Operating Instructions

SeCorr® 300

SEWERIN
Technologies for leak detection.

Measurable success by Sewerin equipment

Congratulations. You have chosen a quality instrument manufactured by Hermann Sewerin GmbH.

Our equipment will provide you with the highest standards of performance, safety and efficiency. They correspond with the national and international guide-lines.

Please read and understand the following operating instructions before using the equipment; they will help you to use the instrument quickly and competently. If you have any queries we are available to offer advice and assistance at any time.

Yours

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Aerial

Connector

LED

Charging socket

Headphone socket

Microphone socket

Carrying handle

Transmitter marking

Connector

Housing base

Connection nipple
for stand *(not visible)*

Rubber feet

Fig. 1:   **Radio transmitter RT 300**

Connector

Light key

Loudspeaker key

Filter key

Arrow-up key

ON/OFF-key

Connector

Arrow-down key

Display

Aerial connector
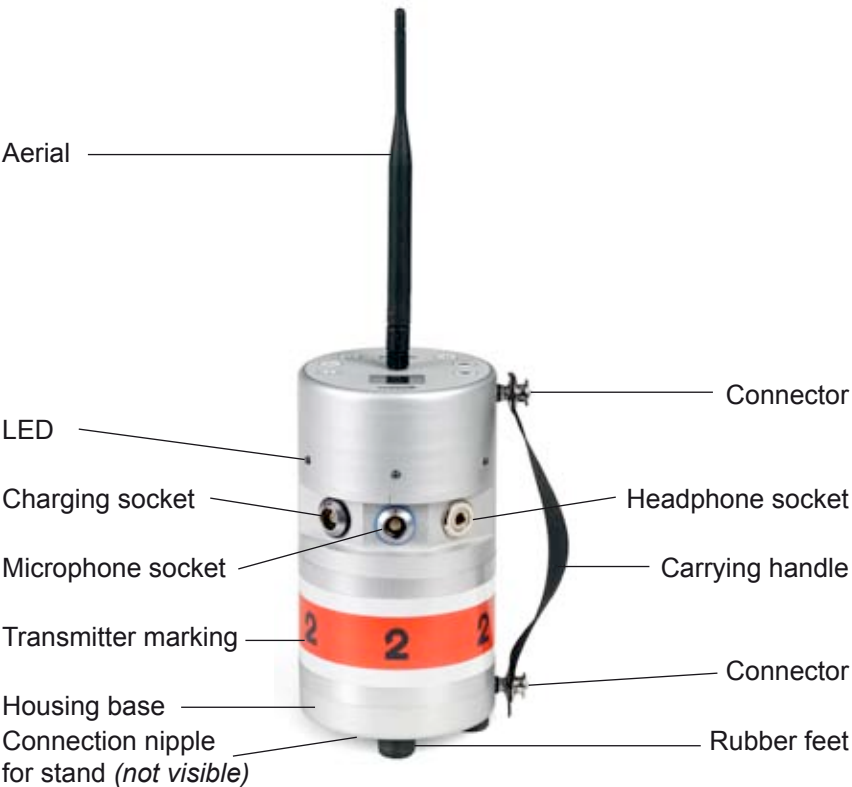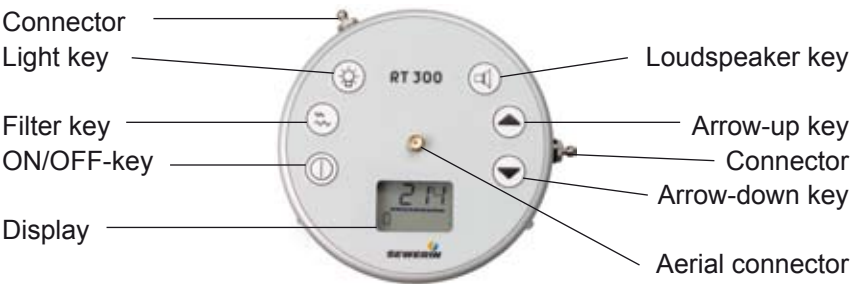
Fig. 2:   **Radio transmitter RT 300** without aerial view from top
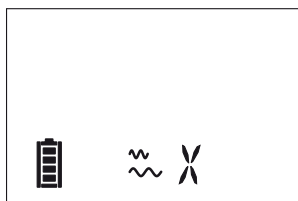
2230

- Signal
- Version number
- Filter
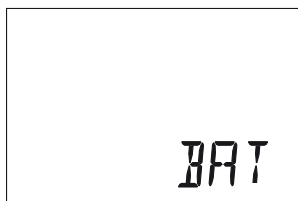- Charging time
- Battery type
- Error code

Bar display
- Volume
- Reception quality
- Charging

Symbols, *here:*
- Battery symbol (full)
- Filter symbol
- Synchronisation symbol

Status message, *here:*
- **BAT** (Battery)

BAT

🖝 **NOTICE:**
You will find an overview of all symbols and status messages in section 10.2.

Operating Instructions

SeCorr® 300

15.07.2009 – V 2.XX – 105805 – en-us

DANGER!
DANGER indicates a harzardous situation which, if not avoided, will result in death or serious injury.

WARNING!
WARNING indicates a harzardous situation which, if not avoided, could result in death or serious injury.

CAUTION!
CAUTION, used with the safety alert symbol, indicates a harzardous situation which, if not avoided, could result in minor or moderate injury.

CAUTION!
CAUTION, without the safety alert symbol, is used to address practices not related to personal injury.

NOTICE:
NOTICE is used to address practices not related to personal injury.

1 Introduction

The **SeCorr 300** system is used to detect leaks in underground pressure line systems, such as water pipes, with the help of a computer. It uses the correlation principle and features continuous digital signal processing and options to manually filter out noise.

The **SeCorr 300** can be used to detect leaks in both metal and plastic piping.

All the data recorded is cached in the **RT 300** radio transmitter. The advantage of this is

● the data does not have to be analysed directly at the measurement location, rather this can be done at a later stage,

● data can be recorded for a virtually infinite measuring section.

The **SeCorr 300** system can also be used to detect leaks by means of multi-point correlation.

2   General

2.1   Warranty

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

Hermann Sewerin GmbH cannot be held responsible for any damages resulting from non-compliance with these instructions. The warranty and liability provisions of the terms of sale and delivery of Hermann Sewerin GmbH are not affected by the information given below.

- This product must only be operated after the relevant operating instructions have been read and understood.

- This product must only be used for its intended purpose.

- This product is only suitable for use in industrial and commercial applications.

- Repairs must only be carried out by a specialist technician or by other suitably trained personnel.

- Changes or modifications to this product must not be carried out without approval from Hermann Sewerin GmbH. The manufacturer cannot be held responsible for damages if non-approved modifications have been made.

- Only accessories supplied by Hermann Sewerin GmbH may be used with this product.

- All repairs must be carried out using replacement parts that have been approved by Hermann Sewerin GmbH.

