SEWERIN
Technologies for leak detection.

SePem®

SePem® 100/150

SePem® 01 Master

Operating instructions

24.03.2017 a – 107336 – en

Logger SePem® 100/150

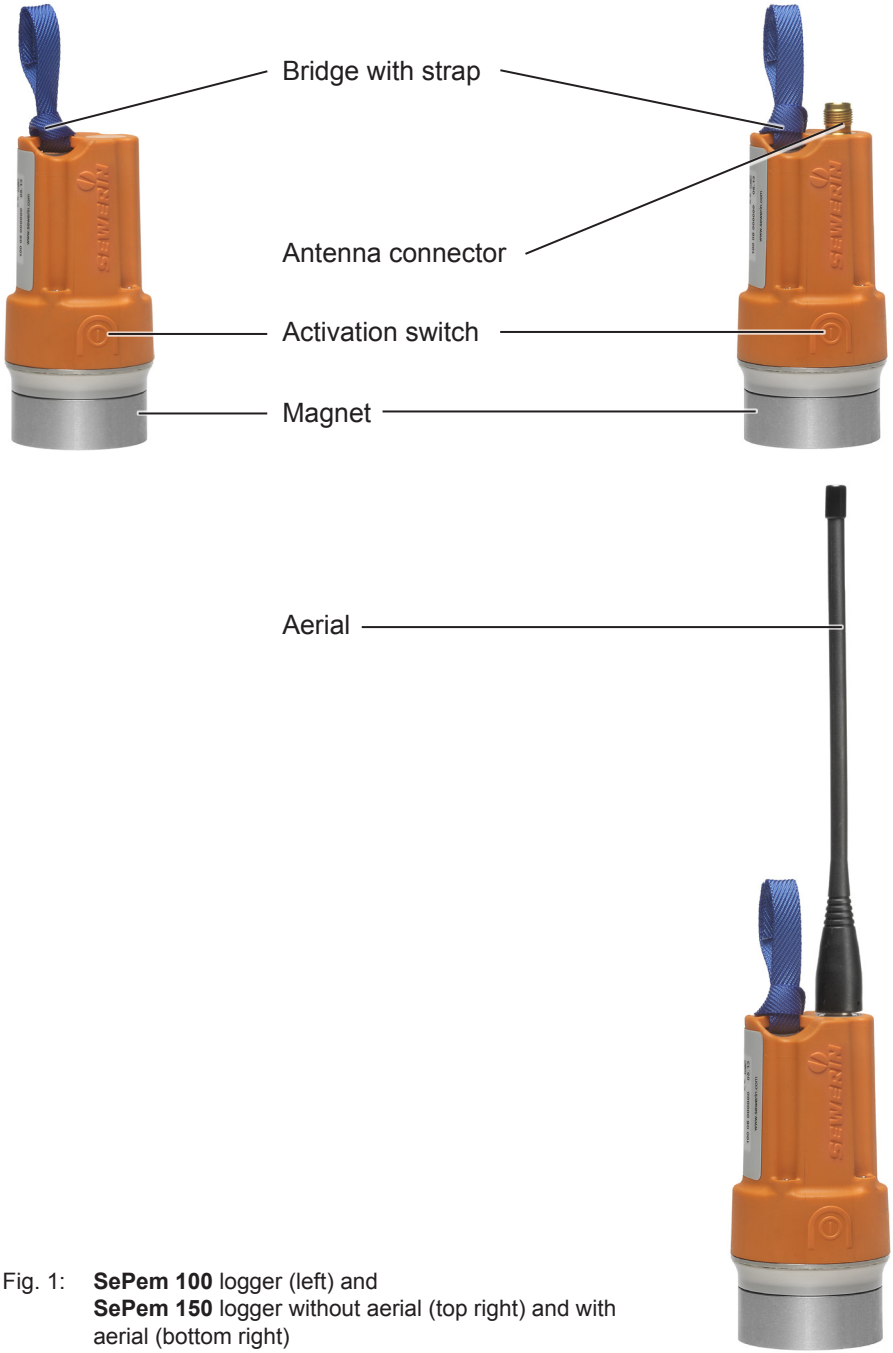


Fig. 1: **SePem 100** logger (left) and
SePem 150 logger without aerial (top right) and with aerial (bottom right)

SePem® 01 Master

Fig. 2: **SePem 01 Master** without aerial (top) and with aerial (bottom)

Information about this document

The warnings and notes in the document mean the following:

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

NOTICE!
Risk of damage to property.

Note:
Tips and important information.

Enumerated lists (numbers, letters) are used for:

- instructions that must be followed in a specific sequence

Bullet lists (bullet points, dashes) are used for:

- lists
- Instructions comprising only one action

Numbers enclosed by forward slashes /.../ refer to referenced documents.

1 Introduction

The **SePem** system is used for the early detection of leaks in water pipe networks.

The **SePem 100** logger is ideal for mobile use as the aerial of the logger is integrated in the housing.

The **SePem 150** logger is designed especially for stationary operation, i.e. for use in the continuous monitoring of water pipe networks at fixed measurement locations over long periods of time (several years).

The **SePem 01 Master** programming and read-out unit allows the system to be operated without the need for a computer.

SePem is a prelocation system. Indications that a leak is present must, therefore, always be verified using an appropriate method (e.g. correlation).

Note:
These operating instructions describe the **SePem** system. All descriptions refer to the system as delivered (factory settings). The manufacturer reserves the right to make changes.

---

2 General

2.1 Warranty

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

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

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

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

The manufacturer reserves the right to make technical changes.

2.2 Intended use

SePem is a measurement data recording and evaluation system. The system is designed for use in the stationary and mobile monitoring of water pipe networks. It must only be operated by suitably qualified employees (skilled staff, specialists and technicians) of water supply companies.

The system is only suitable for use in industrial and commercial applications. All applicable safety regulations and accident prevention regulations must be complied with when using the system.

Detailed information on appropriate operating conditions for the system and its components at the place of installation are provided in Section 7.1.

2.3 General safety information

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

However, if you handle the product improperly or not as intended, the product may present a risk to persons and property. For this reason, always observe the following safety information.

- Do not make any changes to the product.
- Never open the equipment housing. (Does not apply to the battery compartment of the **SePem 01 Master**.)
- The logger contains a powerful magnet. Persons with heart pacemakers must avoid close proximity to the device.
- The logger must be kept away from magnetic storage media (diskettes, hard drives, credit cards, etc.), monitors (PC, TV) and clocks.
- The logger batteries must only be replaced by SEWERIN Service or by other suitably trained personnel.
- Ensure that no dirt or moisture can get into the connections on any of the devices.
- Never carry a unit by its aerial.
- Never bend, kink or cut the aerial of the units.
- Always observe the permitted operating and storage temperatures.
- Do not expose the **SePem 01 Master** to any source of moisture that could enter the device.

3 SePem system

3.1 System components

The **SePem** system (**SePem** for short) comprises:

- **SePem 100** / **SePem 150** logger (**logger** for short (see Section 4)

  for recording measurement data

- **SePem 01 Master**, **Master** for short (see Section 5)

  for programming loggers and collecting and evaluating measurement results from the loggers

A single **Master** can be used to manage up to 400 loggers. A wide range of accessories is available for both the loggers and the **Master** (see Section 7.7).

3.2 Mobile operation versus stationary operation

The aim of stationary applications is to provide **continuous** monitoring over a large area of water pipe networks, whereas mobile applications of the system are designed for **regular** checks carried out over smaller areas.

Mobile operation represents a cost-effective alternative to stationary operation as only a limited number of loggers are necessary. The loggers will typically be installed for a few days to provide comprehensive coverage in the monitoring area. The measurement data that is recorded can then be read out and evaluated at regular intervals. Monitoring of the area is completed when any leaks detected are repaired. The loggers can then be moved to the next monitoring area.

The **SePem 100** logger is ideal for mobile use because the aerial in the logger is integrated in the housing

3.3 Operating principle

3.3.1 Monitoring procedure (overview)

The system works according to the following principle:

1. Program the logger for the first time (see Section 5.5.3).

   For each individual logger, specify where it will be used to gather measurement data and at what times.

2. Install the logger at the measurement location (see Section 4.3)
3. The logger works autonomously, i.e. it records data at the predefined times.
4. Read out the measurement data using the **Master** (see Section 5.5.2)

   The logger will transmit the measurement results at regular intervals within a prescribed period of time. The period of time is referred to as the radio time frame and is specified during programming.

   To read out the data, the user must take the **Master** into the radio transmission range of the logger. The measurement results will be transferred automatically from the logger to the **Master** as soon as the user enters the radio transmission range.

