



UT 930



Receiver UT 930 R

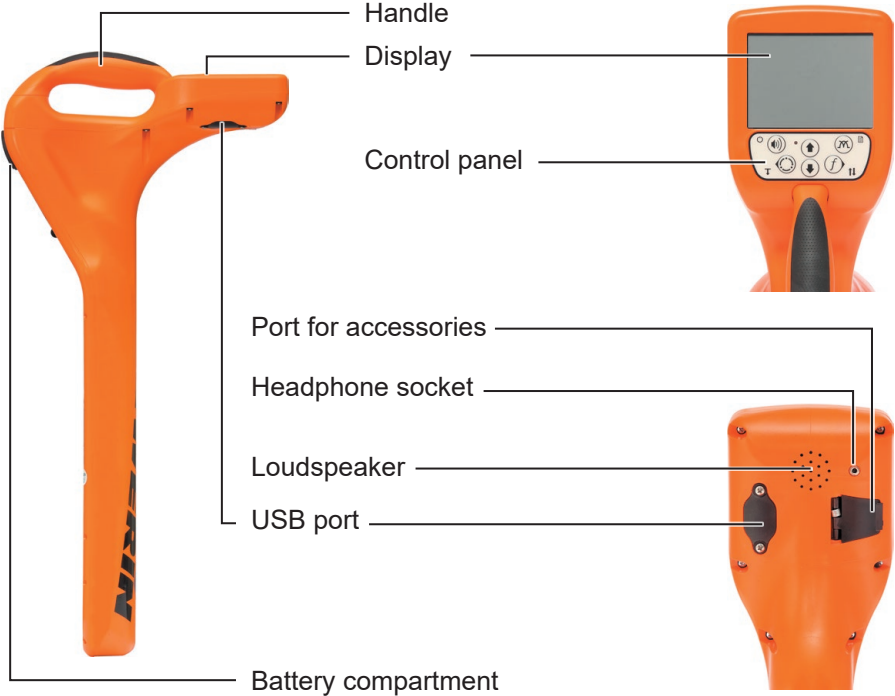


Fig. 1: Receiver

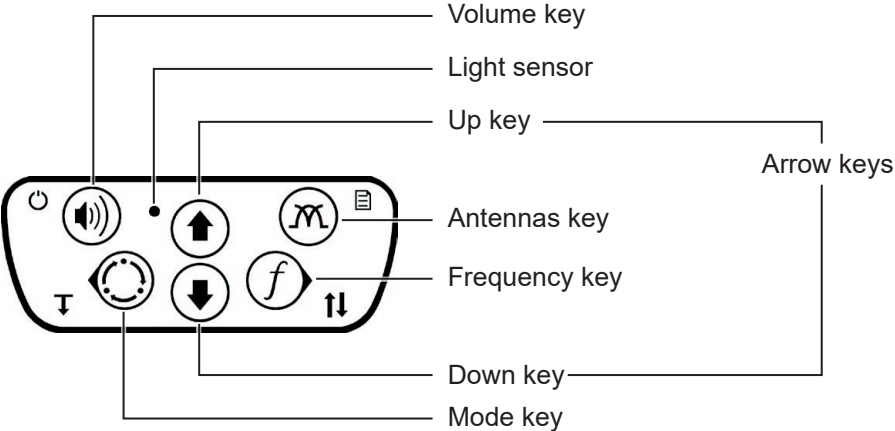


Fig. 2: Receiver control panel

Generator UT 935 TX



Fig. 3: Generator

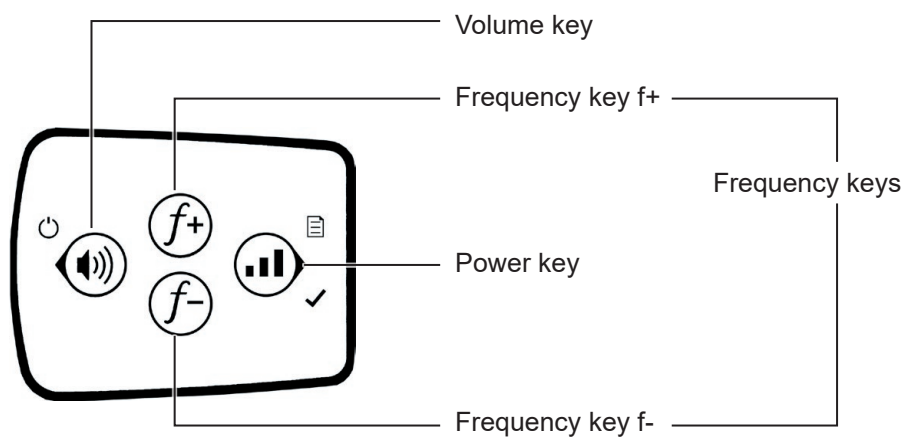


Fig. 4: Generator control panel

Illustration of warnings in this document



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.

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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.

Note:

The **UT 930** system is described in these operating instructions. The descriptions refer to the system as delivered (factory settings).

Translations

Translations are produced to the best of our knowledge. The original German version is authoritative.

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1.2 Purpose

UT 930 is an electronic locating system to detect electrically conductive, underground lines.

The system can be used for:

- Locating and tracking lines

Lines refer to current-conducting and signal-transmitting cables as well as supply lines, for example.

- Determining the depth of lines

1.3 Intended use

The product is suitable for the following uses:

- Professional
- Industrial
- Commercial

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

Note:

Specialist knowledge is required to operate the system. Work on electrical installations may only be completed by trained specialists.

1.4 Safety information

This product was manufactured in accordance 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.

- Observe all the applicable safety standards and accident prevention regulations. This particularly applies to work on electrical systems (e.g. current-carrying cables).
- Use the product only as intended.

- 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 Hermann Sewerin GmbH.
- Do not use the product if it is damaged or faulty. Never use damaged or defective accessories.
- Only use accessories and consumables approved by Hermann Sewerin GmbH.

If not described otherwise: Standard batteries or rechargeable batteries can be used for the power supply of the products.

- At the same time, always use power sources that are identical in terms of type (battery or rechargeable battery), capacity, manufacturer, charge and state (new or used).
- Always observe the permitted operating and storage temperatures.
- Before starting the location work obtain information about the route of buried cables and lines from local utility companies.
- Always adequately cordon off the work area.
- Never operate the product in the vicinity of explosive areas.
- Protect the ports and sockets on the product against dirt, and electrical ports in particular against moisture.
- Do not submerge the product in liquids.
- 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 your hearing.

1.5 Safety information for lithium-ion rechargeable battery

- Risk of short circuit! Do not touch the power connector poles with metal.
- Never try to open the rechargeable battery.
- Do not use the rechargeable battery if it is damaged.
- Prevent the ingress of moisture into the rechargeable battery.
- Protect the rechargeable battery from mechanical loads (impact, vibration). Never drop the rechargeable battery.
- Observe the permissible conditions during charging, storage and operation. Protect the rechargeable battery against very low and high temperatures even when these are in the permissible range.
- Only charge the rechargeable battery using the relevant AC/DC adapter.
- Never place the rechargeable battery on an open fire.
- Dispose of the rechargeable battery in accordance with applicable guidelines.

2 System overview

2.1 General information

System **UT 930** can be used for active and passive locating. During active locating the required electromagnetic field is generated with a generator. During passive locating existing electromagnetic fields are used.

SEWERIN recommends: Always check the plausibility of the system's location results.

2.2 System components

The system has a modular construction. The main system components are as follows:

- Receiver **UT 930 R**
- Generator **UT 935 TX**
- **UT configurator** software

The receiver and generator can be transported and stored in bags.

Information about the receiver can be found in section 3 and the generator in section 5.

Accessories

Accessories can be added to the system at any time, for example:

- active locating of lines
 - cable set simple
 - earthing spike
 - cable clamp
- active locating of beacons
 - beacon (locating transmitter)
 - fibre glass rod

UT configurator software

The **UT configurator** software can be used to update and efficiently configure the receiver and generator.