- Only approved aerials may be used.

- The manufacturer reserves the right to make technical modifications in the course of further development.

Generally applicable safety and accident-prevention regulations must be complied with, in addition to the information provided in this manual.

2.2   Intended use

SeCorr 300 is a system for recording and analysing noises. It is used to detect leaks in **brimming** pressure line systems (e.g. water pipe networks). The system can be used for both metal and non-metal pipe networks.

Only suitably qualified employees (skilled staff, specialists and technicians) of utility companies are permitted to operate the **SeCorr 300** system.

All applicable safety regulations and accident prevention regulations must be observed when using the **SeCorr 300** system and its components.

Detailed information on appropriate operating conditions for the components of the **SeCorr 300** system at the place of installation are provided in section 10.1.

All components used in the **SeCorr 300** system have been manufactured in accordance with all binding legal and safety regulations. All components used correspond to the state-of-the-art. The system is safe to operate when used in accordance with the instructions provided.

Careless or improper use of any of the system components may, however, present a risk of damage or harm to persons or property.

2.3   Improper use

Any application of the system or its components that does not comply with the description in section 2.2. shall be deemed to be improper use.

The manufacturer accepts no responsibility for any damage or harm caused to persons or property as a result of improper use.

2.4 Safety information

These operating instructions must be read carefully and in full. All advice given in these operating instructions must be followed.

> **CAUTION!**
> All applicable accident prevention regulations must be observed.

- Do not carry out any modifications to the **SeCorr 300** or otherwise change or tamper with it in any way. Never open devices **RT 300, RX 300**, **EM 300**, **HY 300** (exception: changing the batteries of the **RT 300**). Failure to observe the above instructions will invalidate the warranty.
- Ensure that no dirt or moisture gets into the connections on the appliances (sockets, aerial connections, connection nipples).
- Observe the temperature ranges in which the devices may be used and stored (see section 10.1).
- The rated radio frequency power (conducted) of the **RT 300** and **RX 300** is 0.1 W. Though this is a low power level a minimum separation distance of 8 in. from the device's aerial to all persons must be kept.
- Always adequately secure the setup locations of **SeCorr 300** components to prevent injury to persons and damage to vehicles.

Aerials

The aerials of the **RT 300** and **RX 300** must not be damaged.

- Never carry a unit by the aerial.
- Never bend, kink or cut the aerial.

Only use SEWERIN-approved replacement aerials and aerial attachments.

The aerials must not be co-located and operated in conjunction with any other transmitter.

Special features of radio transmitter RT 300

- The **RT 300** is splash-proof to IP64. The device must therefore not be immersed in liquids or exposed to water jets.

- It is essential to read section 5.7.4 before attempting to replace batteries. Failure to observe the instructions provided may result in injury of the user and/or damage to the **RT 300**.

Special features of radio receiver RX 300

- The **RX 300** must not be operated with computers that are connected to the TNV (Telecommunication Network Voltage) at the same time.

- The **RX 300** must not be connected to Powered USB.

3 System SeCorr 300 (Overview)

3.1 System components

The **SeCorr 300** system includes:

- **Microphone EM 300**, in short: **EM 300** (see section 4)
  or
  Hydrophone HY 300, in short: **HY 300** (see section 4)
  for recording the noises at the measurement location

- **Radio transmitter RT 300**, in short: **RT 300** (see section 5)
  for caching the data;
  for sending the data to the receiver

- **Radio receiver RX 300**, in short: **RX 300** (see section 6)
  for receiving the data from the transmitter;
  for relaying the data to the computer

- **Stand**
  for correct positioning of the **RT 300** during the measurement

- **SeCorr 300 software**
  for analysing the measurements

  The **SeCorr 300 software** is explained in separate operating instructions.

Accessories

There are various optional accessories available for the **SeCorr 300** system (see section 10.3). The user may find the following parts particularly useful when performing a measurement:

- **Case**
  for transporting and storing the system components

- **Cover hammer**
  for easier opening of manhole covers

- **Headphones**
  for listening to the noise on the **RT 300**

3.2   Computer

A computer is required for analysing the measurement using the **SeCorr 300 software**. Various computer types are suitable.

Computer	Preferred range of use	Comment
PC e.g desktop computer	stationary; fixed installation in a service vehicle	standard
Notebook	mobile	standard; must be protected against effects of weather and damage in transit
Robust notebook e.g. microport colibri	mobile	weather-proof

System requirements

- Operating system: Microsoft Windows
  2000 SP4, XP 32/64 SP2, Vista 32/64
- RAM: 512 MB (1024 MB recommended)
- Processor: 1.2 GHz (1.8 GHz recommended)
- Features: USB port 1.1 or higher
  Sound card with headphone jack
- Screen resolution: 1024 × 768 pixels

3.3 Functional principle

SeCorr 300 uses the correlation principle to detect leaks.

Each leak produces a noise which is different to the background noise in the pipe system. It spreads in both directions along the pipe at a certain speed (depending on the sound velocity of the pipe material). This leak noise is recorded by two **microphones** at two different measurement locations along the measuring section and immediately digitised. The data is recorded in **radio transmitter RT 300** and from there it is sent to **radio receiver RX 300**. The receiver relays the data to the **computer** which determines the position of the leak using the **SeCorr 300 software**. The following is used for the calculation:

- the time difference of the sound between measurement locations different distances away

- other measurement data (e.g. length of the measuring section, sound velocity)

$$d = \frac{L - v\,\Delta t}{2}$$

① ② Measurement location (transmitter)

L Length of the pipeline

d Distance of the leak from ①
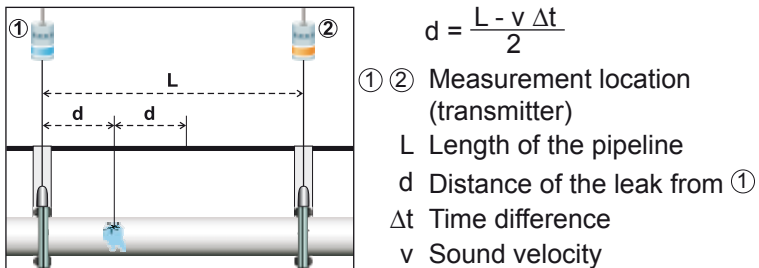
Δt Time difference

v Sound velocity

Fig. 3: Principle for determining the leak position

☞ **NOTICE:**
SeCorr 300 is used to determine the position of a source of noise. The user must always decide whether the noise actually stems from a leak or is caused by something else.

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4 Microphone EM 300 / Hydrophone HY 300

4.1 Functionality

The **EM 300** and **HY 300** record noises at the measurement location. The data is digitised immediately and relayed to the transmitter.

4.2 Ranges of use

The **EM 300** is a universal microphone. It is equally well suited for use in metal pipes and non-metal pipes. The **EM 300** can be attached to the measurement location by means of a magnet or adapter.