   It is also possible to read out additional information relating to the logger itself and to display a chart of the measurement (Graphics).

5. Evaluate the measurement results immediately or later with the **Master** (see Section 5.5.2.2 – Section 5.5.2.4, Section 5.5.4)

3.3.2 Radio frequency for data transmission

When it is installed in a pit, the logger transmits its data out of this pit. The range of the radio signals is heavily dependent on the shielding effects of the shaft, especially the cover.

As a general rule, the radio signals can be expected to have a range of **30 – 70 m** from the installation position. The range may be extended up to 100 – 200 m for plastic covers.

3.3.3 Principles of leak detection

Various methods are used to detect a leak.

Note:
Leak alerts will not be issued if there is background noise (frequency 50Hz or 100Hz).
Please refer also to the information on interpreting measurement results and leak alerts in Section 5.5.2.3 – Section 5.5.2.5.

3.3.3.1 Leak detection in mobile mode

In order to determine whether or not the measurement data recorded by a logger used as a mobile unit indicates a leak, an alarm threshold is specified in the **Master** (**absolute value**). If the minimum noise level measured exceeds the specified threshold value then the operator will be alerted to a leak.

The level that is set for the alarm threshold will depend on the material of the pipe in the vicinity of the logger. It is therefore possible to set the alarm threshold in the **Master** for each individual Logger.

3.3.3.2 Leak detection in stationary mode

When used in a stationary application, the leak detection method employed by the system is based on a mathematical relationship that compares measurement values at different points in time (detection of **variations).** The following points must be taken into consideration when evaluating results:

- The water pipe network must be leak-free before setting up the system for stationary use.
- Only leaks that occur after the monitoring has been started will be detected.
- A leak alert will only be issued after three measurements have been taken since the first occurrence of the leak; this avoids false detection of leaks due to short-term fluctuations.
- It is possible that false leak alerts may be issued because of external influences (e.g. prolonged heavy rain).

4 SePem 100/150 loggers

4.1 Functionality and construction

The **SePem 100** and **SePem 150** loggers record sound. They can gather and save data from water pipe networks. Data is exchanged with the **Master** by radio.

You will find an overview with the names of the logger parts inside the front cover (Fig. 1).

Aerial

The only difference between the **SePem 100** and **SePem 150** loggers is their aerial. The aerial of the **SePem 100** logger is integrated in its housing. The aerial of the **SePem 150** logger can be unscrewed.

Strap

A safety rope can be attached to the logger strap to make installation and removal at deep locations easier.

Mounting

The unit can be mounted on metal objects using magnets. If it is necessary to monitor a plastic pipe then the logger must be attached to the fittings.

Power supply

The power supply is provided by a permanently installed lithium battery that has a guaranteed lifetime of several years under normal operating conditions.

4.2 Specifying a device number (optional)

Every Logger is assigned an 11 digit serial number by the manufacturer before shipping. In order to simplify the job of managing the loggers (in the **Master** software and at the measurement location) it is possible to assign each unit a device number. Any **number may be selected**, up to a **maximum of four digits**. This number could, for example, be the same as the last four digits of the serial number.

1. It is advisable to decide on a format that can be used as the device number for all loggers.
2. Each logger should be labelled with the device number.
3. The device numbers must be saved with the corresponding serial number in the **Master** (see Section 5.5.4.1).

4.3 Installing the logger at the measurement location

4.3.1 Suitable installation locations

The logger can be mounted on:

- Pipes
- Fittings (slide gates, underground hydrants, above-ground hydrants)

Note:
Only attach the logger to above-ground hydrants if it is possible to protect the device against theft and vandalism.

The units can be installed both in water pipe networks constructed from metal and **plastic piping**. Please note that if installed in plastic water pipe networks:

- The logger cannot be mounted directly on the pipe, instead it has to be attached to a fitting.
- On plastic piping sound is not transmitted as well as in metal pipework systems.

4.3.2 Distance between two loggers (recommended)

The following spacing between each logger is recommended to allow systematic monitoring of an area:

Water pipe network made of	Fitting logger to	Recommended distance between two loggers
Metal	Fitting	300 – 500 m (mobile) 500 m (stationary)
Plastic	Fitting	50 – 100 m

For highly intermeshed water pipe networks, the distance between loggers may have to be reduced accordingly.

4.3.3 Preparing the logger

The preparatory work required for each logger includes:

- Screwing the magnet onto the logger
- Screwing the aerial onto the logger (**SePem 150** only)
- Initial programming of the logger

4.3.3.1 Screwing on the magnet

The magnet must be screwed onto the logger to ensure that the logger is secure at the place of installation.

1. Please ensure that the threads on both the logger and the magnet are clean.
2. Screw the magnet on hand-tight.

4.3.3.2 Screwing on the aerial (SePem 150)

Note:
The aerial must only be screwed onto the **SePem 150** logger. The aerial of the **SePem 100** logger is integrated in its housing.

The logger and the aerial are connected using a TNC plug-in connector. The antenna can be screwed directly into the threaded antenna connector.

1. Please ensure that the contacts on both the logger and the aerial are clean and dry.
2. Screw the aerial onto the aerial connector.

   Hand-tighten the aerial to ensure that the unit is sealed and to guarantee a good radio signal.

NOTICE! Risk of damage!
There must be no mechanical stress on the internal contacts of the TNC plug-in connector.
- Only tighten the aerial by hand.
- Do not use any tools.

4.3.3.3 Initial programming of the logger

Before installing the logger at the measurement location it must be programmed, i.e. data relating to measurement times, measurement duration and the radio time frame etc. must be transferred from the **Master** to the logger. Radio contact between the two devices must be established to carry out programming.

Note:
Each logger has to be programmed individually.

1. First prepare the **Master** for programming the loggers (see Section 5.5.3, in particular Section 5.5.3.3).
2. Activate the logger by moving a magnet over the activation switch. Fig. 3 shows the direction of movement to be used. You can, for example, use the magnet of another logger.

   The logger will remain ready to receive information for one minute after activation.

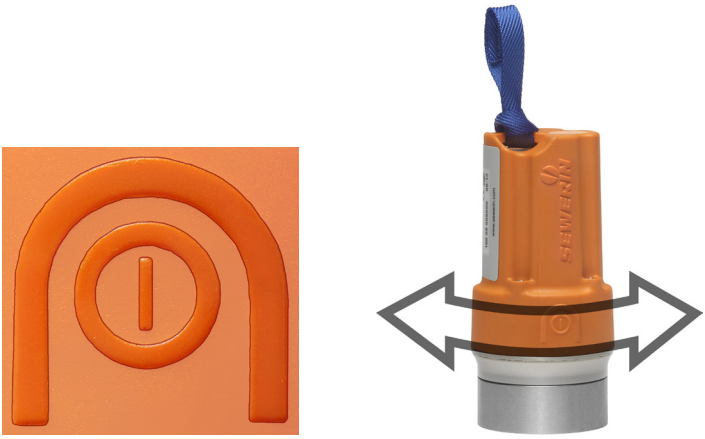


Fig. 3: Activating the logger:
Relief of the activation switch on the housing (left)
Direction of movement of magnet (right)

3. Move the **Master** into the transmission range of the logger. Transfer the data (see Section 5.5.3.5).

If a radio connection is not established between the **Master** and the logger within the available time frame then the logger will automatically switch off again and must be reactivated as required.

Note:
If the device settings for the logger are changed in the course of further work then the radio time frame can be used to transfer the relevant data. The logger, therefore, does not have to be activated manually every time.

4.3.4 Installing the logger

The logger is secured at the installation location using the magnet.

Note:
Note Section 4.3.1 and Section 4.3.2!

NOTICE! Damage possible from rough handling
The logger contains shock-sensitive components.
- Always place the logger carefully on the attachment point.

4.3.4.1 General installation instructions

- Use a safety rope if the attachment point is so deep that you cannot set the logger down by hand. The safety rope is attached to the strap.

  The safety rope is available to buy as an accessory.

- Ensure that a good metal-to-metal contact is formed between the logger magnet and the body to which it is attached.

  It is important that structure-borne sound is not damped by dirt, mud or rust. Clean the attachment point if necessary before mounting the logger magnet.

- The aerial of the **SePem 150** must not touch any metal parts at the installation location.

- The **SePem 150** aerial must remain straight and must not have contact with any other object once the shaft cover is closed. Allow for the required clearance.

4.3.4.2 Using installation adapters

At some installation locations it is difficult or impossible to secure the logger vertically using its magnet. In this case an installation adapter is recommended. The installation adapter is particularly useful for installing loggers horizontally.

The installation adapter is available to buy as an accessory.

