
Interface	1-Wire
Processor	DSP 16 bit
Operating conditions	
Operating temperature	-20 – 50°C
Humidity	15 – 90% r.h., non-condensing
Atmospheric pressure	900 – 1300 hPa
Protection rating	IP54
Non-permitted operating environments	in potentially explosive areas
Storage conditions	
Storage temperature	-25 – 50°C
Humidity	15 – 90% r.h., non-condensing

Measurement	
Filter	BP ± 10 Hz all frequencies; except VLF: BP ± 5 kHz
Sampling rate	16 bit, 48 kHz
Sensitivity levels	110 dB
Sensitivity	Automatic adjustment

Locating	
Receiving frequency	● Frequencies for active locating: 512/640/1100/8192/9950/32768/41667/65536/83078/116000 Hz ● Frequencies for passive locating: 50/60/100/120 Hz, VLF (15 – 25 kHz) ● Frequencies for detecting locating probes: 512/640/32768/41667/116000 Hz
Location depth	max. 8 m ● Error: ± 10% (up to 2.5 m) ● at 512/640/1100 Hz: ○ Error: ± 15% (up to 2.5 m)

Additional data	
Attachment option	on TS 150 carrying rod
Transport	Bag FS 150

Assignment	
For use with	● Carrying rod TS 150 (required accessory) ● AQUAPHON A 150 receiver (required accessory) ● FG 150 generator
Optional accessory for	AQUAPHON A 150 receiver

Subject to technical changes.

8.2 Adjustable frequencies

8.2.1 Frequencies for active locating

Frequency	Display on receiver
512 Hz	512 Hz
640 Hz	640 Hz
1.100 kHz	1.10 kHz
8.192 kHz	8.19 kHz
9.950 kHz	9.95 kHz
32.768 kHz	32.8 kHz
41.667 kHz	41.7 kHz
65.536 kHz	65.5 kHz
83.078 kHz	83.1 kHz
116.000 kHz	116 kHz

8.2.2 Frequencies for passive locating

Frequency	Display on receiver
50	50 Hz
60 Hz	60 Hz
100 Hz	100 Hz
120 Hz	120 Hz
VLF (15 kHz - 25 kHz)	

8.2.3 Frequencies for detecting locating probes

Frequency	Display on receiver
512 Hz	512 Hz
640 Hz	640 Hz
32.768 kHz	32.8 kHz
41.667 kHz	41.7 kHz
116.000 kHz	116 kHz

8.3 Identification plate

The identification plate is located on the back of the device.

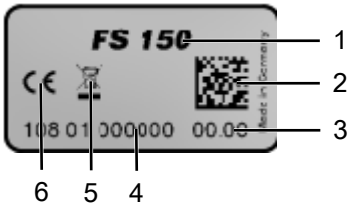


*Fig. 17: Identification plate **FS 150***

1	Product name	2	QR code for serial number
3	Production date (MM.YY)	4	Serial number (made up of type, version and device number)
5	WEEE symbol	6	CE mark

8.4 Accessories

Below is a selection of accessories. SEWERIN sales will be happy to provide you with information on other accessories.

8.4.1 Accessories required

Part	Order number
Aquaphon A 150	EA25-A0100
TS 150 carrying rod	ZM21-A0100

8.4.2 Optional accessories

Part	Order number
FG 150 generator	SW50-A0100
F8 wireless headphones	EZ13-A0230
K3 headphones	EZ13-11000
Bag FS 150	3204-0049
Carrying handle FS 150	ZM21-Z0200

8.5 Declaration of conformity

Hermann Sewerin GmbH hereby declares that the **FS 150** antenna fulfils the requirements of the following directives:

- 2011/65/EU
- 2014/30/EU

The complete declaration of conformity can be found at www.sewerin.com..

8.6 Advice on disposal

The European Waste Catalogue (EWC) governs the disposal of devices and accessories in accordance with EU Directive 2014/955/EU.

Waste	EWC code
Device	16 02 13

Symbol on identification plate

	WEEE symbol	Do not dispose of product in domestic waste.

Alternatively, devices can be returned to SEWERIN.

Index

A

Accessories 41
Activation key 13
Antenna
  Attach the carrying rod 20
  Care 36
  Carrying handle 7
  Description 5
  hold 25
  Identification plate 6
  Minimum value and maximum value 8
  Operating principle 7
  Power supply 10
  Signals 8

C

Cable 31
Care 36
Carrying handle 7
  Mounting 21
Carrying rod
  Attach the aerial 20
  Connect receiver 22
  Description 11
Configuring 22

D

Declaration of conformity 42
Depth
  determining 34
  Setting the unit 35
  Unit 17
Display
  Backlight 15
  Main view 14
  Overview 13
  Rotation 15
  Settings view 15
Display illumination 15
Disposal 42

E

Enter key 13

F

Filter key 13
Firmware version 12
Frequency
  active locating 40
  Locating probe 40
  passive locating 40
  setting 25

G

Gain control
  Automatic 9
  semi-automatic 9, 32
Generator 28
  Description 17
  large distance 33
Glass fibre probe system 28

H

Headphones 18
  Adjusting the volume 24
  Safety information 3
  wired 24
  Wireless headphones 23
Hearing protection function 12

I

Identification plate 6, 41

K

Key
- Activation key 13
- Enter key 13
- Filter key 13
- Function 12
- Menu key 13
- Up/Down button 13

L

Live cable 31
Locating
- Active 28
- electrically conductive pipe 28, 32
- electrically non-conductive pipe 30
- for the first time 27
- Glass fibre probe system 28
- Live cable 31
- Locating probe 30
- Passive 31
- Pipeline 28
- Radio frequencies 32
- weak electromagnetic field 32
- weak reception 32

Locating probe 30
- Frequency 40

Location mode
- Overview 16
- TYPE Electricity 31
- TYPE Locating probe 30
- TYPE pipe 28
- TYPE radio 32

M

Main view 14
Maximum value 8
- multiple 29
- Signal 9

Menu key 13
Minimum value 8
- Signal 9

P

Pipe
- actively locating 28
- Determining the depth 34
- electrically conductive 28, 32
- Follow course 28
- lack of access 33
- locate for the first time 27
- locating 24
- passively locating 31

Q

Qualification of users 2
- Specialist 2
- Trained person 2

R

Radio frequencies 32
Receiver
- Configuring 22
- Connect carrying rod 22
- Description 12
- Firmware version 12
- Key functions 12
- Main view 14
- Setting the frequency 25
- Settings view 15

Reset 17, 23

S

Safety information 3
- Headphones 3

Settings
- View 15

Signals 8

Type 8, 16

T

Technical data 38
Troubleshooting 37

U

Unit 17
Up/Down key 13
Use
improper 1
Intended 1, 3

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