The **HY 300** can also be used for measurements on both metal and non-metal pipes. It is particularly well suited for correlation measurements over large distances and for large pipe diameters. In contrast to the **EM 300**, the **HY 300** records noises directly from the water column. To do so, it must be screwed to a hydrant, for example.

> **CAUTION!**
> Use the **HY 300** for measurements in drinking water networks only.

Refer to section 8.2 for detailed information on suitable measurement locations.

4.3 Construction of microphone EM 300

The **EM 300** consists of:

- Microphone housing
- Magnet (round or horseshoe magnet)
- Special cable with jack for connecting to **RT 300**

> ⚠ **DANGER!**
> **The magnet is very powerful. Persons with a pacemaker should not go near the EM 300 microphone.** The magnet must be kept away from electronic storage media (diskettes, hard drives, credit cards, etc.), monitors (PC, TV) and clocks.

Fig. 4: **Microphone EM 300** with round magnet (left) or horseshoe magnet (right)

> **CAUTION!**
> The piezo components and the **EM 300** magnet are fragile. Never drop the microphone.

4.3.1 Microphone housing

The front of the housing features:

● thread to screw in the magnet

● two LEDs to illuminate the shaft when lowering the microphone

The LEDs are switched on via the **RT 300** (see section 5.7.8).

> ☞ **NOTICE:**
> The housing rattles when it is moved backwards and forwards. This is due to the design of the device and is not a fault.

4.3.2 Magnet

The magnet is removable and interchangeable. It comes in two models:

- **Round magnet**   for flat surfaces, e.g. square gate end
- **Horseshoe magnet** for curves, e.g. pipes

The magnetic force of each model is approx. 11 lb.

The **round magnet** comes with an extra **metal disc**. This reduces the magnetic force and thus protects other devices (e.g. notebooks) from the strong magnetic effect. Nevertheless, you should keep the magnet away from other magnetic storage media.

Retain the metal disc and always use it when the round magnet is not in use. The **cardboard disc** between the magnet and the metal disc is to help you remove the magnetic disc.

4.3.3 Cable

The cable is used to:

- Lower the microphone into the shaft and lift it out again after the measurement
- Transmitting data to the transmitter

> **NOTICE:**
> The cable is designed to withstand any tractive forces that may occur when lowering/lifting the microphone.

The **jack** at the free end of the cable is marked blue and mechanically coded. It can only be connected to the **microphone socket** of the **RT 300**.

4.4   Construction of hydrophone HY 300

The **HY 300** comprises only the hydrophone housing. In contrast to the **EM 300**, the connection cable to the **RT 300** is not permanently attached to the hydrophone.

Hydrophone housing

Stopper
Socket for hydrophone cable
Ventilation valve
Sealing cover
1" thread for attachment to the measurement location
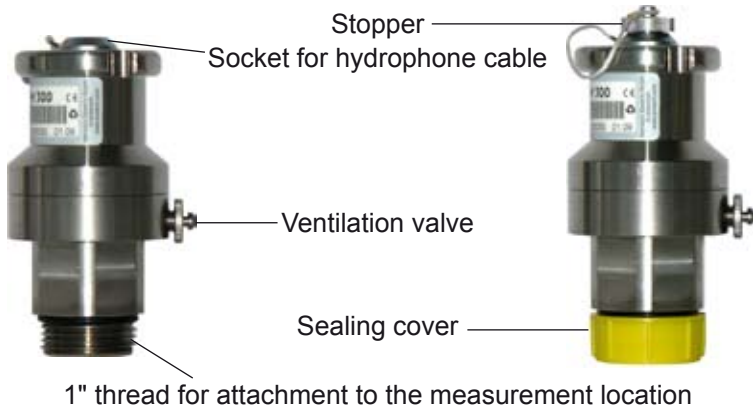
Fig. 5: **Hydrophone HY 300** without stopper and sealing cover (left) and with stopper and sealing cover (right)

CAUTION!
Protect the **HY 300** from moisture and dirt when not in use by closing off the socket with the stopper and the thread with the sealing cover.

Hydrophone cable

The cable is used to transfer data to the transmitter. The jacks on the cable are marked blue and mechanically coded. They can only be connected to the microphone socket of the **RT 300**.

5   Radio transmitter RT 300

5.1   Functionality and construction

Radio transmitter RT 300 takes the digitised data from the microphone and saves it in the form of "data packets" (Stack memory). These "data packets" are ready for retrieval by the receiver. Data which has been successfully retrieved from the **RT 300** memory is deleted.

The **RT 300** acts like a relay station. It can also be used independently of the **SeCorr 300** to listen to noises (microphone **EM 300** or hydrophone **HY 300** required).

You will find an overview and all the part names of the **RT 300** in the front cover (fig. 1 and 2).

5.1.1   Marking

The appliances have colour markings.

- **Transmitter 1: blue**

- **Transmitter 2: orange**

It is important to be able to tell the difference between the transmitters because at least two **RT 300** have to be used for a measurement and there must be no mix-ups during analysis.

> ☞ **NOTICE:**
> The **SeCorr 300 software** uses the same transmitter colour and number allocation.

5.1.2   Aerial

The **RT 300** aerial can be rotated and tilted. This ensures the optimal position for good radio reception according to the on-site situation.

5.1.3   Connections

The sockets on the **RT 300** are colour and mechanically coded. This means that only the right cable can be connected.

Connection	Colour coding
Charging socket	black
Microphone socket	blue
Headphones socket	colourless

Please ensure when plugging in the jacks that the **red markers** on the jack and the socket are **congruent**.

> **CAUTION!**
> Do not use force when plugging the jacks into the sockets. If necessary, check whether the jack – socket allocation is correct (same colour coding) and the jacks are correctly aligned (red dot).

5.1.4   LED

Six LEDs are fitted in the housing of the **RT 300** above the sockets. The LEDs flash red.

Flash rate	Number of LEDs	Description
Constant alternation: fast rotating (0.2 s) – break (2.2 s)	6	Transmitter ready
Light constantly on for 3 s	6	Transmitters have been synchronised
every 2 s	2 (opposite)	Battery charging
Constant alternation: short double flashing – break	2 (opposite)	Charging complete (conservation charging)

The LEDs also serve to make pedestrians and vehicles aware of the erected device by flashing (**warning function**).

5.1.5   Keys

You will find an overview with the names of the keys inside the front cover (fig. 2). The function of the keys is explained in section 5.7.

5.1.6   Display

The display features a backlight (see section 5.7.8). The symbols and status messages are explained in section 10.2.

5.2   Setup/mounting

For a measurement the receiver must **always be mounted on the stand**.

- Set up the stand (see section 7).
- Push the connection nipple (on the base of the device) onto the quick-connect on the stand.

The quick-connect must be pulled down to release the device from the stand.

The device stands securely on three rubber feet when not being used for measurement.