The installation adapter consists of a tilted stainless steel panel with slot hole and a contact adapter (magnet). The contact adapter can be moved along the slot hole until you have found the optimal position for the installation location. The contact adapter is then tightened with a square nut. The logger is docked to the short piece of panel using its magnet (Fig. 4).

Fig. 4: Installation adapter with docked logger and various positions of the contact adapter

5 SePem 01 Master

5.1 Functionality and construction

The **Master** is the programming and read-out device for the loggers.

The following tasks can be performed using the **Master**:

- Program the loggers
- Read out measurement results and device data from the loggers
- Evaluate the measurement results (including chart)
- Change logger data

An illustration of the **Master** with all parts labelled is provided on the inside front cover.

Aerial

The **Master** aerial guarantees a reliable bidirectional radio connection between the device and the loggers. This is important because all measurement data, logger data and programming data for the loggers is transmitted using radio signals.

Supporting bracket

The supporting bracket can be used for carrying the unit and as a stand. The supporting bracket can be adjusted to different positions. With the bracket turned to the rear of the unit, the Master can be stood up safely in a convenient position for reading the display.

Display backlight

The duration for which the display is illuminated can be adjusted. The light will come on whenever a key is pressed or the jog dial is moved (except when battery is almost flat).

Memory

The **Master** saves the measurement results in a **ring memory**. This means that when the memory is full i.e. when there is no more storage space available, the oldest data is automatically

overwritten by the newest data. The unit will generate a warning to alert the user that memory is low.

5.2 Using the Master in vehicles

The most efficient way to program the loggers and read out data is to drive slowly through the transmission range of the loggers in a vehicle with the **Master**. This is generally preferable to a foot patrol. It is important to ensure a stable radio connection between the **Master** and loggers for the data transmission.

Note:
When programming the loggers from a passing vehicle it is imperative to always maintain the radio connection.

The **Master** aerial can be swapped for a **magnetic antenna attachment which is placed on the vehicle roof** to improve the reception quality.

The magnetic antenna attachment is available to buy as an accessory.

It should be noted that the unit will drain power from the vehicle battery when the engine is not running if this is used as an **external power source** for the **Master** (using the TG8 docking station and M4 vehicle cable). The **Master** should, therefore, always be switched off when not in use.

5.3 Power supply

5.3.1 Options

There are various power supply options available for the **Master**:

- Disposable batteries (x4)
- NiMH rechargeable batteries (x4)
- External, using mains or vehicle battery

Note:
The **Master** does not include an integral battery charger.

Switch off the device when not in use to prolong the life of the batteries.

5.3.2 Special features of rechargeable batteries

CAUTION! Risk of burning
Unsuitable rechargeable batteries can overheat in the event of a short circuit.

- Use SEWERIN rechargeable batteries.
- You can use other rechargeable batteries provided they fulfil the requirements of standard EN 60950-1.

Rechargeable batteries must be removed from the device for recharging and charged in an external charger.

5.3.3 Changing the battery

A 2.5 mm Allen key (supplied) is required to open the battery compartment on the back of the device.

1. Loosen the two screws securing the battery compartment. Remove the screws by repeatedly turning them alternately a short way; this ensures that the cover does not jam.
2. Lift off the cover.

3. Remove the disposable/rechargeable batteries and insert new ones. Ensure that the batteries are inserted with the correct polarity.
4. Replace the cover so it fits neatly into place and attach firmly with the screws.

Note:
The date and time will need to be reset under **`Master settings`** if it takes longer than four minutes to replace the batteries (see Section 5.5.5).

5.3.4 External power supply

External power supply options:

Power source	Accessories required	Use power supply connection on/at
Socket	M4 AC/DC adapter	**Master**
	TG8 docking station and M4 AC/DC adapter	TG8 docking station
Vehicle battery	TG8 docking station and M4 vehicle cable	TG8 docking station

The **M4 vehicle cable** is available in various models.

5.4 Operation

5.4.1 Keys and jog dial

The ON/OFF key is the only control on the device that does not change its function.

When switched on, the device is operated using the jog dial and function keys to navigate the display.

Control	Action	Function
ON/OFF key	Press	● Switches the device on ● Switches the device off
Function keys F1, F2, F3	Press	● Variable ● As indicated on the display at the bottom of the screen ● Function keys may also have no function assigned in some cases
Jog dial	Turn	● Select between vertically or horizontally adjacent functions, settings, measurement results, etc. ● Modify values
	Press	● Opens the next program level (e.g. menu item, function, measurement results, selectable values) ● Confirm values

5.4.2 Standard functions

The following functions are frequently required to operate the **Master**:

Standard functions		
Back	F3	Return to previous program level
Accept	F2	Save a modified value
Clear **Delete list**	F2	Delete an individual value or a list

5.4.3 Warning prompts

Warning prompts may be displayed in connection with certain functions (e.g. **Delete**). The intention is to prevent the operator from accidentally performing actions that could lead to loss of data.

Every warning prompt is also accompanied by the following:

- **Visual signal:** Flashing signal light
- **Audible signal:** The buzzer will sound

The audible signal can be switched off in the **Master settings**.

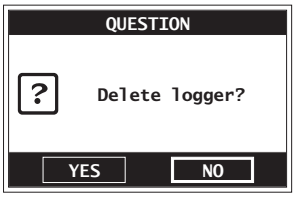


Fig. 5: Warning prompt

Use the jog dial to select **YES/NO** when prompted.

5.4.4 Entering text

You can save **comments** and the **location** for each logger in the **LOGGER DATABASE**. The entry can be up to 20 characters long.

The window for entering text is called **EDIT TEXT**.

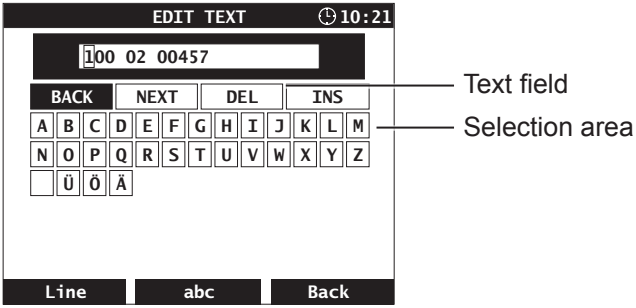


Fig. 6: Edit text

Text field

The text field always contains the last comment/location entered for the logger. The previous entry is overwritten when you enter new text.

The cursor must be moved to each entry position for overwriting. This is done using the jog dial and the functions in the first line of the selection area (**BACK**, **NEXT**, **DEL**, **INS**).

The factory default setting for this field is the serial number.

Selection area

The selection area can be navigated as follows:

- Turn the jog dial forwards or backwards or
- use **F1** **Line** to jump to the next line.

The functions in the first line of the selection area are used to select the cursor position in the text field.

Function	Effect in text field
BACK	Move cursor back one character
NEXT	Move cursor forward one character
DEL	Delete the character at the current cursor position
INS	Insert a character in front of the current cursor position.

Characters and functions in the first line must always be **confirmed** after selection by pressing the jog dial.

Function key assignment

Function keys		
Line	F1	Move to next line in selection area (only forwards)
abc **0-9** **ABC**	F2	Switch to next character set ● **ABC** Upper case ● **abc** Lower case ● **0-9** Numbers and special characters
Back	F3	Return to previous program level

5.4.5 Scrolling in charts

The **Master** can display data in charts. The corresponding windows are called **GRAPHICS** and **HIST. GRAPH**.

The charts always show all the data in one image. If there is a large amount of data, the values will be compressed in the chart.

If you want to study individual values in more detail, you can view the chart in scroll mode. Switch to scroll mode using **F2** **Scroll**. Use **F2** **No scroll** to exit scroll mode again.

Function key F2	
Scroll	Switch to scroll mode
No Scroll	Exit scroll mode

Information on scroll mode

A cursor appears in the chart in scroll mode. This can be moved to the left and right by turning the jog dial.

Information relating to the respective cursor position (date and time, current noise level) is displayed above the chart.

If there is a large amount of data available for a measurement, i.e. when the values are compressed, there may be several values at one cursor position. In such cases, the highest and the lowest noise level at the cursor position are shown with the corresponding time.

5.5 Firmware menus and Master – logger interaction

5.5.1 Main menu (overview)

The main menu is the central starting point for all tasks performed using the **Master**. It is the highest program level.

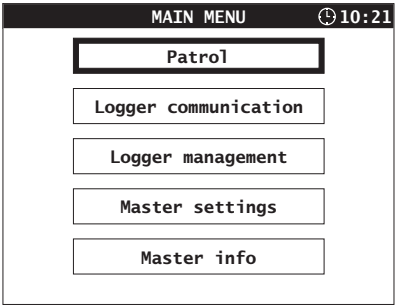


Fig. 7: Main menu

The main menu appears automatically when the unit is switched on, unless the Master settings specify that the program starts in patrol (see Section 5.5.5).