The software can be used to execute the following tasks, for example:

- update firmware
- preset, activate frequencies
- create own frequencies (in addition to available ones)
- configure the device (receiver, generator)
- set up the start screen (e.g. company logo as background)
- save individual settings and load again at a different point in time

Prerequisites for using the software:

- software is installed on a computer
- device is connected to the computer via a USB cable

The software can be downloaded free of charge from www.sewerin.com.

Information on updates and configurations is provided in section 7.5.

3 Receiver UT 930 R

3.1 General information

The receiver can detect signals from electromagnetic fields. Signals are reproduced:

- visually on the display
- audibly via the loudspeaker or headphones

The field strength is shown graphically and numerically on the display. The direction arrows and other graphical elements help when approaching the location object just like the audible sound and special signal tones.

The volume set for the loudspeaker or headphones does not affect the sensitivity of the receiver, i.e. loud signals are not necessarily strong signals.

You will find an overview of the receiver parts inside the front cover (fig. 1).

3.2 Location modes and antennas

Different location modes can be used during active and passive locating. Different antennas can be selected based on the locating mode.

Locating method	Locating mode	Antenna
active	 Line	 Twin
	 Beacon	 Single
	 Auto-Gain	 Null
passive	 Power	 Single
		 Null
	 Radio	 Twin

Locating mode

Locating mode	Suitable locating objects
 Line	- lines that are energised by a generator Features: – manual or semi-automatic gain control – several antennas can be used
 Autogain	- lines that are energised by a generator Features: – automatic gain control – only Single antenna can be used – special audible signal
 Power	- live cables – available network frequencies: 50 Hz, 100 Hz, 150 Hz (Europe) or 60 Hz, 120 Hz, 180 Hz (North America, amongst others)
 Beacon	non-metallic lines into which a beacon (locating transmitter) is inserted
 Radio	- metal lines – frequency range 11.6 – 31.4 kHz (VLF range)

Antennas

Antenna	Description
 Twin	- to determine the position of a line using maximum mode In comparison to a Single antenna: – lower range – higher degree of accuracy
 Single	- to determine the position of a line using maximum mode In comparison to a Twin antenna: – greater range – lower degree of accuracy

Antenna	Description
 Null	to determine the position of a line using minimum mode (null signal) Feature: – significantly more distinct signal curve over the line

3.3 Control panel

You will find an overview of the control panel elements inside the front cover (fig. 2).

The light sensor is designed to automatically control the backlight.

The keys have several functions. Symbols next to the keys illustrate the additional functions.

Volume key

On/Off



- switching on the receiver
 - press and hold the key
- switching off the receiver
 - press and hold the key

Volume



- In measuring mode:
- adjust volume or switch off sound
 - briefly press key repeatedly

Exit the menu

- In the menu:
- exit menu and switch directly to measuring mode
 - press the key

Mode key

Locating mode



In measuring mode:

- select locating mode
 - briefly press key repeatedly

Depth



In measuring mode:

- determine depth manually
 - press the key until there is an audible signal tone

Back



In the menu:

- switch back to the next level up
 - briefly press the key
-

Up key

Gain



In measuring mode:

- increase gain
 - in semi-automatic gain control mode: press the key
 - in manual gain control mode: press the key several times

To top

In the menu:

- move to top
 - press key repeatedly
-

Down key

Gain



In measuring mode:

- decrease gain
 - in semi-automatic gain control mode: press the key
 - in manual gain control mode: press the key several times

To bottom

In the menu:

- move to bottom
 - press key repeatedly
-

Antenna key 		
Antenna		In measuring mode: • select antenna – briefly press key repeatedly
Menu		In measuring mode: • open menu – press and hold the key

Frequency key 		
Frequency		In measuring mode: • select frequency – briefly press key repeatedly
Next		In the menu: • switch to the next level down – briefly press the key
Select		In the menu: • select settings (enable/disable) – briefly press the key

3.4 Measuring mode and menu

When switched on the receiver is automatically in measuring mode. The current measurement values are displayed in measuring mode.

You can switch from measuring mode to the main menu. The main menu has submenus in which the user can implement settings and view information.

3.4.1 Display in measuring mode

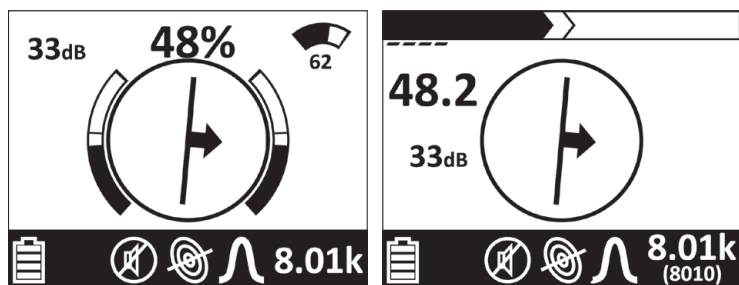


Fig. 5: Receiver display - measuring mode
Left image: **UtiliGuard2** user interface
Right image: **Classic** user interface

During the locating process graphical elements, that support the targeted approach of a location object, are shown on the display. The field strength and gain are also displayed.

If the receiver is directly above the location object the depth can be displayed.

The toolbar shows the current settings.

A schematic representation of a signal indicator is displayed in the right upper corner of the **UtiliGuard2** user interface. The signal indicator provides information about the possible range of the locating signal.

An overview of the symbols that may appear on the display can be found in section 12.3.

3.4.1.1 Approaching a location object (compass)

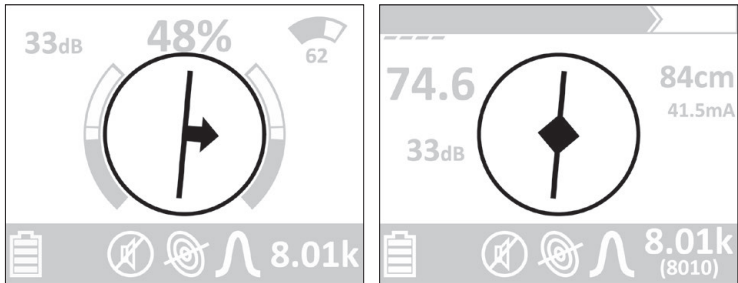


Fig. 6: Receiver display – compass

Left image: **UtiliGuard2** user interface (*here: with directional arrow*)

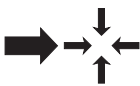
Right image: **Classic** user interface (*here: with diamond*)

The following graphical elements can appear when approaching a location object¹:



Compass with compass needle

- The compass needle shows the position of the line.



Directional arrows

- The receiver must be moved in the displayed direction.
- The shorter the arrow the smaller the distance to the location object.



Diamond

- The receiver is directly above the location object.

¹ Does not apply to passive locating using **Radio** locating mode.

3.4.1.2 Field strength display

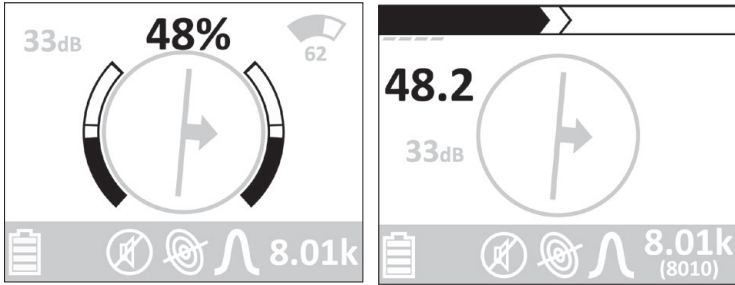


Fig. 7: Receiver display – shows the field strength (*here: 48% to 48.2*)
Left image: **UtiliGuard2** user interface
Right image: **Classic** user interface

The field strength is shown:

- numerically
- graphically

The larger the black area the higher the field strength.

A trailing pointer briefly marks the highest value of the field strength.

