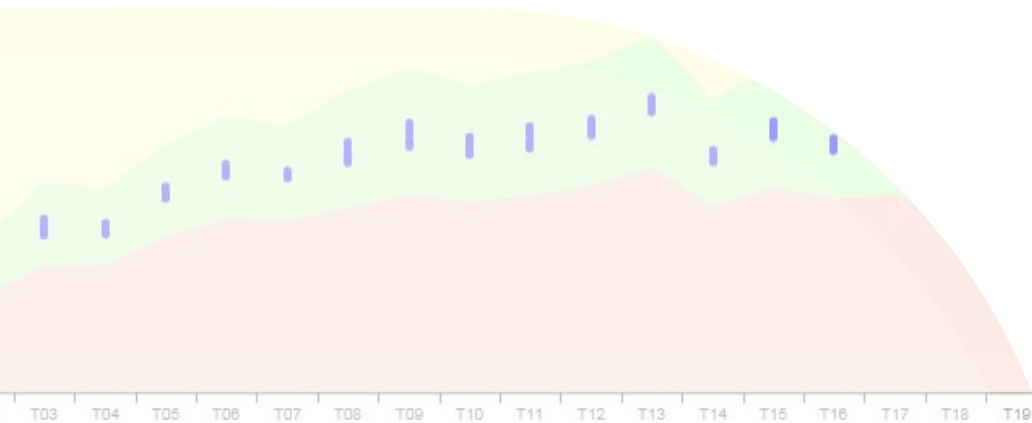


STRAY CURRENT MONITORING SYSTEMS

STELLA-SCMS



Limit Below	Above	Limit Above	In range
5 %	0.00 % (0)	5 %	100.00 % (48)
5 %	0.00 % (0)	5 %	100.00 % (48)
5 %	0.00 % (0)	5 %	100.00 % (48)
5 %	0.00 % (0)	5 %	100.00 % (48)
5 %	0.00 % (0)	5 %	100.00 % (48)



STELLA

PROTECTION & SUPERVISION



Sécheron has been developing and manufacturing safety devices for DC traction systems for the railway industry for decades. We have drawn upon our extensive experience with DC traction systems and the related industry standards to develop our STELLA product range.

All STELLA products, including control and protection devices (SEPCOS range), control and supervision (KEOPS), stray current monitoring system (SCMS) and for the help of operation and predictive maintenance (IOMS), are designed based on our strong experience in the field and customer feedback to answer the railway requirement and simplify our customer's follow up of their traction power substations.

STELLA products are designed with the latest technology, with the modular design allowing the customer needs to be met even on the most complex of projects.

GENERAL INFORMATION

The operation of DC traction systems requires suitable stray current protection to prevent corrosion caused by stray currents on railway and non-railway installations.

In this scope, the European standard EN-50122-2 (Annex B) recommends a continuous supervision of the rail insulation.

Sécheron Stray Current Monitoring System (SCMS) is a straightforward and efficient method to monitor the stray current protection system. It avoids manual repetitive measurement and doesn't interfere with the stray current collecting system. The SCMS gives a quick information for a better reactive maintenance.

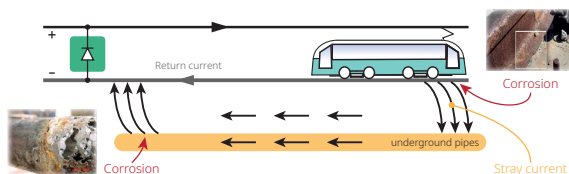
The system measures continuously the rail-to-earth potential under operational conditions, complete with central analysis, visualization, signalling and archiving capacities.

MAIN BENEFITS

- ✓ Real-time measurements
- ✓ Alarm and localization of the detected insulation fault
- ✓ Data acquisition and transmission through the communication network
- ✓ Permanent automatic analysis of recorded values and manual analysis possible
- ✓ Set up of network lines and stations, up to 100 control points
- ✓ Determination on data reference
- ✓ Export and backup of measured and recorded values
- ✓ Communication with SCADA system
- ✓ No interference with Stray Current Collecting System
- ✓ Safe and reliable

PRINCIPLE OF SCMS

Stray current definition



The stray currents are defined as the currents that have deviated from their intended paths. Any metallic structure buried in soil, for example a pipe line, represents a low resistance current path and is therefore fundamentally vulnerable to the effects of stray currents.

1 ampere of stray current can oxidize 9.11 kilograms of iron per year.

Principle of SCMS in floating case

As the return is floating, the potential between earth and rails fluctuates.