The five menu items in the main menu allow the following tasks to be carried out or information to displayed:

MAIN MENU	
Patrol	• Read out measurement results from the loggers
Logger communication	• Program the loggers; transmit logger data to the loggers • Read out measurement results from individual Loggers • Online measurement
Logger management	• Manage measurement results and logger data
Master settings	• Configure the **Master**
Master info	• Information about the **Master**

5.5.2 Patrol

Data saved in the logger is read out (collected) using the **Master** during a patrol.

The **purpose** of a patrol is to:

- Keep track of the locations of leaks detected
- Collect measurement results for viewing and evaluation at a later point in time away from the location.

The **`Patrol`** window will appear as soon as **`PATROL`** is selected from the menu (and confirmed). This will display an overview list of the measurement results for all loggers that have been read.

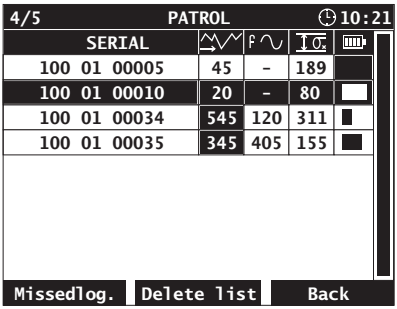


Fig. 8: Patrol - overview of Loggers from which data has been collected

---

Note:

The **`Patrol`** window only displays loggers which have successfully completed a measurement (with the exception of **`Continuous`** measurements, which do not have to be complete.)

The number of loggers read by and known to the **Master** (see logger database) is shown in the top left-hand corner (in e.g. 4/5, i.e. 4 loggers read, 5 loggers known).

The overview will usually be empty at the start of a patrol because the list is automatically deleted from the overview and moved to the **`Patrol lists`** when the unit is switched off.

F1 **`Missed log`** displays a list of all loggers which have not yet been read out during the current patrol. The loggers must be saved in the logger database for this to happen.

5.5.2.1 Requirements for a successful patrol

- **Master** is switched on, **PATROL** window is open
- The operator and the **Master** are within the radio transmission range of the logger
- The radio time frame of the logger is open, i.e. the logger is ready to send

---

Note:
The **Master** can only receive data when the **PATROL** window is open.

5.5.2.2 Patrol procedure (overview)

1. Operator
- Transports **Master** to within radio transmission range of the logger

2. Logger
- Ready-to-send (radio time frame open)

3. Master
- Receives the most recently stored measurement results - a new line appears in the **PATROL** window
- Synchronises the logger with the time of day stored in the Master (corresponds to **Master settings**)
- Sends an acknowledge signal to the logger, indicating that the radio time frame is to be closed in **5 minutes**

4. Operator
- Analyses the measurement results received (see Section 5.5.2.3)
- Continues from Step 5 if the measurement results are to be analysed in more detail
- Otherwise repeat from Step 1 with the next logger

5. Operator
- Takes the **Master** to within the radio transmission range of the logger again to allow the extended data set to be read out (remember there is only a 5 minute period in which to do this!)
- Chooses the required logger in the **PATROL** window (select and confirm)

6. Logger
- Sends the extended data set for the chosen measurement

7. Master
- Displays the window **SELECTED LOGGER**

8. Operator
- Can analyse the extended data set (see Section 5.5.2.4 and Section 5.5.2.5)
- Can terminate communication with the logger: Press **F3 Back**; the **PATROL** window will be displayed.

5.5.2.3 Analysing measurement result readouts

The measurement results read out during the patrol (see Section 5.5.2.2**, procedure to Step 3) must always be analysed and critically assessed.**

The following values give information about the quality of the measurement and any leak:

Value	Indication of	Description
Minimum sound level 	Possible presence of a leak	● Close to zero > no leak ● Much greater than zero > possible leak
Characterising frequency of measurement 	Fault	● 50 Hz or 100 Hz > background noise > usually no leak
	Location of leak	● Low > possible leak is some distance away ● High > possible leak is not far away
Width 	Quality of measurement	● Small > low inference noise > good measurement ● Large > high interference noise > bad measurement

Note:
In the factory settings the **Characterising frequency of measurement** column is hidden. To display the column you will have to change the Master settings.
If graphics are required for analysing the measurement results then the extended data set must be read out. In this case, the patrol should be continued as per the Section 5.5.2.2 procedure described from Step 5 onwards.

The following information is transmitted in addition to the measurement results when data is read out:

Note		Description of alert
Leak alert	Column 	● Numeric value inverted
	Signal light	● Visual signal: lit for long period
	Buzzer	● Audible signal: long signal
Remaining logger battery power less than 10% (battery needs changing)	Column 	● Field is black ● No segments can be seen

Please note: A **leak alert is not a guarantee that a leak is actually present**.

In cases where the analysis of the measurement results confirms that a leak may be present, this result should be checked using an appropriate method (e.g. correlation) before any excavation work is carried out.

5.5.2.4 Extended data set

The extended data set provides additional information on the following:

- A measurement (e.g. graphics),
- The transmitting logger (e.g. radio times, last seven minimum noise levels recorded).

The extended data set allows the measurements to be analysed in more detail and the logger to be checked for correct functioning.

The extended data set for a measurement can be obtained by carrying out the patrol procedure in Section 5.5.2.2 as far as Step 6.

Note:
The extended data set can only ever be read out for the most recent measurement carried out by a logger or the measurement currently in progress.

Extended data set: Values in the patrol	
General	Battery capacity, device number, next service, firmware release, errors (optional)
Radio times	Days, start, duration, patrol style, economy mode
Meas. times	Date, time, duration, interval, type, alarm level, status
Measurement results	Minimum level, characterising frequency, width, measurement temperature, sensor
Last minimum noise level (optional)	Displays of the last seven values (maximum)
Graphics	Displays the graphics

At the end of the patrol part of the extended data set is saved in the **logger database**.

Extended data set: saved values in the logger database (history)	
Meas. times	Date, time, duration
Measurement results	Minimum noise level, characterising frequency, width, read-out time
Graphics	Displays the graphics
Last minimum noise level (optional)	Displays of the last seven values (maximum)

5.5.2.5 Graphics

The graphics component of the extended data set (see Section 5.5.2.4) is particularly important for the thorough analysis of a measurement. The shape of the curve can give an indication that a leak may be present.

It is possible to view the graphics either during a patrol or at a later point in time.

Viewing the graphics during a patrol

1. Using the **PATROL** menu, select the appropriate logger (and confirm). The **SELECTED LOGGER** window will appear.
2. Select **Data/Results** from the menu.
3. Turn the jog dial until the **Graphics** window appears (last window).

Viewing the graphics after completing a patrol

1. From the main menu select **Logger management** and then **Logger database**. The **LOGGER DATABASE** window will appear.
2. Choose the required logger (select and confirm). The **HISTORY** window will appear.
3. Choose the required patrol (select and confirm). The **GRAPHICS** window will appear.

Analysis of the graphics

The x-axis corresponds to time, the y-axis is the measurement value (noise level).

A noise level that is continuously much higher than zero may indicate the presence of a leak (Fig. 9).

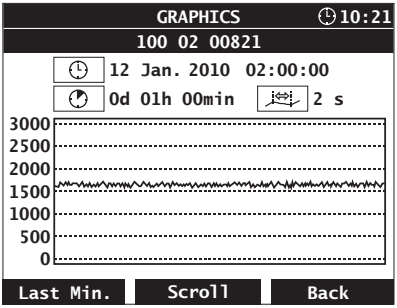


Fig. 9: Graphics showing a high probability of a leak

If the noise level is continuously close to zero then the probability of a leak is low (Fig. 10). Short, high peaks (spikes) may indicate, for example, passing vehicles or water being withdrawn for a short period.

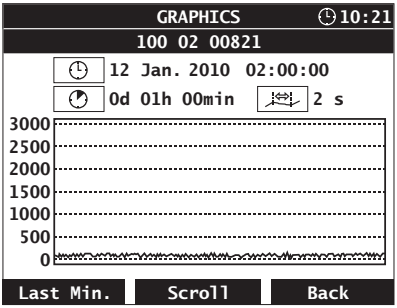


Fig. 10: Graphics showing a low probability of a leak

5.5.3 Logger communication

The **LOGGER COMMUNICATION** is used to control the exchange of data between the **Master** and the logger. Data includes both measurement results and logger data (see Section 5.5.3.1 and Section 5.5.3.2).