3.4.1.3 Gain display

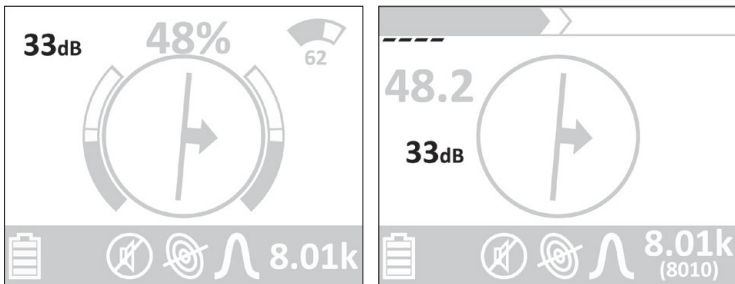


Fig. 8: Receiver display – shows the gain (*here: 33 dB*)
Left image: **UtiliGuard2** user interface
Right image: **Classic** user interface

The gain is shown:

- numerically
- graphically (**Classic** user interface only)

The more segments that are visible the greater the gain.

3.4.1.4 Depth display

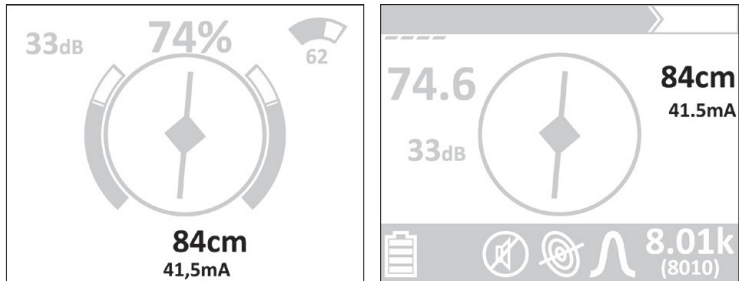


Fig. 9: Receiver display – shows the depth
(here: depth 84 cm, current 41.5 mA)
Left image: **UtiliGuard2** user interface
Right image: **Classic** user interface

The depth is shown numerically. The associated unit can be set.
The current is also specified. This helps to clearly identify the energised line in the event of lines being positioned in parallel, for example.

3.4.1.5 Toolbar

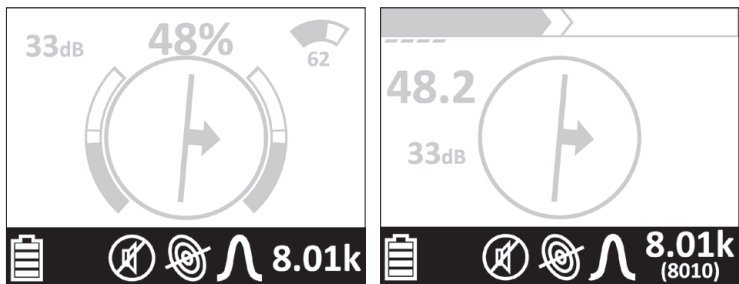


Fig. 10: Receiver display – toolbar
Left image: **UtiliGuard2** user interface
Right image: **Classic** user interface

The following is displayed in the toolbar (from left to right):

- Battery status
- Volume
- Locating mode
- Antenna
- Frequency

3.4.2 Display with main menu

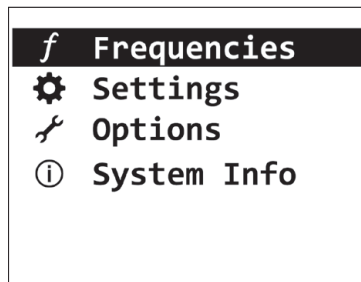


Fig. 11: Receiver display - main menu

Information about the menus can be found in section 4.

3.4.3 Navigating the menus

The control panel keys can be used to navigate the main menu and submenus.

Opening the main menu

The receiver is in measuring mode.

- Press and hold the Volume key. The main menu opens.

Selecting a menu item in a menu

The receiver shows a menu. The currently selected menu item is highlighted.

1. Use the arrow keys to select a menu item.
2. Press the Frequency key. The menu item appears.

Changing settings (enable/disable menu item)

The receiver shows a menu in which menu items can be enabled or disabled (fig. 12). The currently selected menu item is highlighted.

1. Use the arrow keys to select a menu item.
2. Press the Frequency key.
 - If the menu item was disabled (no checkmark set), it is enabled.
 - If the menu item was enabled (checkmark set), it is disabled.
3. Press the Volume key. The setting is applied. The receiver switches back to the next level up.

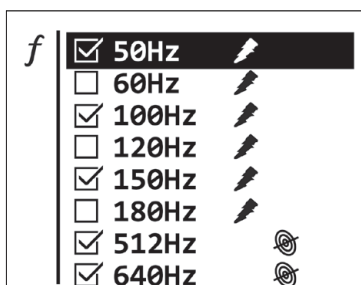


Fig. 12: Receiver display – **Frequencies** menu (*here: menu items 60Hz, 120Hz and 150Hz disabled*)

Switching back to the next level up from a menu

The receiver shows a menu or menu item.

- Press the Mode key. The receiver switches back to the next level up.

Switching directly back to measuring mode from a menu

The receiver shows a menu.

- Press the Volume key. The receiver switches directly back to measuring mode.

3.5 Power supply

The receiver is powered by batteries. Two alkaline batteries LR20, mono D are required for the power supply.

Replacing the batteries

The battery compartment lid is sealed with a quick-release fastener.

The receiver is switched off.

1. Open the battery compartment by turning the quick-release fastener.
2. Remove the used batteries.
3. Insert the new batteries. Ensure that the polarity is correct (fig. 13).
4. Close the battery compartment.
5. Check the receiver is ready for operation.
 - To do so, switch on the receiver.

If the polarity of the batteries is not correct, you will not be able to switch on the receiver.

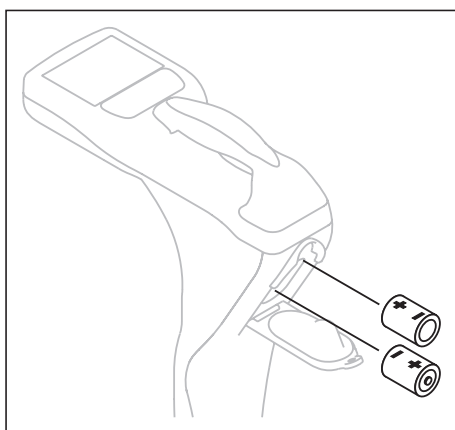


Fig. 13: Replacing the receiver batteries – polarity of the batteries

4 Receiver menus

4.1 Main menu (overview)

The main menu comprises the following menus:

- **Frequencies**
- **Settings**
- **Options**
- **System Info**

The main menu can be opened when the receiver is in measuring mode.

Information about navigating the menus can be found in section 3.4.3.

4.1.1 Frequencies

The preset frequencies can be enabled and disabled in the **Frequencies** menu item. Symbols indicate for which location modes the individual frequencies are suitable.

Additional information about the frequencies can be found in section 7.2.

4.1.2 Settings

The following can be set in the **Settings** menu item:

- **Language**
- **Units**
- **Backlight**
- **Shutdown Timer**

4.1.2.1 Language

The language of the user interface can be set in the **Language** menu item.

4.1.2.2 Units

The measuring unit for the depth can be set in the **Units** menu item.

- **Inches**
- **Feet & Inches**
- **Meters**
- **Centimeters**

4.1.2.3 **Backlight**

The **Backlight** menu item can be used to set whether the display is illuminated.

- **Auto**

The display is illuminated based on the current light conditions. The light sensor on the control panel controls the activation and deactivation of the backlight.

- **Off**

The display is not illuminated.

4.1.2.4 **Shutdown Timer**

The **Shutdown Timer** menu item can be used to set the time after which the receiver will switch off automatically if it is not operated in the meantime.

- **5 | 10 | 15 | 20 | 30 Minutes**

The receiver switches off after the set time has elapsed.

- **Always On**

The receiver does not switch off automatically.

4.1.3 **Options**

The following can be set in the **Options** menu item:

- **Audio**
- **Gain**
- **L/R Arrows**
- **Autodepth**
- **User Interface**

4.1.3.1 Audio

The following can be set in the **Audio** menu item:

- **Audio Mode**
- **Audio Style**
- **Center Beep**

Audio Mode

The type of audible sound can be set in the **Audio Mode** menu item.

- **Pitch**

The tone pitch of the signal can vary (high/low).

