Leak found through precise pinpointing: Sustained minimisation of drinking water losses

Sebalog N-3 Network
Network of correlating noise loggers

Description
In December 2015, our Swiss sales partner Riwatec installed noise loggers at the Bern train station to detect leaks in the station’s drinking water supply. The loggers send data wirelessly on a daily basis to the GSM box with integrated SIM card. From there, the data is sent to an FTP server which the user can access online in the SebaCloud.

Directly following the installation, three leaks were detected in this way. One of these was a constant 30 l/min “continual leak” that for years had caused visible moisture damage in the underground passageways to the platforms. The leak was able to be precisely located through the services of the Riwatec company. Since this leakage was directly under a track bed at platform 6 and the repairs turned out to be very costly, this line was taken out of service until repaired. For the SBB this was a complete success, since leak localisation is made extremely difficult by the constant background noise.

Project
Monitoring the drinking water network of the train station

Period
From December 2015 to present

Customer
Schweizerische Bundesbahnen SBB
Flow measurement – installation of six measuring points without interrupting the service

SebaFlow
Continuous zone monitoring and flow measurement with ultrasonics

Description
SebaFlow enables the continuous flow and zone monitoring of a pipe network section (DMA District Metering Area) through the use of ultrasonics.

Installation is managed without interrupting the water supply by means of attaching sensors to the outside wall of the pipe. SebaFlow is robust and maintenance-free, allowing installation without chamber construction.

The main advantages of the SebaFlow are:
- Maintenance-free flow measurement
- Early leak detection
- Short installation time without supply interruption
- No chamber construction necessary
- Precise measurements even at low flow rates
- Data transmission to the SebaCloud or to the own FTP server
- Battery-operated solution available as an option

Quantity
6 SebaFlow units (900 & 600mm ductile iron pipe)

Period
November 2016 - ongoing

Customer
Aguapen-EP, Ecuador
Australia’s first permanent leak detection network

Sebalog N-3
Correlating network noise loggers

Description
Monitoring of trunk mains in remote areas can be very expensive, due to the amount of time that is needed to access the site before leak inspection can begin. Furthermore, the large diameters of trunk mains represent a problem for many conventional acoustic leak detection systems. Despite these challenges it is important to closely monitor trunk mains, as leaks on such pipes can lead to great water losses, and in the worst case, to pipe bursts. SebaKMT’s fixed network of correlating noise loggers enables both the remote monitoring of trunk mains and the exact location of leaks, even on large diameter pipes.

» Remote leak monitoring and pinpointing
» Transmission of acoustic recordings for correlation
» Advanced web-based evaluation software
» Adaptable to existing SCADA systems
» Cascading repeater functionality

Within the first months of the installation for Wingecarribee Shire Council several leaks were identified by the N3 system and later verified in the field, saving the community a lot of water, and a lot of money.

Project
14 km trunkline monitoring with a fixed network of correlating noise loggers.

Period
Started December 2013

Customer
Wingecarribee Shire Council, Australia
“We were very impressed that the Sebalog HydroCorr enabled us to locate the leak despite the very low pressure and large pipe diameter.”

Martin Grupp, Site Manager, Zweckverband Landeswasserversorgung

Sebalog HydroCorr
Correlating noise loggers with hydrophone sensors

Description
In mid-November, flow measurements by the regional water supplier in Stuttgart revealed the likelihood of a major leak in a DN 900 grey cast iron water main. Pressure measurements were carried out along the pipeline and the location of the suspected leak was narrowed down to a section of approximately 250 metres. To find the exact position of the leak, a Sebalog HydroCorr system was used, consisting of correlating noise loggers with hydrophone sensors.

Although the pressure in the pipe was only around 1.5 bar, it was possible to carry out a successful measurement and receive a definite correlation result. The following pipe excavation confirmed the correlated leak location, revealing a 5 metre-long crack in the bottom of the pipe.

Project
Leak location in a DN 900 grey cast iron water main

Quantity
1 Sebalog HydroCorr set

Period
November 2013

Customer
Zweckverband Landeswasserversorgung, Stuttgart
Reducing leak run-time in small, remote communities with web-based correlation technology

Sebalog N-3
Correlating network noise loggers

Description
The Sebalog N-3 fixed network of correlating noise loggers is the future standard solution for water network monitoring and remote leak pinpointing. The system is composed of Sebalog N-3 noise loggers, signal repeaters and a central communication box. Due to the transmission of acoustic recordings, the system can not only display noise levels and frequencies, but can carry out the correlation of sound recordings.