The logger communication uses different methods for data transmission to a single logger and transmission to multiple loggers (see Section 5.5.3.5).

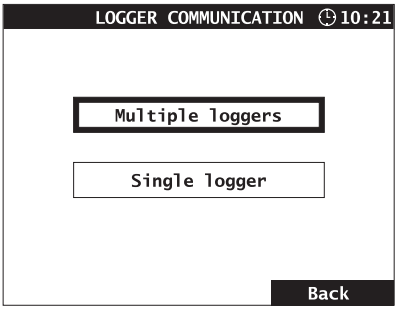


Fig. 11: Logger communication

LOGGER COMMUNICATION	
Multiple Loggers	• Configure and program as many loggers as you wish
Single logger	• Read out logger data and measurement results • Online measurement • Configure and program a single logger

5.5.3.1 Logger data features

Logger data is either:

- Specified in the **Master** (e.g. radio times and measurement times) or
- Stored internally in the unit (e.g. next service due, firmware release).

Radio times and measurement times must be transmitted to the logger, which results in the logger being programmed.

For monitoring purposes, it is also possible to subsequently read out logger data from a logger using the **Master**.

LOGGER DATA	
General	Battery capacity, device number, next service, firmware release
Radio times	Days, time, duration, patrol style, economy mode
Meas. times	Start of measurement ("Start in" or date), time, duration, interval, type, alarm level, status

5.5.3.2 Measurement result features

Measurement results are calculated from the measurement data collected by the logger. They can be read out using the **Master**. All measurement results are assigned to the appropriate logger ID.

MEASUREMENT RESULTS
Logger identification, minimum level, characterising frequency, width Optional, depending on the program settings: battery capacity, leak alert, measurement temperature, sensor

5.5.3.3 Multiple loggers (logger configuration)

The menu item **Multiple loggers** takes you directly to the **LOGGER CONFIGURATION** menu. This includes the options **Measurement times**, **Radio times** and **Miscellaneous**. Once entered, the settings can be sent to any desired number of loggers (see Section 5.5.3.5).

Please note the following configuration tips:

- The windows **Measurement times**, **Radio times** and **Miscellaneous** are ordered one after the other (turn the jog dial).
- The magnitude of the values set affects the lifetime of the logger battery. Long radio times, short intervals, etc. reduce the lifetime.

- If values are chosen that are invalid or are not permitted then these cannot be transmitted. They will be automatically corrected.

Measurement times

The settings under **Meas. times** determine how and when a **logger** will record measurement data.

LOGGER CONFIGURATION	
Meas. times	
Start in	**d** **(days)** ● Number of days until start of measurement (0-30d)
Time	**Hrs** (hour: minutes) ● Time of day at which the measurement should start
Duration	**d h min** (days: hours: minutes) ● Duration of a measurement (Measurement type: single and repeat) ● Recording time (meas. type: continuous)
Interval	**s / m i n / h** (seconds/minutes/hours) ● Length of time between recording of two measurement values within one measurement period
Type	**SINGLE** > **CYCLICAL** > **CONT.** (meas. type) ● Selection of measurement type (see Section 7.2)

Radio times

The settings under **`Radio times`** determine when and for how long a **logger** is ready to exchange data with the **Master** (**radio time frame**). The length of time between two transmission pulses is specified under **`Patrol style`**.

`LOGGER CONFIGURATION`	
`Radio times`	
`Days`	**`SU MO TU WE TH FR SA`** ● Days of the week on which the radio time frame will be open ● The ticks can be set or removed using the jog dial
`Time`	**`Hrs`** (hour: minutes) ● Time of day at which the radio time frame will be open
`Duration`	**`h`** (hours) ● Duration of radio connection (1-23h)
`Patrol style`	**`DRIVE > SLOWDRIVE > WALK > STATIC`** ● Type of patrol ● specifies the length of time between two transmission pulses ● **`DRIVE`**: transmission pulse **5 s** equivalent to vehicle at approx. 30 km/h ● **`SLOW DRIVE`**: Transmission pulse **10 s** equivalent to vehicle at less than 10 km/h or stop-and-go traffic ● **`WALK`**: Transmission pulse **30 s** equivalent to foot patrol ● **`STATIC`**: Transmission pulse **60 s**

Miscellaneous

The settings available in the **Miscellaneous** option determine the way in which the **Master** operates. It is particularly important to set the correct **Alarm level**.

LOGGER CONFIGURATION	
Miscellaneous	
Alarm level	**MOBILE** (mobile operation) ● requires a value to be set between 30 and 3000 (in increments of 30). A leak alert is then issued when this value is exceeded (see Section 3.3.3.1)
	STATIC (stationary operation) ● There is no alarm level for this mode as a different leak detection method is used (see Section 3.3.3.2)
Economy mode	**ON** > **OFF** ● **ON**: energy saving mode – Logger can still send measurement results (within the radio time frame), but cannot receive data from the**Master** – The logger must be activated with a magnet for programming

5.5.3.4 Single logger

Note:
A radio connection must always be established between the **Master** and **logger** when working with single loggers.

The **Master will switch to receive mode** as soon as the `Single logger` menu option is chosen (selected and confirmed). The `LOGGER SELECTION` options will appear. A selection window will be displayed (initially blank).

1. Establish radio connection to the required logger by:
   - Activating the logger with a magnet

   OR

   - Moving the **Master** within the transmission range of the logger (requires the radio time frame to be open).
2. Ensure that the **Master** and logger are approx. 1 – 2 m apart.
3. Wait a moment. When the internal logger search has been completed a list will be displayed in the selection window showing up to four loggers detected to which there is a radio connection. (These are loggers with an open radio time frame / manually activated loggers.)

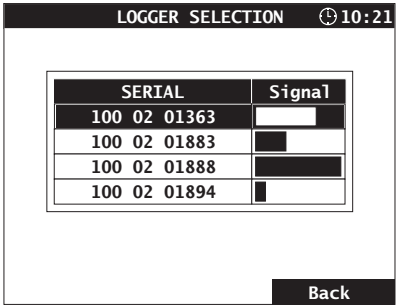


Fig. 12: Logger selection for single loggers

4. Choose the required logger (select and confirm).

Note:
Only select loggers to which there is a radio connection with a good signal quality. These are loggers for which the bar in the Signal column fills at least half of the field.

- The measurement and logger data for the chosen logger will be read out. The **SELECTED LOGGER** window will then appear.

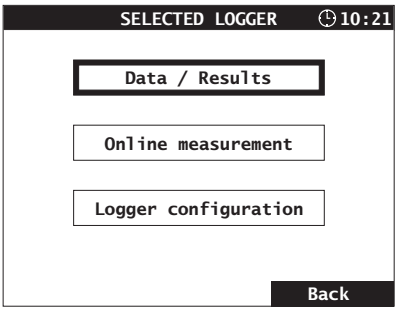


Fig. 13: Selected logger

The three options in the **SELECTED LOGGER** menu allow the following actions to be performed / information to be viewed:

SELECTED LOGGER	
Data/Results	• Display data for the selected logger
Online measurement	• Live recording of measurement data • Results can be viewed immediately on the **Master** in real time
Logger configuration	• Specify measurement and radio times for the selected logger (same as **Multiple loggers**, see Section 5.5.3.3)

Data / Results

Data/Results in the menu provides information from the logger. The logger data specified in Section 5.5.2.4(first table) is listed. Please note that some values are only displayed if the logger has saved corresponding measurements.

Any **logger errors** detected during read-out will be shown under **General** in the last line. The error number given will be important for any contact with SEWERIN Service.

Online measurement

When online measurement is active the measurement data recorded by the logger can be viewed directly on the **Master** in real time.

Note:
Online measurements cannot be saved.

Online measurement is typically used during **mobile monitoring**. This is useful for providing feedback on the noise levels detected by the logger immediately after installation. If the level is close to zero then it will not be necessary to monitor the installation location with a stationary unit. The logger can be removed immediately and reinstalled at another location.

Usually, measurement values are calculated every second. All measurement values are immediately displayed in a chart. The **F2 Stop** key can be used to stop the measurement in order to view the graphics. (Note: The measurement **cannot** be subsequently restarted.) Pressing **F3 Back** cancels the online measurement.

Please note the following points:

- The measurement interval (**Logger configuration** > **Meas. times** > **Interval**) specifies the length of time between each measurement that is recorded, and therefore determines the speed at which the graphics is updated.
- If an online measurement is running at the same time as a predefined measurement then the scale of the time axis will depend on the measurement interval.