5.3 Transport

Each **RT 300** features a flexible carrying handle. It can be attached to two of the three connectors available.

Fig. 6: Carrying handle attached to **RT 300** lengthways (left) or crossways (right)

5.4   Power supply

The **RT 300** can be operated by:

- rechargeable NiMH batteries (as delivered)
- disposable Alkaline batteries
- external AC/DC adapter

Batteries

Always use **four battery cells** of the same type. More details about the battery types can be found in section 10.1.1.

It is advisable to switch the unit off when not in use to extend the operating time when the device is powered by batteries.

Please note the following important points:

- As soon as the batteries need replaced/recharged, the **battery symbol** on the display will begin to **flash**.
- **RT 300** cannot store any further data once the batteries are empty.

> ☞ **NOTICE:**
> Check the condition of the batteries **before each measurement**. Replace/recharge the batteries in good time.

5.5   Changing the aerial

The aerial is fitted to the device with a screwed joint. Please note when changing the aerial:
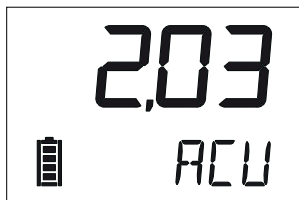
- The screwed joint must always be **clean and dry**.
- **Hand-tighten** the aerial. Do not use any tools to tighten it.

Note: The aerials for the **RT 300** and **RX 300** are identical in construction.
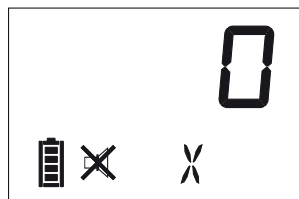
5.6   Operation

5.6.1   Switching on

● Hold down the ON/OFF key until the start screen appears.

The following will be displayed:

● Version number, *here:* **2.03**

● Battery symbol

● Type of power supply, *here:* **ACU** (accu/rechargeable battery)

● Wait a moment.

The device is **ready for use**.

● There will be no signal until the microphone/hydrophone is connected.

● Synchronisation symbol

Flashes until the transmitters are synchronised.

Not visible when the transmitters are synchronised (**measuring mode**).

● *here:* headphones switched off

Battery symbol

The number of segments in the battery symbol represents the remaining battery capacity / remaining charge. If the batteries need replaced/recharged, the battery symbol flashes.

☞ **NOTICE:**
You must press the ON/OFF key again to turn the device off.

5.6.2 Plugging in the microphone/hydrophone

The transmitter automatically recognises when a microphone/hydrophone is connected.

It will briefly show the name of the microphone/hydrophone (e.g. **EM 300**; two-part display: first **EM**, then **300**).

- Signal, *here:* **1247**

- Microphone/hydrophone connected, *here:* **EM**

The status message will then disappear. The device is back in measuring mode.

5.6.3 Listening to noise

The noise can be heard on the **RT 300** through headphones. The headphones are switched on and off using the loudspeaker key. The various displays are explained below:
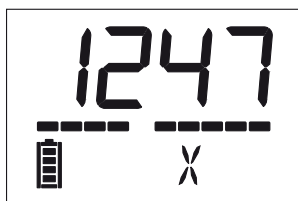
Headphones	Loudspeaker symbol	Bar display
switched on	not visible	volume
switched off	visible	reception quality

Conditions for listening to noises:

- Headphones connected
- Microphone/hydrophone connected
- Headphones switched on

5.6.3.1 Adjusting the volume

The volume can be adjusted any time during listening using the arrow keys.

The currently selected volume is symbolised by the missing segment.

- *here:* moderate volume selected

- Press the **arrow-up key** to **increase** the volume or the **arrow-down key** to **reduce** the volume.

    The missing segment of the volume display will move to the left or right.

5.6.3.2 Hearing protection function

The **RT 300** features a hearing protection function to protect the user. On the headphones this:

- **limits** noise to a certain volume if a preset limit is exceeded.
- The sound is **switched off** if the preset limit is **considerably** exceeded.

The **hearing protection symbol** appears on the display when the sound is switched off.

Listening again

If the sound has been switched off by the device (hearing protection symbol visible) there are two ways to start listening again:

- Reduce the volume
- Wait until the noise falls back down below the limit again

Noise protection limits (levels)

Level	Limit [dB]
0	–
1	95
2	85

If **level 0** is set, the hearing protection is **switched off** (as delivered).

⚠️ **WARNING!**
Set the hearing protection function to level 1 or 2 to protect yourself against loud noises.

Adjusting the hearing protection

● Hold down the loudspeaker key for 3 s.

The current hearing protection level setting will appear.

● *here:* level **0**

● Status message **PRO**

● Using the arrow keys set the desired level for the hearing protection function.

● Press the ON/OFF key to save the setting. The device will return to measuring mode.

5.6.3.3 Filtering noise

The noise that can be heard through the headphones can be filtered. The filters limit the range of the audible frequencies. By systematically changing the filters you can often improve the individual perception of the noise.

☞ **NOTICE:**
The filter does not affect the type or volume of data saved by the **RT 300** or the correlation result.

Filter limits

Frequency [kHz]
0.2 – 1
1   – 3
0   – 0.2
0   – 0.5
0   – 1   *
0   – 5   **

* Factory settings **HY 300**
** Factory settings **EM 300**

Adjusting the filter

● Press the filter key. The headphones are switched on automatically (if they were switched off).

0-5

▯ ≈KHZ

The currently set filter is shown.

● *here:* filter **0 – 5 kHz**

● **Filter symbol** flashes

● Set the desired filter using the arrow keys.

● Press the ON/OFF key OR the filter key to apply the setting. The device will return to measuring mode.

☞ **NOTICE:**
The selected filter is not saved when the device is switched off.

5.6.4   Changing the battery

If the **RT 300** is powered by batteries, they must be changed as soon as the battery symbol on the display starts to flash. Rechargeable batteries (accus) can also be changed if required. After replacing the disposable/rechargeable batteries, you must set the type.

> ☞ **NOTICE:**
> Used batteries must be disposed of carefully using **appropriate local recycling facilities**.

5.6.4.1   Replacing the disposable/rechargeable batteries

The battery compartment is under the housing base. To unscrew the housing base you will need a large screwdriver or another tool (e.g. metal disc from round magnet on microphone, coin).

> ☞ **NOTICE:**
> The housing base must be correctly lined up after you have changed the batteries so that it can be screwed back on again. This is easier if you attach the **carrying handle lengthways** before unscrewing housing base and do not remove it when replacing the batteries.

- Loosen the two screws securing the housing base. Remove the screws by repeatedly turning them a short way in alternation; this ensures that the housing base does not twist.

- Remove and replace the batteries (disposable or rechargeable). Ensure that the batteries are inserted with the correct polarity (negative terminal to spring / positive terminal to metal strip).

- Replace the housing base and line it up so that the screws can be screwed into the thread. Retighten the screws alternately.