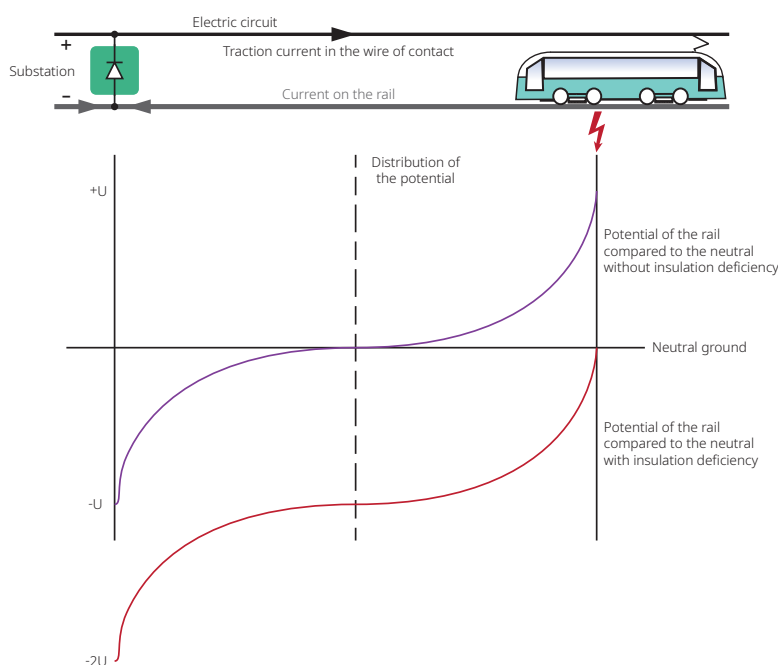
A healthy system presents a specific voltage profile called "reference" or "imprint".

A deficiency of insulation between the rail and the earth will modify this voltage distribution.

The track potential can be used to ensure the health of the insulation and determine a modification in behaviour of the stray current by comparison with the reference curves.

The SCMS is based on a rail potential measure as recommended by the European standard EN-50122-2 (Annex B).

The SCMS can adapt to either an existing or a new network.



STANDARDS

Voltage monitoring:

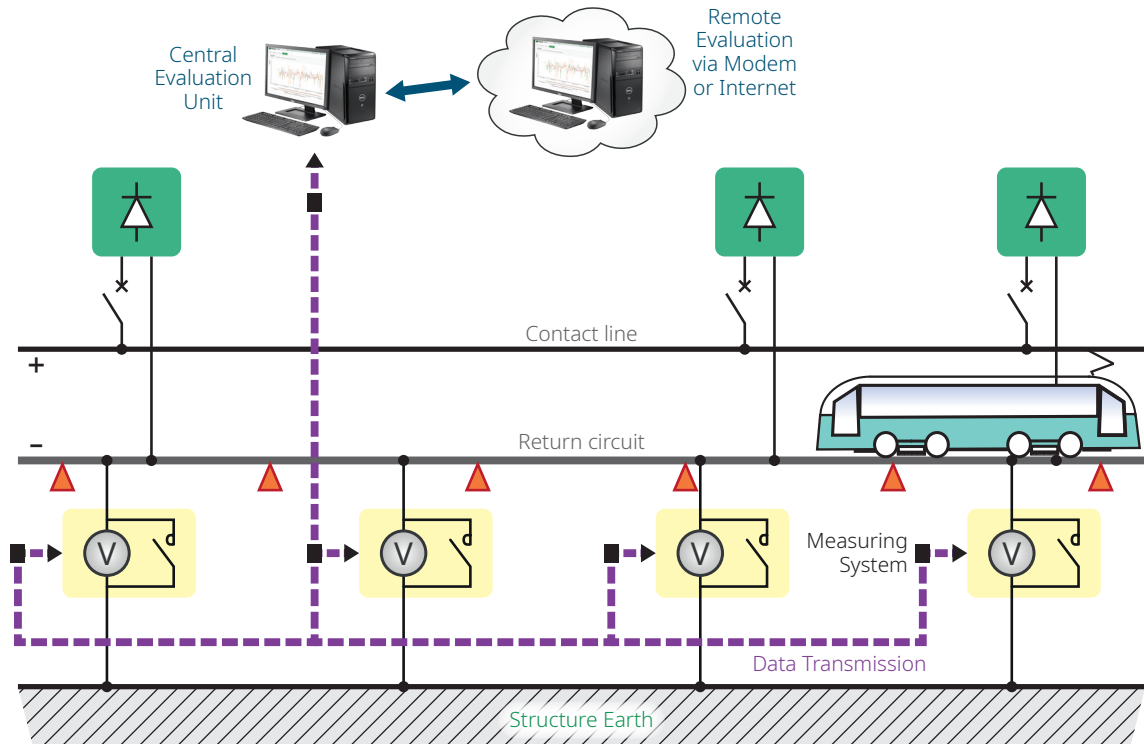
- **EN 50122-2 (Annex B)** | Railway applications – Fixed installations – Electrical safety, earthing and the return circuit – Part 2: Provisions against the effects of stray currents caused by DC traction systems