- **Volume**

The volume of the signal can vary (loud/quiet).

Audio Style

The way in which the sound is reproduced for the audible sound can be set in the **Audio Style** menu item.

- **Classic**
- **Smooth**

Center Beep

If the receiver is directly above a line during the locating process, a special signal tone can be emitted. The signal tone can be enabled and disabled in the **Center Beep** menu item.

- **On**

A signal tone is emitted directly above a line.

- **Off**

No signal tone is emitted.

4.1.3.2 Gain

Received signals generally have to be enhanced on the receiver. The way in which the received signals are enhanced can be set in the **Gain** menu item.

- **Manual**

The gain can be set manually by the user in increments until the required level is achieved.

- **Semi-auto** (semi-automatic)

The device automatically determines the optimum gain. The user can then continue to adjust the gain manually.

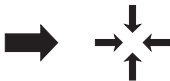
Note:

In **Autogain** locating mode the gain is adjusted automatically.

Information about adjusting the gain can be found in section 7.3.

4.1.3.3 L/R Arrows

A compass is displayed during measuring mode in **Line** and **Power** location modes. In the **L/R Arrows** menu item, you can set whether the compass is displayed with or without the following graphical elements:



Directional arrows



Diamond

Fig. 14 provides a comparison of both display types.

- **On**

Display of the compass with directional arrow or diamond.

- **Off**

Display of the compass without the directional arrow or diamond.

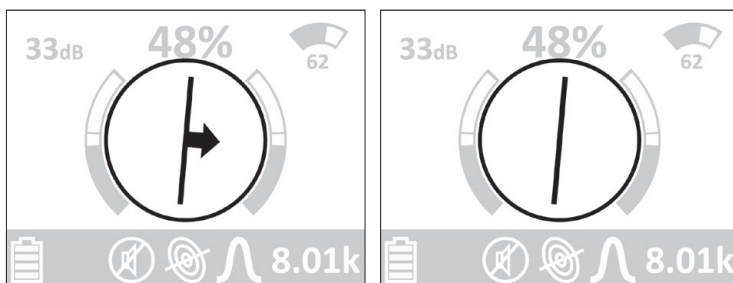


Fig. 14: Receiver display – measuring mode (*here: UtiliGuard2 user interface*)

Left image: Compass with directional arrow

Right image: Compass without directional arrow

4.1.3.4 Autodepth

The way in which the depth is determined can be set in the **Autodepth** menu item.

- **Auto**

The depth is displayed automatically as soon as the receiver is directly above the location object.

- **Manual**

The depth can be determined manually by the user by pressing the Mode key.

Further information about determining the depth can be found in section 7.4.

4.1.3.5 User Interface

The type of display (fig. 5) for measuring mode can be set in the **User Interface** menu item.

- **UtiliGuard2**

- **Classic**

4.2 System Info menu

Information about the receiver, such as the serial number and software version, are displayed in the **System Info** menu.

The information is spread over several display views.

– Press the arrow keys to see all of the information.

5 Generator UT 935 TX

5.1 General information

Lines can be energised directly and indirectly with the generator. The generator is therefore also often referred to as the transmitter.

Various frequencies are available for energising. The most common frequencies are set as part of the factory settings (section 12.2.2).

You will find an overview of the generator parts inside the front cover (fig. 3).

As long as the volume on the generator is switched on, a signal will sound to secure the work area.

5.2 Operating modes

Indirect and direct energising are referred to as operating modes on the **UT 935 TX**. Symbols are used to show the selected operating mode on the display (fig. 15).

Operating mode	Energise with
Indirect energising	 cable clamp
	 generator without accessories
Direct energising	 simple cable set

5.3 Control panel

You will find an overview of the control panel elements inside the front cover (fig. 4).

The keys have several functions. Symbols next to the keys illustrate the additional functions.

Volume key

On/Off



- switch on the generator
 - press and hold the key
- switch off the generator
 - press and hold the key

Volume



- In transmitting mode:
- switch the volume on and off
 - briefly press the key

Back



- In the menu:
- switch back to the next level up
 - briefly press the key
-

Frequency key f+

Frequency



- In transmitting mode:
- increase the frequency
 - briefly press the key
-

Frequency key f-

Frequency



- In transmitting mode:
- reduce the frequency
 - briefly press the key
-

Power key

Power setting 

In transmitting mode:

- select power setting
 - briefly press key repeatedly

Menu 

In transmitting mode:

- open menu
 - press and hold the key

Next 

In the menu:

- switch to the next level down
 - briefly press the key

Select 

In the menu:

- select settings (enable/disable)
 - briefly press the key

5.4 Transmitting mode and menu

When switched on the generator is automatically in transmitting mode.

You can switch from transmitting mode to the main menu. The main menu has submenus in which the user can implement settings and view information.

5.4.1 Display in transmitting mode

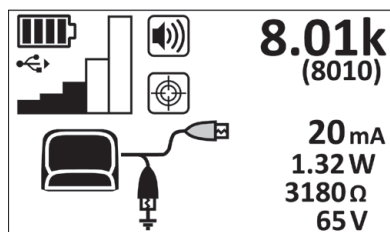


Fig. 15: Generator display – transmitting mode

In transmitting mode the current settings and states are shown on the left of the display using symbols. The frequency and current values are shown on the right.

An overview of the symbols that may appear on the display can be found in section 12.3.

Frequency display

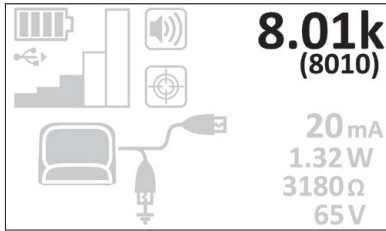


Fig. 16: Generator display – frequency

The set frequency is shown on the top right of the display. For frequencies greater than 1000 Hz, the value is shown in kHz and Hz.

Display of other values

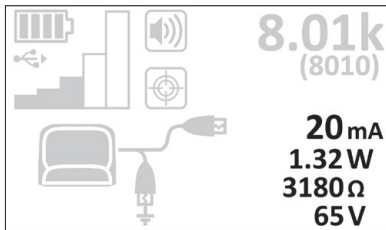


Fig. 17: Generator display – other values

Other values that can be displayed, for example, include the resistance between the connection points and the current.

Which values are actually displayed is dependent on:

- operating mode
- the **Meter** settings

Information about the settings can be found under **Meter** in section 6.3.2.

5.4.2 Display with main menu

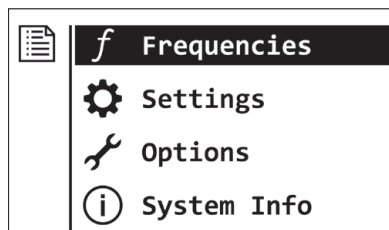


Fig. 18: Generator display - main menu

Information about the menus can be found in section 6.

5.4.3 Navigating the menus

The control panel keys can be used to navigate the main menu and submenus.

Opening the main menu

The generator is in transmitting mode.

- Press and hold the Power key. The main menu opens.

Selecting a menu item in a menu

The generator shows a menu. The currently selected menu item is highlighted.

1. Use the Frequency keys to select a menu item.
2. Press the Power key. The menu item appears.

Changing settings (enable/disable menu item)

The generator shows a menu in which menu items can be enabled or disabled. The currently selected menu item is highlighted.

1. Use the Frequency keys to select a menu item.
2. Press the Power key.
 - If the menu item was disabled (no checkmark set), it is enabled.
 - If the menu item was enabled (checkmark set), it is disabled.

3. Press the Volume key. The setting is applied. The generator switches back to the next level up.

Switching back to the next level up from a menu

The generator shows a menu or a menu item.

- Press the Volume key. The generator switches back to the next level up.

5.5 Power supply

The generator can optionally be operated with batteries or with a special lithium-ion rechargeable battery.

Different battery compartment lids (fig. 19) must be used depending on the power source.

Power source	Battery compartment lid features
Batteries	battery holder is on the inside of the battery compartment lid
Lithium-ion rechargeable battery	rechargeable battery is built into the battery compartment lid

So that they can be distinguished, the battery compartment lids have a sticker on the outside specifying the power source being used.