5.5.3.5 Transmitting data to the loggers

To transmit the measurement time and radio time settings to the loggers always use the **F1** **`Transmit`** option from the **`Logger configuration`** window. It is imperative to note the following differences between transmission to multiple loggers and transmission to a single logger:

Data transmission to **`multiple loggers`**	
Radio connection	● Must be established with each logger separately: – Use a magnet to activate the logger. Wait until the audible signal is heard. **Caution!** If multiple loggers are active, the system will automatically switch off all but one unit. OR – Move the **Master** into the transmission range of the logger (the radio time frame must be open).
Start data transmission	● After the radio connection has been established
Destination for transmitted data	● Only the currently active/ready-to-receive logger
Continue data transmission	● Establish a radio connection to the next logger
End of Master's transmission mode	● Radio connection is terminated before the end of data transmission if – The measurement starts within the data transmission time period OR – The connection is terminated by pressing **`Back`**.
End data transmission	● Ends when no new radio connection is established with a logger

Data transmission to a `single logger`	
Radio connection	● Already established
Start data transmission	● Starts as soon as **F1** `Transmit` is pressed
Destination for transmitted data	● Only the selected logger
End data transmission	● Radio connection will be terminated automatically ● Return to main menu
Continue data transmission	● Not possible directly ● Select next logger using `Logger communication` - `Single logger` (see also Section 5.5.3.4)

Data cannot be transmitted if any invalid entries have been made in the `Logger configuration`. A prompt will be displayed to this effect; this must be acknowledged. The system will return to the `Logger configuration` window. The invalid values will be corrected automatically. (Values are adjusted to approximate the requested value wherever possible.) Corrected values are marked to assist with identification. The data can be `transmitted` immediately if the corrected values are acceptable.

Note:
Any existing measurement data will be deleted when transmitting data to `Multiple loggers`. Please ensure therefore that all measurement results are read out before transmitting.

Loggers programmed (only with `Multiple Loggers`)

After data has been transmitted to `Multiple Loggers` the `LOGGERS PROGRAMMED` screen will be displayed.

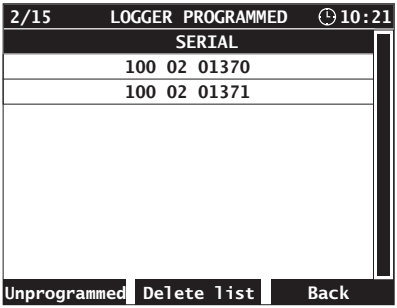


Fig. 14: Loggers programmed

A list of **all** loggers that have been programmed with the current settings since switching on the **Master** will be displayed.

The loggers are listed using the specified logger ID (e.g. **SERIAL**) and sorted according to the time of programming.

In the top left corner is a counter showing the number of programmed loggers and the number of loggers recognised by the **Master** (see logger database) - ("2/15" in the example means that 2 loggers were programmed and the Master has recognised 15 loggers).

Note:
When you switch off the **Master** the list of programmed loggers is deleted.

Press **F1Unprog.Log.** to display a list of all loggers which have not been programmed since the **Master** was switched on. The loggers must be saved in the logger database for this to happen (see Section 5.5.2.4). (This means that new loggers that have not yet completed a data transfer will not be shown in the list.)

5.5.3.6 Standard settings

The **Master** has a set of standard settings for the logger configuration. This set of values has been optimised to provide long battery life for the logger.

Pressing the **F2** `Standard` key will cause all values to be overwritten with the standard settings. No additional warning is provided.

Standard settings for configuration of loggers	
Meas. times	
Start in	1 d
Time	02 : 00 hrs
Duration	00 d 01 h 00 min
Interval	2 s
Type	REPEAT
Radio times	
Days	TU
Time	08 : 00 hrs
Duration	8 h
Patrol style	DRIVE
Miscellaneous	
Alarm level	STATIC
Economy mode	OFF

Note:
The life of the logger battery is approx. 40% longer in economy mode (`ON`).

5.5.4 Logger management

Logger management is used for the following:

- Displaying all stored measurement results and logger data
- Editing logger data

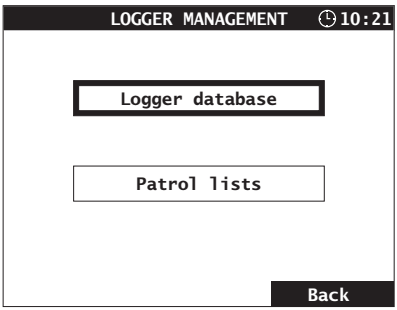


Fig. 15: Logger management

5.5.4.1 Logger database

The **LOGGER DATABASE** option displays a list of all loggers stored. A logger will be identified and saved by the **Master** as soon as there is a radio conne ction between the two. No distinction is made here between intentional radio connections and those that were established by chance.

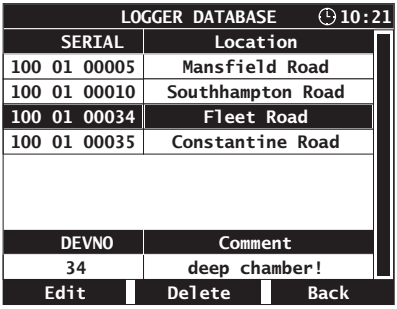


Fig. 16: Logger database

The top section of the window displays a list of loggers sorted by **Serial** number alongside their **Location**.

The bottom section of the window shows the additional logger data (**DEVNO**, **Comment**) for the logger selected in the list above.

Note:
All associated logger data will be also deleted when a logger is deleted from the logger database.

History

A **History** is saved for each logger. This contains the measurement results for all measurement readings (time of reading, minimum noise level, width, characterising frequency). If the extended data set was read out then this will also be saved (indicated by an 'x' in the last column; see also Section 5.5.2.4, second table).

1. Select a logger from the **logger database**.
2. Press the jog dial. The **HISTORY** window will appear.

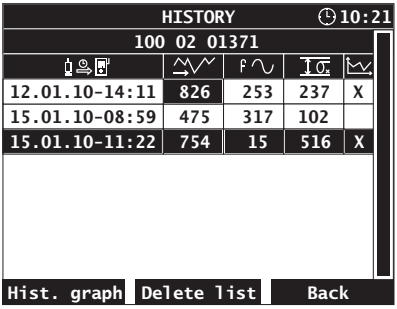


Fig. 17: History

3. Optional: **Viewing the graphics**

   Select a measurement result that includes an extended data set (and confirm). The **GRAPHICS** window will appear.

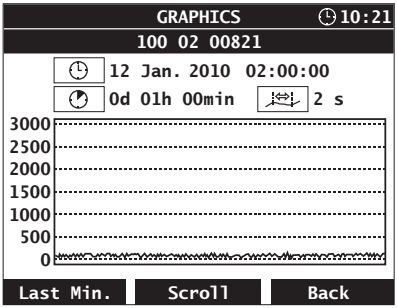


Fig. 18: Graphics in a saved patrol

Pressing the **F1**`Hist. graph` key (in the `History` window) will create a chart plotting the **minimum noise level of all the saved measurements**.

Note:
The history will be deleted automatically for all loggers if the **Master** memory is deleted.

Edit

Pressing **F1** `Edit` allows you to edit the logger data saved in the `LOGGER DATABASE`.

EDIT LOGGER	
`SERIAL`	• Cannot be changed
`Device number`	• Any number between 0 and 9999 (see Section 4.2)
`Location`	• Text entry possible (see Section 5.4.4)
`Comment`	• Factory default setting for this field is the serial number

5.5.4.2 Patrol lists

During a **PATROL**, all measurement results received will be saved automatically to the **patrol lists** (see Section 5.5.2.2). Whenever

- the **Delete** option is selected in the **PATROL** window
- the **Master** is switched off

the existing data will be saved.

The **patrol lists** provide the following information:

- Dates of the last four patrols
- The loggers read during those patrols
- Associated measurement results

As soon as you select **Patrol lists** from the menu (and confirm) the **Date/Time** selection window will appear. This will list up to four patrols.

Fig. 19: Selecting patrols

Note:
The **Date / Time** window will not list any patrols the first time the **Master** is used, or when all existing patrol lists have been deleted, or the memory has been erased. A patrol must be carried out in order for a patrol to be recorded! Reading out data from a logger that has been activated manually is not treated as a patrol.

Once a patrol has been selected, a list containing the corresponding measurements will appear (**SAVED PATROL**).

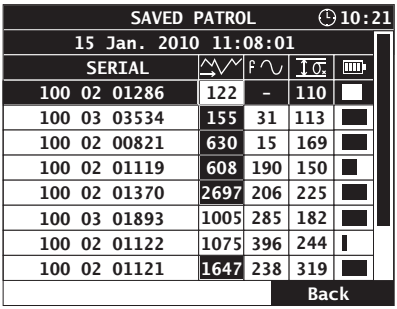


Fig. 20: Saved patrol

The measurements are listed with the logger ID information (e.g. **SERIAL**), minimum noise level, characterising frequency, width and remaining logger battery capacity.