Data exchange with VLD and SCADA:

- **IEC 61850** | Communication networks and systems for power utility automation
- **IEC 60870-5-104** | Telecontrol equipment and systems – Part 5-104: Transmission protocols – Network access for IEC 60870-5-101 using standard transport profiles



ARCHITECTURE

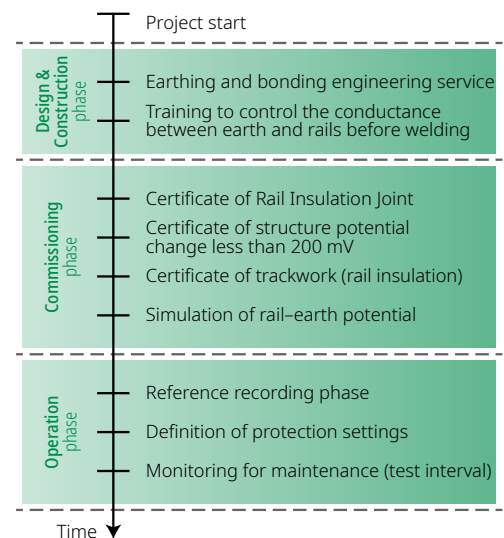
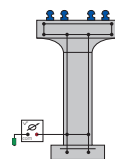


EXPERTISE

Before the recording of the reference data, Sécheron can provide the service of its earthing and bonding experts for the certification of the track.

This expertise allows to check if the installation meets the characteristics defined in the European standard EN 50122-2:

- Rail resistance measure
- Conductance per length between running rails and structures
- Insulating rail joints certification
- Stray current interference of reinforced concrete structures
- Assistance with reference data recording
- Stray current emission
- Expertise and recommendation
- Training of personal
- Parameterization support



The variation of the structure potential can be considered as null and so compliant with the requirement of EN 50122-2 standard < 200 mV.

HARDWARE

DATA COLLECTION

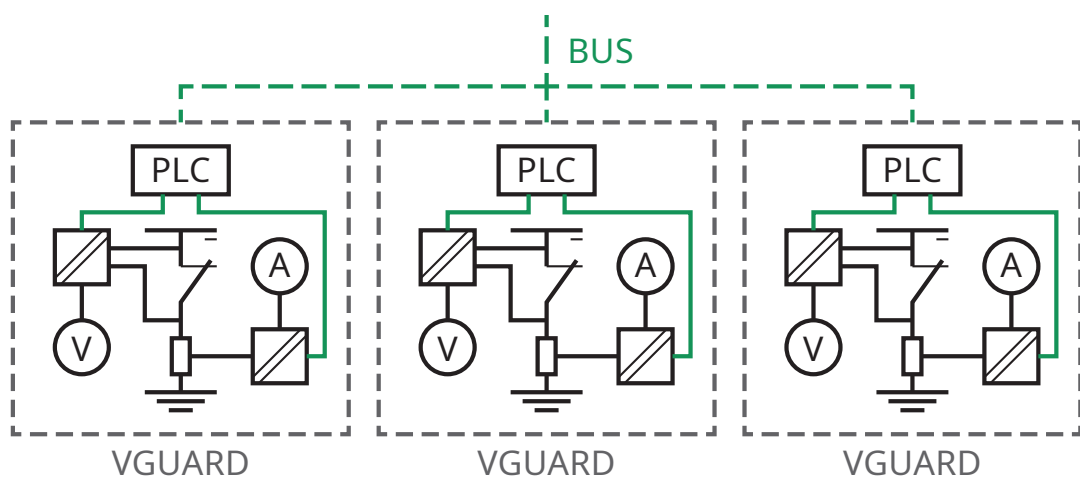
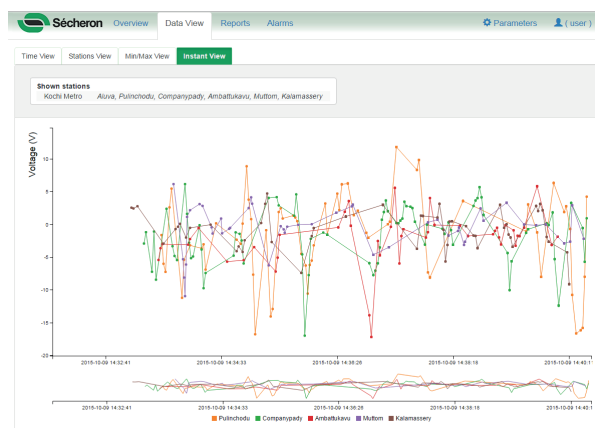
Data collection from VGUARD

Already compatible with the SCMS, the VGUARD collects measurement along the line and transmits data via possible communication protocols:

- Voltage between the return circuit and the earth structure through a high accuracy sensor
- Potential current flowing in the VGUARD through a high accuracy sensor
- VGUARD status



STRAY CURRENT MONITORING SYSTEM



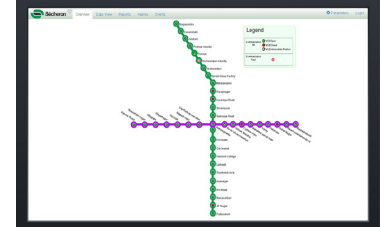
Additional data collection

The accuracy of the system can be increased by installing additional measuring devices provided by Sécheron along the line. Integration can be done either by Sécheron or by the user himself.