The main advantages of the Sebalog N-3 fixed network are:

» Remote leak monitoring and pinpointing
» Transmission of acoustic recordings for correlation
» Advanced web-based evaluation software
» Adaptable to existing SCADA systems
» Cascading repeater functionality
» Interactive pipe mapping tool

Project
Several network installations in different communities throughout Israel.

Quantity
200 noise loggers

Period
2011 - ongoing

Customer
Mey Ram, Israel
We can transmit the data from 100 noise loggers with just two GSM boxes. That’s great, because we therefore have minimal data transmission costs!

Sebalog N-3
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» Cascading repeater functionality
» Interactive pipe mapping tool

Project
Permanent leak monitoring of the densely populated inner district of Dortmund city.

Quantity
100 noise loggers installed so far

Period
2012 - ongoing

Customer
DEW21 - Water and energie supplier of the city Dortmund, Germany

Mr. Tobias Nayda, DEW21, Head of maintenance and inspection
Minimizing the running costs of one of Denmark’s largest water suppliers

Sebalog N-3
Correlating network noise loggers

Customer’s opinion

Niels Rasmussen
(Operational Manager / Guldborgsund Forsyning):

Here at Guldborgsund Forsyning we have chosen to implement ISO 22000 for our drinking water supplies, which is an international standard for food safety management systems.

As part of the ISO 22000 process we are prioritizing the reduction of leaks, which do not only waste water, but are also a potential source of contamination. To ensure optimum drinking water safety and security, we have decided to install automatic leak detection technology in urban areas. After a thorough study of the various options we chose Sebalog N-3, because it is a very efficient leak detection system, is easy to install and will considerably help us reduce our running costs.

Quantity
260 noise loggers installed so far

Period
2012 - ongoing

Customer
Guldborgsund Forsyning, Denmark
It’s a **mobile leak detection** department and a **must for every municipality**.

**Leak detection van**

*With incorporated office compartment and wet room*

**Description**

When on the road, you can be sure that you have all the necessary equipment for managing and maintaining your pipe network at hand with a SebaKMT leak detection van. You can transport high-quality measuring equipment such as correlators, listening equipment, noise loggers, line location equipment, etc. quickly, effectively and correctly. All your equipment is then within easy reach, whenever it’s needed.

The van is divided into two sections. The front area accommodates the SebaKMT “Mobile Office”. This contains all the main features that you need to work efficiently and in comfort while on the road – from seating, work surfaces & a wardrobe through to drawers and cupboards. An additional battery, both modern and powerful, ensures that all your equipment has an independent power supply. In the rear of the vehicle, the so-called wet room, the emphasis is on safety and ergonomics. This section contains shelving with drawers and cupboards to store equipment and tools securely and accessibly. The shelving can be expanded to meet individual customer requirements.

**Project**

Network analysis and leak pinpointing in the city of Lobito, Angola

**Quantity**

1 van full equipped with leak detection instruments in 2009

**Customer**

Empresa de Águas e Saneamento do Lobito, Angola
The most reliable **data logger** for the **remote monitoring** of **pressure** and **flow**

**Sebalog Dx**
**Flow and pressure logger with GPRS**

**Description**
Using a Sebalog Dx data logger allows you to always remain informed about exactly what is going on in your supply network. You can record pressure and flow on up to 4 channels simultaneously, and send the data conveniently and reliably as daily updates to the control centre by GPRS.

Thanks to its small size and robust housing, the Sebalog Dx can be used even under the most adverse conditions. The internal battery, which can supply the logger with power for 5 years under standard conditions, and its extremely large memory for over 1 million measurements give you all the freedom you need for your specific application.

Almost all configuration of the Sebalog Dx settings can be re-programmed remotely. The logger receives the new configuration automatically during communication with GSM, making it unnecessary (to spend time and resources) to re-program the logger on site. In the event of an alarm a trigger causes the logger to temporarily transmit online data via GSM, allowing you to see what happened following the alarm event.

