The Sitras® SMS stray current monitoring system is used to monitor the track potential of DC railway networks.

This system permits evaluation of the stray current conditions of the track and the early detection of insulation deficiencies, thus enabling measures to be taken to prevent damage due to stray current corrosion.

**Features**

- Continuous monitoring of track potentials during operation
- Automatic location of insulation deficiencies
- Representation, archiving and analysis of track potentials in a central evaluation unit
- Transmission of measured values via the communication network, existing networks can be used
- No interference with stray current conditions because Sitras SMS is based on potential measurement
Design

Main components

The Sitras SMS stray current monitoring system consists of the following main components:

• Measuring sensors along the track (located about every 1 to 3 km)
• Communication network
• Central evaluation unit (PC with communication interface and Simatic WinCC® software), such as located in the operations control centre

Measured value acquisition

Sitras SMS collects information about the voltages between return line L- and earth (structure earth) at several measuring points along the tracks to be monitored during railway operations. The measured values are represented and evaluated in order to locate any insulation deficiencies.

Communication

The measured values are transmitted from the sensors to the central evaluation unit via a communication network, by SCADA for example. Existing networks can be used.

Basic Design

Remote evaluation via modem or Internet (VPN)

Central evaluation unit

Substation

Contact line L+

Return line, track L-

Sensors with communication network

Earth, structure earth

Sstras SMS basic design
**Function**

The central evaluation unit with the basic software Simatic WinCC performs the following functions:

- **Data acquisition**
- **Archiving** with multi-level data compression:
  - Representation of the track potentials at all measuring points
  - Instantaneous values as a time characteristic
  - Average values and averages of the absolute value as short-term and long-term averages
  - Representation of average values as a time characteristic or at a line location
- **Location** of insulation deficiencies:
  - Reference value recording
  - Automatic analysis

To locate insulation deficiencies, Sitras SMS compares the current measured values with previously recorded reference values (“fingerprint”). If the track potentials exceed the tolerance range with respect to certain criteria, a message will be generated. The location of the suspected insulation deficiencies can be pinpointed by means of integrated analysis functions.
Technical data

Data acquisition

<table>
<thead>
<tr>
<th>Via communication network and Simatic® NET® interface module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum number of measuring points</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>Maximum number of lines</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>Communication protocols</td>
</tr>
<tr>
<td>Industrial Ethernet, TCP/IP, MPI, PROFIBUS DP / FMS / S7</td>
</tr>
</tbody>
</table>

Representation and archiving

<table>
<thead>
<tr>
<th>Instantaneous values</th>
<th>time characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archiving of instantaneous values</td>
<td>last 52 weeks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Short-term values:</th>
<th>time characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average values / averages of the absolute value</td>
<td>characteristic along the line</td>
</tr>
<tr>
<td>Width of average value window</td>
<td>1...60 minutes</td>
</tr>
<tr>
<td>Archiving of average values / averages of the absolute value</td>
<td>min. 10 years**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Long-term values:</th>
<th>time characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average values / averages of the absolute value</td>
<td>characteristic along the line</td>
</tr>
<tr>
<td>Width of average value window</td>
<td>1...7 days</td>
</tr>
<tr>
<td>Archiving of average values / averages of the absolute value</td>
<td>min. 10 years**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dialog languages</th>
<th>German / English / Spanish / Turkey*</th>
</tr>
</thead>
</table>

Analysis of rail potentials (localization of insulation deficiencies)

<table>
<thead>
<tr>
<th>Reference value and automatic analysis</th>
<th>during operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width of average value window</td>
<td>2...60 minutes</td>
</tr>
<tr>
<td>Daily recording period</td>
<td>parameterizable</td>
</tr>
<tr>
<td>Maximum number of reference value records</td>
<td>10</td>
</tr>
</tbody>
</table>

* other values on request
** depending on size of hard disk

References

Since market introduction in 2002, our system solutions are in use worldwide, e.g.
- TriMet Portland, USA
- VAG Nuremberg, Germany
- BTS Sukhumvit Ext., Thailand

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