SOFTWARE

/// Data analysis - Central Evaluation Unit (CEU)

Functions of the SCMS are performed at the CEU. The CEU includes an interface program to plot the real-time data being captured by the SCMS, as well as the data stored in the database. It realizes permanent automatic analysis of recorded values and an alarm is displayed in case stray current increases. This interface program also allows the user to visualize the data in different ways, export the plotted data, perform various manual analysis of stored data, parameter the SCMS and see the fault localization.



The CEU is designed to store all instantaneous values for 10 years. Stored data at the CEU is safely kept in a redundant RAID-1 hard drive system. The data can be exported to text files.

Alternatively the CEU software can be installed on an appropriate server or virtual machine provided and managed by the customer.

The CEU communicates with the network and the SCADA system through different types of communication protocols: IEC 61850, IEC 60870-5-104, Modbus-TCP, DNP 3.0 with flexible connectivity (copper cable or optical fiber).

/// Alarm and event management

Measure	
Maximum number of measuring points	100 for one system
Frequency of acquisition	1 sec
Communication	
Communication protocols	IEC 61850 IEC 60870-5-104 Modbus-TCP
Vizualization and archiving	
Data storage capacity	Circular buffer to hold 10 years of 1 sample per second data for all measuring points
Main functionalities	Average, Absolute Average, Only Positive Average. In function of time or position Average window from 1 minutes to 30 days

/// Analysis

- Automatic daily analysis
- Analysis of stations voltages during off-peak and peak hours
- EN 50122-2 Ure calculation (based on measuring points)
- Manual analysis
- Automatic generation of alarms to SCADA
- Help of baseline definition



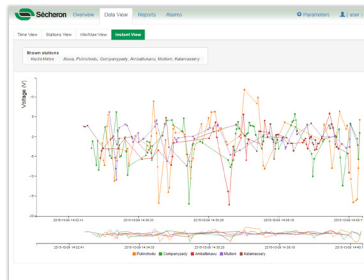
Examples of detection

Examples of interface screens

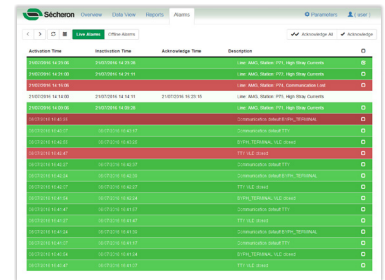
At the end of each day, the software generates automatically an analysis file of data recorded during the day and saves it as CSV file. The analysis window allows to access the history files and to generate a PDF report.



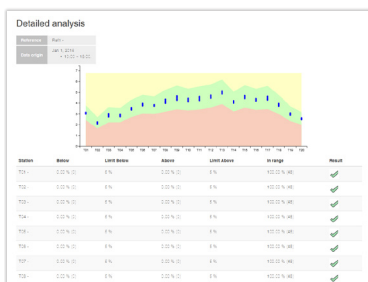
Overview of the line



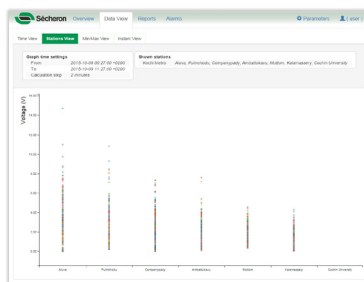
Instantaneous view



Live alarms list

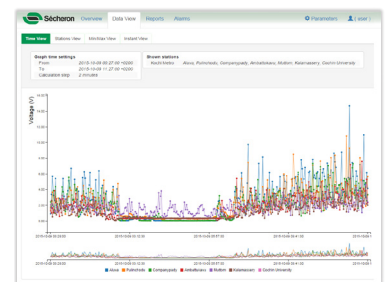


Reports



Stations view

Typical values of the line potential during operation are displayed (digital imprint). This screen also allows to reference the localization of the insulation deficiency



Time view

Short-term and long-term values are displayed. The short-term values allow the analysis of insulation deficiency. The long-term values allow the analysis of tendency.

RELATED PRODUCTS

VGUARD VOLTAGE LIMITING DEVICES

Refer to **Brochure VGUARD** · SG825867BEN



SEPCOS CONTROL & PROTECTION RELAYS

Refer to **Brochure SEPCOS** · SG825866BEN



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