**Project**
Pressure and flow monitoring in an urban area, India

**Quantity**
100 data loggers

**Period**
2012

**Customer**
Larson & Toubro (L&T), India
From **30%** to **2%** –
a *success story* from Styria

**Sebalog N-3**
Correlating network noise loggers

**Description**
In 2004, the public utility company Gleisdorf employed the first-noise level loggers in its water pipe network, thus initiating the electronic age of permanent water loss monitoring. 156 Sebalog N-3 units are currently in use in the Gleisdorf water pipe network.

In the 8 years of operation, annual water loss was able to be reduced from 30% to 2%. This spares a yearly water loss of approx. 29,000 m³ which would cost around € 19,000.

This reduction in the loss was possible because the noise level-loggers can detect the smallest leak immediately. By detecting these early, greater damage is prevented and thus unnecessarily long leakage durations avoided.

**Project**
Automated water loss management from the public utility company Gleisdorf

**Quantity**
Thus far 156 noise loggers have been installed.

**Time period**
2004 – today (2012)

**Customer**
Public utility company Gleisdorf, Austria
Let your *leak detection van guide* you to the *leaks*!

**Leak detection van**  
*With incorporated office compartment and wet room*

**Description**

When on the road, you can be sure that you have all the necessary equipment for managing and maintaining your pipe network at hand with a SebaKMT leak detection van. You can transport high-quality measuring equipment such as correlators, listening equipment, noise loggers, line location equipment, etc. quickly, effectively and correctly.

The van is divided into two sections. The front area accommodates the SebaKMT “Mobile Office”. This contains all the main features that you need to work efficiently and in comfort while on the road – from seating, work surfaces & a wardrobe through to drawers and cupboards. An additional battery, both modern and powerful, ensures that all your equipment has an independent power supply. In the rear of the vehicle, the so-called wet room, the emphasis is on safety and ergonomics. This section contains shelving with drawers and cupboards to store equipment and tools securely and accessibly.

**Project**

Reducing non-revenue-water in the City of Benguela (Angola) and surrounding areas. Intensive training was carried out in Angola and Germany as capacity development of the local water utility company.

**Quantity**

1 van full equiped with leak detection instruments in 2010

**Customer**

Empresa de Águas e Saneamento de Benguela, Angola
The challenge of **rebuilding** the water supply network of Angola’s capital

**Leak detection van**  
*With incorporated office compartment and wet room*

**Description**

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**Project**

Repairing the water supply network that was severely damaged during the long-lasting civil war. Supplying the latest technology for reducing losses in the water network. Bilateral knowledge transfer for improving the expertise of local non-revenue water engineers.

**Quantity**

2 water leak detection vans in 2006

**Customer**

Empresa Publica de Aguas de Luanda, Angola

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Helping to **restore** the **water supply system** in Northern Iraq

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**Project**

Emergency Measures Water Supply and Sanitation in North Iraq (funded by the KfW), 2012

**Quantity**

2 leak detection vans with all necessary equipment for water network monitoring and leak detection. 1 service and maintenance van furnished with shelves and storage room for small construction equipment.

**Client**

Development aid project funded by the KfW
Leakages detected with minimal expense using the starter set

Sebalog N-3 & Sebalog Corr
Noise level logger starter set and multi-correlator

Description
While searching for drinking water losses of 20.4 m³/day in the upper section of the town of Wächtersbach/Hessen, the powerful duo Sebalog N-3 (noise level logger) and Sebalog Corr (multi-correlator) turned out to be a real stroke of luck.

The noise level loggers as well as the multi-correlators were planted in the zone on valves in the drinking water pipeline for the purposes of measurement so the data recorded could be analysed the following day. By using these devices, approx. 3 km of the pipe network was able to be checked with one measurement.

Using the analysed data, the leakage was able to be clearly isolated to one pipe section. Using the correlation function of the Sebalog Corr sensors, the leak was able to be measured and located with precision.

Project
200 days of increased water consumption of 20.4 m³/day
850 l/h (that corresponds to a water loss of 4,080 m³ in this period)

Quantity
8 Sebalog N-3 units, 3 Sebalog Corr units

Time period
2013 – brief use

Customer
Public utility company Wächtersbach
**Water tank level monitoring**

**Sebalog Dx**  
**Level, flow & pressure monitoring**

**Description**

Using a Sebalog Dx data logger allows you to always remain informed about exactly what is going on in your supply network. You can record pressure and flow on up to 4 channels simultaneously, and send the data conveniently and reliably as daily updates to the control centre by GPRS.