Fig. 19: Generator

Top image: Generator with open battery compartment

Bottom left image: Battery compartment lid for batteries

Bottom right image: Battery compartment lid with integrated lithium-ion rechargeable battery

5.5.1 Powered by batteries

Ten alkaline batteries LR20, mono D are required for the power supply.

Replacing the batteries

The battery compartment lid is sealed with quick-release fasteners.

The generator is switched off.

1. Open the battery compartment by turning the quick-release fasteners.
2. Remove the used batteries.
3. Insert the new batteries. Ensure that the polarity is correct (fig. 20).
4. Close the battery compartment.
5. Check the generator is ready for operation.
 - To do so, switch on the generator.

If the polarity of the batteries is not correct, you will not be able to switch on the generator.

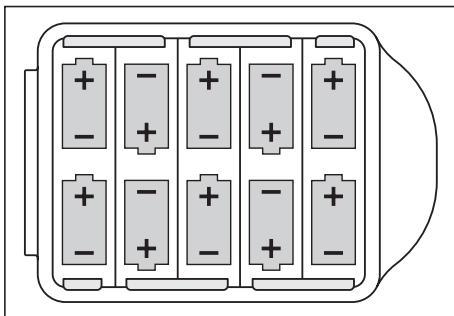


Fig. 20: Replacing the generator batteries – polarity of the batteries

5.5.2 Powered by lithium-ion rechargeable battery

A special lithium-ion rechargeable battery is required for the power supply. The rechargeable battery is built into the battery compartment lid (fig. 19).

The lithium-ion rechargeable battery can be purchased as an accessory.

Please observe the following information about the rechargeable battery:

- Safety information: section 1.5
- Charging and storage: section 11.1.1 and section 11.1.2
- Handling faulty lithium-ion rechargeable batteries: section 11.1.3

6 Generator menus

6.1 Main menu (overview)

The main menu comprises the following menus:

- **Frequencies**
- **Settings**
- **Options**
- **System Info**

The main menu can be opened when the generator is in transmitting mode.

Information about navigating the menus can be found in section 5.4.3.

6.2 Frequencies menu

The preset frequencies can be enabled and disabled in the **Frequencies** menu. Symbols indicate for which operating modes the individual frequencies are suitable.

The fewer frequencies are enabled, the faster you can switch between the frequencies during measuring mode.

Additional information about the frequencies can be found in section 7.2.

6.3 Settings menu

The following can be set in the **Settings** menu:

- **Backlight**
- **Meter**

6.3.1 Backlight

The **Backlight** menu item can be used to set whether and for how long the display is illuminated.

- **On**

The display is illuminated for a certain time. The duration is dependent on the setting in the **Timer** menu item.

- **Off**

The display is not illuminated.

- **Timer**

The backlight automatically switches off after the set amount of time if the generator is not operated in the meantime. Default setting is 5 seconds.

– **5 | 10 | 20 | 40 Seconds**

Note:

The **Timer** menu item is only available if the **On** menu item is enabled.

6.3.2 Meter

In the **Meter** menu item you can set the extent to which other values (fig. 16) are displayed.

- **Simple**

- **Advanced**

The display is dependent on the operating mode.

Meter	Indirect energising		Direct energising
	Generator without accessories	With cable clamp	
Simple	● power (as percentage of output power) [%]	● current [mA]	● current [mA]
Advanced	● power (as percentage of output power) [%] ● voltage [V]	● current [mA] ● voltage [V]	● current [mA] ● power [W] ● resistance [Ω] ● voltage [V]

6.4 Options menu

The following can be set in the **Options** menu:

- **Language**
- **Shutdown Timer**

6.4.1 Language

The language of the user interface can be set in the **Language** menu item.

6.4.2 Shutdown Timer

The **Shutdown Timer** menu item can be used to set the time after which the generator will switch off automatically if it is not operated in the meantime.

- **2 | 4 | 8 Hours**

The generator switches off after the set time has elapsed.

- **Always On**

The generator does not switch off automatically.

6.5 System Info menu

Information about the generator is displayed in the **System Info** menu. The information can be spread over several display views.

- Press the Frequency key f- to see all of the information.

7 Using the system

7.1 Adjusting the volume or switching off the sound

The volume of the sound changes continuously during the locating process. The volume on the receiver must therefore be adjusted as required to prevent any hearing damage or to be able to hear the sound better.



CAUTION! Health hazard

Excessive noise can damage the hearing and lead to irreversible damage to health.

- Always adjust the volume to the current situation, especially if you are using headphones.
 - Choose as low a volume as possible.
-

Three volume levels are available. The sound is switched off in the fourth level.

The receiver is in measuring mode.

- Briefly press the Volume key repeatedly until the required volume is set. The volume changes with each keystroke.

7.2 Setting the frequency

Frequencies can be available, preset and enabled. Only enabled frequencies can be used for the locating process.

• **Available frequencies**

There are 75 available frequencies in the **UT configurator** software. Available frequencies can be selected and transferred to a device. (By transferring the frequencies, they become preset frequencies on the device.)

• **Preset frequencies**

Preset frequencies are a selection of the available frequencies. The preset frequencies are listed under **Frequencies** in the menu on the device.

The most common frequencies are set as part of the factory settings. If different or additional frequencies are required, these

must be transferred to the device using the **UT configurator** software.

An overview of the preset frequencies in the factory settings can be found in section 12.2.

- **Enabled frequencies**

Enabled frequencies are a selection of the preset frequencies.

Frequencies required for the locating process must be enabled while frequencies that are not required can be disabled.

7.2.1 Enabling frequencies

Notes:

- The fewer frequencies are enabled, the faster you can switch between the frequencies during measuring or transmitting mode.
 - Please note that certain frequencies are only suitable for certain locating and operating modes (section 12.2).
-

Required frequencies must be enabled on the generator as well as the receiver.

Receiver and generator are switched on.

1. On the generator:
 - a) In the menu select: **Frequencies**.
 - b) Enable the required frequencies. Disable any frequencies that are not required.
2. On the receiver:
 - a) In the menu select: **Frequencies**.
 - b) Enable the required frequencies. Disable any frequencies that are not required.

7.2.2 Selecting a frequency

An optimum location result can only be achieved if the receiver and generator are working with the same frequency. All of the enabled frequencies can be selected.

- In **Beacon** locating mode the frequency on the receiver must match the frequency of the beacon.
- During the following location modes the frequency can be changed during the locating process until the optimum frequency is found.
 - active locating: **Line, Autogain**
 - passive locating: **Power**

SEWERIN recommends immediately adjusting the frequency on the generator as soon as the frequency on the receiver is changed. The same applies if the generator is changed first. The frequency on the receiver must then be reset.

Changing the frequency on the receiver

The receiver is in measuring mode.

- Press the Frequency key. The frequency changes when the key is pressed.

Changing the frequency on the generator

The generator is in transmitting mode.

- Press one of the Frequency keys. The frequency changes when the key is pressed.

7.3 Adjusting the gain

During the locating process, the signal reception on the receiver can be too weak or too strong. This effect is counteracted by readjusting the gain.

The following applies to the gain:

- high gain > high signal sensitivity: locating possible at greater distance from the generator
- low gain > low signal sensitivity: may reduce overloading

The gain is adjusted manually or semi-automatically depending on the setting.

Note:

The gain cannot be adjusted by the user in **Autogain** locating mode.

Adjusting the gain manually

The gain of the receiver is set to **Manual (Options > Gain)**.
The receiver is in measuring mode.

- Press the Up key several times or press and hold the key to increase the gain.
- Press the Down key several times or press and hold the key to decrease the gain.

Adjusting the gain semi-automatically

The gain of the receiver is set to **Semi-auto (Options > Gain)**.
The receiver is in measuring mode.

- Press the Up key once if the gain is too low.
- Press the Down key once if the gain is too high.

7.4 Determining the depth

The depth specifies the distance between the bottom edge of the receiver and centre of the line. When locating beacons the depth up to the centre of the beacon is determined.