5.6.4.2 Setting the type

… following battery replacement (Section 5.6.4.1)

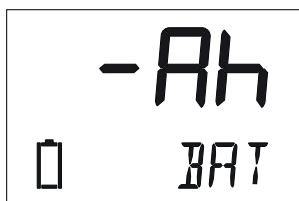● Hold down the ON/OFF button until the start screen appears.
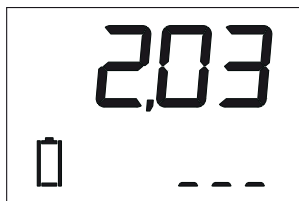
The following information will be displayed:

● Version number, here: 2.03

● Battery symbol (empty)

● Type of power supply not recognised (dashes)

… following error message F042

● Hold down the filter key.

In both cases wait until the following image appears on the display:

The battery symbol and **BAT** flash alternately.

● Using the arrow keys set the type of battery in use.

Setting	Type of battery	Capacity [Ah]
BAT	disposable	–
5 Ah		5
6 Ah		6
7 Ah		7
8 Ah	rechargeable	8
9 Ah		9
10Ah		10
11Ah		11
12Ah		12

```
 5 Ah

 □      ACU
```

Display with selected accu type

● *here:* accu type **5 Ah**

● Press the ON/OFF key to save the setting. The device will re-turn to measuring mode.

Rechargeable batteries (accus) must be charged before you use the **RT 300** again (see section 5.7.5).

5.6.5   Charging the batteries

If the **RT 300** is powered by rechargeable batteries, they must be recharged as soon as the battery symbol on the display starts to flash.

The device must be **switched off** when the batteries are being recharged.

☞ **NOTICE:**
If the **RT 300** is switched on when the jack is plugged into the charging socket, the batteries will not charge. Instead, the device will be powered externally and is ready for use (see also section 5.7.5.3).
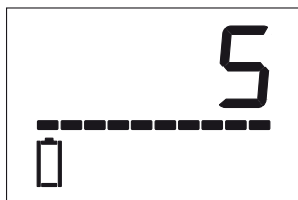

● Plug the AC/DC adapter plug into the charging socket of the **RT 300**. The batteries will begin to charge. Two opposite LEDs on the **RT 300** flash every two seconds (see section 5.1.4).
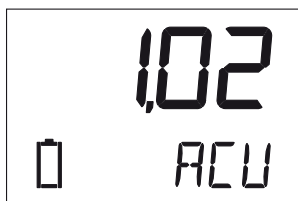
The **charging start screen** will appear. The following will be displayed:

● Version number, *here:* **1.02**

● Battery symbol (empty)

● Battery type display **ACU** (rechargeable battery)

● Wait a moment.

Charging begins.

● Duration of charging process [h], *here:* **5**

● The bar display will run continually from left to right.

● Battery symbol; initially empty, number of visible segments will increase with charging

The time until the end of charging will be counted down.

5.6.5.1 End of charging

The batteries are fully charged when the flash of the LEDs changes to a short double flash (see section 5.1.4).
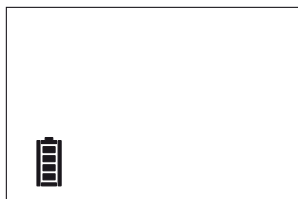
The display shows the battery symbol (full).

● Remove the AC/DC adapter plug from the charging socket of the **RT 300**.

5.6.5.2 Charging problems

Any problems encountered when charging the batteries are signalled by status messages (see section 10.2.2).

Message	RT 300 response	Corrective action
T 0	Charging aborted	● If possible: change the
T45		ambient temperature
10V	Charging voltage reduced to 10 V, charging time doubles	–
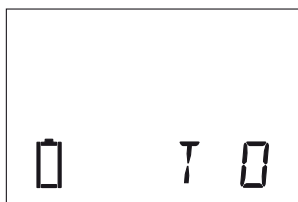
The display shows problems during charging.

● *here:* status message **T 0**, i.e. temperature of battery during charging below 0 ºC (32 ºF)
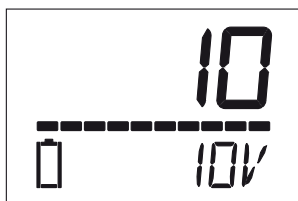
● *here:* status message **10V**, i.e. charging voltage reduced to 10 V

● Charging time doubles, *here:* **10** h

5.6.5.3 Changing between charging and external power supply

During the charging process the **RT 300** can be switched to measuring mode with external power supply.

● Press the ON/OFF key.

The device switches on.

● **DSP** status message (powered via AC/DC adapter)

● Wait a moment until the device returns to measuring mode.

Continuing charging

● Press the ON/OFF key again. The device switches back to charging (provided the AC/DC adapter is still connected).

The process will take a while. The device switches off in between, but comes back on again.

5.6.6 Reception quality display

During measurement the **RT 300** bar display indicates the quality of the radio connection. The more segments that are visible on the bar display, the better the reception quality.

Conditions for reception quality display:

● Radio receiver **RX 300** connected
● Headphones switched off
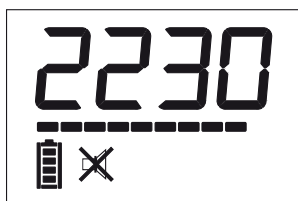
Display showing reception quality

● *here:* very good reception quality (one segment missing)

5.6.7 Synchronicity display

The radio transmitters used for a measurement must be synchronised to ensure a correct measurement.

The radio transmitters are synchronised via the computer.

Each individual device will show whether the radio transmitters are synchronised.

Synchronisation symbol		Radio transmitter RT 300
X	flashes	not synchronised
	not visible	synchronised

5.6.8 Switching on the light (display and microphone)

The display lighting on the **RT 300** and the illumination of the measurement location by LEDs on the **EM 300** are linked.

- Press the light key to illuminate the display and to switch on the LEDs on the **EM 300**.

  The light will stay on for **30 s** and will then go out automatically.

- Press the light key again before the 30 s lapse if you want to switch off the light in a specific way.

> **WARNING!**
> The LEDs on the microphone have a high intensity.
> Never shine the microphone light into the eyes.

6   Radio receiver RX 300

6.1   Functionality and construction

Radio receiver RX 300 synchronises the radio transmitters and relays the data from the transmitters to the computer. As such, the **RX 300** is the link between the transmitters and the computer.

The **RX 300** does not have any controls. It is ready for use as soon as it is receives power from the computer. To this end the jack of the USB cable must be plugged into the appropriate socket in the housing.

You will find an overview and all the part names of the **RX 300** in the back cover (fig. 10 and 11).

Fig. 7:   **Radio receiver RX 300** with connected USB cable and magnet (left) or mounting clip (right)

6.1.1   Aerial

The **RX 300** aerial can be rotated and tilted. This ensures the optimal position for good radio reception according to the on-site conditions.