Leak alerts and low logger-battery alerts are indicated using an inverse representation, as described in the **PATROL** section.

It is also possible to access the history for saved patrols (see Section 5.5.4.1).

5.5.5 Master settings

The **MASTER SETTINGS** are used to configure the **Master**. The settings will be stored until they are next changed (unless the **memory is deleted**). If it takes longer than four minutes to change the batteries then the date and time must be reset.

MASTER SETTINGS	
Date	(Day: Month: Year) ● Current date
Time	**hrs** (hour : minutes) ● Current time
DST	**YES** > **NO** ● **YES**: Change to daylight saving time (for details see Section 7.5)
Language	**German > English > French >** … ● Language selection
Illumi-nation	**OFF > 10s > 30s > 1min > 5min > ON** ● Illumination of display ● **ON**: Light permanently on ● **Note:** Long on-times will reduce the lifetime of the battery.
Buzzer	**ON > OFF** ● Switches audible signal off/on
Delete memory	**YES > NO** ● **YES**: Delete **Master** memory ● Affects all data relating to logger management (logger data in the **logger database,** measurement results in the **patrol lists**) ● **Caution!** This is not a stored setting - effects are immediate.
Contrast	● Sets the contrast of the display
Log. identifi-cation	**SERIAL > DEVNO > LOCATION** ● Logger ID ● **Master** detects loggers either by the serial number (**SERIAL**), device number (**DEVNO**) or the location (**LOC**)
Autom. shut down	**OFF > 5min > 10min > 30min** ● Auto power off ● Time after which the **Master** switches off if it has not been used ● **OFF**: Auto power off disabled

Multiple antennas	**YES** > **NO** ● **YES**: **Master** receives the logger data from several aerials. **Caution!** If **YES** is selected the **Master** will only be able to receive data, but not send any. **LOGGER COMMUNICATION** is blocked.
Start with patrol	**YES** > **NO** ● **YES**: When the **Master** is switched on the **PATROL** window will appear instead of the **MAIN MENU** window.
Suppress frequency	**YES** > **NO** ● The **Characterising frequency of measurement** column is set to hidden in the factory settings ● Column can be displayed ● Refers to the **PATROL**, **SAVED PATROL** and **HISTORY WINDOWS** ● **YES**: column is hidden

Delete memory

The memory can only be deleted if the correct PIN code is entered. This is intended to prevent accidental deletion of the contents of the memory.

1. Select **DELETE MEMORY** from the **Master settings** menu (and confirm).
2. Select **YES** and press the jog dial.
3. Press **F2** **Accept**.
4. Answer **YES** at the warning prompt.
5. Enter the **PIN code 7314**. A message will appear as soon as the last digit is entered to confirm that the memory has been deleted. The unit will then return to the main menu.

5.5.6 Master info

The Master info is solely for information purposes. It is not possible to modify any settings.

MASTER INFO	
	● Serial number
	● Date and time as set in **Master settings**
	● Remaining battery capacity
	● Memory used
	● Release of hardware and firmware
	● Temperature

6 Troubleshooting

6.1 Problems with the logger

Problem/symptom	Solution
Logger cannot be activated	● Flat battery > send logger to SEWERIN Service

6.2 Problems with the Master

Problem/symptom	Solution
No radio connection (error message e.g. "Connection to logger terminated!")	● Check the radio connection (see Section 6.3.1)
Logger 'forgotten' when reading out data	● In future, check under **`Patrol`** using **F1** **`Unprogrammed`** that all loggers have been read.
History does not contain any entries	● Memory was deleted OR ● Logger is new and no measurements have been read out yet
Not possible to communicate with the logger	● Economy mode **`ON`** selected? > If so, then bidirectional radio connection is switched off: Logger continues to send measurement results, but **Master** cannot establish contact to logger during the patrol

6.3 Problems with the Master – logger radio connection

The most common reason for problems with exchanging data between the **Master** and logger is the quality of the radio connection. It is rare for problems to be caused by a device malfunction.

Problem/symptom	Solution
Logger is activated, but the Master does not recognise it	● Check the radio connection (see Section 6.3.1) ● Improve the radio connection (see Section 6.3.2)
Master does not receive data	● Check the radio connection (see Section 6.3.1) ● Check the **Master**: Aerial on device? ● Improve the radio connection (see Section 6.3.2)
No data received when in vehicle	● Check the radio connection (see Section 6.3.1) ● Improve the radio connection (see Section 6.3.2, Changing the aerial)

6.3.1 Check the radio connection

Check the following points first if there are problems with radio communication between the logger and **Master**:

- Are all aerial connections clean and dry (**SePem 150** logger, **Master**)? Moisture will reduce the quality of the radio connection.
- Are the logger and **Master** approx. 1 – 2 m apart?
- Are there any other devices nearby that may transmit at the same frequency (433 MHz), (e.g. correlators or radio masts)?

  Either remove the other transmitting device (e.g. correlator) or select a new installation location (e.g. away from fixed radio mast).

If the interference is not due to one of the causes mentioned above then it will be necessary to establish if the interference to the radio signal is permanent or intermittent. To do this, test the radio connection with at least two loggers in succession.

1. Test the radio connection between the **Master** and a logger (first logger) at another location far away from the original installation location.

Result:	Conclusion:
– Radio communication OK	Original installation location unsuitable, e.g. due to strong shielding effects or another transmitting device in the area
– Radio communication not OK	Master, Master aerial, first logger or its aerial faulty

2. Test the radio communication between the **Master** and another logger (second logger) at the same place as under Step 1.

Result:	Conclusion:
– Radio communication OK	First logger or its aerial faulty
– Radio communication not OK	Master or Master aerial faulty

6.3.2 Improving the radio connection

There are a number of ways to improve the radio connection between the **logger** and **Master**:

- Align the logger and Master aerials in parallel
- Replace metal valve box with plastic valve box
- When using the **Master** in vehicles: Use the magnetic antenna attachment to be placed on the roof of the vehicle (instead of standard Master aerial)

6.4 Other problems

Problem/symptom	Solution
The Master issued a leak alert, but no leak could be found	**SePem** is a prelocation system. Leak alerts must always be verified using an appropriate method (e.g. correlation) before carrying out excavation work.

7 Appendix

7.1 Specifications and permitted operating conditions

7.1.1 SePem 100 and SePem 150 loggers

Device data

Dimensions (Ø × H)	SePem 100: 54 × 104 mm (without magnet) SePem 150: 54 × 114 mm (without magnet and aerial)
Weight	SePem 100: 740 g SePem 150: 775 g

Certificates

Certificate	CE

Features

Interface	radio data
Memory	64 kB
Controls	magnetic activation via reed contact

Operating conditions

Operating temperature	-20 °C – +55 °C
Storage temperature	-20 °C – +70 °C
Humidity	100 % r.h.
Atmospheric pressure	900 – 1180 hPa
Protection rating	IP68
Permitted operating environments	outdoors submersible to 1 m
Non-permitted operating environments	in liquids other than water in aggressive media in potentially explosive areas
Normal position of use	Vertical

Power supply

Power supply	Lithium battery
Operating time, typical	5 years (if standard settings are used)
Operating voltage	3.6 V

Data logging

Sampling rate	adjustable 1 s – 1 h

Data transmission

Transmission frequency	433 MHz
Communication	bi-directional radio data
Power	10 mW

Additional data

Attachment option	magnetic at measuring point

7.1.2 SePem 01 Master

Device data

Dimensions (W × D × H):	158 × 57 × 205 mm 158 × 57 × 253 mm with supporting bracket
Weight	approx. 850g (with antenna)

Certificates

Certificate	CE, FCC

Features

Display	320 × 240 pixels monochrome
Buzzer	for audible signals in operation
Signal light	LED
Interface	USB/radio data
Memory	8 MB
Controls	Membrane keypad with 4 keys, jog dial

Operating conditions

Operating temperature	-15 °C – +45 °C (depends on battery type)
Storage temperature	-30 °C – +80 °C (without disposable batteries)
Humidity	95%, non-condensing
Protection rating	IP54
Permitted operating environments	outdoors in vehicle
Non-permitted operating environments	in water or other liquids in aggressive media In potentially explosive areas

Power supply

Power supply	External 12 V= OR internal, using 4 replaceable AA-size batteries, disposable or rechargeable (LR6, AA, AM3), either: − Alkali-manganese disposable cells − Zinc-carbon disposable cells − NiMH rechargeable batteries (all 4 cells must be the same type)
Operating time, minimum	10 h
Operating voltage	6 V