Note:

Please note before any excavation that the depth always refers to the centre of the electromagnetic field. The top edge of lines with a large diameter may therefore not be as deep as specified.

The depth can be determined automatically or manually. The determined value can be displayed in various units (**Settings > Units**).

7.4.1 Determining the depth automatically

The receiver is switched on.

1. Enable the automatic depth measurement.
 - To do so, in the menu select: **Options > Autodepth > Auto.**
2. Switch back to measuring mode.
3. Start the locating process.

The depth is displayed automatically as soon as the receiver is directly above the location object.

If the receiver is no longer above the location object then no value for the depth is shown.

Note:

If the locating process is being completed over distorted fields then the depth may not be able to be determined automatically by the receiver. In such cases the depth can be determined manually.

7.4.2 Determining the depth manually

The receiver is switched on.

1. Enable the manual depth measurement.
 - To do so, in the menu select: **Options > Autodepth > Manual.**
2. Switch back to measuring mode.
3. Start the locating process, moving until the receiver is directly above the location object.
4. Press and hold the Mode key until there is an audible signal tone.

The depth is shown.

7.5 Configuring or updating the receiver and generator via the software

The **UT configurator** software is required to configure the receiver and generator and update the firmware on these devices. The device that should be configured or updated must be connected to the computer on which the software is installed.

The current software version is installed on a computer.

1. On the device (receiver, generator):
 - Unscrew the cover on the USB port.
2. Connect the device and computer using the USB cable.
3. On the computer:
 - a) Start the software.
 - b) Click **Connect** in the **Software Update** tab. The connected device is detected.
 - c) Use the software to update or configure the device as required.
4. Disconnect the device from the computer.
5. On the device:
 - Carefully seal the USB port with the cover again.

8 Active locating of lines

During active locating, a generator generates an electromagnetic field around the lines being located. The energised line can thus be located.

The active locating of lines comprises the following steps:

1. Energising a line (section 8.1)
2. Locating a line (section 8.2)

8.1 Energising a line

The line is energised directly or indirectly during the active locating process.

8.1.1 Direct energising

During direct energising power from a generator is supplied into the line being located via a cable. The prerequisite is that an electrical connection can be made on an exposed part of the line.

A generator and set of cables are required for the energising process.



Fig. 21: Simple cable set (above) and associated symbols (below)

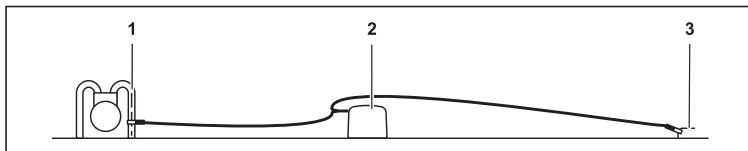


Fig. 22: Arrangement of the devices during direct energising

1 electrical connection to the line being located

2 generator

3 earthing spike

The connection between the three connection points is established with a cable set.



WARNING!

Danger of electrical shock from high voltage

High voltages may be present at exposed parts of lines.

- Observe the specified sequence of actions.
- Always switch off the generator before moving the earthing spike.

The generator is switched off.

1. Insert an earthing spike firmly into the ground.
Position the earthing spike at an angle of 90° to the line, if possible.
2. Connect the cable set to the generator (port for accessories).
3. Connect the black cable from the cable set to the earthing spike.
4. Connect the red cable from the cable set to the existing line.
5. Switch on the generator.
6. Select a suitable frequency.
7. Select a suitable power setting.

The line is energised with the selected power.

8.1.2 Indirect energising

Indirect energising is used if there is no exposed connection on the line that is being located to which the generator could be connected.

The following options are available for indirect energising:

- energising without accessories on the generator section 8.1.2.1
- energising with a cable clamp section 8.1.2.2

8.1.2.1 Energising without accessories on the generator

Only a generator is required for the energising process. The line must be made of metal.

The generator is positioned directly above the line being located. The electromagnetic field generated by the generator causes a current flow in the line being located.

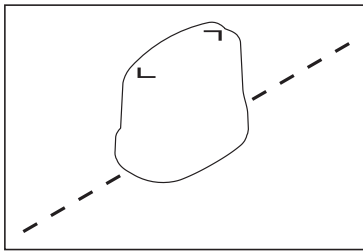


Fig. 23: Alignment of the generator to the line during indirect energising

The generator is switched off.

1. Position the generator so that its longitudinal axis is parallel above the line being located (fig. 23).

The angle between the line and longitudinal axis of the generator must not exceed a maximum of 15°.

2. Switch on the generator.
3. Select a suitable frequency.
4. Select a suitable power setting.

The line is energised with the selected power.

8.1.2.2 Energising with a cable clamp

A generator and cable clamp are required for the energising process.

Individual cables can be energised selectively using the cable clamp without being directly coupled to the cable. The cable does not have to be activated.

The cable clamp can be purchased as an accessory.



WARNING!

Danger of electrical shock from high voltage

If the cable clamp is attached to a single power current cable then high voltages can be generated in the cable clamp. These voltages can cause shock currents or destroy the receiver.

- Only use the cable clamp if it has been ensured that the current rating in the power current cables does not exceed 300 A.
-

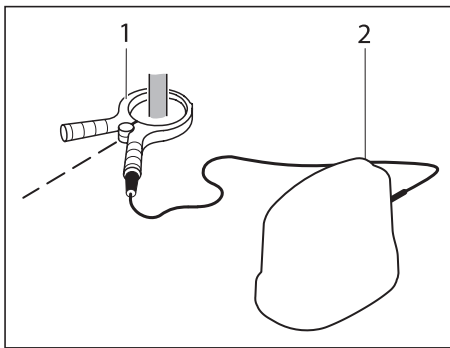


Fig. 24: Arrangement of the devices when energising with a cable clamp

1 cable clamp
2 generator

The generator is switched off.

1. Connect the cable of the cable clamp to the generator.
2. Connect the cable clamp to the cable being located.
 - Observe the information in the operating instructions for the cable clamp during this process.

3. Switch on the generator.
4. Select a suitable frequency.
5. Select a suitable power setting.

The line is energised with the selected power.

8.2 Locating a line

A requirement for the active locating of a line is that the line is energised (section 8.1).

Note:

When locating indirectly energised lines, there is a possibility that the field of the generator is accidentally located.

- When indirectly locating energised lines using the receiver, maintain a distance of approx. 15 m to the generator.
-

The line is energised. The receiver is switched on.

1. On the receiver:
 - Select the following settings:
 - Locating mode: **Line**
 - Antenna: **Twin, Single or Null**
2. Hold the receiver vertically downwards.
3. Select the frequency set on the generator.
4. Locate the line.
 - To do so, evaluate the reaction of the receiver (see following overview).

Reaction of the receiver when locating a line	
Audio	maximum directly over the line
Field strength	maximum directly over the line
Gain	adjust as required, multiple times if necessary
Directional arrows	change into a diamond directly over the line
Compass needle	shows the position of the line
Depth	for automatic depth measurement: value appears as soon as the receiver is directly above the line
Current	current on the line is stronger than the current on a neighbouring line on to which the current signal has jumped over

9 Active locating of beacons

Lines that are not electroconductive can be located using beacons (locating transmitters). These are placed in the line. When switched on, beacons generate an electromagnetic field which can be located by the receiver.

Beacons come in different shapes and sizes. They can also be integrated in cameras used for line diagnostics. Beacons can be purchased as accessories.

The receiver is switched off. The beacon is ready.

1. Switch on the beacon.
 - Observe the information in the operating instructions for the beacon during this process.
2. Switch on the receiver.
3. Select the following settings on the receiver:
 - Locating mode: **Beacon**
 - Antenna: **Twin, Single or Null**
 - Frequency: same as frequency of the beacon
4. Check that the beacon is working and can be located by the receiver.
 - To do so, perform a location test outside of the line.
5. Insert the beacon into the line to be located.
6. Hold the receiver vertically downwards.
7. Locate the beacon.
 - To do so, evaluate the reaction of the receiver (see following overview and fig. 25).