6.1.2   LED

An LED is fitted in the housing of the **RX 300** above the USB socket. The LED flashes red.

Flash rate	Description
steadily flashing every 1 s	receiver ready for use, no radio connection to the transmitters
light permanently on	radio connection to at least one transmitter
light permanently on, flickering	data transfer between receiver and transmitter

6.2   Setup/mounting

The **RX 300** can stand alone when the **magnet** is screwed on. The magnet prevents the device from toppling on metal surfaces.

> ⚠ **DANGER!**
> **The magnet is very powerful. Persons with a pacemaker should not come close to the RX 300 radio receiver.**
> The magnet must be kept away from electronic storage media (diskettes, hard drives, credit cards, etc.), monitors (PC, TV) and clocks.
> If the **RX 300** is mounted on the roof of a vehicle, the vehicle must not be moved.

If a robust notebook is used as the computer, the **RX 300** can be attached using the **mounting clip** on the carrying strap at the front.

6.3   Power supply

The **RX 300** is powered via the computer. This means that a computer must always be connected for the **RX 300** to receive data.

6.4   Changing the aerial

The aerial is fitted to the device with a screwed joint. Please note when changing the aerial:

● The screwed joint must always be **clean and dry**.

● **Hand-tighten** the aerial. Do not use any tools to tighten it.

Note: The aerials of the **RX 300** and **RT 300** are identical in construction.

6.5   Advice for use

● Basic rule for using the **RX 300**:

   The freer and higher the RX 300 is mounted, the better the data reception.

   In other words, high, flat surfaces are ideal (e.g. vehicle roof).

● If the vehicle is to be used to mount the **RX 300**, always place the device on the roof. Do not attach the receiver to the side of the vehicle.

● The magnet is rubberised to prevent damage to the underlying surface (e.g. damage to paintwork). Always keep the **magnet clean**. If necessary, wash down with water.

7 Stand

The stand ensures that the **RT 300** is positioned securely and is at the required height for optimal data transmission. The **RT 300** must always be secured to the stand during the measurement.

The stand, **RT 300** and microphone can all be easily transported together whilst assembled by the top end of the telescopic tube.

⚠ **CAUTION!**
Small magnets secure the three parts of the stand base. Please take into account their magnetic power when assembling and dismantling the stand - your fingers could get trapped.
Always keep your fingers away from moving parts of the stand.

Fig. 8: Stand (folded down)

Assembling the stand

● Unfold the two outer parts of the stand base as far as the stop.

● Place the stand on the ground.

● Untwist the knob. Erect the telescopic tube. Fix the telescopic tube in the desired position by tightening the knob again.

● Extend the telescopic tube **as far as possible** using the two clamp levers.

● Push the points of the stand base into the ground if it is soft.

☞ NOTICE:
The **RT 300** must be as vertical as possible on the stand. You can compensate for dips in the ground by adjusting the angle between the stand base and the telescopic tube (15º increments).

Fig. 9: Stand (assembled) with **RT 300** and **EM 300**

8 Performing a correlation measurement

8.1 Suitable measurement locations

Any accessible point in the pipe network is suitable as a measurement location, provided the leak generates a measurable signal there. This can, however, only be verified through the measurement itself.

Accessible points include, for example, slide gates, hydrants and house connection valves. A radio link or line-of-sight between the measurement locations is not required.

	Can be connected to
EM 300	● Pipeline ● Hydrant ● House connection valve ● Slide gate
HY 300	● Hydrant ● House connection ● Flushing equipment ● Fan

If you intend to use the **EM 300** and attach it with a magnet, select an appropriate location that provides the most surface contact for the magnet.

8.2 Requirements

8.2.1 Equipment

To perform a correlation measurement with the **SeCorr 300** you will need (at least):

● 2 **EM 300** microphones or 2 **HY 300** hydrophones
● 2 **RT 300** radio transmitters
● 2 stands
● 1 **RX 300** radio receiver
● 1 computer

☞ **NOTICE:**
The radio transmitters and receivers are calibrated by the manufacturer. If you are using several **SeCorr 300**, only the **RT 300** and **RX 300** which are part of the one system may be combined. If necessary, mark the appliances which are part of the same system to prevent mix-ups.
When recording noise, you must use only microphones or only hydrophones. It is not possible to combine a microphone and a hydrophone in the same application.

8.2.2 Required data

To calculate the leak position using the **SeCorr 300 software,** you must have the following information about the **pipeline**:

- Position
- Material
- Special features in the piping (e.g. bends, house connections, pressure regulators)
- Length of the (water-filled) pipeline between the measurement locations

Please note that it is **not the distance** (i.e. the shortest connection) between the measurement locations, but rather the **actual length of the pipeline** that is required.

8.3 Setting up the measuring section

Once all the conditions for performing a measurement have been met (see section 8.2), you can start up the system.

- Set up a stand close to the computer for each measurement location (see section 7).
- Attach a **RT 300** to each stand.
- Switch on all **RT 300**.
- Switch on the computer.
- Connect the **RX 300** to the computer.

- Erect the **RX 300**. Follow the instructions in sections 6.2 and 6.5.
- Test the system. Launch the **SeCorr 300 software** on the computer. The connection to the **RX 300** will be established automatically and the **RT 300** will be synchronised.

  You will be informed of any problems that occur by a corresponding error message on the computer/display of the **RT 300**.

- Carry the stands (with the **RT 300**) and a microphone/hydrophone to the measurement locations.

At each measurement location:

… When measuring with a microphone

- Attach the microphone to the measurement location.
  - − Despite the strong magnetic force **carefully** place the microphone at the measurement location.
  - − Install the microphone at the measurement location as **upright** as possible. The maximum permitted tilt is 45º.
- Connect the microphone to the **RT 300**.
- Test the microphone by connecting headphones to the **RT 300**.

  If you can hear noises through the headphones (see section 5.7.3), the microphone is working.

… When measuring with a hydrophone

- Flush the measurement location.
- Disinfect all parts of the **HY 300** that can come into contact with drinking water.

> ⚠ **CAUTION!**
> To disinfect the **HY 300**, use only disinfectants approved for use with drinking water.

● Attach the hydrophone to the measurement location.

  − Use an adapter if necessary.

  − Seal off the connection.

  − Do this with the aid of the rotary tool if necessary.

> **CAUTION!**
> When using the **adapter for underground hydrants**, you
> must only hand-tighten hydrophone – adapter connection.

● Open the fitting completely.

● Check all connections between the hydrophone, measurement location and any adapter used for leak-tightness. Leaky connections cause interference noises that can falsify the measurement result.

● Vent the measurement location using the ventilation valve on the hydrophone.

● Connect the hydrophone to the **RT 300** using the hydrophone cable.

● Test the hydrophone by connecting headphones to the **RT 300**.

  If you can hear noises through the headphones (see section 5.7.3), the hydrophone is working.