Data transmission

Transmission frequency	433 MHz (Europe)
Radio range	> 50 m
Communication	bi-directional radio data
Power	10 mW

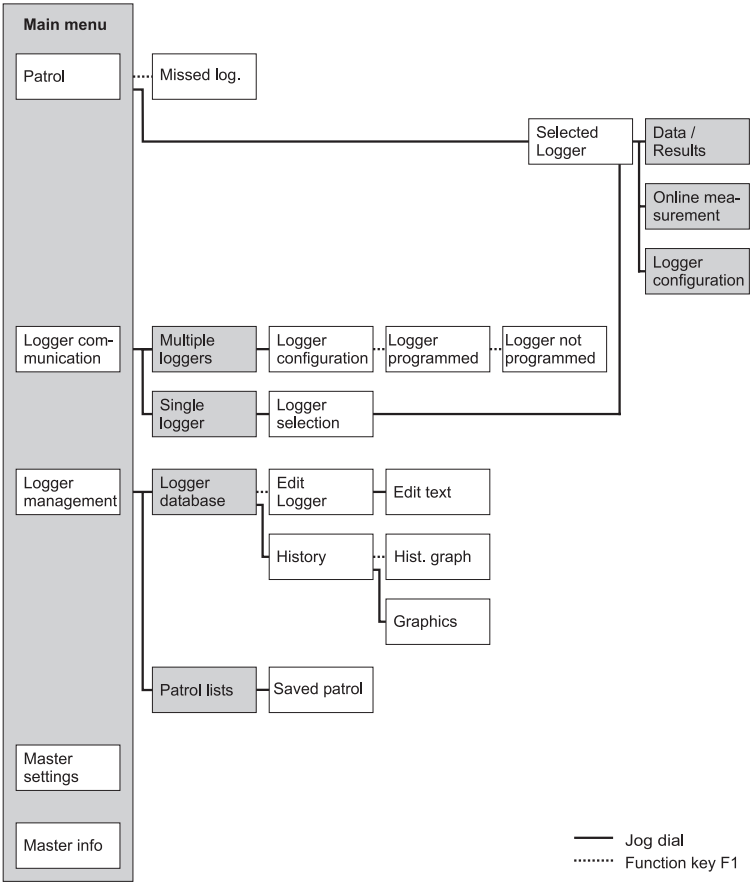
Additional data

Attachment option	Carrying strap, Docking station
Transport	System case ZD28-10000

7.2 Measurement types (overview)

Measurement type	Features
Single measurement Abbr.: `Single`	● Records a single measurement, with a specified duration, at a specified point in time ● Any previous measurement data stored in the logger will be completely deleted before recording starts.
Continuous measurement Abbr.:- `Cont.`	● Records an ongoing measurement ● Measurement time is 24h or a multiple thereof ● Always starts at 00:00 hrs ● Any previous measurement data stored in the logger will be overwritten ● The first measurement results can be read out after 24 hours.
Repeat measurement Abbr.: `Repeat`	● Records a measurement at intervals of 24 hours. ● Any previous measurement data stored in the logger will be completely deleted before recording starts.

7.3 Menu structure



7.4 Display symbols (Master)

Notes

	Wait
	PIN code protected area
	Errors
	Warning
	Question
	About

Measurement

	Number of measurements
	Graphics
	Maximum noise level
	Minimum noise level
	Width
	Characterising frequency of measurement
	Current noise level (online measurement)
	Interval
	Scale for time axis (graphics)
	Evaluation

General information

	Date, time (time of day, meas. time)
	Duration
	Radio time
	Read out time
	Logger
	SERIAL NUMBER
	Remaining logger battery capacity
	Remaining **Master** battery capacity
	Memory for **Master**
	Release of hardware and firmware
	Temperature

7.5 Terminology and general abbreviations

Attachment point	● Point at which the logger is attached to the pipe or fitting i.e. where it makes physical contact with the water pipe network
Background noise	● Unwanted electromagnetic radiation from various sources (e.g. street lamps)
Character set	● Specifies the character type (upper case, lower case, numbers) for entering text
DST	● Daylight Saving Time ● Adjusts the time on the last Sunday in March (time moved forward by 1 hour; Summer Time) and the last Sunday in October (time moved back by 1 hour; Winter Time) ● Applies to all member countries of the European Union
Extended data set	● Can be read out during a patrol in addition to the measurement results ● Provides further information about the measurement (e.g. graphics)
Firmware	● Term used to refer to software in electronic devices (e.g. logger, **Master**) ● to distinguish it from PC software
Graphics	● Chart of the noise level of a measurement plotted against time
Hist. graph	● Chart of the history of a logger ● Shows a chart of minimum noise levels for all saved measurements
History	● Contains all measurement results read out from each logger: time of reading, minimum noise level, width, characterising frequency, graphics (if read out) ● Can be displayed as a chart (Hist. graph)

Installation location	● Location in the water pipe network where a logger is installed to record measurement data
Logger data	● Data that identifies a logger ● A distinction is made between: general data (battery capacity, device number, next service due, firmware release), radio times (days, start, continuous, patrol type, economy mode) and measurement times (date, time, duration, interval, type, alarm threshold, status)
Measurement data	● Data that is collected and stored by a logger during a measurement
Measurement location	● Same meaning as installation location
Measurement results	● Calculated from the measurement data ● includes: minimum noise level, characterising frequency, width, battery capacity, leak alert ● To avoid data being incorrectly assigned, the logger serial number is also issued with the measurement results
Online measurement	● A measurement type that allows data measured by the logger to be followed directly on the **Master** in real time (live recording)
Patrol	● Derived from the French verb patrouiller ● Reading out of data recorded by the logger ● The operator must move the **Master** to within the transmission range of the logger
Radio time frame	● Period of time during which the logger is in the correct mode for data exchange with the **Master**

Read out	● Transmit data from logger to the **Master**
Width	● Standard deviation of measurement data

7.6 Abbreviations in the firmware

DEL	● Delete
DEVNO	● Device number
DST	● Daylight Saving Time
Hist. graph	● History graph
INS	● Insert
Last Min.	● Last minimum
LAST MIN. NOISE LEVELS	● Last minimum noise levels
LOC	● Location
Log.identification	● Logger identification
Meas. results	● Measurement results
Meas. temperature	● Measurement temperature
Meas. times	● Measurement times
Min. noise level	● Minimum noise level
Missed log.	● Missed logger
Updat. Log	● Updated Logger

7.7 Accessories and consumables

Accessories

Part	Order number
SePem 01 carrying case	ZD28-10000
SePem 01 transport box	ZD30-10000
Safety line, 1.2 m	SF01-Z0300
"Vario" carrying system	3209-0012
Installation adapter	ZF02-Z2000
Magnetic antenna attachment	KR04-Z1200
Charger, 4 x AA-size batteries	9042-0026
Docking station TG8	LP11-10001
AC/DC adapter M4	LD10-10001
M4 vehicle cable, 12 V= portable	ZL07-10100
M4 vehicle cable, 12 V= installed	ZL07-10000
M4 vehicle cable, 24 V= portable	ZL09-10000

Consumables

Part	Order number
Disposable alkaline battery	1353-0001
Rechargeable NiMH battery	1354-0003

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

7.8 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
Disposable battery, re-chargeable battery	16 06 05

End-of-life equipment

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

8 Index

M

O

P

R

S

T

U

V

W

Hermann Sewerin GmbH
Robert-Bosch-Straße 3
33334 Gütersloh, Germany
Tel.: +49 5241 934-0
Fax: +49 5241 934-444
www.sewerin.com
info@sewerin.com

SEWERIN SARL
17, rue Ampère – BP 211
67727 Hoerdt Cedex, France
Tél. : +33 3 88 68 15 15
Fax : +33 3 88 68 11 77
www.sewerin.fr
sewerin@sewerin.fr

Sewerin Ltd
Hertfordshire
UK
Phone: +44 1462-634363
www.sewerin.co.uk
info@sewerin.co.uk

SEWERIN IBERIA S.L.
Centro de Negocios “Eisenhower”
Avenida Sur del Aeropuerto
de Barajas 28, Of. 2.1 y 2.2
28042 Madrid, España
Tel.: +34 91 74807-57
Fax: +34 91 74807-58
www.sewerin.es
info@sewerin.es

Sewerin Sp.z o.o.
ul. Twórcza 79L/1
03-289 Warszawa, Polska
Tel.: +48 22 675 09 69
Tel. kom.: +48 501 879 444
www.sewerin.pl
info@sewerin.pl