Reaction of the receiver when locating a beacon	
Audio	maximum directly over the beacon
Field strength	maximum directly over the beacon
Gain	adjust as required, multiple times if necessary
Directional arrows	change into a diamond directly over the beacon
Depth	for automatic depth measurement: value appears as soon as the receiver is directly above the beacon The depth up to the centre of the beacon is determined. This generally does not equate exactly to the centre.

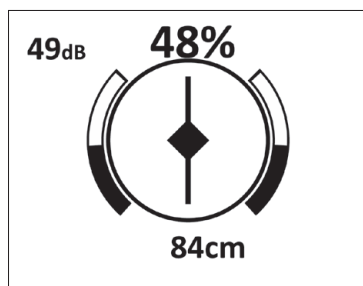
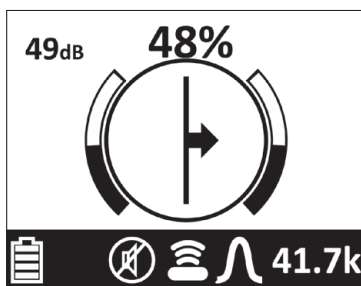
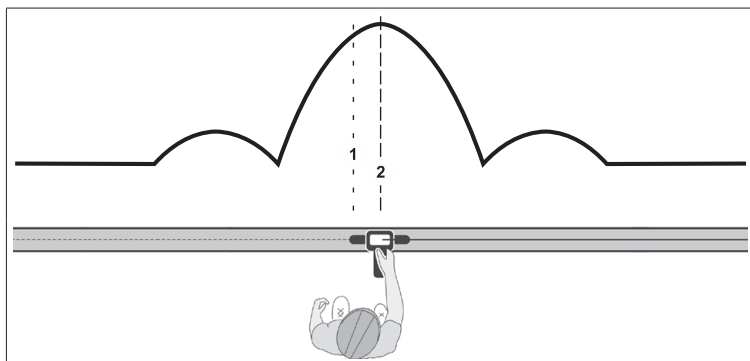


Fig. 25: Locating a beacon

Top image:

Signal curve over the line
Main maximum directly above the beacon and
both of the minor maximum values.

Bottom image:

Receiver display (*here: **UtiliGuard2** user
interface*)

left: Approaching the beacon (1)

right: Beacon located (2)

10 Passive locating

Electromagnetic fields, that are already present on a line that is being located, are used for the passive locating process. Only the receiver and not the generator is required for this locating process.

The following network frequencies can be located:

- 50 Hz, 100 Hz, 150 Hz (Europe)
- 60 Hz, 120 Hz, 180 Hz (North America, etc.)

Note:

Only enabled frequencies can be used for the locating process.



Fig. 26: Alignment of the receiver with the suspected location of the line

The receiver is switched on.

1. Use the Mode key to select **Power** or **Radio**.
2. Hold the receiver vertically downwards.
3. Hold the receiver and move within the suspected location of the line being located.
4. As soon as a specific signal is received clearly:
 - Position the receiver along the suspected location of the line, as illustrated in fig. 26.
5. Locate the line.
 - To do so, evaluate the reaction of the receiver (see following overview).

Reaction of the receiver during passive locating	
Audio	maximum or minimum directly over the line
Field strength	maximum or minimum directly over the line
Gain	adjust as required, multiple times if necessary
Depth	for automatic depth measurement, Power locating mode: – value appears as soon as the receiver is directly above the line

Completing the locating process in **Radio** locating mode has special features in comparison to **Power** locating mode and the active locating process.

Special features in Radio locating mode	
Antenna	only Twin possible
Gain	only manual possible
Display	only gain and field strength visible (fig. 30)
Audible signals	no modulation – sounds similar to signal noise
Field strength	constantly high above the line being located – The field strength drops significantly as soon as the receiver is moved a little to the side of the line being located.

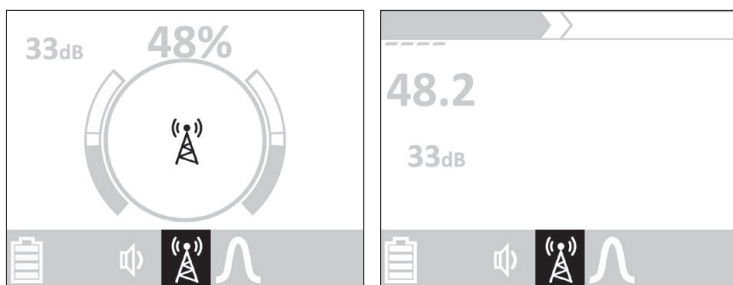


Fig. 27: Receiver display – passive locating using **Radio** locating mode
 Left image: **UtiliGuard2** user interface
 Right image: **Classic** user interface

11 Maintenance and error management

11.1 Lithium-ion rechargeable battery (generator)

The generator can be operated with a special lithium-ion rechargeable battery.

Note:

Observe the safety information about the rechargeable battery (section 1.5).

11.1.1 Storing rechargeable batteries

If the rechargeable battery is going to be stored for long periods, it must be prepared for storage and maintained during storage.

Note:

Observe the permissible storage conditions (section 12.1.2).

Preparing for storage

- Before storage, charge or discharge the rechargeable battery to a remaining capacity of 30 – 50%.

Rechargeable battery maintenance during storage

Rechargeable batteries that have completely self-discharged can no longer be charged.

- You should charge the rechargeable battery every 6 months to prevent it from completely self-discharging. Only charge the rechargeable battery up to a remaining capacity of approx. 30 – 50%.

11.1.2 Charging the rechargeable battery

The **UT** AC/DC adapter is required for the charging process. The rechargeable battery, i.e. the special battery compartment lid, must be removed from the generator. There is a charging socket on one of the longitudinal sides of the battery compartment lid.

The LED on the AC/DC adapter shows the charge status of the rechargeable battery:

LED	Charge status
red	rechargeable battery is being charged
green	rechargeable battery is fully charged (charging process complete) The LED also lights up green if the AC/DC adapter is connected to the power supply without the rechargeable battery being connected to the AC/DC adapter.

The battery compartment lid is sealed with quick-release fasteners.

The generator is switched off.

1. Open the battery compartment by turning the quick-release fasteners. Remove the battery compartment lid.
2. Connect the rechargeable battery to a suitable power source using the **UT** AC/DC adapter.

The rechargeable battery is charged.

3. When the rechargeable battery is fully charged, disconnect the rechargeable battery from the power source.
4. Place the battery compartment lid back on the battery compartment. Close the battery compartment.

11.1.3 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 before shipping. Transportation by

road or rail must occur in compliance with the current applicable version of the ADR¹ regulations.

Identifying faulty rechargeable batteries

A lithium-ion rechargeable 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

11.2 Care

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

SEWERIN recommends: always remove significant contamination immediately.

Displays

The display surface of the devices are sensitive to mechanical and chemical stress.

- Always use a clean, soft cloth to clean the displays.
- Never use cleaning agents containing aggressive constituents (e.g. acidic or abrasive constituents).

11.3 Servicing

SEWERIN recommends: Have the receiver and generator serviced regularly by SEWERIN Service or an authorised

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 According to: EPTA – European Power Tool Association

professional. Only regular servicing can ensure that the devices are always ready for use.

11.4 Solving problems

11.4.1 Source of errors during the locating process

Interference fields are the most common sources of error. Interference fields can distort the electromagnetic fields along the line, thus producing erroneous location results. This can apply to both the position and depth of the line or beacon.

Electromagnetic fields that are too weak or distorted can also lead to incorrect location results. Distorted fields, for example, occur if other lines cross the line being located or if there are junctions or curves.