Once you have set up all the measurement locations as described, the system is ready to start measuring. Signals are already being picked up and recorded. Continue to work on the computer.

● Click on the N**ew measurement** button. The **Measurement parameter** window will appear.

● Enter the required data.

● Confirm your entries with **OK**. The **measuring dialogue** and the **Time stream** window will appear.

  Further use of the **SeCorr 300 software** is explained in separate operating instructions.

9   Troubleshooting

If you encounter problems when working with the **SeCorr 300**, you will generally receive an error message on the computer from the **SeCorr 300 software**. This states the cause of the fault and repair options.

The following sections explain problems that can be attributed to the individual system components.

9.1   Problems with the RT 300

9.1.1   Device not ready for use

Description of alert	Cause/corrective action
LEDs not flashing	● Batteries empty > Change/recharge batteries ● Device faulty > Send device to SEWERIN Service

9.1.2   Status messages during the charging process

Charging problems are indicated by a status message: section 10.2.2 explains what the status messages mean.

9.1.3   Error codes

The **RT 300** displays internal errors on the display with an error code (see table).

● Error code, *here:* **F042**
● Status message **ERR** (error)

Error code	Cause	Corrective action
F014	Device malfunction	● Only through SEWERIN Service
F042	Battery requires charging	● Insert rechargeable OR ● Replace battery (instead of charging) OR ● set correct battery type (see Section 5.6.4.2)
F055	Device malfunction	● Only through SEWERIN Service
F062	Battery missing or inserted wrong way round	● Insert battery ● Check polarity
F063	External voltage less than 10 V	● Device will automatically halve charging voltage (display **10 V**) If malfunction reoccurs: ● AC/DC adapter faulty > replace AC/DC adapter ● Replace vehicle cable with AC/DC adapter
F064	Charging electronics error	● Only through SEWERIN Service
F200	Device malfunction	● Switch on device again ● Fault can be ignored if it occurs occasionally ● If it occurs regularly contact SEWERIN Service for help.
F201	Communication error	● Temporary error message ● Fault can be ignored if it occurs occasionally ● If it occurs regularly contact SEWERIN Service for help.
F210	Device malfunction	● Only through SEWERIN Service
F211		
F212		
F213		
F214		
F215		

9.2   Problems with the RX 300

Description of alert	Cause/corrective action
LED not flashing	● Check plug connection (cable) on **RX 300** and on computer
	● Exit software and restart
	● Device faulty > Send device to SEWERIN Service

9.3   Problems with radio connection RX 300 – RT 300

The most common reason for problems with exchanging data between the **RX 300** and the **RT 300** is the quality of the radio connection.

> ☞ **NOTICE:**
> The radio connection is only required for data trans-mission. A radio connection is not required for a correlation measurement.

Description of alert	Cause/corrective action
Bar display on **RT 300 display**: Only a few or no seg-ments visible	● Check transmission path: are ob-jects causing dark zones?
	● Change position of **RT 300**, e.g. move to side, position higher up
AND	● Set up **RT 300** close to **RX 300** for data transmission
SeCorr 300 software, **Info transmitter** area: aerial symbol shows low signal strength; status bar, right: black square visible	● Change position of **RX 300**, e.g. move to side, position higher up

10   Appendix

10.1   Specifications and permitted operating conditions

10.1.1   Radio transmitter RT 300

Construction:	Aluminium
Type of protection:	IP64
Power supply:	4 cells, type: mono D 1.5 V, optionally: ● Rechargeable batteries (accus): NiMH, 5 – 12 Ah ● Disposable batteries: Alkaline also possible: externally via AC/DC adapter
Operating time:	● Rechargeable batteries (accus): 8 – 20 h (depending on type) ● Disposable batteries: > 25 h
Charging time for re-chargeable batteries:	3 – 7 h (depending on type)
Weight:	5.73 lb. (with batteries)
Dimensions (Ø × H):	● 4.33 × 8.46 in. excl. aerial ● 4.33 × 12.4 in. incl. aerial
Operating temperature:	14 ºF – 104 ºF
Storage temperature:	-4 ºF – 140 ºF
Data memory:	40 min latch
Communication:	Bi-directional radio data
Frequency band:	2.4 – 2.48 GHz
Processor:	● Signal processing: DSP, 24 Bit ● Data processing: Microcontroller
Connections:	sturdy, non-twist, coded sockets for: ● charging/external power source ● Microphone/Hydrophone ● Headphones (phone jack 0.25 in.)
Transport:	Carrying handle: ● to be secured in 2 positions ● 3 attachment points (Tenax connections)
Secured by:	Quick-connect
Permitted operating environments:	● Outdoors
Non-permitted operating environments:	● In liquids ● In aggressive media ● In potentially explosive areas
Permissible relative humidity:	95 % non condensing

10.1.2   Radio receiver RX 300

Construction:	Injection-moulded aluminium housing
Type of protection:	IP68
Power supply:	Externally via USB, i.e. powered by computer
Weight:	1.1 lb.
Dimensions (W × H × D):	● 1.97 × 4.25 × 2.01 in. excl. aerial ● 1.97 × 11.81 × 2.01 in. incl. aerial
Operating temperature:	14 ºF – 104 ºF
Storage temperature:	-4 ºF – 140 ºF
Communication:	Bi-directional radio data
Frequency band:	2.4 – 2.48 GHz
Processor:	Data processing: microcontroller
Connection:	Sturdy, non-twist socket for USB cable RX 300 (Connection to computer: USB 1.1 or higher, power consumption 500 mA)
Cable length:	9.5 ft.
Secured by:	● Magnet (rubberised) ● Mounting clip
Permitted operating environments:	● Outdoors
Non-permitted operating environments:	● In aggressive media ● In potentially explosive areas
Permissible relative humidity:	95 % non condensing

10.1.3 Microphone EM 300

Construction:	Stainless steel
Type of protection:	IP68
Weight:	2.43 lb. (incl. cable)
Dimensions (W × H):	1.77 × 5.91 in.
Operating temperature:	-4 ºF – 176 ºF
Storage temperature:	-22 ºF – 194 ºF
Communication:	Digital via cable with RT 300
Frequency band:	0 – 5000 Hz
Processor:	Signal processing: ADC, 2 × 24 Bit
Cable length:	9.2 ft.
Other:	● Digital microphone ● Integrated LEDs (torch function)
Permitted operating environments:	● Outdoors ● Submersible to 3.3 ft.
Non-permitted operating environments:	● In liquids other than water ● In aggressive media ● In potentially explosive areas
Permissible relative humidity:	95 % non condensing