Thanks to its small size and robust housing, the Sebalog Dx can be used even under the most adverse conditions. The internal battery, which can supply the logger with power for 5 years under standard conditions, and its extremely large memory for over 1 million measurements give you all the freedom you need for your specific application.

Almost all configuration of the Sebalog Dx settings can be re-programmed remotely. The logger receives the new configuration automatically during communication with GSM, making it unnecessary (to spend time and resources) to re-program the logger on site. In the event of an alarm a trigger causes the logger to temporarily transmit online data via GSM, allowing you to see what happened following the alarm event.

**Project**

Remote monitoring of level, flow and pressure. Commenced April 2013, with planned expansion across the water district.

**Quantity**

Two sets with two channel analog input and built-in pressure logging

**Customer**

Placer Water District, Mindanao, Philippines
"Our goal is to get water losses permanently under control!"

Klaus Babilon, construction yard manager, community of Mömlingen

Sebalog N-3 Network
Noise level and frequency logger with remote reading and correlation

Description
The community of Mömlingen needs to reduce the high costs of commissioning the tracing of leaks in the drinking water network. The duration of the leaks must also be minimised because preparing drinking water is an expensive process.

With this in mind, a network of 25 Sebalog N-3 loggers was installed at the beginning of March 2013 for trial. After running for 7 weeks and a sudden increase in night-time consumption by 120 m³/day for a total pumped quantity of 480 m³, two leakages could be detected directly using the remote reading. The correlation function of the network was even able to identify the faulty house connection. It only took 7 days, from the time the leaks began until they were repaired. With the knowledge gathered on how modern leak monitoring can function today, the system was extended to 100 permanently installed network loggers.

Project
Early detection of leakages arising in the drinking water network through automated monitoring

Quantity
100 loggers installed (therefore covering 3/4 of the complete network)
Objective: Complete coverage in 2014

Time period
March 2013 - Present

Customer
Mömlingen community, Miltenberg district (Lower Franconia)
Excellent work of the leak detection specialists in Dubai

Correlux P-2 and HL 5000
Correlator and ground microphone for pinpointing leaks

Description
The leak detection team in Dubai have become experts at detecting leaks with SebaKMT equipment. Leaks that are very close to each other are often hard to identify. But using the SebaKMT Correlux P-2 correlator they were able to locate two leaks neighbouring each other. The following excavation work showed how accurately they had pinpointed both leaks.

The correlator Correlux P-2 is used for leak location on pipes for portable water. Water escaping from a leak under pressure creates a noise which travels into both directions of the pipe. This noise is recorded by two sensors attached to the pipe (valves, hydrants), amplified and transmitted to the correlator. The Correlux P-2 compares both signals (correlation) and calculates the exact distance to the leak by use of the signal delay, the sensor distance and the sound velocity.

With the Hydrolux equipment HL 5000 you can find leaks particularly quickly, easily and reliably. The equipment uses modern digital signal processing technology to clearly recognise the leak sound, even when there is a lot of noise in the environment.

Project
Leak detection and repair work throughout the city of Dubai

Quantity
Complete set of leak detection instruments (correlators, ground microphones, noise loggers etc.)

Period
2012 - ongoing
Singapore’s PUB chooses the world leader in fixed network correlating

Sebalog N-3
Correlating network noise loggers

Description

After extensive field testing PUB has decided to purchase noise loggers, repeaters and GSM boxes from SebaKMT for 40 separate fixed networks that will be installed throughout Singapore.

Although chamber covers of several centimeter thickness were encountered the powerful Sebalog N3 noise loggers with external antenna were able to transmit measurement data and audio recordings to the repeater network without any problems. A simulated leak during the test installation was perfectly pinpointed using the web-based correlation software of SebaKMT.

The main advantages of the Sebalog N-3 fixed network are:

» Remote leak monitoring and pinpointing
» Transmission of acoustic recordings for correlation
» Advanced web-based evaluation software
» Adaptable to existing SCADA systems
» Cascading repeater functionality
» Interactive pipe mapping tool

Project

Web-based leak monitoring and pinpointing

Quantity

40 separate networks

Time period

Starting 2013

Customer

PUB, Singapore