Adjacent lines

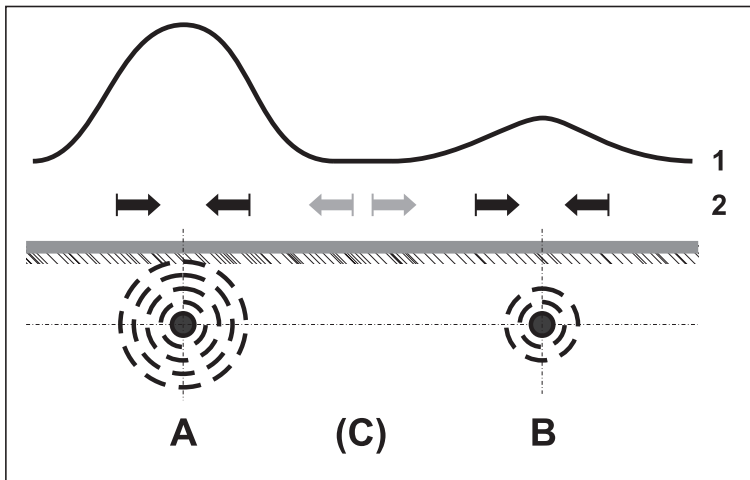


Fig. 28: Locating situation for adjacent lines
A line to be located (directly energised)
B other line
1 signal curve
2 directional arrows

Fig. 28 shows a locating situation where another line (B) is positioned closely next to the line being located (A). Line A is

energised directly. The signal curve (1) shows a maximum above both lines.

Users that predominantly rely on sound for the locating process can make the mistake of detecting a fictional line C between line A and line B.

This mistake cannot occur if the directional arrows on the display are observed during the locating process. The directional arrows indicate in which direction a line runs. The directional arrows change into a diamond when positioned directly over the line. As C is not a line, no diamond will appear.

11.4.2 Problems with the receiver

Problem	Possible cause	Corrective action
Receiver cannot be switched on	remaining capacity of batteries too low	● replace the batteries
	power supply interrupted	● check battery contacts
Receiver does not react after being switching on	receiver faulty	● briefly remove the batteries, then insert again > switch on the receiver again
	remaining capacity of batteries too low	● replace the batteries
No audible sound	sound switched off or volume set too low	● increase volume
Display shows unusually fluctuating values	interference fields present	● remove interference fields: e.g. switch off computers, monitors, light dimmers, industrial devices
Active locating: Field strength too strong (at minimum gain)	receiver too close to the generator	● move receiver away from generator

11.4.3 Problems with the generator

Problem	Possible cause	Corrective action
Generator cannot be switched on	remaining capacity of batteries too low	- replace the batteries - charge rechargeable battery
Generator does not transmit after being switching on	generator faulty	Check function of generator: Switch on the generator (without connected cable set) and receiver > check whether the frequency set on the generator is received by the receiver with a significant signal strength
	remaining capacity of batteries too low	- replace the batteries - charge rechargeable battery
Direct energising does not working	line is not electroconductive	system is unsuitable > use special accessory (e.g. fiber glass probe) or other system (e.g. COMBIPHON)
	electric circuit interrupted	use earthing spike
	no or low current in the line being located	
	cable set defective	replace cable set
	cable set not connected correctly	check cable set connection
Indirect energising does not working	generator not positioned correctly above the line being located	position generator differently
Generator shuts down during the locating process	power supply insufficient	- select lower power setting - replace the batteries

12 Appendix

12.1 Technical data

12.1.1 Receiver UT 930 R

Device data

Dimensions (W × D × H)	120 × 325 × 705 mm
Weight	2.2 kg (with batteries)

Certificates

Certificate	CE
-------------	----

Features

Display	graphics LCD, LED backlight with light sensor
Interface	mini USB
Operation	membrane keypad with 6 keys

Operating conditions

Operating temperature	-20 – 50°C
Humidity	10 – 90% r.h., non-condensing
Atmospheric pressure	950 – 1100 hPa
Protection rating	IP65
Non-permitted operating environments	in potentially explosive areas

Storage conditions

Storage temperature	-32 – 70°C
---------------------	------------

Power supply

Power supply	alkaline batteries LR20, mono D, two units
Operating time, typical	30 h

Location

Receiving frequency	• 7 active frequencies between 64 Hz and 200 kHz • passive frequencies: 50/60/100/120/150/180 Hz
Location depth	• manual: max. 12 m • automatic: max. 6 m • error: ◦ active locating: ±5% up to 3 m ◦ passive locating: ±10% up to 3 m ◦ beacon (locating transmitter): ±5% up to 3 m

12.1.2 Generator UT 935 TX

Device data

Dimensions (W × D × H)	295 × 180 × 260 mm
Weight	3.75 kg (with batteries)

Certificates

Certificate	CE
-------------	----

Features

Display	graphics LCD, LED backlight with light sensor
Interface	mini USB
Operation	membrane keypad with 4 keys

Operating conditions

Operating temperature	-20 – 50°C
Humidity	10 – 90% r.h., non-condensing
Atmospheric pressure	950 – 1100 hPa
Protection rating	IP65
Non-permitted operating environments	in potentially explosive areas

Storage conditions

Storage temperature	• with batteries: -32 – 70°C • with lithium-ion battery (rechargeable): -20 – 45°C, optimum: <21°C
Humidity	with lithium-ion battery (rechargeable): <80% r.h., non-condensing
Environment	with lithium-ion battery (rechargeable): free of corrosive gases

Power supply

Power supply	either: • batteries: alkaline LR20, mono D, 10 units (as delivered) • lithium-ion battery (rechargeable) [9083-9007], built into special battery compartment lid
Net weight of batteries	weight per cell: 0.046 kg total: $16 \times 0.046 \text{ kg} = 0.736 \text{ kg}$
Operating time, maximum	• with batteries: 100 h • with lithium-ion battery (rechargeable): 80 h
Battery power	130 Wh

Location

Transmitting frequency	7 active frequencies between 256 Hz and 200 kHz
Transmitting power	5 W, 5 power settings
Transmitting current	max. 500 mA
Transmission voltage, effective	max. 65 V

12.2 Preset frequencies (factory settings)

12.2.1 Receiver UT 930 R

Frequency	suitable for
50 Hz	
60 Hz	
100 Hz	
120 Hz	
150 Hz	
180 Hz	
512 Hz	  
640 Hz	  
1.10 kHz	 
9.95 kHz	 
41.7 kHz	  
83.1 kHz	  
116 kHz	  

Symbol explanation:

-  Power
-  Line
-  Autogain
-  Beacon

Note about **Autogain**:

- The suitable frequencies are not displayed in the menu under **Frequencies**.
- The suitable frequencies are enabled if the same frequencies are enabled for **Line** locating mode.

12.2.2 Generator UT 935 TX

Frequency	suitable for
512 Hz	 
640 Hz	 
1.10 kHz	 
9.95 kHz	  
41.7 kHz	  
83.1 kHz	   
116 kHz	 

Symbol explanation:

-  Direct energising
-  Indirect energising
-  Cable clamp for low frequency
-  5" cable clamp

12.3 **Symbols (meaning)**

Symbols that are shown on the displays of the receiver and generator without a descriptive text are described in the following.

Modes



Line



Autogain



Power



Beacon



Radio

Antennas



Twin



Single



Null

Basic information



Battery status



Volume switched on



Volume switched off

Interaction between the receiver and generator



Generator transmitting



Generator not transmitting (no output power)



Generator not transmitting
(faulty connection during direct energising)



Power

Power setting



Ports

USB



Accessories

Cable clamp



Cable set (simple cable set)



Generator without accessories

12.4 Accessories and consumables

Accessories

Part	Order number
UT euro lithium-ion rechargeable battery	UT90-Z0500
UT 5" cable clamp	UT90-Z1000

Consumables

Part	Order number
Mono LR20 battery	1353-0003

Other accessories and consumables are available for the product. Please contact our SEWERIN sales department for further information.

12.5 Declaration of conformity

Hermann Sewerin GmbH hereby declares that the **UT 930 R** receiver fulfils the requirements of the following guideline:

- 2014/53/EU

Hermann Sewerin GmbH hereby declares that the **UT 935 TX** generator fulfils the requirements of the following guidelines:

- 2014/30/EU
- 2014/35/EU
- 2014/53/EU

The complete declarations of conformity can be found online.

12.6 Advice on disposal

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

Description of waste	Allocated EWC waste code
Device	16 02 13
Batteries	16 06 04
Lithium-ion rechargeable battery	16 06 05

Alternatively, devices can be returned to Hermann Sewerin GmbH.

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