10.1.4 Hydrophone HY 300

Construction:	Stainless steel
Type of protection:	IP68
Weight:	1.54 lb. (without cable)
Dimensions (W × H):	1.77 × 5.91 in.
Thread:	1"
Pressure:	16 bar
Operating temperature:	-4 ºF – 176 ºF
Storage temperature:	-22 ºF – 194 ºF
Communication:	Digital via cable with RT 300
Frequency band:	0 – 3000 Hz
Processor:	Signal processing: ADC, 2 × 24 Bit
Cable:	● Separate ● Length: 9.2 ft.
Other:	Digital microphone
Permitted operating environments:	● Outdoors ● Submersible to 3.3 ft.
Non-permitted operating environments:	● In liquids other than water ● In aggressive media ● In potentially explosive areas
Permissible relative humidity:	95 % non condensing

10.1.5   Stand for RT 300

Construction:	Aluminium, zinc-coated steel
Weight:	6.83 lb.
Dimensions (W × H):	22.83 × 34.25 in.
Mounting:	Quick-connect for RT 300
Other:	● Adjustable telescopic rod tilt angle (15º incre-ments) ● Microphone holder

10.1.6   SeCorr 300 software

Operating system:	Windows 2000, XP, Vista
RAM:	512 MB minimum (1024 MB recommended)
Processor:	1.2 GHz minimum (1.8 GHz recommended)

10.1.7   SeCorr 300 system (system features)

Range:	● Built-up area: approx. 650 ft. ● With line-of-sight: approx. 2000 ft.
Number of RT 300 that can be connected:	2

10.2 RT 300 display

10.2.1 Symbols

Symbol	Description
▤ ▯	Battery symbol, full (left) or empty (right)
✖	Loudspeaker symbol (always crossed out)
∿	Filter symbol
Ⅹ	Synchronisation symbol
⌐ ⌐	Hearing protection symbol

10.2.2 Status messages

Message	Description
ACU	Powered by accumulator
BAT	Powered by battery
DSP	Powered by AC/DC adapter
EM … 300	Microphone EM 300 detected
ERR	Error code display
HY … 300	Hydrophone HY 300 detected
KHZ	Kilohertz unit [kHz]
PRO	Adjusting the hearing protection
T 0	Battery temperature when charging below 0 ºC (32 ºF)
T45	Battery temperature when charging above 45 ºC (113 ºF)
10V	Charging voltage reduced to 10 V due to under-voltage (charging time doubles)

10.3   Accessories

RT 300 case

Art. no.: ZD32-10000

- for transporting and storing two **RT 300** including accessories

- **RT 300** batteries can be **recharged** from outside

- with large free-running rollers

RX 300 case

Art. no.: ZD33-10000

- for transporting and storing a **notebook** and the **RX 300** including accessories

- Case inlay with sections for various notebooks (e.g. DELL Latitude D820, COLIBRI X6)

Hydrophone HY 300 equipment set

Art. no.: HY30-S0001

- includes two **HY 300** units, two hydrophone cables and two adapters for mounting on underground hydrants, as well as one rotary tool

- comes complete in carrying case

**AC/DC adapter M300
12 V = / 5 A EURO**

Art. no.: LD30-10000

- for charging the **RT 300** batteries in the case
- for charging individual **RT 300** from the mains

Vehicle cable M300

Art. no.: ZL08-10100

- with jack and integrated fuse (5 A)
- for charging the **RT 300** batteries in the case
- for charging individual **RT 300** from the 12-V car battery

Vehicle cable M300 mounting

Art. no.: ZL08-10200

- for charging the **RT 300** rechargeable batteries or individual **RT 300** units from the 12-V car battery
- permanently connects unit to the vehicle electrical system

Headphones K3

Art. no.: EZ13-11000

- for listening to noises on the **RT 300**

M10 main pipe adapter

Art. no.: ZM02-10000

- to permanently connect a microphone to slide gates or hydrants

M10 house connection adapter

Art. no.: ZM04-10000

- to permanently connect a microphone to a house shut-off valve

Cover hammer

Art. no.: 7222-0001

- for opening covers

Magnetic cover lifter

Art. no.: 7222-0002

- for undoing and lifting covers

8-pin hydrophone cable

Art. no.: HY30-Z0100

- for transferring data between **HY 300** and **RT 300**

RX 300 vehicle aerial

Art. no.: RX30-Z0400

- for permanent mounting on vehicle
- 3 m in length
- 5 m length also available

10.4   Declarations of conformity

SEWERIN
Technologies for leak detection.

EC Declaration of Conformity

Product: **RT 300**

Intended use: Radio transmitter for leak detection system SeCorr® 300

Manufacturer: Hermann Sewerin GmbH

Address: Robert-Bosch-Str. 3
                    33334 Gütersloh - Germany

The product complies with the following directives:

1999/5/EC

For evaluation of conformity the following harmonised standards apply:

EN 301489-1
EN 60950-1
EN 301489-6   (only Fab-No. 0300X)
EN 55022   (only Fab-No. 0300X)
EN 301489-17   (only Fab-No. 0301X)
FCC Part 15 B   (only Fab-No. 0301X)

Gütersloh, 2009-03-05

S. Sewerin

Dr. S. Sewerin
(General Manager)

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SEWERIN
Technologies for leak detection.

EC Declaration of Conformity

Product:	**RX 300**
Intended use:	Radio receiver for leak detection system SeCorr® 300
Manufacturer:	Hermann Sewerin GmbH
Address:	Robert-Bosch-Str. 3 33334 Gütersloh - Germany

The product complies with the following directives:

1999/5/EC

For evaluation of conformity the following harmonised standards apply:

EN 301489-1	
EN 60950-1	
EN 301489-6	(only Fab-No. 0310X)
EN 55022	(only Fab-No. 0310X)
EN 301489-17	(only Fab-No. 0311X)
FCC Part 15 B	(only Fab-No. 0311X)

Gütersloh, 2009-03-05

S. Sewerin

Dr. S. Sewerin
(General Manager)

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10.5   FCC/IC Compliance statements

The **RT 300** and **RX 300** include modules with the following identification:

● FCC ID: WSP860221

● IC: 7994A-860221

Radio receiver RX 300

The **RX 300** has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

● Reorient or relocate the receiving antenna.

● Increase the separation between the equipment and receiver.

● Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

● Consult the dealer or an experienced radio/TV technician for help.

This Class B digital apparatus complies with Canadian ICES-003.

Radio transmitter RT 300

The **RT 300** complies with part 15.103 (c) Exempted devices of the FCC Rules.

10.6   Advice on disposal

The European Waste Catalogue (EWC) governs the disposal of appliances and accessories.

Description of waste	Allocated EWC waste code
Device	16 02 13
Battery, accumulator	16 06 05

Old instruments

Old instruments can be returned to Hermann Sewerin GmbH. We will arrange for the appliance to be disposed of appropriately by certified specialist contractors free of charge.

11 Index

Aerial

LED

USB socket

Magnet

Fig. 10: **Radio receiver RX 300**, front view with aerial

Aerial connector

Guide rail for mounting clip

Holder for mounting clip

Fig. 11: **Radio receiver RX 300**, back view without aerial

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